UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

JUL 28 2016

**Memorandum For:** Trevor Spradlin
Acting Chief, Marine Mammal and Sea Turtle Conservation Division

**From:** Cathryn E. Tortorici
Chief, Endangered Species Act Interagency Cooperation Division

**Subject:** Reinitiation of the Biological Opinion on the Endangered Species Act Section 10(a)(1)(A) Permit by Regulation to Authorize Response to Stranded Endangered Sea Turtles in the Marine Environment Permit to the National Marine Fisheries Service's Office of Protected Resources, Marine Mammal and Sea Turtle Conservation Division

Enclosed is the National Marine Fisheries Service's (NMFS) biological opinion, issued under the authority of section 7(a)(2) of the Endangered Species Act of 1973, as amended (ESA), regarding the effects of the NMFS Marine Mammal and Sea Turtle Conservation Division's Section 10(a)(1)(A) Permit by Regulation to authorize response to stranded endangered sea turtles in the marine environment. In this opinion, NMFS concludes that the operation of the Sea Turtle Stranding and Salvage Network, including actions to aid stranded turtles, and salvage and dispose of dead carcasses, is not likely to jeopardize the continued existence or recovery of green, hawksbill, Kemp's ridley, leatherback, loggerhead, or olive ridley sea turtles and is not likely to destroy or adversely modify designated critical habitat. No incidental take of non-targeted ESA-listed species is anticipated or authorized.

The attached biological opinion contains no conservation recommendations for the issuance of the Permit by Regulation.

This concludes formal consultation on this action. Consultation on this issue must be reinitiated if: (1) the amount or extent of allowable take is exceeded for the identified action; (2) new information reveals effects of this action that may affect listed species or critical habitat 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 the listed species 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.

If you have any questions regarding this biological opinion, please contact me or Ron Dean at (301) 427-8445.

# NATIONAL MARINE FISHERIES SERVICE
# ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
# BIOLOGICAL OPINION

**Action Agency:** National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Marine Mammal and Sea Turtle Conservation Division

**Activity Considered:** Reinitiation of Endangered Species Act Section 7 Consultation on the Endangered Species Act Section 10(a)(1)(A) Permit by Regulation to Authorize Response to Stranded Endangered Sea Turtles in the Marine Environment

**Consultation Conducted By:** Endangered Species Act Interagency Cooperation Division, Office of Protected Resources, National Marine Fisheries Service

**Approved:**

Donna S. Wieting
Director, Office of Protected Resources

**Date:** 7/27/16

**Public Consultation Tracking System (PCTS) number:** FPR-2016-9168

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| DNA | Deoxyribonucleic Acid |
| DPS | Distinct Population Segment |
| DWH | Deepwater Horizon |
| ESA | Endangered Species Act of 1973 |
| IUCN | International Union for Conservation of Nature |
| NOAA | National Oceanic and Atmospheric Administration |
| NMFS | National Marine Fisheries Service |
| PIT | Passive Integrated Transponder |
| STDN | Sea Turtle Disentanglement Network |
| STSSN | Sea Turtle Stranding and Salvage Network |
| USFWS | United States Fish and Wildlife Service |

# 1 INTRODUCTION

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of any critical habitat of such species.[1] To fulfill this obligation, section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any action they propose that "may affect" ESA-listed species or designated critical habitat. The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

A federal action agency requests section 7 consultation when it determines that a proposed action "may affect" ESA-listed species or designated critical habitat. Consultations on most ESA-listed marine species and their designated critical habitat are conducted between the action agency and NMFS. The consultation is concluded after NMFS concurs with an action agency that its action is not likely to adversely affect an ESA-listed species or designated critical habitat, or issues a biological opinion that identifies whether a proposed action is likely to jeopardize the continued existence of an ESA-listed species, or destroy or adversely modify its designated critical habitat. If either of those circumstances is expected, the biological opinion identifies a reasonable and prudent alternative to the action as proposed, if any, that can avoid jeopardizing ESA-listed species or resulting in the destruction or adverse modification of designated critical habitat.

This document represents NMFS' reinitiated biological opinion on 50 CFR Part 222.301: "Sea Turtle Conservation; Exceptions to Taking Prohibitions for Endangered Sea Turtles." This rule is a programmatic permit by regulation pursuant to ESA section 10(a)(1)(A) to authorize any agent or employee of NMFS, USFWS, the U.S. Coast Guard, or any other Federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife who is designated by his or her agency for such purposes, when acting in the course of his or her official duties, to take endangered sea turtles if such taking is necessary to aid a sick, injured, entangled or stranded endangered sea turtle or dispose of such specimen or salvage such specimen which may be useful for scientific and educational purposes.

The Sea Turtle Stranding and Salvage Network (STSSN) currently responds to, and documents, sick, injured and dead sea turtles that are found in coastal areas under U.S. jurisdiction. The biological opinion covers activities conducted in territorial and exclusive economic zone waters of the U.S. and their effects on ESA-listed green, hawksbill, Kemp's ridley, leatherback, loggerhead or olive ridley sea turtles in the marine environment in accordance with section 7(a)(2) of the ESA.

This biological opinion has been prepared in accordance with section 7 of the ESA, associated

[1] For this biological opinion, when we refer to threatened or endangered species under NMFS' jurisdiction and any critical habitat that has been designated for those species, we mean all species and designated critical habitat that have been listed, and all species and designated critical habitat that have been proposed to be listed under the ESA.

implementing regulations, and agency policy and guidance (50 CFR 402). It is based on information provided by participants in the sea turtle stranding and salvage networks, published and unpublished scientific information on the biology and ecology of endangered sea turtles within the action area, and other sources of information. A complete administrative record is on file with NMFS's Office of Protected Resources, Marine Mammal and Turtle Conservation Division, Silver Spring, Maryland.

# 2 Background

The STSSN was established in the southeastern U.S. and U.S. Gulf of Mexico in 1980, Hawaii in 1982, and the NMFS Southwest Region California Marine Mammal Stranding Network in 1983 in response to sea turtles washing up on beaches or floating in the water, dead or in need of assistance. The STSSN was established to better understand the threats sea turtles face in the marine environment; to provide aid to stranded sea turtles; and to salvage dead sea turtles that may be useful for scientific and educational purposes. Actions taken by the STSSN improve the survivability of sick, injured, and entangled turtles, while also helping scientists and managers to expand their knowledge about diseases and other threats that affect in coastal areas under U.S. jurisdiction.

NMFS and USFWS share federal jurisdiction for the conservation and recovery of sea turtles. In accordance with the 1977 Memorandum of Understanding between NMFS and USFWS, which was reaffirmed in 2015 (NMFS and USFWS 2015b), USFWS has lead responsibility on the nesting beaches and NMFS has lead responsibility in the marine environment. Sea turtle stranding response and rehabilitation has traditionally operated with a shared jurisdictional responsibility between the two agencies. NMFS has the primary coordination role to ensure that data are collected in a manner sufficient for management, monitoring and research purposes and to facilitate their use to meet recovery objectives.

Both NMFS and USFWS have promulgated regulations that provide an exception to the prohibitions on take and allow for response to stranded sea turtles in water and on land, based on their specific jurisdictional responsibility. This consultation is a reinitiation of consultation on the NMFS regulation found at 50 CFR Part 222.301: "Sea Turtle Conservation; Exceptions to Taking Prohibitions for Endangered Sea Turtles."

# 3 Consultation History

The initial consultation for the ESA Section 10(a)(1)(A) Permit by Regulation to Authorize Response to Stranded Endangered Sea Turtles in the Marine Environment was completed on July 12, 2005. The biological opinion from that consultation concluded that the proposed activities were not likely to jeopardize the continued existence of any ESA-listed endangered sea turtle species and that takes pursuant to the proposed action would be beneficial to individual animals that would be disentangled from gear or debris and treated and released. The biological opinion noted that there might be some physiological effects from handling, tagging, measuring and weighing, but NMFS believed that those activities would have relatively low level, short-term physiological effects on individual animals and would not result in any population or species level effects.

*Cause for Reinitiation and Present Consultation*

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 ESA-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 ESA-listed species or critical habitat that was not considered in the biological opinion; or 4) a new species is ESA-listed or critical habitat designated that may be affected by the identified action.

New species have been ESA-listed that may be affected by the identified action. NMFS and USFWS published a final rule designating nine Distinct Population Segments (DPSs) of loggerhead sea turtles on July 10, 2014 (76 FR 58868). The DPSs established by this rule includes: 1) Northwest Atlantic Ocean (threatened); 2) Northeast Atlantic Ocean (endangered); 3) South Atlantic Ocean (threatened); 4) Mediterranean Sea (endangered); 5) North Pacific Ocean (endangered); 6) South Pacific Ocean (endangered); 7) North Indian Ocean (endangered); 8) Southeast Indo-Pacific Ocean (endangered); and 9) Southwest Indian Ocean (threatened).

In addition, on April 6, 2016, NMFS published a final rule (81 FR 20057) listing 11 DPSs of green sea turtle. This includes eight DPSs listed as threatened (Central North Pacific, East Indian-West Pacific, East Pacific, North Atlantic, North Indian, South Atlantic, Southwest Indian and Southwest Pacific) and three as endangered (Central South Pacific, Central West Pacific and Mediterranean).

The following DPSs are listed as threatened: 1) Central North Pacific; 2) East Indian-West Pacific; 3) East Pacific; 4) North Atlantic; 5) North Indian; 6) South Atlantic; 7) Southwest Indian DPS; and 8) Southwest Pacific. The following three DPSs are listed as endangered: 1) Central South Pacific; 2) Central West Pacific; and 3) Mediterranean.

In addition, there have been various enhancement actions of the STSSN program since its inception. For example, there is a suite[2] of projects for implementation in Phase IV of Deep Water Horizon (DWH) Early Restoration. These projects include improving the infrastructure of the STSSN in the U.S. Gulf of Mexico in all five U. S. Gulf of Mexico states. The actions are geared at improving response capabilities to quickly respond to injured sea turtles and recover dead sea turtles; enhance coordination; enhance data handling and reporting; and streamline data dissemination for use in conservation management programs. The intent of the enhanced STSSN is to provide a more rapid response to unusual stranding events than was previously possible with the resources available, allowing mortality sources to be identified and addressed and solutions to be implemented where possible.

[2] See: http://www.gulfspillrestoration.noaa.gov/restoration/early-restoration/ for more information.

# 4 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

The proposed action for this consultation is the operation of the STSSN nationwide and, specifically, the response to stranded sea turtles in the marine environment. The STSSN is organized through a structure that consists of Atlantic, west Pacific, and east Pacific coordinators, and there is a coordinator for each state. The network consists of trained volunteers, municipal, state and federal employees and their designated agents who operate under the direction of the state and national coordinators. Each state oversees and is responsible for collecting data under their STSSN program, except for California where NMFS oversees and collects the data. Although the STSSN has historically responded to entangled turtles in the marine environment, in response to the high number of leatherbacks found entangled in fishing gear (primarily pot gear) along the U.S. northeast Atlantic coast, NMFS established the Northeast Atlantic Coast Sea Turtle Disentanglement Network (STDN) in 2002. The STDN is considered a component of the larger STSSN program, and the NMFS Greater Atlantic Regional Office oversees and is responsible for collecting entanglement data under the STDN program.

The proposed activities are limited to direct takes of sea turtles while responding to incidents that have occurred because of human activity or natural causes of illness, injury or mortality. Actions authorized under the STSSN do not include incidental takes.

## 4.1 Turtle Stranding Events

The types of events that render turtles in need of aid in the marine environment are varied and include cold stunning; disease and health related issues; entanglement in and impingement on active or abandoned commercial and recreational fishing gear; ingestion of pollutants or marine debris; and vessel strikes and other traumatic injuries, including shark attacks. Typically, these events are reported through a NMFS-dedicated phone line or through the state's STSSN phone line for reporting sick, injured, entangled or stranded wildlife. Alternately, STSSN responders may encounter turtles in the water when acting in the course of their official duties. On rare occasions, a member of the public reports a sick, injured or entangled sea turtle, and an immediate response is necessary to prevent further injury or death to the turtle. In these events, NMFS grants authority and gives specific instructions to the person at the scene to safely and properly aid the sea turtle.

When a turtle is encountered in the water, the STSSN responder determines whether the turtle is alive. The response protocol is based upon this first determination. Activities on live animals will be short in duration (maximum 10 minutes). Animals will be lifted into the boat manually or with small dip-nets. No large nets or gear (e.g., trawling gear) would be used. For live turtles, the treatment is based upon the circumstances surrounding the event. For example, when sea temperatures drop below a certain level, sea turtles become lethargic or comatose, a condition known as cold stunning. For these cold stun cases, the most immediate response is to remove the turtle from the water, apply a moisture emollient around its nostrils and eyes to prevent the membranes from drying out, provide a cover for the animal and transport it to a rehabilitation facility for veterinary care. For entanglement events, removal from the water is not always the best response and can result in further injury. The STSSN responder assesses the amount and type of gear that is involved and examines where and how the turtle is entangled in the gear.

#### 4.1.1 Transporting, Measuring, Photographing, Weighing and Tagging

The STSSN responder looks for injuries associated with the entanglement and observes the turtle's behavior (e.g., lethargic, energetic). Based on the examination and assessment, the STSSN responder attempts to remove any gear that can be removed without further injury to the turtle. If the animal can be brought on board a vessel without further injury, the STSSN responder attempts to remove all external gear and treat the turtle for any associated injuries. If injuries are severe, and it is logistically possible (due to their size and weight leatherbacks present unique challenges), the turtle is transported to shore for transfer to a rehabilitation facility for veterinary care.

Although not a required element of the proposed action, for dead specimens found in the marine environment, STSSN responders may either document and mark the carcass and leave it where found or salvage the specimen for further examination or for scientific or educational purposes.[3]

*Transporting*

Turtles transported to a facility and held (e.g., for rehabilitation) must be maintained and cared for under the "Care and Maintenance Guidelines for Sea Turtles Held in Captivity" issued by the USFWS. During transport, the turtle must be shaded and kept damp or moist but under no circumstance be placed into a container holding water or placed in an area where the turtle may accidentally ingest material. For live turtles that are not injured but need resuscitation, procedures specified in 50 CFR 223.206(d)(1) are followed.

*Photographing, Measuring, Weighing and Tagging*

Animals will be lifted into the boat manually or with small dip-nets. No large nets or gear (e.g. trawling gear) would be used. Depending on availability of equipment, some proportion of the animals will be measured, flipper and Passive Integrated Transponder (PIT) tagged, weighed, and photographed. Morphometric data will be collected using forestry calipers and a flexible tape. Measurements will include straight standard carapace length, straight minimum carapace length, straight maximum carapace width, straight midline plastron length, curved standard carapace length, and curved maximum carapace width and head width. Inconel tags will be applied to the trailing edge of each front flipper and a PIT tag will be subcutaneously applied to the right front flipper. Before insertion of any tags, all flippers will be scanned for the presence of any pre-existing PIT tags. Turtles may also be weighed and photographed.

### 4.2 Regulations Applicable to Sea Turtle Stranding, Salvage and Emergency Response

In 2005, NMFS published the final rule under 50 CFR Part 222.301: "Sea Turtle Conservation; Exceptions to Taking Prohibitions for Endangered Sea Turtles." This rule is a programmatic permit by regulation pursuant to ESA section 10(a)(1)(A) to authorize any agent or employee of NMFS, USFWS, the U.S. Coast Guard, or any other federal land or water management agency,

[3] NMFS has determined that salvage activities for examination or for educational purposes will, at worst, have no effect on populations or species or, at best, will result in a beneficial benefit by increasing knowledge and public education about sea turtle biology. Salvage will also have no effect to the individual dead turtle. Thus, salvage activities are not analyzed in the Effects section of this biological opinion.

or any agent or employee of a state agency responsible for fish and wildlife who is designated by his or her agency for such purposes, when acting in the course of his or her official duties, to take endangered sea turtles if such taking is necessary to aid a sick, injured, entangled or stranded endangered sea turtle or dispose of such specimen or salvage such specimen which may be useful for scientific and educational purposes.

Additionally, 50 CFR Part 223.206(b) provides an exception to the prohibitions on take of threatened sea turtles. The regulation states that: "If any member of any threatened species of sea turtle is found injured, dead, or stranded, any agent or employee of the National Marine Fisheries Service, the Fish and Wildlife Service, the U.S. Coast Guard, or any other federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife who is designated by his or her agency for such purposes, may, when acting in the course of his or her official duties, take such specimens without a permit if such taking is necessary to aid a sick, injured, or stranded specimen or dispose of a dead specimen or salvage a dead specimen which may be useful for scientific study."

The regulations authorize an unspecified annual take because there is no method for projecting or anticipating how many turtles may need to be responded to in any one area or region. USFWS also codified regulations authorizing USFWS and NMFS personnel to respond to strandings on land (50 CFR 17.21 and 17.31).

### 4.3 Action Area

The Action Area means all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The Action Area includes the territorial and economic exclusive zone waters of the U.S. and its territories. All activities will occur in coastal areas in the marine environment.

### 4.4 Interrelated and Interdependent Activities

Interrelated actions are those that are part of a larger action and depend on that action for their justification. Interdependent actions are those that do not have independent use, apart from the action under consideration. NMFS determined that there are no interrelated and interdependent actions outside the scope of this consultation.

## 5 Overview of NMFS' Assessment Framework

Section 7(a)(2) of the ESA requires federal agencies, in consultation with NMFS, to insure that their actions either are not likely to jeopardize the continued existence of endangered or threatened species; or adversely modify or destroy their designated critical habitat.

"To jeopardize the continued existence of an ESA-listed species" means 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 an ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). The jeopardy analysis considers both survival and recovery of the species.

Section 7 assessment involves the following steps:

1) We identify the proposed action and those aspects (or stressors) of the proposed action that are likely to have direct or indirect effects on the physical, chemical, and biotic environment within the action area, including the spatial and temporal extent of those stressors.
2) We identify the ESA-listed species and designated critical habitat that are likely to co-occur with those stressors in space and time.
3) We describe the environmental baseline in the action area including: past and present impacts of federal, state, or private actions and other human activities in the action area; anticipated impacts of proposed federal projects that have already undergone formal or early section 7 consultation, impacts of state or private actions that are contemporaneous with the consultation in process.
4) We identify the number, age (or life stage), and gender of ESA-listed individuals that are likely to be exposed to the stressors and the populations or subpopulations to which those individuals belong. This is our exposure analysis.
5) We evaluate the available evidence to determine how those ESA-listed species are likely to respond given their probable exposure. This is our response analyses.
6) We assess the consequences of these responses to the individuals that have been exposed, the populations those individuals represent, and the species those populations comprise. This is our risk analysis.
7) The adverse modification analysis considers the impacts of the proposed action on the critical habitat features and conservation value of designated critical habitat.
8) We describe any cumulative effects of the proposed action in the action area.

   Cumulative effects, as defined in our implementing regulations (50 CFR §402.02), are the effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area. Future federal actions that are unrelated to the proposed action are not considered because they require separate section 7 consultation.
9) We integrate and synthesize the above factors by considering the effects of the action to the environmental baseline and the cumulative effects to determine whether the action could reasonably be expected to:
   a) Reduce appreciably the likelihood of both survival and recovery of the ESA-listed species in the wild by reducing its numbers, reproduction, or distribution; or
   b) Reduce the conservation value of designated or proposed critical habitat. These assessments are made in full consideration of the status of the species and critical habitat.
10) We state our conclusions regarding jeopardy and the destruction or adverse modification of critical habitat.

If, in completing the last step in the analysis, we determine that the action under consultation is likely to jeopardize the continued existence of ESA-listed species or destroy or adversely modify designated critical habitat, we must identify a reasonable and prudent alternative to the action. The reasonable and prudent alternative must not be likely to jeopardize the continued existence of ESA-listed species nor adversely modify their designated critical habitat and it must meet other regulatory requirements.

To comply with our obligation to use the best scientific and commercial data available, we conducted searches to identify information relevant to the potential stressors and responses of ESA listed species that may be affected by the proposed action to draw conclusions about the likely risks to the continued existence of these species and the conservation value of their critical habitat.

# 6 Status of Species and Critical Habitat

Species listed and proposed for listing under the ESA occurring within the action area that may be affected by the proposed action include marine mammals and sea turtles. Table 1 lists each species, listing status, and whether critical habitat has been designated. This does not include species that we do not expect will be affected by the action.

**Table 1. Species listed under the Endangered Species Act that may be affected by Sea Turtle Stranding and Salvage Network activities.**

| Species | ESA Status [1] | Critical Habitat | Recovery Plan |
|---|---|---|---|
| **Marine Mammals – Cetaceans** | | | |
| Blue Whale (*Balaenoptera musculus)* | E – 35 FR 18319 | -- -- | 07/1998 |
| Fin Whale (*Balaenoptera physalus)* | E – 35 FR 18319 | -- -- | 75 FR 47538 |
| Humpback Whale (*Megaptera novaeangliae*) | E – 35 FR 18319 and 80 FR 22304 (Proposed) | -- -- | 55 FR 29646 |
| North Atlantic Right Whale (*Eubalaena glacialis*) | E – 73 FR 12024 | 59 FR 28805 and 81 FR 4837 | 70 FR 32293 |
| North Pacific Right Whale (*Eubalaena japonica*) | E – 73 FR 12024 | 59 FR 28805 | 70 FR 32293 |
| Sei Whale (*Balaenoptera borealis*) | E – 35 FR 18319 | -- -- | 76 FR 43985 |
| Sperm Whale (*Physeter macrocephalus*) | E – 35 FR 18319 | -- -- | 75 FR 81584 |
| False Killer Whale, (*Pseudorca crassidens*) – Main Hawaiian Islands Insular DPS | E -- 77 FR 70915 | -- -- | -- -- |
| **Marine Mammals – Pinnipeds** | | | |
| Guadalupe Fur Seal, (*Arctocephalus townsendi*) | T – 50 FR 51252 | -- -- | -- -- |
| Hawaiian Monk Seal, (*Neomonachus schauinslandi*) | E – 41 FR 51611 | 80 FR 50925 and 53 FR 18988 | 72 FR 46966 |
| **Sea Turtles** | | | |
| Green Turtle, (*Chelonia mydas*) – North Atlantic DPS | T – 81 FR 20057 | 63 FR 46693 | 63 FR 28359 |

| Species | ESA Status [1] | Critical Habitat | Recovery Plan |
|---|---|---|---|
| Green Turtle, (*Chelonia mydas*) – East Pacific DPS | T – 81 FR 20057 | -- -- | -- -- |
| Green Turtle, (*Chelonia mydas*) – Central North Pacific DPS | T – 81 FR 20057 | -- -- | -- -- |
| Hawksbill Turtle (*Eretmochelys imbricata)* | E – 35 FR 8491 | 63 FR 46693 | 57 FR 38818 |
| Kemp's Ridley Turtle (*Lepidochelys kempii*) | E – 35 FR 18319 | -- -- | 75 FR 12496 |
| Leatherback Turtle (*Dermochelys coriacea*) | E – 61 FR 17 | 44 FR 17710 and 77 FR 4170 | 63 FR 28359 |
| Loggerhead Turtle, (*Caretta caretta*) – Northwest Atlantic Ocean DPS | T – 76 FR 58868 | 79 FR 39855 | 63 FR 28359 |
| Loggerhead Turtle, (*Caretta caretta*) – North Pacific Ocean DPS | E – 76 FR 58868 | -- -- | 63 FR 28359 |
| Olive Ridley Turtle (*Lepidochelys olivacea*) | T – 43 FR 32800 | -- -- | -- -- |

*[1] E = Endangered, T = Threatened, DPS = distinct population segment*

## 6.1 Species and Critical Habitat Not Likely to be Adversely Affected

NMFS uses two criteria to identify the ESA-listed species or critical habitat that are not likely to be adversely affected by the proposed action, as well as the effects of activities that are interrelated to or interdependent with the federal agency's proposed action. The first criterion is exposure, or some reasonable expectation of a co-occurrence, between one or more potential stressors associated with the proposed activities and ESA-listed species or designated critical habitat. If we conclude that an ESA-listed species or designated critical habitat is not likely to be exposed to the proposed activities, we must also conclude the species or critical habitat is not likely to be adversely affected by those activities.

The second criterion is the probability of a response given exposure. ESA-listed species or designated critical habitat that is exposed to a potential stressor but is likely to be unaffected by the exposure is also not likely to be adversely affected by the proposed action. We applied these criteria to the ESA-listed species in Table 1 and we summarize our results below.

An action warrants a "may affect, not likely to be adversely affected" finding when its effects are wholly beneficial, insignificant or discountable. Beneficial effects have an immediate positive effect without any adverse effects to the species or habitat. Beneficial effects are usually discussed when the project has a clear link to the ESA-listed species or its specific habitat needs and consultation is required because the species may be affected.

Insignificant effects relate to the size or severity of the impact and include those effects that are undetectable, not measurable, or so minor that they cannot be meaningfully evaluated. Insignificant is the appropriate effect conclusion when plausible effects are going to happen, but will not rise to constituting an adverse effect. That means the ESA-listed species may be expected to be affected, but not harmed or harassed.

Discountable effects are those that are extremely unlikely to occur. For an effect to be discountable, there must be a plausible adverse effect (i.e., a credible effect that could result from the action and that will be an adverse effect if it did impact a listed species), but it is very unlikely to occur.

After reviewing the proposed action, we have determined that the proposed action is not likely to adversely affect any ESA-listed marine mammals or any designated critical habitat. We summarize those findings below.

### 6.1.1 Marine Mammals

*Whales*

In the action area, whales are found predominantly in waters where STSSN activities would not occur. Sightings of sperm whales are almost exclusively in the continental shelf edge and continental slope areas. Sei and blue whales also typically occur in deeper waters (CETAP 1982; Waring et al. 2008; Waring et al. 2011). Fin whales are generally found along the 100-m isobath with sightings also spread over deeper water including canyons along the shelf break (Waring et al. 2008). Main Hawaiian Islands insular false killer whales, right whales and humpback whales are coastal animals and are occasionally sighted in the nearshore environment. NMFS has developed various guidelines and regulations[4] on approaching and viewing these animals to minimize adverse effects from interactions. However, because of the directed nature of the activities associated with the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment, any interactions are extremely unlikely to occur and are thus discountable. Therefore, we conclude that the STSSN is not likely to adversely affect the ESA-listed whales.

*North Atlantic Right Whale Designated Critical Habitat*

Five U.S. areas have been reported to be critical to the survival and recovery of North Atlantic right whales: 1) coastal Florida and Georgia; 2) the Great South Channel, which lies east of Cape Cod; 3) Cape Cod and Massachusetts Bays and have been designated by NMFS as critical habitat. In 2016, NMFS expanded North Atlantic right whale critical habitat to contain approximately 29,763 $nm^2$ of marine habitat in the Gulf of Maine and Georges Bank region and off the Southeast U.S. coast.

The availability of dense concentrations of zooplankton blooms in Cape Cod Bay in late winter and the Great South Channel in spring is described as the key factor for right whale utilization of these areas and serves as physical and biological features essential to the conservation of the species. Important habitat components in Cape Cod Bay include seasonal availability of dense zooplankton patches and protection from weather afforded by landmasses surrounding the bay. The spring current regime and bottom topography of the Great South Channel result in nutrient

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[4] See: http://www.nmfs.noaa.gov/pr/dontfeedorharass.htm

rich upwelling conditions. These conditions support the dense plankton and zooplankton blooms used by right whales. The combination of highly oxygenated water and dense zooplankton concentrations are optimal conditions for the small schooling fishes (sand lance, herring and mackerel) that prey upon some of the same zooplankton as right whales. Therefore, the abundance of these fishes, in turn, may affect and be affected by the distribution of several piscivorous marine mammal species such as humpback, fin, minke, and pilot whales, Atlantic whitesided dolphins, and harbor porpoise (CETAP 1982).

Because of the directed nature of the activities in responding to dead or injured sea turtles on the surface of the action area, there will be no measurable effects to zooplankton populations or the habitat features that support them in any designated critical habitat. Therefore, we conclude that the STSSN will not affect North Atlantic right whale designated critical habitat.

*Pinnipeds*

Because of the directed nature of the activities associated with the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment, any interactions with pinnipeds or any essential feature of any pinniped critical habitat are extremely unlikely to occur and are thus discountable. These species and any designated critical habitat are described below.

*Guadalupe Fur Seal*

Guadalupe fur seals are found on Guadalupe Island (Mexico) in the eastern Pacific Ocean off Mexico; a few individuals have been known to range as far north as Sonoma County, California, south to Los Islotes Islands in Baja California, Mexico. A few Guadalupe fur seals occupy California sea lion rookeries in the Channel Islands of California (Stewart et al. 1987 in Reeves et al. 1992). Guadalupe fur seals exist as a single population from one breeding colony at Isla Guadalupe, Mexico. Guadalupe fur seals occur predominately in Mexican waters and are rare in U.S. waters.

Because of the directed nature of the activities associated with the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment, any interactions with Guadalupe fur seals in the water would be extremely unlikely to occur and would thus be discountable. No interaction with Guadalupe fur seals on land is expected. Therefore, we conclude that the STSSN is not likely to adversely affect the Guadalupe fur seal.

*Hawaiian Monk Seal*

The Hawaiian monk seal is found primarily on the Leeward Chain of the Hawaiian Islands, especially Nihoa, Necker, French Frigate Shoals, Pearl and Hermes Reef, Kure Atoll, Laysan, and Lisianski. Sightings on the main Hawaiian Islands have become more common in the past 15 years and a birth was recorded on Kauai and Oahu in 1988 and 1991 respectively (Kenyon 1981). Monk seals are increasingly sighted in the main Hawaiian Islands. Monk seals have been reported on at least three occasions at Johnston Island over the past 30 years (not counting nine adult males that were translocated there from Laysan Island in 1984). Because of the directed nature of the activities associated with the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment, any interactions with Hawaiian monk seals in the water would be extremely unlikely to occur and would thus be discountable. No interaction with Hawaiian monk seals on land is expected. Therefore, we conclude that the STSSN is not likely to adversely affect the Hawaiian monk seal.

*Hawaiian Monk Seal Designated Critical Habitat*

Critical habitat for Hawaiian monk seals includes all beach areas, sand spits and islets, including all beach vegetation to its deepest extent inland, and lagoon waters out to a depth of 20 fathoms (120 ft.) for the following areas: Kure Atoll, Midway Islands except Sand Island and its harbor, Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island.

In 2015, NMFS revised critical habitat for Hawaiian monk seals to include sixteen occupied areas within the range of the species: ten areas in the Northwestern Hawaiian Islands and six in the main Hawaiian Islands. These areas contain one or a combination of habitat types: Preferred pupping and nursing areas, significant haul-out areas, and/or marine foraging areas, that will support conservation for the species. Specific areas in the Northwestern Hawaiian Islands include all beach areas, sand spits and islets, including all beach crest vegetation to its deepest extent inland, lagoon waters, inner reef waters, and including marine habitat through the water's edge, including the seafloor and all subsurface waters and marine habitat within 10 meters (m) of the seafloor, out to the 200-m depth contour line around the following 10 areas: Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, Maro Reef, Gardner Pinnacles, French Frigate Shoals, Necker Island, and Nihoa Island. Specific areas in the main Hawaiian Islands include marine habitat from the 200-m depth contour line, including the seafloor and all subsurface waters and marine habitat within 10 m of the seafloor, through the water's edge 5 m into the terrestrial environment from the shoreline between identified boundary points on the islands of: Kaula, Niihau, Kauai, Oahu, Maui Nui (including Kahoolawe, Lanai, Maui, and Molokai), and Hawaii. In areas where critical habitat does not extend inland, the designation ends at a line that marks mean lower low water.

Essential features of designated critical habitat for the conservation of Hawaiian monk seals include: areas with characteristics preferred by monk seals for pupping and nursing; shallow, sheltered aquatic areas adjacent to coastal locations preferred by monk seals for pupping and nursing; marine areas from 0 to 500 m in depth preferred by juvenile and adult monk seals for foraging; areas with low levels of anthropogenic disturbance; marine areas with adequate prey quantity and quality; and significant areas used by monk seals for hauling out, resting or molting.

The marine component of this habitat was designated primarily as feeding areas for Hawaiian monk seals, while terrestrial habitat serves as pupping and nursing habitat for mothers and pups. Both components are currently under significant degradation pressure.

Because of the directed nature of the activities of the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment, no effect to any above essential feature of Hawaiian monk seal critical habitat is expected to occur. The STSSN activities will not have any effect on areas with low levels of anthropogenic disturbance; marine areas with adequate prey quantity and quality; or significant areas used by monk seals for hauling out, resting or molting. Therefore, we conclude that the STSSN will have no effect on Hawaiian monk seal designated critical habitat.

### 6.1.2 Sea Turtle Critical Habitat

Because the proposed actions are salvaging of dead sea turtles, and the aid of sick, injured, or entangled sea turtles in surface waters of the marine environment, no effects to any sea turtle critical habitat essential features are expected. These essential features consist mainly of geological and hydrological components that will not be affected by any STSSN activity. These essential features are described below.

*Loggerhead Sea Turtle (Northwest Atlantic Ocean DPS)*

In 2014, critical habitat was designated for the Northwest Atlantic Ocean DPS of loggerhead sea turtles. essential features for this species include: 1) Nearshore waters directly off the highest density nesting beaches to 1.6 km offshore; 2) Waters sufficiently free of obstructions or artificial lighting to allow transit through the surf zone and outward toward open water; 3) Waters with minimal manmade structures that could promote predators (i.e., nearshore predator concentration caused by submerged and emergent offshore structures), disrupt wave patterns necessary for orientation, and/or create excessive longshore currents; and 4) *Sargassum ssp.* in concentrations that support adequate prey abundance and cover.

The directed nature of the activities of the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment are not expected to affect any essential feature of the Northwest Atlantic Ocean DPS of the loggerhead sea turtle critical habitat. Activities will not have any measurable effect on nearshore waters directly off the highest density nesting beaches, waters sufficiently free of obstructions or artificial lighting or waters with minimal manmade structures that could promote predators, and thus, the effects are insignificant. Therefore, we conclude that the STSSN is not likely to adversely modify or destroy loggerhead turtle designated critical habitat.

*Green Sea Turtle (North Atlantic DPS)*

In 1998, critical habitat for green sea turtles was designated in coastal waters surrounding Culebra Island, Puerto Rico. Aspects of these areas that are important for green sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for green sea turtle prey. The effects of vessel traffic, coastal construction activities, pollution and dredge and fill activities all significantly threaten these habitat features. The directed nature of the activities of the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment are not expected to affect any essential feature of the Northwest Atlantic Ocean DPS of green sea turtle critical habitat. The activities will not have any measurable effect on important natal development habitat, refuge, shelter or food for green sea turtle prey and thus, the effects are insignificant. Therefore, we conclude that the STSSN is not likely to adversely modify or destroy green turtle designated critical habitat.

*Leatherback turtle*

In 1979, leatherback critical habitat was identified adjacent to Sandy Point, St. Croix, U.S. Virgin Islands. from the 183 m isobath to mean high tide level between 17° 42’12” N and 65°50’00” W (44 FR 17710). This habitat is essential for nesting, which has been increasingly threatened since 1979, when tourism increased significantly, bringing nesting habitat and people into close and frequent proximity. However, studies do not currently support significant critical habitat deterioration.

In 2012, NMFS designated critical habitat for leatherback sea turtles in waters along Washington State and Oregon (Cape Flattery to Cape Blanco; 64,760 $km^2$) and California (Point Arena to Point Arguello; 43,798 $km^2$). The essential features of these areas include 1) the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (*Chrysaora, Aurelia, Phacellophora,* and *Cyanea*), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks; and 2) migratory pathway conditions to allow for safe and timely passage and access between high use foraging areas. At this time, there are no data to suggest that these essential features have been significantly degraded.

The directed nature of the activities of the STSSN in rescuing and salvaging turtles in the surface waters of the marine environment are not expected to affect any essential feature of the leatherback sea turtle critical habitat. The activities will not have any measurable effect on the occurrence of prey species or on migratory pathway conditions and thus, the effects are insignificant. Therefore, we conclude that the STSSN is not likely to adversely modify or destroy leatherback turtles' designated critical habitat.

## 6.2 Species Likely to be Adversely Affected

This action is likely to adversely affect North Atlantic, Central North Pacific and East Pacific green; hawksbill; Kemp's ridley; leatherback; Northwest Atlantic and North Pacific loggerhead; and olive ridley sea turtles. The following sections summarize the best available information on the status of these species, including information on the distribution, population structure, life history, abundance and trends of each species and the threats that these species face.

Background information on the status of sea turtle species can be found in a number of published documents, including: recovery plans for the green sea turtle (NMFS and USFWS 1991, 1998); hawksbill sea turtle (NMFS and USFWS 1993, 1998d); Kemp's ridley sea turtle (NMFS and USFWS 1992b, 2011); leatherback sea turtle (NMFS and USFWS 1992, 1998b); loggerhead sea turtle (NMFS and USFWS 1991b, 1998c, 2009); and olive ridley sea turtle (NMFS and USFWS 1998e).

Additional information can be found in sea turtle status reviews, stock assessments, and biological reports (Conant et al. 2009; NMFS 2016; NMFS SEFSC 2001, 2009; NMFS and USFWS 1995, 2007, 2007b, 2007c, 2007d, 2007e, 2013, 2013b, 2014, 2015, 2015b; Seminoff et al. 2015; TEWG 1998; TEWG 2000; TEWG 2007; TEWG 2009).

### 6.2.1 General Threats Faced by All Sea Turtle Species

Sea turtles face numerous natural and anthropogenic threats that shape their status and affect their ability to recover. The threats identified below are discussed in a general sense for all ESA-listed sea turtles. Specific threats to a particular species are discussed in the corresponding status of the species sections below where appropriate.

*Fisheries*

Incidental bycatch in commercial fisheries is identified as a major contributor to past declines, and threat to future recovery, for all of the sea turtle species (NMFS 2016; NMFS and USFWS 1991, 1992, 1993, 2008, 2011, 2015, 2015b). Domestic fisheries often capture, injure and kill sea turtles at various life stages. In addition to threats posed by pelagic longline fisheries, sea turtles in the benthic environment are exposed to a suite of other fishery threats. These include trawls, gillnets, purse seines, hook-and-line gear, pound nets, and trap fisheries. Specific fishery interactions for each species are discussed within Sections 6.2.2-6.2.7.

In addition to domestic fisheries, sea turtles are subject to capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles that circumnavigate the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish and various other fleets (Aguilar and Pastor 1995; Bolten et al. 1994; Crouse 1999).

Bottom longline and gillnet fishing is known to occur in many foreign waters, including the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries also occur in the waters of numerous foreign countries and pose a significant threat to sea turtles. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure has on ESA-listed sea turtles.

*Non-Fishery In-Water Activities*

There are many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (see NMFS 1997, 2005 for examples). Sea turtles entering coastal or inshore areas have also been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment or injury resulting from private and commercial vessel operations, military activities, in-water construction activities, and scientific research activities.

*Coastal Development and Erosion Control*

Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Bouchard et al. 1998; Lutcavage et al. 1997). These factors may decrease the amount of nesting area available to females and change the natural behaviors of both adults and hatchlings, directly or indirectly, through loss of beach habitat or changing thermal profiles and increasing erosion (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). In addition, artificial lighting can alter the behavior of nesting adults (Witherington 1992) and emerging hatchlings (Witherington and Bjorndal 1991).

In-water erosion control structures such as breakwaters, groins, and jetties can impact nesting females and hatchling as they approach and leave the surf zone or head out to sea by creating physical blockage, concentrating predators, creating longshore currents, and disrupting wave patterns.

*Environmental Contamination*

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides and others that may cause adverse health effects to marine vertebrates (Garrett 2004; Grant and Ross 2002; Hartwell 2004; Iwata et al. 1993). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through direct contact with oils, inhalation at the water's surface and through ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations and, therefore, may affect ESA-listed species indirectly by reducing food availability in the action area.

In 2010, there was a massive explosion and resulting oil spill in the Gulf of Mexico at British Petroleum's DWH mobile drilling unit. Official estimates are that approximately 3.19 million barrels of oil were released into the U.S. Gulf of Mexico. Additionally, approximately 1.8 million gallons of chemical dispersant were applied on the seawater surface and at the wellhead to attempt to break down the oil. The total direct impacts to sea turtles from these contaminants have not yet been determined. The long-term impacts to sea turtles because of habitat impacts, prey loss, and subsurface oil particles and oil components broken down through physical, chemical and biological processes are not entirely understood. Environmental contaminants are discussed further in the environmental baseline in Section 7.6 of this document.

Because their prey often converge along oceanographic fronts where debris concentrates, sea turtles living in the pelagic environment commonly eat or become entangled in marine debris (e.g., tar balls, plastic bags/pellets, balloons and ghost fishing gear). This is especially problematic for leatherback, juvenile loggerhead and juvenile green turtles, which spend all or significant portions of their life cycle in the pelagic environment.

### 6.2.2 Green Sea Turtle

Green sea turtles were originally listed as threatened (except for endangered breeding populations found in Florida and the Pacific coast of Mexico) in 1978. In 2016, NMFS and the USFWS issued a final rule to list 11 DPSs of the green sea turtle under the ESA. The following DPSs are listed as threatened: 1) Central North Pacific; 2) East Indian-West Pacific; 3) East Pacific; 4) North Atlantic; 5) North Indian; 6) South Atlantic; 7) Southwest Indian; and 8) Southwest Pacific. The following three DPSs are listed as endangered: 1) Central South Pacific; 2) Central West Pacific; and 3) Mediterranean. Of these, the threatened Central North Pacific DPS, East Pacific DPS and North Atlantic DPS occur in the action area. We used information available in the status review (NMFS and USFWS 2007) and the status review (Seminoff et al. 2015) to summarize the status of the species, as follows.

The genus *Chelonia* is composed of two taxonomic units at the population level, the eastern Pacific green turtle (referred to by some as "black turtle," *C. mydas agassizii*), which ranges from Baja California south to Peru and west to the Galapagos Islands, and the nominate *C. m. mydas*, which occurs in tropical regions of the Atlantic, Indian, and Pacific Oceans and most seas, associated with these oceans, except for the Bering and Beaufort Seas. They are most common along a north-south band from 15°N to 5°S along 90°W, and between the Galapagos Islands and Central American Coast (NMFS and USFWS, 1998)**.**

Green sea turtles have been impacted historically by domestic fishery operations that often capture, injure and even kill sea turtles at various life stages. In the U.S., the bottom trawl, sink gillnets, hook and line gear, and bottom longline managed in the Northeast Multispecies Fishery are known to frequently capture sea turtles during normal fishery operations (Epperly et al. 1995; Lewison et al. 2003, Lewison et al. 2004; Richards 2007; Watson et al. 2004) while the lines used for pot gear for the U.S. Lobster and Red Crab fisheries cause entanglement resulting in injury to flippers, drowning, and increased vulnerability to boat collisions (Lutcavage et al. 1997). In addition, various trawl, gillnet, longline, and hook gears used for the Monkfish, Spiny Dogfish, Summer Flounder, Scup, Black Sea Bass, and Atlantic Highly Migratory Species fisheries managed in the U.S. impact sea turtles at various degrees. While sea turtle bycatch varies depending on the fishery, the Southeast shrimp trawl fishery affects more sea turtles than all other activities combined (NRC 1990).

Green turtles depend on shallow foraging grounds with sufficient benthic vegetation. Eutrophication, heavy metals, radioactive elements and hydrocarbons all may reduce the extent, quality and productivity of foraging grounds as well (Frazier, 1980; McKenzie et al. 1999; Storelli and Marcotrigiano 2008). Various types of marine debris such as plastics, oil, and tar tends to collect on pelagic drift lines that young green turtles inhabit (Carr, 1987; Moore and Waring 2001) and can lead to death through ingestion (Balazs, 1985). Another major threat from man-made debris is the entanglement of turtles in discarded monofilament fishing line and abandoned netting (Balazs, 1985).

Fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtle's body, has been found to infect green sea turtles, most commonly juveniles (Williams et al. 1994). The occurrence of fibropapilloma tumors may result in impaired foraging, breathing or swimming ability possibly leading to death in some cases making it a serious threat to the survival and recovery of the species.

Another growing problem affecting green sea turtles is the increasing female bias in the sex ratio of green sea turtle hatchlings, likely related to global climate change and imperfect egg hatchery strategies (Baker et al. 2006; Hays et al. 2003). At least one site (i.e., Ascension Island) has had an increase of mean sand temperature in recent years (Hays et al. 2003). It is expected that similar rises in sand temperatures on nesting beaches may alter sex rations towards a female bias and significantly impact the ability of the species to survive and recover in the wild.

A summary of current nesting trends[5] is provided in the most recent status review for the species (i.e., NMFS and USFWS 2007) in which the authors collected and organized abundance data from 46 individual nesting concentrations organized by ocean region (i.e., Western Atlantic Ocean, Central Atlantic Ocean, Eastern Atlantic Ocean, Mediterranean Sea, Western Indian Ocean, Northern Indian Ocean, Eastern Indian Ocean, Southeast Asia, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). The authors found it was possible to determine trends at 23 of the 46 nesting sites and found that 10 appeared to be increasing, nine

[5] Estimates of abundance were largely based on annual numbers of nesting females or deposited nests at each site. In some cases, abundance was based on egg production or egg harvest rates (see NMFS and USFWS, 2007b).

appeared to be stable, and four appeared to be decreasing. With respect to regional trends, the Pacific, the Western Atlantic and the Central Atlantic regions appeared to show more positive trends (i.e., more nesting sites increasing than decreasing) while the Southeast Asia, Eastern Indian Ocean and possibly the Mediterranean Sea regions appeared to show more negative trends (i.e., more nesting sites decreasing than increasing). We must note that these regional determinations should be viewed with caution since trend data was only available for about half of the total nesting concentration sites examined in the review and that site specific data availability appeared to vary across all regions.

#### *6.2.2.1 North Atlantic Distinct Population Segment*

The range of the North Atlantic DPS extends from the boundary of South and Central America, north along the coast to include Panama, Costa Rica, Nicaragua, Honduras, Belize, Mexico, and the United States. It extends due east across the Atlantic Ocean at 48° N. and follows the coast south to include the northern portion of the Islamic Republic of Mauritania (Mauritania) on the African continent to 19° N. It extends west at 19° N. to the Caribbean basin to 65.1° W., then due south to 14° N., 65.1° W., then due west to 14° N., 77° W., and due south to 7.5° N., 77° W., the boundary of South and Central America. It includes Puerto Rico, the Bahamas, Cuba, Turks and Caicos Islands, Republic of Haiti, Dominican Republic, Cayman Islands, and Jamaica. The North Atlantic DPS includes the Florida breeding population, which was originally listed as endangered under the ESA.

The DPS exhibits high nesting abundance, with an estimated total nester abundance of 167,424 females at 73 nesting sites. More than 100,000 females nest at Tortuguero, Costa Rica, and more than 10,000 females nest at Quintana Roo, Mexico. Nesting data indicate long-term increases at all major nesting sites. There is little genetic substructure within the DPS, and turtles from multiple nesting beaches share common foraging areas. Nesting is geographically widespread and occurs at a diversity of mainland and insular sites.

*Status*

Nesting beaches are degraded by coastal development, coastal armoring, beachfront lighting, erosion, sand extraction, and vehicle and pedestrian traffic. Foraging habitat is degraded by pollution (including oil spills, agricultural and residential runoff, and sewage), propeller scarring, anchor damage, dredging, sand mining, marina construction, and beach nourishment. The harvest of green turtles and eggs remains legal in several countries (e.g. Lagueux et al. 2014), and illegal harvest occurs in many areas. Fibropapillomatosis is a chronic, often lethal disease that affects turtles throughout the range of the DPS, and (as discussed in a summit held since the publication of the proposed rule) especially in areas with some degree of environmental degradation resulting from altered watersheds (NMFS, in progress). It may be increasing in prevalence in some areas (e.g., Stringell et al. 2015). As recently described by Brost et al. (2015), predation is one of the main sources of egg and hatchling mortality in some areas.

The State of Louisiana repealed the prohibition on enforcement of Turtle Excluder Device regulations. Fisheries bycatch in artisanal and industrial fishing gear (e.g., gill net, trawls, and dredges) results in substantial mortality (see NMFS, 2009). Vessel strikes are a significant and increasing source of mortality in the U.S. Atlantic and U.S. Gulf of Mexico and likely in other locations.

The high nesting abundance, increasing trends, connectivity, and spatial diversity provide the DPS with some resilience against current threats (i.e., the threats have not prevented positive population growth in recent years). The DPS is threatened by several factors: The current and projected destruction and modification of its habitat; legal and illegal harvest of turtles and eggs; disease and predation; inadequacy of regulatory mechanisms to regulate the underlying threats; and other factors (i.e., fisheries bycatch, channel dredging, marine debris, cold stunning, and climate change). Though beneficial, the conservation efforts do not adequately reduce the threats. Based on the above information, the DPS is not presently in danger of extinction throughout all or a significant portion of its range. Listing was warranted because numerous threats remain, several of which are likely to increase within the foreseeable future; all threats are likely to increase if ESA protections are lost, resulting in curtailed or reversed population trends. We conclude that the North Atlantic DPS is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

#### *6.2.2.2 Central North Pacific Distinct Population Segment*

The Central North Pacific DPS exhibits low nesting abundance, with an estimated total nester abundance of 3,846 nesting females at 13 nesting sites. The most recent published study on this DPS estimates the total nester abundance at roughly 4,000 nesting females (Balazs et al., 2015). The nesting trend is increasing. Nesting site diversity is extremely limited: 96 percent of nesting occurs at one low-lying atoll. In the main Hawaiian Islands, nesting and basking habitats are degraded by coastal development and construction, vehicular and pedestrian traffic, beach pollution, tourism, and other human related activities. Foraging habitat is degraded by coastal development, marina construction, siltation, pollution, sewage, military activities, vessel traffic, and vessel groundings.

*Status*

Vessel strikes result in injury and mortality. Vessel traffic excludes turtles from their preferred foraging areas. In addition, climate change impacts threaten the DPS. Sea level rise and the increasing frequency and intensity of storm events are likely to reduce available nesting habitat. A recent study indicated that increasing temperatures are likely to modify beach thermal regimes that are important to nesting and basking (Van Houtan et al. 2015). Temperature increases are also likely to result in increased hatchling mortality, skewed sex ratios, and changes in juvenile and adult distribution patterns.

Though the low nesting abundance and extremely limited nesting diversity render the DPS vulnerable to several threats, the increasing nesting trend at French Frigate Shoals provides some resilience. The DPS is threatened by the following section 4(a)(1) factors: Present and threatened habitat loss and degradation, disease and predation, inadequate regulatory mechanisms, fisheries bycatch, marine debris, vessel activities, limited spatial diversity, and climate change. Though beneficial, the conservation efforts are not sufficient to reduce all threats. We conclude that the DPS is not presently in danger of extinction throughout all or a significant portion of its range. Listing is warranted because of numerous continuing and increasing threats, which would be further exacerbated if ESA protections were lost. We conclude that the DPS is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

#### *6.2.2.3 East Pacific Distinct Population Segment*

The East Pacific DPS exhibits an estimated total nester abundance of 20,112 females at 39 nesting sites. The largest nesting aggregation (Colola, Michoacán, Mexico) hosts more than 10,000 nesting females. Nesting data indicate increasing trends in recent decades. Within the DPS, there is additional substructure, and four regional genetic stocks have been identified; however, stocks mix at foraging areas. Nesting occurs at both insular and continental sites, providing some spatial diversity.

The DPS exhibits an estimated total nester abundance of 20,112 females at 39 nesting sites. The largest nesting aggregation (Colola, Michoacán, Mexico) hosts more than 10,000 nesting females. Nesting data indicate increasing trends in recent decades. Within the DPS, there is additional substructure, and four regional genetic stocks have been identified; however, stocks mix at foraging areas. Nesting occurs at both insular and continental sites, providing some spatial diversity.

*Status*

Some nesting beaches are degraded by coastal development, tourism, and pedestrian traffic. Some foraging areas exhibit high levels of contaminants and reduced seagrass communities. As described by Senko et al. (2014), the direct harvest of turtles is a significant source of mortality. The legal and illegal harvest of eggs is a significant threat due to high demand and lack of enforcement of existing protections. Predation by dogs results in egg and hatchling mortality (Ruiz-Izaguirre et al. 2015; Santidrián Tomillo et al. 2015). Other threats include marine debris ingestion, boat strikes, and red tide poisoning, which may result in an Unusual Mortality Events. Climate change is likely to impact nesting and hatchling success.

The increasing trends and spatial diversity provide the DPS with some resilience against current threats; the nesting abundance, though not high, may be large enough to avoid depensation and other risks associated with small population size. The DPS is threatened by the following section 4(a)(1) factors: Habitat loss and degradation, overexploitation, inadequate regulatory mechanisms, fisheries bycatch, marine debris, boat strikes, red tide poisoning, and climate change. Though beneficial, conservation efforts are not sufficient to adequately reduce threats. We conclude that the DPS is not presently in danger of extinction throughout all or a significant portion of its range. Listing is warranted because significant threats (e.g., egg poaching) continue and others (e.g., climate change) are increasing. The loss of ESA protections would further exacerbate several threats. We conclude that the DPS is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

### 6.2.3 Hawksbill Sea Turtle

The hawksbill sea turtle was listed as endangered under the ESA in 1970. The species is also protected by Convention on International Trade in Endangered Species and is classified as critically endangered on the International Union for Conservation of Nature's (IUCN's) Red List of Threatened Species. We used information available in the recovery plan (NMFS and USFWS 1993, 1998d) and status reviews (NMFS and USFWS 2007b, 2013) to summarize the status of the species as follows.

Hawksbill sea turtles are small to medium-sized. The carapace is usually serrated and has a "tortoise-shell" coloring, ranging from dark to golden brown, with streaks of orange, red, and/or black. The plastron of a hawksbill turtle is typically yellow. The head is elongated and tapers to a point, with a beak-like mouth that gives the species its name. The shape of the mouth allows the hawksbill turtle to reach into holes and crevices of coral reefs to find sponges, their primary adult food source, and other invertebrates. The shells of hatchlings are 1.7 in (42 mm) long, are mostly brown, and somewhat heart-shaped (Eckert 1995; Hillis and Mackay 1989).

Hawksbill sea turtles have a circumtropical distribution and usually occur between latitudes 30°N and 30°S in the Atlantic, Pacific, and Indian Oceans. In the western Atlantic, hawksbills are widely distributed throughout the Caribbean Sea, off the coasts of Florida and Texas in the continental United States, in the Greater and Lesser Antilles, and along the mainland of Central America south to Brazil (Amos 1989; Groombridge and Luxmoore 1989; Lund 1985; Meylan and Donnelly 1999; NMFS and USFWS 1998; Plotkin and Amos 1988; Plotkin and Amos 1990). They are highly migratory and use a wide range of habitats during their lifetimes (Musick and Limpus 1997; Plotkin 2003). Adult hawksbill sea turtles are capable of migrating long distances between nesting beaches and foraging areas. For instance, a female hawksbill sea turtle tagged at Buck Island Reef National Monument was later identified 1,160 miles (1,866 km) away in the Miskito Cays in Nicaragua (Spotila 2004).

Hawksbill sea turtles nest on sandy beaches throughout the tropics and subtropics. Nesting occurs in at least 70 countries, although much of it now only occurs at low densities compared to that of other sea turtle species (NMFS and USFWS 2007b). Meylan and Donnelly (1999) believe that the widely dispersed nesting areas and low nest densities is likely a result of overexploitation of previously large colonies that have since been depleted over time. 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 Reef National Monument, respectively. Although nesting within the continental U.S. is typically rare, it can occur along the southeast coast of Florida and the Florida Keys. The largest hawksbill nesting population in the western Atlantic occurs in the Yucatán Peninsula of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (Garduño-Andrade et al. 1999; Spotila 2004).

In the U.S. Pacific, hawksbills nest on main island beaches in Hawaii, primarily along the east coast of the island. Hawksbill nesting has also been documented in American Samoa and Guam. More information on nesting in other ocean basins may be found in the status review for the species (NMFS and USFWS 2007).

Mitochondrial Deoxyribonucleic Acid (DNA) studies show that reproductive populations are effectively isolated over ecological time scales (Bass et al. 1996). Substantial efforts have been made to determine the nesting population origins of hawksbill sea turtles assembled in foraging grounds, and genetic research has shown that hawksbills of multiple nesting origins commonly mix in foraging areas (Bowen et al. 1996). Hawksbill sea turtles nest primarily on the beaches where they were born. Therefore, if a nesting population is decimated, it might not be replenished by sea turtles from other nesting rookeries (Bass et al. 1996).

Hawksbill sea turtles exhibit slow growth rates although they are known to vary within and among populations from a low of 0.4-1.2 in (1-3 cm) per year, measured in the Indo-Pacific (Chaloupka and Limpus 1997; Mortimer et al. 2002; Mortimer et al. 2003; Whiting 2000), to a high of 2 in (5 cm) or more per year, measured at some sites in the Caribbean (Díez and Dam

2002; León and Díez 1999). Differences in growth rates are likely due to differences in diet and/or density of sea turtles at foraging sites and overall time spent foraging (Bjorndal and Bolten 2000; Chaloupka et al. 2004). Consistent with slow growth, age to maturity for the species is also long, taking between 20 and 40 years, depending on the region (Chaloupka and Musick 1997; Limpus and Miller 2000). Hawksbills in the western Atlantic are known to mature faster (i.e., 20 or more years) than sea turtles found in the Indo-Pacific (i.e., 30-40 years) (Boulan 1983; Boulon 1994; Díez and Dam 2002; Limpus and Miller 2000). Males are typically mature when their length reaches 27 in (69 cm), while females are typically mature at 30 in (75 cm) (Eckert et al. 1992; Limpus 1992).

Female hawksbills return to their natal beaches every 2-3 years to nest (van Dam et al. 1991; Witzell 1983) and generally lay 3-5 nests per season (Richardson et al. 1999). Compared with other sea turtles, the number of eggs per nest (clutch) for hawksbills can be quite high. The largest clutches recorded for any sea turtle belong to hawksbills (approximately 250 eggs per nest) (Hirth and Abdel Latif 1980), though nests in the U.S. Caribbean and Florida more typically contain approximately 140 eggs (USFWS hawksbill fact sheet). Eggs incubate for approximately 60 days before hatching. Hatchling hawksbill sea turtles typically measure 1-2 in (2.5-5 cm) in length and weigh approximately 0.5 oz. (15 g).

Immature hawksbills may undertake developmental migrations and reproductive migrations that involve travel over many tens to thousands of miles (Meylan 1999). Post-hatchlings (oceanic stage juveniles) are believed to live in the open ocean, taking shelter in floating algal mats and drift lines of flotsam and jetsam in the Atlantic and Pacific oceans (Musick and Limpus 1997) before returning to more coastal foraging grounds. In the Caribbean, hawksbills are known to feed almost exclusively on sponges (Meylan 1988; van Dam and Díez 1997), although at times they have been seen foraging on other food items, notably corallimorphs and zooanthids (León and Díez 2000; Mayor et al. 1998; van Dam and Díez 1997).

Reproductive females undertake periodic (usually non-annual) migrations to their natal beaches to nest and exhibit a high degree of fidelity to their nest sites. Movements of reproductive males are less certain, but are presumed to involve migrations to nesting beaches or to courtship stations along the migratory corridor. Hawksbills show a high fidelity to their foraging areas as well (van Dam and Díez 1998). Foraging sites are typically areas associated with coral reefs, although hawksbills are also found around rocky outcrops and high energy shoals that are optimum sites for sponge growth. They can also inhabit seagrass pastures in mangrove-fringed bays and estuaries, particularly along the eastern shore of continents where coral reefs are absent (Bjorndal 1997; van Dam and Díez 1998).

*Status*

Reliable estimates of population abundance and trends for non-nesting hawksbills are scarce. Therefore, nesting beach data is currently the primary information source for evaluating trends in global abundance. Most hawksbill populations around the globe are either declining, depleted, and/or remnants of larger aggregations (NMFS and USFWS 2007). The largest nesting population of hawksbills occurs in Australia where approximately 2,000 hawksbills nest off the northwest coast and about 6,000-8,000 nest off the Great Barrier Reef each year (Spotila 2004). Additionally, about 2,000 hawksbills nest each year in Indonesia and 1,000 nests in the Republic of Seychelles (Spotila 2004). In the United States, hawksbills typically laid about 500-1,000 nests on Mona Island, Puerto Rico in the past, but the numbers appear to be increasing, as the Puerto Rico Department of Natural and Environmental Resources counted nearly 1,600 nests in 2010 (Puerto Rico Department of Natural and Environmental Resources nesting data). Another 56-150 nests are typically laid on Buck Island off St. Croix (Meylan 1999b; Mortimer and Donnelly 2008).

Nesting also occurs to a lesser extent on beaches on Culebra Island and Vieques Island in Puerto Rico, the mainland of Puerto Rico, and additional beaches on St. Croix, St. John, and St. Thomas, U.S. Virgin Islands.

Mortimer and Donnelly (2008) reviewed nesting data for 83 nesting concentrations organized among 10 different ocean regions (i.e., Insular Caribbean, Western Caribbean Mainland, Southwestern Atlantic Ocean, Eastern Atlantic Ocean, Southwestern Indian Ocean, Northwestern Indian Ocean, Central Indian Ocean, Eastern Indian Ocean, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean). They determined historic trends (i.e., 20-100 years ago) for 58 of the 83 sites, and determined recent abundance trends (i.e., within the past 20 years) for 42 of the 83 sites. Among the 58 sites where historic trends could be determined, all showed a declining trend during the long-term period. Among the 42 sites where recent (past 20 years) trend data were available, 10 appeared to be increasing, three appeared to be stable, and 29 appeared to be decreasing. With respect to regional trends, nesting populations in the Atlantic (especially in the Insular Caribbean and Western Caribbean Mainland) are generally doing better than those in the Indo-Pacific regions. For instance, nine of the 10 sites that showed recent increases are located in the Caribbean. Buck Island and St. Croix's East End beaches support two remnant populations of between 17-30 nesting females per season (Hillis and Mackay 1989). While the proportion of hawksbills nesting on Buck Island represents a small proportion of the total hawksbill nesting occurring in the greater Caribbean region, Mortimer and Donnelly (2008) report an increasing trend in nesting at that site based on data collected from 2001-2006. The conservation measures implemented when Buck Island Reef National Monument was expanded in 2001 most likely explain this increase.

Nesting concentrations in the Pacific Ocean appear to be performing the worst of all regions despite the fact that the region currently supports more nesting hawksbills than either the Atlantic or Indian Oceans (Mortimer and Donnelly 2008). More information about site-specific trends can be found in the most recent status review for the species (NMFS and USFWS 2007).

Hawksbills are currently subjected to the same suite of threats on both nesting beaches and in the marine environment that affect other sea turtles (e.g., interaction with federal and state fisheries, coastal construction, oil spills, and climate change affecting sex ratios). There are also specific threats that are of special emphasis, or are unique, for hawksbill sea turtles discussed in further detail below.

The historical decline of the species is primarily attributed to centuries of exploitation for the beautifully patterned shell, which made it a highly attractive species to target (Parsons 1972). The fact that reproductive females exhibit a high fidelity for nest sites and the tendency of hawksbills to nest at regular intervals within a season made them an easy target for capture on nesting beaches. The shells from hundreds of thousands of sea turtles in the western Caribbean region were imported into Europe during the nineteenth and early twentieth centuries (Parsons 1972). Additionally, hundreds of thousands of sea turtles contributed to the region's trade with

Japan prior to 1993 when a zero quota was imposed (Milliken and Tokunaga 1987), as cited in (Brautigram and Eckert 2006).

The continuing demand for the hawksbills' shells as well as other products derived from the species (e.g., leather, oil, perfume, and cosmetics) represents an ongoing threat to its recovery. The British Virgin Islands, Cayman Islands, Cuba, Haiti, and the Turks and Caicos Islands (United Kingdom) all permit some form of legal take of hawksbill sea turtles. In the northern Caribbean, hawksbills continue to be harvested for their shells, which are often carved into hair clips, combs, jewelry, and other trinkets (Márquez M 1990; Stapleton and Stapleton 2006).

Hawksbills are harvested for their eggs and meat, while whole, stuffed sea turtles are sold as curios in the tourist trade. Hawksbill sea turtle products are openly available in the Dominican Republic and Jamaica, despite a prohibition on harvesting hawksbills and their eggs (Fleming 2001). Up to 500 hawksbills per year from two harvest sites within Cuba were legally captured each year until 2008 when the Cuban government placed a voluntary moratorium on the sea-turtle fishery (Carillo et al. 1999; Mortimer and Donnelly 2008). While current nesting trends are unknown, the number of nesting females is suspected to be declining in some areas (Carillo et al. 1999; Moncada et al. 1999). International trade in the shell of this species is prohibited between countries that have signed the Convention on International Trade in Endangered Species of Wild Flora and Fauna, but illegal trade still occurs and remains an ongoing threat to hawksbill survival and recovery throughout its range.

Due to their preference to feed on sponges associated with coral reefs, hawksbill sea turtles are particularly sensitive to losses of coral reef communities. Coral reefs are vulnerable to destruction and degradation caused by human activities (e.g., nutrient pollution, sedimentation, contaminant spills, vessel groundings and anchoring, recreational uses) and are also highly sensitive to the effects of climate change (e.g., higher incidences of disease and coral bleaching) (Crabbe 2008; Wilkinson 2004). Because continued loss of coral reef communities (especially in the greater Caribbean region) is expected to impact hawksbill foraging, it represents a major threat to the recovery of the species.

### 6.2.4 Kemp's Ridley Sea Turtle

The species was first listed on June 2, 1970 under the Endangered Species Conservation Act (35 FR 8491) and has been listed as endangered under the ESA since 1973. Critical habitat has not been designated. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Groombridge 1982; TEWG 2000). We used information available in the original and revised recovery plan (NMFS and USFWS 1992b, NMFS et al. 2011) and the status review (NMFS and USFWS 2015) to summarize the status of the species, as follows.

The Kemp's ridley sea turtle is the smallest of all sea turtles. Adults generally weigh less than 100 lbs. (45 kg) and have a carapace length of around 2.1 ft. (65 cm). Adult Kemp's ridley shells are almost as wide as they are long. Coloration changes significantly during development from the grey-black dorsum and plastron of hatchlings, a grey-black dorsum with a yellowish-white plastron as post-pelagic juveniles, and then to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are two pairs of prefrontal scales on the head, 5 vertebral scutes, usually 5 pairs of costal scutes, and generally 12 pairs of marginal scutes on the carapace. In each bridge adjoining the plastron to the carapace, there are four scutes, each of which is perforated by a pore.

Kemp's ridley habitat largely consists of sandy and muddy areas in shallow, nearshore waters less than 120 ft. (37 m) deep, although they can also be found in deeper offshore waters. These areas support the primary prey species of the Kemp's ridley sea turtle, which consist of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The primary range of Kemp's ridley sea turtles is within the U.S. Gulf of Mexico basin, though they also occur in coastal and offshore waters of the U.S. Atlantic Ocean. Juvenile Kemp's ridley sea turtles, possibly carried by oceanic currents, have been recorded as far north as Nova Scotia.

Historic nesting records range from Mustang Island, Texas, in the north, to Veracruz, Mexico, in the south. Kemp's ridley sea turtles have recently been nesting along the Atlantic Coast of the United States, with nests recorded from beaches in Florida, Georgia, and the Carolinas. In 2012, the first Kemp's ridley sea turtle nest was recorded in Virginia. The Kemp's ridley nesting population is exponentially increasing, which may indicate a similar increase in the population as a whole (NMFS et al. 2011).

Kemp's ridley sea turtles share a general life history pattern similar to other sea turtles. Females lay their eggs on coastal beaches where the eggs incubate in sandy nests. After 45-58 days of embryonic development, the hatchlings emerge and swim offshore into deeper, ocean water where they feed and grow until returning at a larger size. Hatchlings generally range from 1.65-1.89 in (42-48 mm) Straight Carapace Length, 1.26-1.73 in (32-44 mm) in width, and 0.3-0.4 lbs. (15-20 g) in weight. The return to nearshore coastal habitats typically occurs around 2 years of age (Ogren 1989), although the time spent in the oceanic zone may vary from one to four years or perhaps more (TEWG 2000). Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but move towards more suitable overwintering habitat in deeper offshore as water temperature drops.

The average rates of growth may vary by location, but generally fall within 2.2-2.9 ± 2.4 in per year (5.5-7.5 ± 6.2 cm/year) (Schmid and Woodhead 2000). Age to sexual maturity ranges greatly from 5-16 years, though NMFS et al. (2011) determined the best estimate of age to maturity for Kemp's ridley sea turtles was 12 years. It is unlikely that most adults grow very much after maturity. While some sea turtles nest annually, the weighted mean remigration rate for Kemp's ridley sea turtles is approximately two years. Nesting generally occurs from April to July and females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs (Márquez M 1994).

*Status*

Of the seven species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult female turtles nest on the beaches of Rancho Nuevo, Mexico (Pritchard 1969). Kemp's ridley turtles were historically abundant. Recent population abundance, based on nests and hatchling recruitment, was estimated by Gallaway et al. (2013). They estimated the female population size for age 2 and older in 2012 to be 188,713 (SD = +32,529). Assuming females comprise 76% (sex ratio = 0.76; TEWG 1998, 2000) of the population, they estimated the total population of age 2 years and over at 248,307. Based on the number of hatchlings released in 2011 and 2012 (1+ million) and recognizing mortality over the first two years is high, Gallaway et al. (2013) thought the total population, including hatchlings younger than 2 years, may exceed one million turtles. It is important to note that 2012 was the highest year for recorded nests since monitoring began, and in 2014, the number of nests (all beaches) was almost half of the 2012 number; thus, the population estimate would be much lower.

Preliminary data through May 30, 2015, show at total of 11,955 for the Rancho Nuevo, Tepehuajes, and Playa Dos (NMFS and USFWS 2015). The number of hatchlings released from Rancho Nuevo, Tepehuajes, and Playa Dos, Mexico, beaches has exceeded 300,000 each year since 2002, and was over one million in 2009, but dropped to about 520,000 in 2014 (CONANP 2014).

During the mid-20th century, the Kemp's ridley was abundant in the U.S. Gulf of Mexico. Historic information indicates that tens of thousands of ridleys nested near Rancho Nuevo, Mexico, during the late 1940s (Hildebrand 1963). The famous "Herrera" film from 1947 was estimated to include as many as 40,000 turtles in a single arribada (Hildebrand 1963). The Kemp's ridley population experienced a rapid and significant decline between the late 1940s and the mid-1980s. The largest arribadas recorded from 1966 to 1968 ranged from approximately 1,500 to 5,000 turtles (Pritchard 1969). The total number of nests at Rancho Nuevo was at a record low of 702 in 1985, estimated to be fewer than 250 nesting females. This dramatic decline resulted from intensive egg collection, killing of nesting females, and bycatch and drowning in the shrimp fleets of the U.S. and Mexico (NMFS et al. 2011). Due to intensive conservation actions, the Kemp's ridley began to slowly rebound during the 1990s.

In 2014, there were 7,272 nests in Rancho Nuevo, 1,381 in Tepehuajes, and 2,333 in Playa Dos, Mexico, for 10,986 nests. This number represents approximately 4,395 nesting females for the season based on 2.5 clutches/female/season. The number of nests reported annually from 2010 to 2014 overall declined. Since 2000, more than 300,000 hatchlings have been released each year. In 2014, 519,345 hatchlings were released from Rancho Nuevo, Tepehuajes, and Playo Dos (NMFS and USFWS 2015).

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, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000, with a low of 702 nests in 1985. Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the twenty-first century, which indicates the species is recovering. It is worth noting that when the Bi-National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added. In 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico reached a record high of 21,797 in 2012. In 2013 through 2014, there was a second significant decline, with only 16,385 and 11,279 nests recorded, respectively. A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 209 nests in 2012 (National Park Service data).

Heppell et al. (2005) predicted in a population model that the population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011) produced an updated model that predicted the population to increase 19% per year and attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2012, it is clear that the population is steadily increasing over the long term.

The recent increases in Kemp's ridley sea turtle nesting seen in the last 2 decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of Turtle Excluder Devices, reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000). While these results are encouraging, the species limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental randomness, all of which are often difficult to predict with any certainty. Additionally, the significant nesting declines observed in 2010 and 2013-2014 potentially indicate a serious population-level impact, and there is cause for concern regarding the ongoing recovery trajectory.

Direct harvest of eggs and nesting adults was common in Mexico before 1967 and represented a major threat to the species causing declines in both adult survival and reproductive success. The fact that the species nests in only a few key areas as well as the mass arribadas formed during the nesting season made them particularly vulnerable to capture based on their predictability.

While direct harvest no longer occurs, illegal poaching continues to be an issue affecting Kemp's ridleys nesting in Mexico and Texas although the presence of field biologists and enforcement personnel on nesting beaches has minimized the threat in recent decades. Of all commercial fisheries operating in the U.S. Gulf of Mexico and along the east coast of the U.S., shrimp trawling has had the greatest impact on sea turtle populations, including Kemp's ridleys. The National Academy of Sciences estimated that between 500 and 5,000 Kemp's ridley sea turtles were killed annually by the offshore shrimping fleet in the southeastern U.S. and U.S. Gulf of Mexico (Magnuson et al. 1990).

While direct harvest on beaches affected eggs and adults, incidental mortalities in trawls and other commercial fisheries impacted offshore and neritic juveniles as well as adults. Before the use of Turtle Excluder Devices, shrimp trawling was estimated to cause 10 times the mortality of any other anthropogenic factors combined.

The global population of Kemp's ridley sea turtles is the lowest of all the extant sea turtle species and a review of nesting data collected since the late 1940s suggest that species has drastically declined in abundance over the past 50 years. When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970s, the world population estimate of mature female Kemp's ridleys had reduced to 2,500-5,000 individuals (i.e., 88-94% decline from 1940s levels) and this trend continued through the mid-1980s with the lowest nest count of 702 recorded for Rancho Nuevo in the year 1985. The severe decline in the Kemp's ridley population was likely caused by a combination of factors including direct egg removal, direct harvest of females on beaches, and impacts from U.S. Gulf of Mexico fishery operations during that time (notably shrimp trawling) (NMFS et al. 2011).

Despite these drastic declines in abundance, recent nesting data collected from the National Institute of Fisheries in Mexico as well as data from the USFWS has suggested the population may be showing signs of recovery. For instance, the number of nests at Rancho Nuevo grew from a low of 702 nests in 1985, to 1,940 nests in 1995, to over 20,000 nests in 2009, which was the highest nest count seen in over 55 years. Similar increases were documented for Texas beaches as the 911 nests documented from 2002-2010 represented an eleven-fold increase from the 81 nests counted over the period 1948-2001 (Shaver and Caillouet 1998; Shaver 2005).

Over the past 3 years, NMFS has documented (via STSSN data) elevated sea turtle strandings in the northern U.S. Gulf of Mexico, particularly throughout the Mississippi Sound area. In the first 3 weeks of June 2010, over 120 sea turtle strandings were reported from Mississippi and Alabama waters, none of which exhibited any signs of external oiling to indicate effects associated with the DWH oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) occurring from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, 428 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 301 (70%) were Kemp's ridley sea turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively. It should be noted that stranding coverage has increased considerably due to the DWH oil spill event.

While strandings represent only a small fraction of actual mortality, these stranding events potentially represent a serious impact to the recovery and survival of the local sea turtle populations. While a definitive cause for these strandings has not been identified, necropsy results indicate a significant number of stranded turtles from these events likely perished due to forced submergence, which is commonly associated with fishery interactions. Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that in both 2010 and 2011 approximately 85% of all Louisiana, Mississippi, and Alabama stranded sea turtles were Kemp's ridleys is notable; however, this could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance as reflected in recent Kemp's ridley nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fishery during the summer of 2012. During May-July of that year, observers reported 24 sea turtle interactions in the skimmer trawl fishery, all but one of which were identified as Kemp's ridleys (1 sea turtle was an unidentified hardshell turtle). Encountered sea turtles were all very small, juvenile specimens ranging from 7.6-19.0 in (19.4-48.3 cm), and all sea turtles were released alive. The small average size of encountered Kemp's ridleys introduces a potential conservation issue, as over 50% of these reported sea turtles could potentially pass through the maximum 4-in bar spacing of Turtle Excluder Devices currently required in the shrimp fishery. Due to this issue, a proposed 2012 rule to require Turtle Excluder Devices in the skimmer trawl fishery (77 FR 27411) was not implemented. Based on anecdotal information, these interactions were a relatively new issue for the inshore skimmer trawl fishery. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the northern U.S. Gulf of Mexico may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

### 6.2.5 Leatherback Turtle

The leatherback sea turtle is unique among sea turtles for its large size, wide distribution (due to thermoregulatory systems and behavior) and lack of a hard, bony carapace. It ranges from tropical to subpolar latitudes, worldwide. The species was first listed under the Endangered Species Conservation Act and listed as endangered under the ESA since 1973. We used information available the recovery plans (NMFS and USFWS 1992, 1998b), status reviews (NMFS and USFWS 2007c, 2013b) and the critical habitat designation to summarize the status of the species as follows.

The leatherback sea turtle ranges farther than any other sea turtle species, exhibiting broad thermal tolerances and are widely distributed throughout the world's oceans (NMFS and USFWS, 1992). They forage in temperate and subpolar regions between latitudes 71º N and 47º S in all oceans and undergo extensive migrations to and from their tropical nesting beaches. In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina and South Africa. Female leatherbacks nest from the southeastern U.S. 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 located in French Guiana and Suriname (NMFS 2001). Leatherbacks also occur in the Mediterranean Sea, although they are not known to nest there. Leatherback turtles are found on the western and eastern coasts of the Pacific Ocean, with nesting aggregations in Mexico and Costa Rica (eastern Pacific) and Malaysia, Indonesia, Australia, the Solomon Islands, Papua New Guinea, Thailand, and Fiji (western Pacific). In the Indian Ocean, leatherback nesting aggregations are reported in India and Sri Lanka (NMFS and USFWS 2007c).

Leatherback turtles are uncommon in the insular Pacific Ocean, but individual leatherback turtles are sometimes encountered in deep water and prominent archipelagoes. They range as far north as Alaska and the Bering Sea and as far south as Chile and New Zealand. In Alaska, leatherback turtles are found as far north as 60.34°N, 145.38°W and as far west as the Aleutian Islands (Hodge 1979, Stinson 1984). Largely, the oceanic distribution of leatherback turtles may reflect the distribution and abundance of their macroplanktonic prey in temperate and boreal latitudes (NMFS and USFWS 2007c).

Previous genetic analyses of leatherbacks using only mitochondrial DNA suggested that within the Atlantic basin there were at least three genetically distinct 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). Further genetic analyses using microsatellite markers along with the mitochondrial DNA data and tagging data has resulted in Atlantic Ocean leatherbacks now being divided into seven groups or breeding populations: Florida, Northern Caribbean, Western Caribbean, Southern Caribbean/Guianas, West Africa, South Africa and Brazil (TEWG 2007).

*Status*

Leatherback sea turtles are threatened by several human activities, including entanglement in fishing gear (e.g., gillnets, longlines, lobster pots, weirs), direct harvest, egg collection, the destruction and degradation of nesting and coastal habitat, and ingestion of marine debris (NMFS and USFWS 2007c, NMFS 2016). Leatherbacks are more likely to become entangled in fishing gear because they are less maneuverable and larger than other sea turtle species (Davenport 1987). The decline in the Mexican population of leatherbacks has been suggested to coincide with the growth of the longline and coastal gillnet fisheries in the Pacific (Eckert and Sarti 1997). Lewison et al. (2004) reported that between 1,000 and 1,300 leatherback sea turtles are estimated to have been captured and killed in longline fisheries in the year 2000 alone. Between 2004 and 2008, shallow-set fisheries based out of Hawaii are estimated to have captured about 19 leatherback sea turtles and leatherbacks continue to be captured and killed in the deep-set based longline fisheries based out of Hawaii and American Samoa. Leatherback sea turtles are also very susceptible to marine debris ingestion due to their predominantly pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding and migratory purposes (Lutcavage et al. 1997; Shoop and Kenney 1992).

Leatherback sea turtle populations have seen dramatic declines worldwide, especially for nesting females where a majority of the data exists. For example, in the year 1980, the global leatherback population was estimated at approximately 115,000 adult females (Pritchard 1982) that later declined to 34,500 by the year 1995 (Spotila et al. 1996). The most recent population estimate for leatherback sea turtles from the North Atlantic breeding groups is in the range of 34,000-90,000 adult individuals (20,000-56,000 of which are adult females) (TEWG 2007). Increases in the number of nesting females have been noted at some sites in the Atlantic Ocean, but these are far outweighed by local extinctions (especially of island populations) and the demise of populations throughout the Pacific, such as in Malaysia and Mexico.

In the Atlantic and Caribbean, the largest nesting assemblages of leatherbacks are found in the U.S. Virgin Islands, Puerto Rico and Florida. Populations in the eastern Atlantic (i.e., off Africa) and Caribbean appear to be stable; however, information regarding the status of the entire leatherback population in the Atlantic is lacking and it is certain that some nesting populations (e.g., St. John and St. Thomas, U.S. Virgin Islands have been extirpated (NMFS and USFWS 2007c). The TEWG (2007) reported that nesting populations appear to be increasing for Trinidad, Suriname, Guyana and Puerto Rico while other colonies in the Caribbean, Costa Rica, Nicaragua and Honduras may be stable or slightly declining. The Florida nesting stock appears to have grown from under 100 nests per year in the 1980s (Meylan et al. 1995) to over 1,000 nests per year on average in the first decade of the twenty-first century (FWC 2009). Using data from the index nesting beach surveys, the TEWG (2007) estimated a significant annual nesting growth rate of 1.17% between 1989 and 2005 for the Florida nesting stock.

Based on published estimates of nesting female abundance, leatherback populations are declining at all major Pacific basin nesting beaches, particularly in the past two decades (Spotila et al. 1996; Spotila et al. 2000; NMFS and USFWS 2007c). For example, the leatherback population nesting along the east Pacific Ocean dropped from an estimated 91,000 adults in the year 1980 (Spotila et al. 1996) to 3,000 total adults and subadults by the 1990s (Spotila et al. 2000). TEWG (2007) reported catastrophic collapse of the colonies in the South China Sea and East Pacific that contributed to these declines. It should be noted that these trends are for nesting females that represent only one segment of the true leatherback abundance and should be taken with caution.

Leatherback sea turtles are highly migratory, exploiting convergence zones and upwelling areas in the open ocean, along continental margins, and in archipelagic waters (Morreale and Standora 1998; Eckert 1999). In a single year, a leatherback may swim more than 10,000 kilometers (Eckert 1999). In the North Atlantic Ocean, leatherback turtles regularly occur in deep waters (over 328 feet), and an aerial survey study in the north Atlantic sighted leatherback turtles in water depths ranging from 3-13,618 feet, with a median sighting depth of 131.6 feet (CETAP 1982). Leatherbacks lead a pelagic existence, foraging widely in temperate waters except during the nesting season, when gravid females return to tropical beaches to lay eggs. Males are rarely observed near nesting areas, and it has been hypothesized that leatherback sea turtles probably mate outside of tropical waters, before females swim to their nesting beaches (Eckert et al. 1989).

Leatherbacks are known as proficient divers with some individuals diving deeper than 1,100 meters in the Caribbean (López-Mendilaharsu et al. 2008). Leatherbacks appear to spend almost the entire portion of each dive traveling to and from maximum depth, suggesting that maximum exploitation of the water column is essential for the species (Eckert et al. 1989).

### 6.2.6 Loggerhead Sea Turtle

The loggerhead sea turtle was originally listed as threatened throughout its range in 1978. In 2011, NMFS published a final rule to list nine separate DPSs under the ESA with four listed as threatened (i.e., Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean DPSs) and five listed as endangered (i.e., Mediterranean Sea, North Indian Ocean, North Pacific Ocean, South Pacific Ocean, and Northeast Atlantic Ocean DPSs). The threatened Northwest Atlantic DPS and the endangered North Pacific DPS occur in the action area. We used information available in the 2009 Status Review (Conant et al. 2009), recovery plans (NMFS and USFWS 1991b, 1998c, 2009) and the final listing rule to summarize the status of the species.

#### *6.2.6.1 Northwest Atlantic Ocean Distinct Population Segment*

In the most recent status review conducted for the species, the loggerhead Biological Review Team identified 60$^{o}$N latitude and the equator as the north-south boundaries and 40ºW longitude as the east boundary of the Northwest Atlantic Ocean population segment based on oceanographic features, loggerhead sightings, thermal tolerance, fishery bycatch data, and information on loggerhead distribution from satellite telemetry and flipper tagging studies (Conant et al. 2009). The majority of loggerhead nesting in the Northwest Atlantic is concentrated along the U.S. Coast from southern Virginia to Alabama. Additional nesting beaches are found along the northern and western U.S. Gulf of Mexico, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas, off the southwestern coast of Cuba, and along the coasts of Central America, Colombia, Venezuela and the eastern Caribbean Islands (Addison and Morford, 1996; Addison, 1997; Moncada Gavilán 2001). From a global perspective, the loggerhead nesting aggregation in the southeastern U.S. is second in size only to the nesting aggregations in the Arabian Sea off Oman, making it one of the most important nesting aggregations for the species.

Non-nesting, adult female loggerheads are reported in nearshore and offshore waters throughout the U.S. and Caribbean Sea (Foley et al. 2008) and recent tagging studies conducted in the U.S. Gulf of Mexico suggest that sea turtles nesting along the Gulf coast of Florida and the Florida Panhandle generally do not leave the region for extended periods throughout the year (TEWG2009). Significant numbers of male and female loggerheads forage in shallow water habitats with large expanses of open ocean access (such as Florida Bay) year-round while juveniles are also found in enclosed, shallow water estuarine environments (Epperly et al. 1995b).

In terms of population structure for the Northwest Atlantic Ocean DPS, NMFS and USFWS (2008) identified and evaluated five separate recovery units (i.e., nesting subpopulations): the Northern U.S. (Florida/Georgia border to southern Virginia); Peninsular Florida (Florida/Georgia border south through Pinellas County, excluding the islands west of Key West, Florida); Dry Tortugas (islands west of Key West, Florida); Northern U.S. Gulf of Mexico (Franklin County, Florida, west through Texas); and Greater Caribbean (Mexico through French Guiana, The Bahamas, Lesser and Greater Antilles). All Northwest Atlantic recovery units are reproductively isolated from populations occurring within the Northeast Atlantic, South Atlantic and Mediterranean Sea.

*Status*

Loggerhead sea turtles have been impacted historically by domestic fishery operations that often capture, injure and even kill sea turtles at various life stages. In the U.S., the bottom trawl, sink gillnets, hook and line gear, and bottom longline managed in the Northeast Multispecies Fishery are known to frequently capture sea turtles during normal fishery operations (Watson et al. 2004; Epperly et al. 1995; Lewison et al. 2003, Lewison et al. 2004; Richards 2007) while the lines used for pot gear for the U.S. Lobster and Red Crab fisheries cause entanglement resulting in injury to flippers, drowning, and increased vulnerability to boat collisions (Lutcavage et al. 1997). In addition, various trawl, gillnet, longline, and hook gears used for the Monkfish, Spiny Dogfish, Summer Flounder, Scup, Black Sea Bass, and Atlantic Highly Migratory Species fisheries managed in the U.S. impact sea turtles at various degrees.

In the Caribbean region, sea turtles are impacted by the Atlantic pelagic longline, Caribbean reef fish and spiny lobster fisheries in addition to various state and artisanal fisheries. The estimated number of loggerhead sea turtles caught by pelagic longline fisheries during the period 1992-2002 for all geographic areas was 10,034 individuals of which 81 were estimated to be dead when brought to the vessel (NMFS 2004). Actual mortalities associated with pelagic longline were likely substantially higher given the fact that these numbers did not include post-release mortalities because of hooking injuries.

In nearshore waters, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997). Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, and scientific research activities.

Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and renourishment, and sand extraction (Lutcavage et al. 1997; Bouchard et al. 1998). These factors may directly, through loss of beach habitat, or indirectly, through changing thermal profiles and increasing erosion, serve to decrease the amount of nesting area available to females and may evoke a change in the natural behaviors of both adults and hatchlings (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). Mosier (1998) reported that fewer loggerheads made nesting attempts on beaches fronted by seawalls and found that when turtles did emerge in the presence of armoring structures, more returned to the water without nesting than those on non-armored beaches.

For nesting subpopulations occurring in the Northwest Atlantic, the Peninsular Florida and Northern U.S. units support the greatest numbers of nesting females (i.e., over 10,000 for the Peninsular Florida unit and over 1,000 for the Northern U.S. unit) while the other three nesting subpopulations (i.e., Northern U.S. Gulf of Mexico, Dry Tortugas, and Greater Caribbean units) contain fewer than 1,000 nesting females based on count data (Ehrhart et al. 2003; Kamezaki et al. 2003; Margaritoulis et al. 2003; TEWG 2009).

According to the most recent status review for the species in 2011, all nesting subpopulations occurring in the Northwest Atlantic Ocean show declining trends in the annual number of nests for which they were adequate data (NMFS and USFWS 2008; Conant et al 2009; TEWG 2009). The Peninsular Florida nesting subpopulation, which represents approximately 87% of all nesting effort in the Northwest Atlantic Ocean DPS has declined 26% over a recent 20-year study period (1989–2008) with a greater decline (41 percent) occurring in the latter 10 years of the study (NMFS and USFWS 2008; Witherington et al. 2009). The second largest nesting subpopulation (i.e., Northern U.S.) also saw annual declines of 1.3% since 1983 (NMFS and USFWS 2008) while the third largest recovery unit (i.e., Greater Caribbean) saw annual declines of over 5% occurring over the period 1995-2006 (TEWG 2009). The two smallest nesting subpopulations (i.e., Northern U.S. Gulf of Mexico and Dry Tortugas) have also seen declines in nest counts since the mid-1990s; however, these units represent only a small fraction in loggerhead nesting and are not considered good indicators of the overall trend. In addition, a detailed analysis of Florida's long-term loggerhead nesting data (1989-2011) revealed that following a 24% increase between 1989 and 1998, nest counts for Florida beaches declined 16% between 1998 and 2011. More recent nest counts in 2011 were close to the average for the preceding five-year period suggesting the recent trend may be stabilizing (FWC 2011).

At present, there are no reliable estimates of population size of loggerheads occurring in the pelagic and oceanic environments (Bjorndal and Bolten 2000); however, recent data collected from in-water studies reveal some patterns of abundance and/or size composition of loggerheads occurring in the Northwest Atlantic. The 2009 Turtle Expert Working Group report summarized in-water capture and strandings data[6] spanning over four decades from the late 1970’s through

[6] Data were compiled from turtle captures recorded for the St. Lucie Power Plan in Florida since 1976, entanglement surveys conducted in the Indian River in Florida since 1982 (see Ehrhart et al. 2007), fishery-independent trawl surveys off the southeastern U.S. [see South Carolina Marine Resources Research Institute (SCMRI), 2000], pound-net captures off North

the late 2000's. Data from the southeastern U.S. (from central North Carolina through central Florida) indicated a possible increase in the abundance of neritic loggerheads captured over the past one to two decades while aerial surveys and one other in-water study conducted in the northeastern U.S. (north of Cape Hatteras, North Carolina) indicate a decrease in abundance over similar periods (TEWG 2009).

This increase in catch rates for the southeastern U.S. was not consistent with the declines in nesting seen over the same period. The authors suggested that the apparent increase in in-water catch rates in the southeastern U.S. coupled with a shift in median size of captured juveniles might indicate there is a relatively large cohort that will be reaching sexual maturity in the near future. However, additional data from the review suggests that any increase in adults may be temporary because in-water studies throughout the entire eastern U.S. also indicated a substantial decrease in the abundance of smaller sized juveniles that, in turn, would indicate possible recruitment failure.

However, the authors also stated these trends should be viewed with caution given the limited number and size of studies dedicated to assessing in-water abundance of loggerheads as well as the lack of longer-term studies that could more adequately determine what impact, if any, these trends have on recruitment and/or survival rates for the population.

The loggerhead sea turtle Biological Review Team recently conducted two independent analyses using nesting data (including counts of nesting females or nests) to assess extinction risks for the identified DPS using methods developed by Snover and Heppell (2009). The analysis performed for the status review indicated that the Northwest Atlantic Ocean DPS had a high likelihood of quasi-extinction over a wide range of quasi-extinction threshold values, suggesting that the DPS is likely to continue to decline in future years (Conant et al. 2009).

As post-hatchlings, loggerheads hatched on U.S. beaches migrate offshore and become associated with *Sargassum spp.* habitats, driftlines and other convergence zones (Carr, 1986; Witherington 2002). They are believed to lead a pelagic existence in the North Atlantic Gyre for a period as long as 7-12 years (Bolten et al. 1998) although Snover (2002) suggests a much longer oceanic juvenile stage duration with a range of 9-24 years and a mean of 14.8 years. Stranding records indicate that when immature loggerheads reach 40-60 centimeters straight carapace length, they then travel to coastal inshore waters of the continental shelf throughout the U.S. Atlantic and U.S. Gulf of Mexico (Witzell et al. 2002). Other studies, however, have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Laurent et al. 1998; Bolten 2003). These studies suggest some turtles may either remain in the pelagic habitat in the North Atlantic longer than hypothesized or move back and forth between pelagic and coastal habitats interchangeably (Witzell et al. 2002).

After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay south to Florida, the Bahamas, Cuba and the U.S.

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Carolina (see Epperly et al. 2007 and off New York (see Morreale and Standora, 1998; Morreale et al. 2005), and strandings data maintained by the Sea Turtle Stranding and Salvage Network.

Gulf of Mexico (neritic refers to the inshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters). Benthic, immature loggerheads foraging in northeastern U.S. waters are also known to migrate southward in the fall as water temperatures cool and then migrate back northward in spring (Epperly et al. 1995; Keinath, 1993; Morreale and Sandora, 1998; Shoop and Kenney, 1992). 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 found in coastal waters and prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

#### *6.2.6.2 North Pacific Ocean Distinct Population Segment*

Loggerheads can be found throughout tropical to temperate waters in the Pacific; however, their breeding grounds include a restricted number of sites. Within the North Pacific, loggerhead nesting has been documented only in Japan (Kamezaki et al. 2003), although low-level nesting may occur outside of Japan in areas surrounding the South China Sea (Chan et al. 2007). Despite this limited nesting distribution, these loggerhead sea turtles undertake extensive developmental migrations using the Kuroshio and North Pacific Currents, and some of them reach the vicinity of Baja California in the eastern Pacific. After spending years foraging in the central and eastern Pacific, loggerheads return to their natal beaches for reproduction and remain in the western Pacific for the remainder of their life cycle.

*Status*

Destruction and modification of loggerhead nesting habitat in the North Pacific result from coastal development and construction, placement of erosion control structures and other barriers to nesting, beachfront lighting, vehicular and pedestrian traffic, sand extraction, beach erosion, beach sand placement, beach pollution, removal of native vegetation, planting of non-native vegetation (NMFS and USFWS, 1998c). Beaches in Japan where loggerheads nest are extensively eroded due to dredging and dams constructed upstream, and are obstructed by seawalls as well. The use of loggerhead meat for food was historically popular in local communities such as Kochi and Wakayama prefectures. In addition, egg collection was common in the coastal areas during times of hunger and later by those who valued loggerhead eggs as revitalizers or aphrodisiacs and acquired them on the black market (in Kamezaki et al. 2003; Takeshita 2006).

Overutilization for commercial purposes in both Japan and Mexico likely was a factor that contributed to the historical declines of this DPS. Current illegal harvest of loggerheads in Baja, California for human consumption continues as a significant threat to the persistence of this DPS. In addition, fishery bycatch that occurs throughout the North Pacific Ocean, including the coastal pound net fisheries off Japan, coastal fisheries affecting juvenile foraging populations off Baja California, Mexico, and undescribed fisheries likely affecting loggerheads in the South China Sea and the North Pacific Ocean is a significant threat to the persistence of this DPS. Kamezaki et al. (2003) concluded a substantial decline (50–90%) in the size of the annual loggerhead nesting population in Japan since the 1950s. Snover (2008) combined nesting data from the Sea Turtle Association of Japan and data from Kamezaki et al. (2002) to analyse an 18-year time series of nesting data from 1990–2007. Nesting declined from an initial peak of approximately 6,638 nests in 1990– 1991, followed by a steep decline to a low of 2,064 nests in 1997. During the past decade, nesting increased gradually to 5,167 nests in 2005 declined and then rose again to a high of just under 11,000 nests in 2008. Estimated nest numbers for 2009 were about 7,000–8,000 nests. While nesting numbers have gradually increased in recent years and the number for 2009 was similar to the start of the time series in 1990, historical evidence from Kaunda Beach (census data dates back to the 1950s) indicates that there has been a substantial decline over the last half of the 20th century (Kamezaki et al. 2003) and that current nesting represents a fraction of historical nesting levels.

North Pacific loggerhead sea turtles occur in coastal waters of Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. Other important juvenile turtle foraging areas have been identified off the coast of Baja California Sur, Mexico (Pitman 1990; Peckham and Nichols 2006; Peckham et al. 2007).

### 6.2.7 Olive Ridley Sea Turtle

The olive ridley sea turtle is a small, mainly pelagic, sea turtle with a circumtropical distribution. The species was listed under the ESA in 1978. The species was separated into two listing designations: endangered for breeding populations on the Pacific coast of Mexico, and threatened wherever found except where listed as endangered (i.e., in all other areas throughout its range). We used information available in the recovery plan (NMFS and USFWS 1998e) and recent status reviews (NMFS and USFWS 2007e, 2015) to summarize the status of the threatened listing as follows.

Olive ridley sea turtles occur in the tropical waters of the Pacific and Indian Oceans from Micronesia, Japan, India and Arabia south to northern Australia and southern Africa. In the Atlantic Ocean off the western coast of Africa and the coasts of northern Brazil, French Guiana, Surinam, Guyana, and Venezuela in South America, and occasionally in the Caribbean Sea as far north as Puerto Rico. In the eastern Pacific Ocean, olive ridley sea turtles are found from the Galapagos Islands north to California. While olive ridley turtles have a generally tropical to subtropical range, individual turtles have been reported as far as the Gulf of Alaska (Hodge and Wing 2000).

*Status*

The Mexican turtle fishery caused rapid, large declines at olive ridley arribada beaches in Mexico (Cliffion et al. 1982). An estimated 75,000 turtles were taken each year over two decades until 1990 when the fishery closed (Aridjis 1990). The fishery closure is generally believed to have resulted in an increase in the population (Marquez. et al. 1996, Godfrey 1997, Pritchard 1997), while others caution the interpretation of the data (Ross 1996).

Large-scale egg harvests historically occurred at arribada beaches in Mexico, concurrent with the use of adult turtles at these beaches (Cliffion et al. 1982*).* The nationwide ban on harvest of nesting females and eggs has decreased the threat to the endangered population. However, illegal egg use is still believed to be widespread. Approximately 300,000-600,000 eggs were seized each year from 1995-1998 (Trinidad and Wilson 2000).

Incidental capture in fisheries remains a serious threat in the eastern Pacific (Frazier et al. 2007) where olive ridleys aggregate in large numbers off nesting beaches (Kalb et al. 1995), but the information available is incomplete (Pritchard and Plotkin 1995, NMFS and USFWS 1998d). Incidental captures of olive ridleys in this region have been documented in shrimp trawl fisheries, longline fisheries, purse seine fisheries, and gillnet fisheries (Frazier et al. 2007). Incidental capture of sea turtles in shrimp trawls is a serious threat along the coast of Central America, with an estimated annual capture for all species of marine turtles exceeding 60,000 turtles, most of which are olive ridleys (Arauz 1996). Recent growth in the longline fisheries of this region is also a serious and growing threat to olive ridleys and has the potential to capture hundreds of thousands of ridleys annually (Frazier et al. 2007).

The current abundance of olive ridleys compared with former abundance at each of the large arribada beaches indicates the populations experienced steep declines (Cliffton et al. 1982). Based on qualitative information, Cliffton et al. (1982) derived a conservative estimate of 10 million adults prior to 1950. By 1969, after years of adult harvest, the estimate was just over one million (Cliffion et al. 1982). At-sea estimates of density and abundance of the olive ridley were determined by shipboard line-transects conducted along the Mexico and Central American coasts in 1992 1998 1999, 2000, 2003 and 2006 (Eguchi et al. 2007). A weighted average of the yearly estimates was 1.39 million, which is consistent with the increases seen on the eastern Pacific nesting beaches over the last decade (Eguchi et al. 2007).

Olive ridley sea turtles may move between the oceanic zone (the vast open ocean environment from the surface to the sea floor where water depths are greater than 200 meters) and the neritic zone (the inshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters) (Plotkin et al. 1995, Shanker et al. 2003) or just occupy neritic waters (Reichart 1993). They nest along continental margins and oceanic islands.

# 7 Environmental Baseline

The Environmental Baseline includes the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02).

This section contains a description of the effects of past and ongoing human factors leading to the current status of the species, their habitat, and ecosystem, within the action area. The environmental baseline is a snapshot of the factors affecting the species and includes 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 consultation are also part of the environmental baseline, as are implemented and ongoing federal and other actions within the action area that may benefit ESA-listed species. The purpose of describing the environmental baseline in this manner is to provide context for the effects of the proposed action on the ESA-listed species.

NMFS has undertaken a number of section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered sea turtle species, and when appropriate, has authorized the incidental taking of these species. Each of those consultations sought to minimize the adverse effects of the action on these species. The summary below of federal actions and the effects these actions have had on these species includes only those federal actions in the action areas that have already concluded or are currently undergoing formal section 7 consultation. Specific threats to a particular species are discussed in the corresponding status of the species (Section 6.2.2 – 6.2.7) where appropriate.

## 7.1 Fisheries

Formal section 7 consultations have been conducted on multiple fisheries occurring within the action area. Effects of these fisheries to specific turtle species are described in Sections 6.2.2 – 6.2.7. Turtles can become entangled in gillnets, pound nets, and the lines associated with longline and trap and pot fishing gear, and may be injured or drown. Longline gear can also hook turtles in the jaw, esophagus, or flippers. Trawls that do not employ Turtle Excluder Devices do not allow turtles to escape. Turtles trapped in these trawls may be injured or drown. Fishing dredges can crush and entrap turtles and can cause death and serious injury. In the Pacific, coastal gillnet and other fisheries conducted from a multitude of smaller vessels are of increasing concern. These fisheries, known as artisanal fisheries, can collectively have a very great impact on local turtle populations, especially leatherbacks and loggerheads.

## 7.2 Federal Activity and Military Operations

Watercraft are the greatest contributors to overall noise in the sea and have the potential to interact with sea turtles though direct impacts or propellers. Sound levels and tones produced are generally related to vessel size and speed. Larger vessels generally emit more sound than smaller vessels, and vessels underway with a full load, or those pushing or towing a load, are noisier than unladen vessels. Vessels operating at high speeds have the potential to strike sea turtles. Potential sources of adverse effects from federal vessel operations in the action area include operations of the U.S. Department of Defense, Bureau of Ocean Energy Management, Federal Energy Regulatory Commission, U.S. Coast Guard, NOAA, and U.S. Army Corps of Engineers.

### 7.2.1 Military

Multiple ESA section 7 consultations on U.S. Navy activities have been completed, including on U.S. Navy training exercises and testing activities in the Northwest Training and Testing Study Area (NMFS 2015); U.S. Navy Surveillance Towed Array Sensor System Low Frequency Active Sonar training, testing and operations for 2015-2016 (NMFS 2015b); U.S. Military training exercises and testing activities in the Mariana Islands (NMFS 2015c); and U.S. Navy training exercises and testing activities in Hawaii / Southern California (NMFS 2015d). These biological opinions concluded that takes would occur, but that the activities were not likely to jeopardize the continued existence of any ESA-listed sea turtle species.

### 7.2.2 Offshore Energy

NMFS has also conducted multiple section 7 consultations related to energy projects with Bureau of Ocean Energy Management, Federal Energy Regulatory Commission, and the United States Maritime Administration. Through the section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to ESA-listed species. However, they present the potential for some level of take of turtles.

### 7.2.3 Dredging

Marine dredging vessels are common within U.S. coastal waters. Although the underwater noises from dredge vessels are typically continuous in duration (for periods of days or weeks at a time) and strongest at low frequencies, they are not believed to have any long-term effect on sea turtles. However, the construction and maintenance of federal navigation channels and dredging in sand mining sites ("borrow areas") have been identified as sources of sea turtle mortality.

Hopper dredges in the dredging mode are capable of moving relatively quickly compared to sea turtle swimming speed and can thus overtake, entrain, and kill sea turtles as the suction draghead(s) of the advancing dredge overtakes the resting or swimming turtle. Entrained sea turtles rarely survive. NMFS has completed regional biological opinions on the impacts of U.S. Army Corps of Engineers' hopper- dredging operations and determined hopper dredging would not jeopardize the continued existence of any sea turtle species (see NMFS 1997, 2007, for examples). Numerous other biological opinions have also been issued on navigation channel improvements and beach restoration projects (see NMFS 2005, 2007b, for examples).

### 7.2.4 Vessel Traffic

Data show that vessel traffic is one cause of sea turtle mortality (Lutcavage et al. 1997). Stranding data for the U.S. Gulf of Mexico and Atlantic coasts show that vessel-related injuries are noted in stranded sea turtles. 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. Although the U.S. Army Corps of Engineers - permitted docks and boats may determine the location of recreational vessels, for most projects, the docks themselves are not believed to result in increases of the number recreational vessels on the water.

Operations of vessels by other federal agencies within the action area (NOAA, Environmental Protection Agency, and U.S. Army Corps of Engineers) 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.

## 7.3 Oil and Gas Exploration and Extraction

Federal and state oil and gas exploration, production, and development are expected to result in some sublethal effects to protected species, including impacts associated with the explosive removal of offshore structures, seismic exploration, marine debris, oil spills, and vessel operation. Many section 7 consultations have been completed on oil and gas lease activities. These consultations have concluded that sea turtle takes may also result from vessel strikes, marine debris, and oil spills (see NMFS 2002, 2002b, 2003for examples).

*Impact of DWH Oil Spill on Status of Sea Turtles*

On April 20, 2010, while working on an exploratory well approximately 50 miles offshore Louisiana, the semi-submersible drilling rig DWH experienced an explosion and fire. The rig subsequently sank and oil and natural gas began leaking into the U.S. Gulf of Mexico. Oil flowed for 86 days, until finally being capped on July 15, 2010. Approximately 3.19 million barrels (134 million gallons) of oil were released into the Gulf. Additionally, approximately 1.84 million gallons of chemical dispersant was applied both subsurface and on the surface to attempt to break down the oil. There is no question that the unprecedented DWH event and associated response activities (e.g., skimming, burning, and application of dispersants) have resulted in adverse effects on ESA-listed sea turtles.

In accordance with the Oil Pollution Act of 1990 and the National Environmental Policy Act, the federal and state natural resource trustee agencies (Trustees) have prepared a Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. In the Programmatic Damage Assessment and Restoration Plan, the Trustees determined that four of the five species of sea turtles that inhabit the U.S. Gulf of Mexico were injured by the DWH oil spill (loggerhead, Kemp's ridley, green, and hawksbill). Leatherbacks were also likely exposed to oil, but injury could not be confirmed. Sea turtles were injured by oil or response activities in open ocean, nearshore, and shoreline environments and resulting mortalities spanned multiple life stages. The Trustees estimated that between 4,900 and up to 7,600 large juvenile and adult sea turtles (Kemp's ridleys, loggerheads, and hard-shelled sea turtles not identified to species) and between 55,000 and up to 160,000 small juvenile sea turtles (Kemp's ridleys, green turtles, loggerheads, hawksbills, and hard-shelled sea turtles not identified to species) were killed by the DWH oil spill. Additionally, nearly 35,000 hatchling sea turtles (loggerheads, Kemp's ridleys, and green turtles) were injured by response activities, and thousands more Kemp's ridley and loggerhead hatchlings were lost due to unrealized reproduction of adult sea turtles that were killed by the DWH oil spill.

Please refer to the PDARP/PEIS for additional details on how exposure to oil was document, and how injury was quantified (Deepwater Horizon Natural Resource Damage Assessment Trustees 2016).

The PDARP/PEIS identified several approaches for sea turtle restoration to restore the sea turtles that were lost during the oil spill event. Restoration for sea turtles will reduce threats in the marine and terrestrial environments to reduce mortality and enhance survivorship of all life stages. The PDARP/PEIS also describes the process through with the Trustees will work together to develop strategies for restoration, which will be implemented in the coming years. Other than emergency restoration efforts, most restoration efforts have yet to be determined and implemented, and so the ultimate beneficial restoration impacts on the species are unknowable at this time, but will work to restore for the sea turtle injury, described above.

## 7.4 ESA Permits

Sea turtles are the focus of research activities authorized by section 10 permits under the ESA. Regulations developed under the ESA allow for the issuance of permits allowing take of certain ESA-listed species for the purposes of scientific research under Section 10(a)(1)(A) of the ESA. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, to blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally captured sea turtles. The number of authorized takes varies widely depending on the research and species involved, but may involve the taking of hundreds of sea turtles annually. Most takes authorized under these permits are expected to be (and are) non-lethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations. In addition, since issuance of the permit is a federal activity, issuance of the permit by NMFS must also be reviewed for compliance with section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species or adverse modification of its critical habitat.

## 7.5 State or Private Actions

Various fishing methods used in state commercial and recreational fisheries, including gillnets, fly nets, trawling, pot fisheries, pound nets, and vertical line are all known to incidentally take sea turtles, but information on these fisheries is sparse. Most of the state data are based on extremely low observer coverage, or sea turtles were not part of data collection; thus, these data provide insight into gear interactions that could occur but are not indicative of the magnitude of the overall problem. Specific threats that these fisheries may pose to the species are described in Sections 6.2.2 – 6.2.7.

## 7.6 Marine Pollution and Environmental Contamination

*Debris*

For sea turtles, ingestion of debris and the resultant blocking the digestive tract is a major source of death and serious injury (Lutcavage et al. 1997). Lazar and Gracan (2011) found that 35% of loggerheads had plastic in their gut. A Brazilian study found that 60% of stranded green sea turtles had ingested marine debris (primarily plastic and oil; (Bugoni et al. 2001). Loggerhead sea turtles had a lesser frequency of marine debris ingestion. Plastic is possibly ingested out of curiosity or due to confusion with prey items; for example, plastic bags can resemble jellyfish (Milton and Lutz 2003). Marine debris consumption has been shown to depress growth rates in post-hatchling loggerhead sea turtles, elongating the time required to reach sexual maturity and increasing predation risk (McCauley and Bjorndal 1999). Sea turtles can also become entangled and die in marine debris, such as discarded nets and monofilament line (Laist et al. 1999; Lutcavage et al. 1997). This fundamentally reduces the reproductive potential of affected populations, many of which are already declining.

*Contaminants*

Sources of pollutants along the action area include atmospheric loading such as polychlorinated biphenyls, stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean, groundwater and other discharges. Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. 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 thoroughly investigated.

Oil spills can impact wildlife directly through three primary pathways: ingestion – when animals swallow oil particles directly or consume prey items that have been exposed to oil, absorption – when animals come into direct contact with oil, and inhalation – when animals breath volatile organics released from oil or from "dispersants" applied by response teams in an effort to increase the rate of degradation of the oil in seawater. Several aspects of sea turtle biology and behavior place them at particular risk, including the lack of avoidance behavior, indiscriminate feeding in convergence zones, and large pre dive inhalations (Milton et al. 2003).

When large quantities of oil enter a body of water, chronic effects such as cancer, and direct mortality of wildlife becomes more likely (Lutcavage et al. 1997). Oil spills in the vicinity of nesting beaches just prior to or during the nesting season could place nesting females, incubating egg clutches, and hatchlings at significant risk (Fritts and McGehee 1982; Lutcavage et al. 1997; Witherington 1999). Continuous low-level exposure to oil in the form of tar balls, slicks, or elevated background concentrations also challenge animals facing other natural and anthropogenic stresses. Types of trauma can include skin irritation, altering of the immune system, reproductive or developmental damage, and liver disease (Keller et al. 2004; Keller et al. 2006). Chronic exposure may not be lethal by itself, but it may impair a turtle's overall fitness so that it is less able to withstand other stressors (Milton et al. 2003).

The earlier life stages of living marine resources are usually at greater risk from an oil spill than are adults. This is especially true for hatchlings, since they spend a greater portion of their time at the sea surface than do adults; thus, their risk of exposure to floating oil slicks is increased (Lutcavage et al. 1995). One of the reasons might be the simple effects of scale: for example, a given amount of oil may overwhelm a smaller immature organism relative to the larger adult.

The metabolic machinery an animal uses to detoxify or cleanse itself of a contaminant may not be fully developed in younger life stages. In addition, in early life stages, animals may contain proportionally higher concentrations of lipids, to which many contaminants such as petroleum hydrocarbons bind. 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.

There are studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Aguirre et al. 1994; Caurant et al. 1999; Corsolini et al. 2000). Mckenzie et al. (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in sea turtles tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age.

Thirty- four percent of post-hatchlings captured in *sargassum ssp.* off the Florida coast had tar in the mouth or esophagus and more than 50% had tar caked in their jaws (Witherington 1994). These zones aggregate oil slicks, such as a Langmuir cell, where surface currents collide before pushing down and around, and represents a virtually closed system where a smaller weaker sea turtle can easily become trapped (Carr 1987; Witherington 2002). 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.

### 7.6.1 Climate Change

Past, present, and future impacts of global climate change may be exacerbated and accelerated by human activities. Some of the likely effects are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides some background information on these and other measured or anticipated effects

While there is some uncertainty as to the effects of climate change on sea turtles, significant impacts to the hatchling sex ratios of sea turtles may be a significant threat (NMFS and USFWS 2007c). In sea turtles, sex is determined by the ambient sand temperature (during the middle third of incubation) with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007c).

The effects from increased temperatures may be intensified on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). These impacts will be exacerbated by sea level rise. If females nest on the seaward side of the erosion control structures, nests may be exposed to repeated tidal overwash (NMFS and USFWS 2007c).

Sea level rise from climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006). Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc.) which could ultimately affect the primary foraging areas of sea turtles.

## 7.7 Other Threats

Predation by various land predators is a threat to developing nests and emerging hatchlings. The major natural predators of sea turtle nests are mammals, including raccoons, dogs, pigs, skunks, and badgers. These mammals as well as ghost crabs, laughing gulls, and introduced species, such as South American fire ants (*Solenopsis spp.*), prey upon eggs and hatchlings. In addition to natural predation, direct harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges. Diseases, toxic algal blooms, and cold stunning events are additional sources of mortality that can range from local to wide-scale and can impact hundreds or thousands of animals.

## 7.8 Actions Taken to Reduce Threats

Actions have been taken to reduce man-made impacts to sea turtles from various sources, particularly since the early 1990s. These include lighting ordinances, predation control, and nest relocations to help increase hatchling survival, as well as measures to reduce the mortality of pelagic immatures, benthic immatures and sexually mature age classes from various fisheries and other marine activities. Some actions have resulted in significant steps towards reducing the recurring sources of mortality of sea turtles in the environmental baseline and improving the status of all sea turtle populations in the Atlantic and U.S. Gulf of Mexico. For example, the Turtle Excluder Device regulation published on February 21, 2003 (68 FR 8456), represents a significant improvement in the baseline effects of trawl fisheries on sea turtles, though shrimp trawling is still considered to be one of the largest sources of anthropogenic mortality for sea turtle species (NMFS SEFSC 2009).

### 7.8.1 Conservation and Recovery Actions Benefiting ESA-listed Species

NMFS has implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles from commercial fisheries in the action area. These include sea turtle release gear requirements for Highly Migratory Species and Turtle Excluder Device requirements for the shrimp trawl fisheries. These regulations have relieved some of the pressure on sea turtle populations.

Under Section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions of ESA-listed species. NMFS has agreements with all states in the action area. Prior to issuance of these agreements, the proposal must be reviewed for compliance with section 7 of the ESA. Participants along the Atlantic and U.S. Gulf of Mexico coasts not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles.

*Sea Turtle Handling and Resuscitation Techniques*

NMFS published a final rule (66 FR 67495) on December 31, 2001 that detailed handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to handle and resuscitate (as necessary) sea turtles as prescribed in the final rule. These measures help to prevent mortality of hard-shelled turtles caught in fishing or scientific research gear.

On August 3, 2007, NMFS published a final rule requiring selected fishing vessels to carry observers on board to collect data on sea turtle interactions with fishing operations, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address prohibited sea turtle takes may be necessary (72 FR 43176). This rule also extended the number of days NMFS observers placed in response to a determination by the Assistant Administrator that the unauthorized take of sea turtles may be likely to jeopardize their continued existence under existing regulations, from 30 to 180 days.

*Other Actions*

Status reviews were completed in 2007 for green, hawksbill, Kemp’s ridley, leatherback, and loggerhead sea turtles. These reviews were conducted to comply with the ESA mandate for periodic status evaluation of ESA-listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at this time.

Further review of species data for the green, hawksbill, leatherback, and loggerhead sea turtles was recommended to evaluate whether DPS should be established for these species (NMFS and USFWS 2007; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e). The Services completed a revised recovery plan for the loggerhead sea turtle on December 8, 2008, (NMFS and USFWS 2008) and published a final rule on September 22, 2011, listing loggerhead sea turtles as separate DPSs. A revised recovery plan for the Kemp’s ridley sea turtle was completed on September 22, 2011. NMFS finalized status reviews of Kemp's ridley in 2015, leatherback in 2013, and hawksbill sea turtles in 2013.

### 7.9 Summary of the Environmental Baseline

Many activities adversely affect sea turtles in the action area. These activities are ongoing and are expected to occur simultaneously with the proposed action. Fisheries in the action area have likely had the greatest adverse impacts on sea turtles in the mid to late1980s, when fishing efforts were near or at peak levels. With the decline of managed fishery species, fishing effort since that time has also generally been declining. Impacts associated with fisheries have also been reduced through the section 7 consultation process and regulations implementing effective bycatch reduction strategies. However, interactions with commercial and recreational fishing gear are still ongoing and are expected to occur.

Other environmental impacts including military activities, offshore energy activities, dredging, vessel traffic, oil and gas exploration and extraction, ESA Permits, state or private actions, marine pollution and environmental contamination and have also had and continue to have adverse effects on sea turtles. The recent DWH oil spill is also expected to have had an adverse impact on the baseline for sea turtles, but the extent of that impact is still being evaluated.

# 8 Effects of the Action

Section 7 regulations define "effects of the action" as the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline (50 CFR 402.02). Indirect effects are those that are caused by the proposed action and are later in time, but are reasonably certain to occur. This effects analyses section is organized following the stressor, exposure, response, risk assessment framework. The jeopardy analysis relies upon the regulatory definition of "to jeopardize the continued existence of an ESA-listed species," which is "to engage in an action that would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of an ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The scope of this biological opinion is on the effects STSSN activities will have to sea turtles and the populations that they comprise. We begin our analysis of the effects of the action by first reviewing the activities (i.e., disentanglement response, morphometric data collection) associated with the proposed action that are likely to adversely affect ESA-listed species in the action area (i.e., what the proposed action stressors are). This effects analyses section is organized following the stressor, exposure, response, risk assessment framework.

### 8.1 Stressors Associated with the Proposed Action

As noted in the *Description of the Action* in Section 4, the proposed activities are limited to direct takes while responding to incidents that have occurred because of human activity or to natural causes of illness, injury or mortality.

When a turtle is encountered in the water, the STSSN responder determines whether the turtle is alive. The response protocol is based upon this first determination. The STSSN responder looks for injuries associated with the entanglement and observes the turtle's behavior (e.g., lethargic, energetic). Based on the assessment and examination, the STSSN responder attempts to remove any gear that can be removed without further injury to the turtle. If the animal can be brought on board a vessel without further injury, the STSSN responder attempts to remove all external gear and treat the turtle for any associated injuries. If injuries are severe, and it is logistically possible, the turtle is transported to shore for transfer to a rehabilitation facility for veterinary care.

For live turtles that are not injured but need resuscitation, procedures specified in 50 CFR 223.206(d)(1) are followed. Throughout the processing period, the turtle will be kept moist with wet towels and pads on the deck of the boat. After all samples and measurements are taken, the turtle will be released back to the original location site. Equipment will be disinfected with a bleach solution according to STSSN protocols[7]. Activities on live animals will be short in duration (maximum 10 minutes).

The potential effects we expect to result from the proposed action are grouped into the following two categories:

1. Disentanglement, Resuscitation, and Transport to Shore; and

2. Measuring, Photographing, Weighing, and Tagging.

Actions that result in mortality affect each turtle species through the impact of the loss of individual turtles and through the loss of the reproductive potential of each turtle to its respective population. Similarly, serious injuries to ESA-listed species due to an action that result in an animal's inability to reproduce affects an ESA-listed species due to the loss of that animal's reproductive potential. These effects have the potential to reduce the likelihood of survival and recovery of species.

Based on a review of available information, we examine the effects of the proposed action on sea turtles below.

## 8.2 Exposure and Response

Based on data collected by NOAA, in the Atlantic and U.S. Gulf of Mexico between 2005 and 2015, 3,928 in-water stranded sea turtles were reported to the STSSN. The species composition of these events was 1,641 loggerheads, 1,659 green turtles, 47 leatherbacks, 80 hawksbills, 390 Kemp's ridleys and 111 unidentified species. The term "in-water stranded sea turtles" can be described as any animal encountered that is cold stunned, sick, injured, entangled or dead.

In the Hawaiian Islands, 972 in-water strandings were reported between 2005 and 2015. The species composition of these events was 913 greens, one leatherback, 47 hawksbills, 6 olive ridleys and one unknown turtle species. In the Oregon and Washington, 41 in-water strandings were reported between 2005 and 2015. The species composition of these events was 14 greens, one leatherback, 4 olive ridleys and one unknown species. In California, 60 sea turtles have been reported through the STSSN from 2005 to 2015. The species composition of these events was 4

[7] Protocols and other resources related to stranding response can be found at http://ocean.floridamarine.org/SeaTurtle/flstssn/flStssnResources.htm

loggerheads, 45 greens, 5 leatherbacks, 4 olive ridleys and 2 unknown species. We expect these numbers of exposures to STSSN activities to be similar in the future.

### 8.2.1 Disentanglement, Resuscitation and Transport to Shore

Handling a turtle in order to resuscitate, transport, or disentangle from gear can result in raised levels of stress hormones. However, it is not known whether these effects would exceed those resulting from the event that renders the animal in need of aid. We know that sea turtles found entangled in gear have been forcibly submerged and undergo respiratory and metabolic stress that can lead to severe disturbance of their acid-base balance. However, we would anticipate those effects to be temporary and minimal and the benefits of rescuing the turtles would outweigh any adverse effects.

While most voluntary dives by sea turtles appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status (pH level of the blood), sea turtles that are stressed as a result of being forcibly submerged through entanglement consume oxygen stores, triggering an activation of anaerobic glycolysis, and subsequently disturbing their acid-base balance, sometimes to lethal levels. It is likely that the rapidity and extent of the physiological changes that occur during forced submergence are functions of the intensity of struggling as well as the length of submergence (Lutcavage and Lutz 1997). In a study of venous blood gases and lactates of wild loggerhead turtles caught captured in 30 minute trawl tows and retrieved from pound nets in North Carolina, both capture methods resulted in perturbations in blood gas, acid-base and lactate status, although the changes were greater with trawl captured turtles (Harms et al. 2003).

Other factors to consider in the effects of forced submergence include the size of the turtle, ambient water temperature, and multiple submergences. Larger sea turtles are capable of longer voluntary dives than small turtles, so juveniles may be more vulnerable to the stress due to entanglement. During the warmer months, routine metabolic rates are higher, so the impacts of the stress due to entanglement may be magnified. With each forced submergence, lactate levels increase and require a long (even as much as 20 hours) time to recover to normal levels. Turtles are probably more susceptible to lethal metabolic acidosis if they experience multiple captures in a short period, because they would not have had time to process lactic acid loads (*in* Lutcavage and Lutz 1997).

Sea turtles forcibly submerged for extended periods show marked, even severe, metabolic acidosis because of high blood lactate levels. With such increased lactate levels, lactate recovery times are as long even as 20 hours. Kemp's ridley turtles stressed from capture in an experimental trawl experienced significant blood acidosis, which originated primarily from non-respiratory (metabolic) sources. Visual observations indicated that the average breathing frequency increased from approximately 1-2 breaths/minute pre-trawl to 11 breaths/minute post-trawl (a 5 to 10-fold increase). Given the magnitude of the observed acid-base imbalance created by these trawl experiments, complete recovery of homeostasis may have required 7 to 9 hours (Stabenau et al. 1991). Similar results were reported for Kemp's ridleys captured in entanglement nets, where turtles showed significant physiological disturbance, and post-capture recovery depended greatly on holding protocol (Hoopes et al. 2000).

This long recovery time suggests that turtles would be more susceptible to lethal metabolic acidosis if they experience multiple captures in a short period of time (*in* Lutcavage and Lutz 1997). Recapture would also depend on the condition of the turtle and the intensity of fishing pressure in the area. Stabenau and Vietti (2003) studied the physiological effects of multiple forced submergences in loggerhead turtles. The initial submergence produced severe and pronounced metabolic and respiratory acidosis in all turtles. Successive submergences produced significant changes in blood pH, percent carbon dioxide, and lactate, but as the number of submergences increased, the acid-base imbalances were substantially reduced relative to the imbalance caused by the first submergence. Increasing the time interval between successive submergences resulted in greater recovery of blood homeostasis. The authors conclude that as long as sea turtles have an adequate rest interval at the surface between submergences, their survival potential should not change with repetitive submergences.

Sea turtles also exhibit dynamic endocrine responses to stress. In male vertebrates, androgen and glucocorticoid hormones (corticosterone in reptiles) can mediate physiological and behavioral responses to various stimuli, influencing both the success and costs of reproduction. Typically, the glucocorticoid hormones increase in response to a stressor in the environment, including interaction with fishing gear. Elevated circulating corticosterone levels in response to a stressor may inhibit synthesis of hormones mediating reproduction, thus affecting the physiology or behavior underlying male reproductive success (Jessop et al. 2002). Jessop et al. (2002) examined whether adult male green turtles decreased corticosterone or androgen responsiveness to a capture/restraint stressor to maintain reproduction. Migrant breeders, which typically had overall poor body condition because they were relying on stored energy to maintain reproduction, had decreased adrenocortical activity in response to a capture/restraint stressor. Smaller males in poor condition exhibited a pronounced and classic endocrine stress response compared to the larger males with good body condition.

Respiratory and metabolic stress from forcible submergence is also correlated with additional factors such as size and activity of the sea turtle (including dive limits), water temperature, and biological and behavioral differences between species. These factors affect the survivability of an individual turtle. For example, larger sea turtles are capable of longer voluntary dives than small turtles, so juveniles may be more vulnerable to the stress of forced submergence than do adults. Gregory et al. (1996) found that corticosterone concentrations of captured small loggerheads were higher than those of large loggerheads captured during the same season. During the warmer months, routine metabolic rates are higher, so the impacts of the stress from entanglement or hooking may be magnified (e.g. Gregory et al. 1996). In addition, disease factors and hormonal status may play a role in anoxic survival during forced submergence. Any disease that causes a reduction in the blood oxygen transport capacity could severely reduce a sea turtle's endurance on a longline. Because thyroid hormones appear to have a role in setting metabolic rate, they may also play a role in increasing or reducing the survival rate of an entangled sea turtle (Lutz and Lutcavage 1997).

Turtles necropsied after being killed by longliners were found to have pathologic lesions. Two of the seven turtles (both leatherbacks) had lesions severe enough to cause probable organ dysfunction, although whether or not the lesions predisposed these turtles to being hooked could not be determined. Jessop et al. (2002) noted that, "We speculate that the stress-induced decrease in plasma androgen may function to reduce the temporary expression of reproductive behaviors until the stressor has abated. Decreased androgen levels, particularly during stress, are known to reduce the expression of reproductive behavior in other vertebrates, including reptiles." Small males with poor body condition that are exposed to stressors during reproduction and experience shifting hormonal levels may abandon their breeding behavior (Jessop et al. 2002).

Based on the above discussion, turtles undergo stressors because of entanglement, forced submergence, and/or injury. If these stressors are not removed, they could result in permanent sublethal or lethal effects. Whereas, handling, disentangling, and/or transporting a turtle may result in short-term stress only. We can logically conclude that the short-term stress resulting from handling, disentangling, and/or transporting are balanced by the long-term benefit of removing the animal from a life-threatening situation (e.g., freeing a struggling turtle from a tightly wrapped gill net or boarding a comatose turtle in order to resuscitate or transporting an injured sea turtle to a rehabilitation facility).

### 8.2.2 Measuring, Photographing, Weighing and Tagging

Handling, measuring, photographing, weighing and tagging can result in injury and raised levels of stressor hormones in sea turtles. However, these procedures are simple and not invasive and NMFS does not expect that individual turtles would normally experience more than short-term stresses because of these activities. All activities must occur in 10-minutes or less. No injury is expected from these activities, and turtles will be processed as quickly as possible to minimize stresses resulting from their capture. Responders are required to follow procedures designed to minimize the risk of either introducing a new pathogen into a population or amplifying the rate of transmission from animal to animal of an endemic pathogen when handling animals. We would anticipate any effects to be temporary and minimal. We also expect that the benefits of collecting information to help us better understand sources of entanglement, injury and mortality to sea turtles in order to prevent such events in the future, and to better respond to incidents that do occur, will outweigh any adverse effects to individual turtles.

Tagging activities are minimally invasive and all tag types have negatives associated with them, especially concerning tag retention. Plastic tags can become brittle, break and fall off underwater, and titanium tags can bend during implantation and thus not close properly, leading to tag loss; tag malfunction can result from rusted or clogged applicators or applicators that are worn from heavy use (Balazs 1999). Turtles that have lost external tags must be re-tagged if captured again later, which subjects them to additional effects of tagging. PIT tags have the advantage of being encased in glass, which makes them inert, and are positioned inside the turtle where loss or damage due to abrasion, breakage, corrosion or age over time is virtually non-existent (Balazs 1999).

Turtles can experience some discomfort during the tagging procedures and these procedures will produce some level of pain. The discomfort is usually short and highly variable between individuals (Balazs 1999). Most turtles barely seem to notice, while a few others exhibit a marked response. However, NMFS expects the stresses to be minimal and short-term and that the small wound-site resulting from a tag applied to the flipper should heal completely in a short period, similar to what happens when a person's ear is pierced for an earring. Similarly, turtles that must be re-tagged should also experience minimal short-term stress and heal completely in a short period. Re-tagging is not expected to appreciably affect these turtles. The proposed tagging methods have been regularly employed in sea turtle research with little lasting impact on the individuals tagged and handled (Balazs 1999).

### 8.2.3 Summary of Effects

Effects from takes pursuant to the proposed action would result from animals being disentangled from gear or debris, then treated and released. Dead animals will be salvaged and disposed of. Limited data will be collected from these animals. The scientific information that will be gathered from these efforts will help us to understand sources of entanglement, injury and mortality in order to prevent such events in the future. This understanding will also help to respond better to incidents that do occur. While there may be some physiological effects from handling, tagging, measuring and weighing turtles, those activities would have relatively low level, short-term physiological effects on individual animals.

The short-term stresses resulting from handling, transporting, measuring, photographing, weighing, flipper tagging, and PIT tagging are expected to be minimal. As discussed above, all work will be conducted as quickly as possible to minimize stresses and the responder would be required to exercise care when handling animals to minimize any further possible injury. To prevent further injury to the turtle, STSSN responders are trained to assess and examine turtles prior to handling the animal. If the animal can be brought on board a vessel without further injury, the STSSN follows established resuscitation protocols. During release, turtles would be lowered as close to the water's surface as possible, to prevent potential injuries. Effects from the actions will not result in any negative population or species level effects. We anticipate that any adverse effects to the turtles from STSSN activities will be temporary and minimal, and the benefits to the turtles from these activities will outweigh any such effects.

## 8.3 Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably expected to occur in the action area. 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.

The actions and their effects described as occurring within the action area (in the *Environmental Baseline* section above) are expected to occur in the future. NMFS is not aware of any proposed or anticipated changes in other human-related actions or natural conditions that would substantially change the impacts that each threat has on the sea turtles.

Stranding data indicate sea turtles in the action area die of various natural causes, including cold stunning and hurricanes, as well as human activities, such as incidental capture in state fisheries, ingestion of and/or entanglement in debris, ship strikes, and degradation of nesting habitat. The cause of death of most sea turtles recovered by the STSSN is unknown.

In addition to fisheries, NMFS is not aware of any proposed or anticipated changes in other human-related actions or natural conditions that would substantially change the impacts that each threat has on the sea turtles covered by this biological opinion. NMFS will continue to work with states to develop ESA Section 6 agreements and with researchers in Section 10 permits to enhance programs to quantify and mitigate these takes.

## 8.4 Integration and Synthesis

This section provides an integration and synthesis of the information presented in the Status of the Species, Environmental Baseline, Cumulative Effects, and Effects of the Action sections of this biological opinion. The intent of the following discussion is to provide a basis for determining the additive effects of the take authorized in the permit on ESA-listed sea turtles, in light of their present and anticipated future status.

The Status of the Species discussion describes how ESA-listed sea turtles affected by the actions outside the action area have been adversely affected by human-induced factors such as commercial fisheries, direct harvest of turtles, and modification or degradation of the turtle's terrestrial and aquatic habitat. Effects occurring in terrestrial habitats have generally resulted in the loss of eggs or hatchling turtles, or nesting females, while those occurring in aquatic habitat have caused the mortality of juvenile, subadult and adult sea turtles through entanglement or capture in fishing gear, ingestion of debris or pollution. Similarly, the actions discussed in the baseline, as well as those considered under Cumulative Effects all pose the potential to result in take of sea turtle species resulting in stress or possible mortality.

Species with delayed maturity such as sea turtles are demographically vulnerable to increases in mortality, particularly of juveniles and subadults, those stages with higher reproductive value. As discussed in the Status of the Species, the estimated age of sexual maturity varies with each species. The potential for an egg to develop into a hatchling, into a juvenile, and finally into a sexually mature adult sea turtle varies among species, populations, and the degree of threats faced during each life stage. Each juvenile that does not survive to produce will be unable to contribute to the maintenance or improvement of the species' status. Reproducing females that are prematurely killed due to the threats mentioned in the above sections, while possibly having contributing something before being removed from the population, will not be allowed to realize their reproductive potential. Similarly, reproductive males prematurely removed from the population will be unable to make their reproductive contribution to the species' population.

The activities that would take place as part of the proposed action are designed to maximize each handled turtle's ability to survive in the wild. While mortality may result from the injuries sustained during the event (e.g., entanglement in fishing gear) that would necessitate the activities as part of this proposed action, the proposed activities, themselves, are not designed to result in any further injury or mortality. Thus, the proposed action will not affect a handled/treated turtle's ability to reproduce and contribute to the recovery of the species (green, hawksbill, Kemp's ridley, leatherback, loggerhead or olive ridley sea turtles) discussed in this biological opinion.

The analyses conducted in the previous sections of this biological opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of any ESA-listed sea turtles. In Section 8, we outlined how the proposed action would affect these species at the individual level and the extent of those effects in terms of the number of associated interactions, captures, and mortalities of each species to the extent possible with the best available data.

"To jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of an ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). In making this conclusion for each species, we first look at whether there will be a reduction in the reproduction, numbers, or distribution. Then, if there is a reduction in one or more of these elements, we evaluate whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

The NMFS and USFWS's ESA Section 7 Handbook (USFWS and NMFS 1998) defines survival and recovery, as they apply to the ESA's jeopardy standard. Survival means "the species' persistence… beyond the conditions leading to its endangerment, with sufficient resilience to allow recovery from endangerment." Survival is the condition in which a species continues to exist into the future while retaining the potential for recovery. This condition is characterized by a sufficiently large population, represented by all necessary age classes, genetic heterogeneity, and number of sexually mature individuals producing viable offspring, which exists in an environment providing all requirements for completion of the species' entire life cycle, including reproduction, sustenance, and shelter. Recovery means "improvement in the status of an ESA-listed species to the point at which listing is no longer appropriate under the criteria set out in Section 4(a)(1) of the Act." Recovery is the process by which species' ecosystems are restored and/or threats to the species are removed so self-sustaining and self-regulating populations of ESA-listed species can be supported as persistent members of native biotic communities.

# 9 CONCLUSION

After reviewing the current status of the green, hawksbill, Kemp's ridley, leatherback, loggerhead or olive ridley sea turtles, the environmental baseline for the action area, the effects of the take authorized in the permit regulation, and probable cumulative effects, it is NMFS' biological opinion that issuance of the permit regulation, as proposed, will not reduce the likelihood of the survival and recovery of their populations by reducing their numbers, distribution, or reproduction. It is therefore our opinion that the proposed action is not likely to jeopardize the continued existence of green, hawksbill, Kemp's ridley, leatherback, loggerhead or olive ridley sea turtle species.

As noted in Section 8.2, based on data collected by NOAA[8], between 2005 and 2015 3,928 in-water stranded sea turtles were reported in the Atlantic and U.S. Gulf of Mexico; 972 in-water strandings were reported In the Hawaiian Islands; 41 in-water strandings were reported in Oregon and Washington; and 60 in water strandings were reported in California. We expect these numbers of exposures to STSSN activities to be similar in the future.

The proposed action and the activities provide a positive benefit to individual sea turtles by providing aid to injured, entangled, or sick turtles so that they may be released back into the environment. Any stress experienced because of the proposed action will result in temporary stress to the animal and is not expected to have more than short-term (maximum 10 minutes), non-lethal effects on individual sea turtles. Thus, the proposed action will not affect a handled/treated turtle's ability to reproduce and contribute to the recovery of the species (green, hawksbill, Kemp's ridley, leatherback, loggerhead or olive ridley sea turtles) discussed in this biological opinion. Therefore, NMFS does not expect the proposed activities to adversely affect

[8] These represent minimum numbers as all turtles found floating may not have been reported as such.

sea turtles in a way that appreciably reduces the number of animals born in a particular year; the reproductive success of adult female turtles; the survival of young turtles; or the number of young turtles that annually recruit into the adult, breeding populations of any population of green, hawksbill, Kemp's ridley, leatherback, loggerhead, or olive ridley sea turtles.

Mortality and serious injury are not anticipated because of the proposed action. The effects of the proposed action have the potential to elicit short-term stresses on the individual turtle that are not likely to result in long-term effects on these individuals, populations or species. Therefore, NMFS does not expect the STSSN activities to result in more than short-term effects on individual animals. In addition, NMFS does not expect any delayed mortality of turtles following their release as a direct result of the proposed activities. Based on the above, NMFS believes the proposed action will have long-term beneficial effects for sea turtles that are rescued and rehabilitated because of STSSN procedures, are returned to the environment, and are able to reproduce. The actions are therefore not likely to appreciably reduce the numbers, distribution, or reproduction of green, hawksbill, Kemp's ridley, leatherback, loggerhead, or olive ridley sea turtles in the wild that would appreciably reduce the likelihood of survival and recovery of these species.

# 10 Incidental Take Statement

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to: "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct." Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to ESA-listed species by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement.

The permit by regulation under which the STSSN operates is for directed take to aid stranded sea turtles; to collect limited data; and to salvage and dispose of dead carcasses of sea turtles in the marine environment. No incidental take of other ESA-listed species is anticipated or authorized. Therefore, this biological opinion does not authorize any take of any ESA-listed species or exempt any actions from the prohibitions of section 9(a) of the ESA. Any take is direct, and authorized by section 10(a) of the ESA as specified in the programmatic permit by regulation.

Basic STSSN data, including strandings by state, species, condition, and county/zone, for the Atlantic Ocean and U.S. Gulf of Mexico are available publicly by querying the "Weekly Reports" available at http://www.sefsc.noaa.gov/species/turtles/strandings.htm. All other stranding data is available upon request through the NMFS Southeast Fishery Science Center, NMFS West Coast Region and NMFS Pacific Islands Fishery Science Center for each respective data set.

# 11 CONSERVATION RECOMMENDATIONS

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

The proposed activities are meant to provide a positive benefit to individual sea turtles by providing aid to injured, entangled, or sick individuals so that they may be released back into the environment. As such, we have made no additional Conservation Recommendations for this action.

# 12 REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed action. 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 ESA-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 ESA-listed species or critical habitat that was not considered in the biological opinion; or 4) a new species is ESA-listed or critical habitat designated that may be affected by the identified action.

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