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

DEC 1 1 2017

Refer to NMFS No.: FPR-2017-9214

Mr. Eric J. Mosher
Co-Chair, Caribbean Regional Response Team
Chief, Response and Prevention Branch
U.S. Environmental Protection Agency, Region 2
2890 Woodbridge Avenue (MS 211)
Edison, NJ 00837-3679

Mr. Forest A. Willis
Co-Chair, Caribbean Regional Response Team
Incident Management Preparedness Advisor
U.S. Coast Guard District Seven
909 SE 1st Avenue
Miami, FL 33131-3050

RE: Endangered Species Act Section 7 Formal Consultation on the Use of Dispersants and In-Situ Burning in the U.S. Caribbean

Dear Messrs. Mosher and Willis:

Enclosed is the National Marine Fisheries Service's (NMFS) biological opinion on the effects of the Caribbean Regional Response Team's (CRRT) potential authorization of the use of dispersants and in-situ burning in waters of the U.S. Caribbean during oil spill response activities on endangered and threatened species under NMFS's jurisdiction and critical habitat that has been designated for those species. We have prepared the biological opinion pursuant to section 7(a)(2) of the Endangered Species Act, as amended (ESA; 16 U.S.C. 1536(a)(2)).

Based on our assessment, we concluded that the proposed action is not likely to jeopardize the continued existence of leatherback, hawksbill, or green (North and South Atlantic Distinct Population Segments [DPS]) sea turtles. We concluded the proposed action will have no effect on leatherback sea turtle critical habitat. We also concluded the proposed action is not likely to adversely affect designated critical habitat for the green sea turtle North Atlantic DPS or hawksbill sea turtles. We concluded the proposed action may affect, but is not likely to adversely affect blue, fin, sei, and sperm whales; Nassau grouper; loggerhead sea turtles (Northwest Atlantic Ocean DPS); scalloped hammerhead sharks (Central and Southwest Atlantic DPS); and elkhorn, staghorn, lobed star, boulder star, mountainous star, pillar, and rough cactus corals. We also concluded the proposed action is not likely to adversely affect designated critical habitat for elkhorn and staghorn corals (Puerto Rico, St. Thomas/St. John, and St. Croix units).

This concludes section 7 consultation on this action. The CRRT is required to reinitiate formal consultation on this action, where it retains discretionary involvement or control over the action and if: (1) take occurs as a result of response actions involving dispersant application or in-situ

burning (ISB), such as if vessel strikes occur that affect ESA-listed whales or sea turtles or vessel groundings occur that affect ESA-listed corals; (2) sea turtles suffer mortality due to mishandling during rescue and recovery efforts associated with the use of ISB as a response tool; (3) new information reveals effects of the agency action that may affect ESA-listed species or critical habitat in a manner or to an extent not considered in this consultation; (4) 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 this consultation; or (5) a new species is listed or critical habitat designated under the ESA that may be affected by the action.

If you have any questions regarding this biological opinion, please contact Dr. Lisamarie Carrubba, Consulting Biologist, at (301) 427-8493 or lisamarie.carrubba@noaa.gov.

Sincerely,

Donna S. Wieting

Donna S. Wieting
Director, Office of Protected Resources

NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7
BIOLOGICAL OPINION

Title: Biological Opinion on the Use of Dispersants and In-Situ Burning in the United States (U.S.) Caribbean

Consultation Conducted By: Endangered Species Act Interagency Cooperation Division, Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Action Agency: Caribbean Regional Response Team: U.S. Environmental Protection Agency Region 2 (Co-Chair) and U.S. Coast Guard District Seven (Co-Chair)

Publisher: Office of Protected Resources, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Approved:

Donna S. Wieting
Director, Office of Protected Resources

Date: DEC 1 1 2017

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1 INTRODUCTION

The Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 et seq.) establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat they depend on. Section 7(a)(2) of the ESA requires Federal agencies to insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitat. Federal agencies must do so in consultation with the National Marine Fisheries Service (NMFS) for threatened or endangered species (ESA-listed), or designated critical habitat that may be affected by the action that are under NMFS jurisdiction (50 C.F.R. §402.14(a)). If a Federal action agency determines that an action "may affect, but is not likely to adversely affect" endangered species, threatened species, or designated critical habitat and NMFS concurs with that determination for species under NMFS jurisdiction, consultation concludes informally (50 C.F.R. §402.14(b)).

Section 7(b)(3) of the ESA requires that at the conclusion of consultation, NMFS provides an opinion stating whether the Federal agency's action is likely to jeopardize ESA-listed species or destroy or adversely modify designated critical habitat. If NMFS determines that the action is likely to jeopardize ESA-listed species or destroy or adversely modify designated critical habitat, NMFS provides those reasonable and prudent alternatives that can be taken by the Federal agency or the applicant and allow the action to proceed in compliance with section 7(a)(2) of the ESA. If incidental take is expected, section 7(b)(4) requires NMFS to provide an incidental take statement that specifies the impact of such incidental taking on the species and includes reasonable and prudent measures NMFS considers necessary or appropriate to minimize such impacts and terms and conditions to implement the reasonable and prudent measures.

The action agencies for this consultation are the U.S. Environmental Protection Agency (EPA) Region 2 and the U.S. Coast Guard (USCG) District Seven, the Co-Chairs of the Caribbean Regional Response Team (CRRT). The CRRT proposes the authorization of the use of dispersants and in-situ burning (ISB) in waters of the U.S. Caribbean during emergency response actions associated with an oil spill.

This consultation, biological opinion, and incidental take statement, were completed in accordance with section 7(a)(2) of the ESA (16 U.S.C. 1536 (a)(2)), associated implementing regulations (50 C.F.R. §§401-16), and agency policy and guidance and was conducted by NMFS Office of Protected Resources Endangered Species Act Interagency Cooperation Division (hereafter referred to as "we"). This biological opinion (opinion) and incidental take statement were prepared by NMFS Office of Protected Resources Endangered Species Act Interagency Cooperation Division in accordance with section 7(b) of the ESA and implementing regulations at 50 C.F.R. Part 402.

This document represents the NMFS opinion on the effects of the proposed action on blue, fin, sei, and sperm whales; Nassau grouper; green (North and South Atlantic Distinct Population

Segment [DPS]), hawksbill, leatherback, and loggerhead (Northwest Atlantic DPS) sea turtles; elkhorn, staghorn, pillar, rough cactus, lobed star, mountainous star, and boulder star corals; green sea turtle North Atlantic DPS critical habitat[1]; leatherback sea turtle critical habitat; hawksbill sea turtle critical habitat; and elkhorn and staghorn coral critical habitat. A complete record of this consultation is on file at the NMFS Office of Protected Resources in Silver Spring, Maryland.

Programmatic Consultations

NMFS and the U.S. Fish and Wildlife Service (USFWS) have developed a range of techniques to streamline the procedures and time involved in consultations for broad agency programs or numerous similar activities with predictable effects on listed species and critical habitat. Some of the more common of these techniques and the requirements for ensuring that streamlined consultation procedures comply with Section 7 of the ESA and its implementing regulations are discussed in the October 2002 joint Services memorandum Alternative Approaches for Streamlining Section 7 Consultation on Hazardous Fuels Treatment Projects (see also, 68 FR 1628 [January 13, 2003] for the notice of availability of the memorandum).

Programmatic consultations can be used to evaluate the potential effects of groups of related agency actions expected to be implemented in the future, where specifics of individual projects such as project location are not definitively known. A programmatic consultation must identify project design criteria (PDCs) or standards that will be applicable to all future projects implemented under the program. PDCs serve to prevent adverse effects to listed species, or to limit adverse effects to predictable levels that will not jeopardize the continued existence of listed species or destroy or adversely modify critical habitat, at the individual project level or taken together from all projects implemented under the programmatic consultation. Programmatic consultations fully cover actions that meet the PDCs, without the need for project-specific consultations. For actions that do not meet the PDCs, project-specific consultations are needed under a programmatic consultation, but these consultations are streamlined because much of the effects analysis has been completed upfront. The following elements should be included in a programmatic consultation to ensure its consistency with ESA Section 7 and its implementing regulations:

1. PDCs to prevent or limit future adverse effects on listed species and critical habitat;

[1] On April 6, 2016, NMFS published a final rule listing 11 DPSs of the green sea turtle, including the North Atlantic DPS, which includes Puerto Rico (81 FR 20057). NMFS may issue a rule designating critical habitat for the DPSs in a future rulemaking. In the interim, the existing green turtle critical habitat designation (i.e., waters surrounding Culebra Island, Puerto Rico; 63 FR 46693; September 2, 1998) remains in effect for the green sea turtle North Atlantic DPS.

2. Description of the manner in which projects to be implemented under the programmatic consultation may adversely affect listed species and critical habitat and evaluation of expected level of adverse effects from covered projects;

3. Process for evaluating and tracking expected and actual aggregate (net) additive effects of all projects expected to be implemented under the programmatic consultation. The programmatic consultation document must demonstrate that when the PDCs are applied to each project, the aggregate effect of all projects would not jeopardize listed species or destroy or adversely modify critical habitat;

4. Procedures for streamlined project-specific consultation. As discussed above, if an approved programmatic consultation document is sufficiently detailed, project-specific consultations ideally will consist of certifications and concurrences between action agency biologists and consulting agency biologists. An action agency biologist or team will provide a description of a proposed project and a certification that it will be implemented in accordance with the PDCs. The action agency also provides a description of anticipated project-specific effects and a tallying of net effects to date resulting from projects implemented under the program, and certification that these effects are consistent with those anticipated in the programmatic consultation. The consultation agency biologist reviews the submission and provides concurrence, or adjustments to the project necessary to bring it into compliance with the programmatic consultation. The project-specific consultation process must also identify any effects that were not considered in the programmatic consultation. Finally, project-specific consultation procedures must provide contingencies for proposed projects that cannot be implemented in accordance with the PDCs; full stand-alone consultation may be performed on these projects if they are too dissimilar in nature or in expected effects from those projected in the programmatic consultation document;

5. Procedures for monitoring projects and validating effects predictions; and

6. Comprehensive review of the program, generally conducted annually.

1.1 Background

Subpart J of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) provides that the Federal On-Scene Coordinator (OSC), with the concurrence of the EPA representative to the CRRT, and, as appropriate, concurrence of the Puerto Rico and/or USVI representative to the CRRT and concurrence by the natural resource trustees from the Departments of Commerce and the Interior, may authorize the use of dispersants and ISB. The CRRT prepared preauthorization agreements for the use of dispersants and ISB, and received concurrence from the applicable CRRT representatives. The preauthorization agreements for dispersant use and ISB are based on the NCP and are in the form of Letters of Agreement for Puerto Rico and USVI. These preauthorization agreements permit the use of dispersants and ISB

in specifically designated areas that are detailed in Section 3.1 of this document. Within pre-approved areas, further coordination on the part of the USCG OSC with federal and state/territorial resource trustees is not required as long as the CRRT is notified and the required dispersant and/or ISB protocols (Appendix A) that are part of the preauthorization agreements are followed.

On June 14, 1995, the CRRT concluded an ESA section 7 consultation with NMFS for the CRRT preauthorization agreement on ISB. On March 24, 1997, the CRRT concluded consultation with NMFS for the CRRT preauthorization agreement on dispersants. The ESA section 7 consultations for the preauthorization agreements were informal and contemplated only the potential impacts to ESA-listed whales and sea turtles from the use of these tools during oil spill response. Since the consultations were completed, new species have been listed and critical habitat designated and some listings have changed to include distinct population segments (DPS) for some species. In addition, new information is now available regarding potential impacts to ESA-listed species related to the use of these techniques in oil spill response due to the Deepwater Horizon (DWH) spill and associated response activities. The DWH spill resulted in the use of a large volume of dispersants and numerous ISB operations. This has resulted in new information regarding potential effects of these response tools on ESA-listed species, as well as new information regarding the fate of oil that was not available when the previous consultations were completed.

1.2 Consultation History

Beginning in 2014, NMFS Southeast Regional Office (SERO) began providing technical assistance to the CRRT regarding the initiation of a new consultation for the potential use of dispersants and ISB during oil spill emergency response in the U.S. Caribbean. In 2015, this included SERO biologists from the Protected Resources and Habitat Conservation Divisions assisting in the preparation of a Biological Assessment (BA) and Essential Fish Habitat (EFH) Evaluation pursuant to the Magnuson-Stevens Act (MSA) on the use of oil spill dispersants and ISB along with biologists from the U.S. Fish and Wildlife Service.

This opinion is based on information provided by the CRRT, including the *Endangered Species Act Biological Assessment and Essential Fish Habitat Evaluation: Use of Oil Spill Dispersants and In-Situ Burning as Part of Response Actions Considered by the Caribbean Regional Response Team* (2015) prepared by the CRRT Response Technologies Committee and the *CRRT Best Management Practices for Oil Spill Response Operations*. Our communication with the CRRT regarding this consultation is summarized as follows:

- **October 5, 2015**: NMFS SERO received the ESA section 7 consultation reinitiation request and request to initiate an EFH consultation from the CRRT
- **May 19, 2017**: Consultation transferred from SERO to the Office of Protected Resources (OPR) in Silver Spring.

- **May 25, 2017**: NMFS sent the draft PDCs and a request for additional information to the EPA and USCG
- **May 31 and June 9, 2017**: NMFS received responses to our information request and comments on the draft PDCs from the CRRT
- **July 11, 2017**: OPR coordinated its response to the CRRT with SERO, as that office will take over responses to individual actions under this programmatic consultation. Also discussed consistency with ESA section 7 consultation SERO is working on with EPA Region 4 for the use of dispersants and ISB in oil spill response in the southeast.
- **July 26, 2017**: NMFS sent revised PDCs to the CRRT for comment
- **July 28, 2017**: NMFS received comments from EPA regarding the revised PDCs
- **August 1, 2017**: NMFS sent consultation initiation letter to CRRT notifying them that consultation will be formal.
- **August 8, 2017**: NMFS met with CRRT to discuss revised PDCs and consultation

2 THE ASSESSMENT FRAMEWORK

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

"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 recovery of an ESA-listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 C.F.R. §402.02).

"Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of designated critical habitat for the conservation of an ESA-listed species. Such alterations may include, but are not limited to, those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features (50 C.F.R. §402.02).

This ESA section 7 assessment involves the following steps:

Description of the Proposed Action (Section 3): In the case of this programmatic consultation, this includes a general description of the CRRT actions expected to be implemented in the future, because the specifics of oil spill response activities, including project location, are not known.

Interrelated and Interdependent Actions (Section 4): *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 utility apart from the action under consideration. We consider the use of vessels for the application of dispersants and use of ISB and associated transit operations, the use of aircraft (i.e., fixed wing airplanes and helicopters) in the application of

dispersants and aerial surveys as part of dispersant application and ISB operations, and the use of mechanical spill response equipment that are part of the larger oil spill response as interdependent and interrelated.

Action Area (Section 5): We describe the proposed action and those aspects (or stressors) of the proposed action that may have direct or indirect effects on the physical, chemical and biotic environment. We identify any interrelated and interdependent actions and describe the action area within the spatial extent of the stressors from those actions. Thus, we evaluate the effects vessel operations, vessel transit, and mechanical cleanup may have on ESA-listed species and designated critical habitat and so include the footprints of these activities in this consultation as part of the action area.

Status of Endangered Species Act Protected Resources (Section 6): We identify the ESA-listed species and designated critical habitat that are likely to co-occur with those stressors in space and time and evaluate the status of those species and habitat. In this Section, we also identify those *Species and Designated Critical Habitat Not Likely to be Adversely Affected* and detail our effects analysis for these species and critical habitats (Section 6.1), and those *Species and Designated Critical Habitat Likely to be Adversely Affected* (Section 6.2).

Environmental Baseline (Section 7): 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; and impacts of state or private actions that are contemporaneous with the consultation in process.

Effects of the Action (Section 8): These are broken into a risk analysis and programmatic analysis as described below for the species and/or critical habitat that are likely to be adversely affected by the proposed action.

Risk Analysis (Section 8.1) and *Programmatic Analysis* (Section 8.2): To determine the effects of the action, we conduct two separate analyses: a Risk Analysis and a Programmatic Analysis. In the Risk Analysis, we evaluate the potential adverse effects of the action on ESA-listed species and designated critical habitat under NMFS' jurisdiction without consideration of the PDCs. To do this, we begin with program formulation that identifies and integrates the stressors of the action with the species' status (Section 6) and the Environmental Baseline (Section 7) and formulate risk hypotheses. 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. We assess the consequences of the responses of individuals of ESA-listed species that are likely to be exposed to the populations those individuals represent, and the species those populations comprise. We also consider whether the action “may affect” designated critical habitat. The adverse modification analysis considers the impacts of the proposed action on the essential habitat features and conservation value of designated critical habitat. We then conduct a programmatic analysis. The Programmatic Analysis evaluates whether the implementation of the applicable PDCs in the event that the CRRT authorizes the

use of dispersants and/or ISB during an oil spill is sufficient to ensure the action is not likely to jeopardize ESA-listed species, or destroy or adversely modify designated critical habitat.

Integration and Synthesis (Section 9): In this section, we integrate the analyses in the opinion to summarize the consequences to ESA-listed species and designated critical habitat under NMFS' jurisdiction.

Cumulative Effects (Section 10): Cumulative effects are the effects to ESA-listed species and designated critical habitat of future state or private activities that are reasonably certain to occur within the action area (50 C.F.R. §402.02). Effects from future Federal actions that are unrelated to the proposed action are not considered because they require separate ESA section 7 compliance.

Conclusion (Section 11): With full consideration of the status of the species and the designated critical habitat, we consider the effects of the action within the action area on populations or subpopulations and on essential habitat features when added to the environmental baseline and the cumulative effects to determine whether the action could reasonably be expected to:

- Reduce appreciably the likelihood of survival and recovery of an ESA-listed species in the wild by reducing its numbers, reproduction, or distribution, and state our conclusion as to whether the action is likely to jeopardize the continued existence of such species; or
- Appreciably diminish the value of designated critical habitat for the conservation of an ESA-listed species, and state our conclusion as to whether the action is likely to destroy or adversely modify designated 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, then we must identify reasonable and prudent alternative(s) to the action, if any, or indicate that to the best of our knowledge there are no reasonable and prudent alternatives. See 50 C.F.R. §402.14(h)(3).

In addition, we include an *Incidental Take Statement* (Section 12) that specifies the impact of the take, reasonable and prudent measures to minimize the impact of the take, and terms and conditions to implement the reasonable and prudent measures. ESA section 7(b)(4); 50 C.F.R. §402.14(i). We also provide discretionary *Conservation Recommendations* (Section 13) that may be implemented by an action agency. 50 C.F.R. §402.14(j). Finally, we identify the circumstances in which *Reinitiation of Consultation* is required (Section 14). 50 C.F.R. §402.16.

To comply with our obligation to use the best scientific and commercial data available, we collected information identified through searches of Google Scholar, Web of Science, literature cited sections of peer reviewed articles, species listing documentation, and reports published by government and private entities. Searches were used to identify information relevant to the potential stressors (oil, dispersants, ISB, other response activities) and responses of ESA-listed

whales, sea turtles, corals, and Nassau grouper. This opinion is based on our review and analysis of various information sources, including:

- Information submitted by the CRRT
- Government reports (including the DWH damage assessment report)
- Peer-reviewed scientific literature

These resources were used to identify information relevant to the potential stressors and responses of ESA-listed species and designated critical habitat under NMFS' jurisdiction that may be affected by the proposed action to draw conclusions on risks the action may pose to the continued existence of these species and the value of designated critical habitat for the conservation of ESA-listed species.

3 DESCRIPTION OF THE PROPOSED ACTION

"Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies (50 C.F.R. §402.02).

The CRRT proposes the use of dispersants and/or ISB in addition to traditional response measures such as physical control and recovery following an oil spill. While the primary method of controlling discharged oil will be physical removal, complete physical containment, collection, and removal is not always possible. The use of dispersants and ISB may be considered to prevent a substantial threat to public health or welfare or to minimize the threat of impacts to the environment. The CRRT encourages the combination of techniques to minimize the effects of a spill. The CRRT requested consultation on, and therefore this consultation focuses on, the use of dispersants and ISB and the potential effects of these response methods on ESA resources. Other response measures and in some cases the use of vessels to implement them are considered in this opinion as interrelated and interdependent effects relative to dispersant application and the use of ISB.

When an oil spill occurs, the type of oil determines how it will behave in terms of spreading over the water surface versus sinking and the physical characteristics at the site of the spill, such as waves and water temperature, will affect weathering and natural dispersion of the oil. The toxicity of oil to many marine organisms is due to the polycyclic aromatic hydrocarbons (PAHs) in oil and the sensitivity of the organisms to PAHs. Response actions following an oil spill aim to contain and remove the oil as quickly as possible. Response tools are selected based on the type of oil and location of the spill. The use of dispersants and ISB may be selected as response tools in order to quickly disperse or remove, respectively, large quantities of oil to reduce the amount of time the oil is present in the environment and associated impacts to marine and coastal organisms and their habitats. In the U.S. Caribbean, oil spills may occur due to accidental groundings as maritime traffic is common in the area, industrial operations on the coast that utilize petroleum products as fuel and rely on the transport of these products in ships and through

transmission lines along the coast and in the ocean, and leakage from motorized recreational and commercial vessels during transit and when docked at piers and in marinas and ports.

Dispersants

The key components of chemical dispersants are one or more surface-active agents (surfactants) that contain molecules with both water-compatible and oil-compatible groups. The molecules reduce the oil/water interfacial surface tension to enable the oil layer to be broken into small droplets with minimal mixing energy. In addition to surfactants, most dispersant formulations also contain a solvent carrier to reduce the viscosity of the surfactant so the chemical can be sprayed uniformly. The solvent may also enhance mixing and penetration of the surfactant into more viscous oils (CRRT Response Technologies Committee 2015).

Chemical dispersants are mixtures of surfactants and solvents designed to reduce the concentration of oil at the water surface by breaking the oil slick into smaller droplets that can be suspended and distributed and subsequently diluted and biologically degraded, throughout the water column. Dispersant application is also used to reduce the amount of oil that may strand in shoreline habitats. The application of dispersants in a typical spill response involves the release of undiluted dispersant chemical onto the surface of a spill in open water from deployed vehicles that may include airplanes, boats, or helicopters (Figures 1 and 2). The volume released depends on the carrying capacity of the vehicles. The rate of application is as consistent as possible over a large area in order to make the input of dispersant chemical as uniform as possible though the required volume will vary depending on the size of the slick. Water column concentrations of oil treated with dispersants decline to undetectable levels within hours of dispersant application versus the days of natural dispersion and weathering prior to oil concentrations being undetected in the water column if dispersants are not used (CRRT Response Technologies Committee 2015).

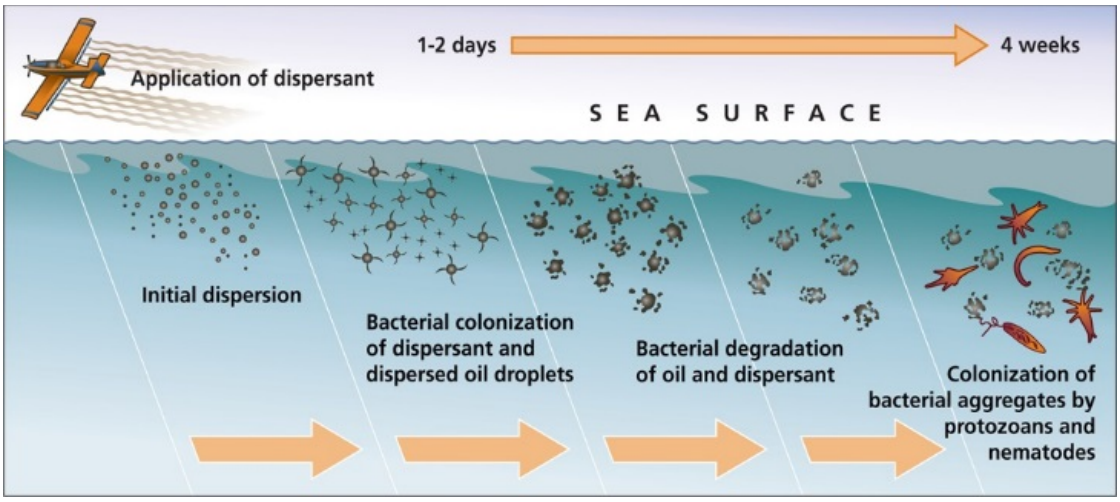


Figure 1. Diagram showing the application of dispersants from an airplane and the expected results (from Schmidt 2010 adapted from Clark 2004).

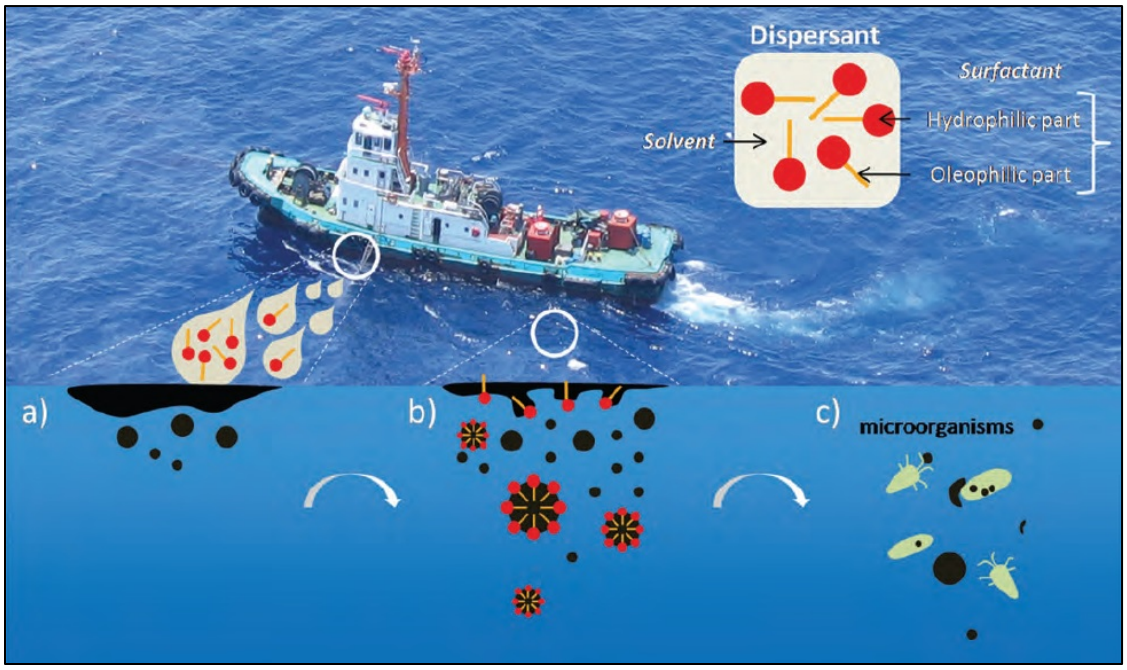


Figure 2. Image showing the application of dispersants from a vessel and the expected results (from Ayles Fernie International Limited taken from ITOPF 2011)

In-Situ Burning

A typical in-situ burn (ISB) employs boats towing fire resistant boom in a U-shaped configuration in which oil is collected, towed away from the main slick, and ignited (Figure 3). The configuration is slowly towed during the burn in order to maintain the oil toward the back end of the boom at the minimum thickness necessary to sustain the burn. After the boomed oil is burned, the process is repeated. ISB does not depend on skimming, transfer, and storage equipment for recovered oil and water and has a higher removal efficiency than mechanical removal or dispersants. Burning can be conducted at night. Burns can be halted by releasing the

containment boom. In-situ burns at sea is most effective early in a spill response when the oil layer is still thick at the water surface. Relatively calm wind (less than 15-18 knots [kt] for ignition and 15-25 kt to sustain a burn) and sea conditions (waves less than 3.5 feet [ft]) are also necessary for ISB to be effective.

Figure 3. Photo of an in-situ burn during the Deepwater Horizon spill showing the boom enclosing the burn area (NOAA Office of Response and Restoration)

Sea Turtle Protection Measures Under ISB

Sea turtles in an area that has been impacted by a spill may be captured for relocation outside any planned ISB areas or for treatment. Capture, relocation, treatment, and release of endangered or threatened sea turtles was previously consulted on under section 7 of the ESA (see PCTS #FPR-2016-9168) for NMFS Marine Mammal and Sea Turtle Conservation Division's Section 10(a)(1)(A) Permit by Regulation to authorize response to stranded sea turtles through operation of the Sea Turtle Stranding and Salvage Network (STSSN). The consultation resulted in a biological opinion from NMFS on 50 C.F.R §222.310: "Permit Authority for Designated Agents and Employees of Specified Federal and State Agencies." This regulation is a programmatic permit by regulation pursuant to ESA section 10(a)(1)(A) to authorize any agent or employee of NMFS, USFWS, USCG, 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, or entangled or stranded endangered sea turtle or dispose of such specimen or salvage such specimen which may be useful for scientific and educational purposes. Capture and handling of wildlife under NMFS' authority requires training and incident-specific approval and coordination with NMFS STSSN to be conducted lawfully (under the existing ITS from the previous consultation referenced above) following the requirements specified in 50 CFR §223.206(d)(1).

Similarly, 50 C.F.R §223.206(b): "Exceptions to Prohibitions Relating to Sea Turtles; Exception for Injured, Dead, or Stranded Specimens" authorizes any agent or employee of NMFS, USFWS, USCG, 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 threatened sea turtles if such taking is necessary to aid a sick, injured, or entangled or stranded threatened sea turtle or dispose of such specimen or salvage such specimen which may be useful for scientific and educational purposes. Handling and resuscitation must be done following the requirements in §223.206(d)(1).

Based on the above, directed take of sea turtles was already consulted on and is authorized by regulation during activities such as oil spill response and is not considered further in this biological opinion.

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, reaffirmed in 2015 (NMFS and USFWS 2015), USFWS has lead responsibility on sea turtle nesting beaches and NMFS has lead responsibility in the marine environment.

3.1 Authorities under which the Proposed Action will be Conducted

Subpart J of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) provides for the Regional Response Team (RRT) representatives for EPA, the affected states (including the Commonwealth of Puerto Rico and the U.S. Virgin Islands [USVI] in the NCP definition), and natural resource trustees from the Departments of Commerce (DOC) and the Interior (DOI) to review and either approve, disapprove, or approve with modification preauthorization plans for the use of chemical countermeasures for oil spill response. If preauthorization is approved, the Federal On-Scene Coordinator (FOSC) may authorize the use of chemical countermeasures as specified in the plan without obtaining specific concurrences from EPA, the affected states, or DOC and DOI. Spill situations that are not addressed by preauthorization plans are not part of this programmatic consultation and will require individual ESA section 7 consultations.

Preauthorization Agreements

Dispersants:

Between 1991 and 1995, the CRRT signed two Letters of Agreement (LOAs) on *Limited Use of Dispersants and Chemical Agents for Puerto Rico and USVI*. Under the LOAs, the following waters are designated as preauthorized areas for the initiation of dispersant application:

<u>Puerto Rico:</u>

- Waters at least 0.5 miles (mi) seaward of any shoreline; and
- Waters at least 30 feet (ft) in depth

<u>USVI:</u>

- Waters at least 1.0 mi seaward of any shoreline or at least 1 mi from any reef which is less than 20 ft from the water's surface; and
- Waters at least 60 ft in depth

Additionally, the LOAs contained a "Protocols" section stating that dispersants or chemical agents will not be used in, on, or over waters containing reefs; waters designated as marine reserves; mangrove areas; or waters in coastal wetlands except with the prior and express concurrence of the Commonwealth or Territory and EPA in consultation with DOC and DOI. Coastal wetlands are identified as including submerged algae beds on rocky or unconsolidated bottom, submerged seagrass beds, and coral reefs.

Between 2003 and 2008, the CRRT conducted three Ecological Risk Assessment Consensus Workshops (ERAs) in the U.S. Caribbean. Among the recommendations from the workshops was the consensus that dispersant usage should be considered in waters shallower and closer to shore than identified in the current LOAs. Specifically, the CRRT determined, based on the results of the ERAs and increased research, expertise and knowledge related to the use of dispersants, that the FOSC should consider the use of chemical countermeasures in the following waters:

Puerto Rico:

- Waters 30 ft or more in depth, regardless of distance from shoreline

USVI:

- Waters at least 1.0 mi seaward of any shoreline; and
- Waters at least 30 ft in depth

This general consensus does not supplant the preauthorization zones established in the LOAs. However, as part of this consultation, the CRRT has requested that NMFS analyze the potential use of dispersants in waters with 30 ft depths as a result of the ERAs.

In-Situ Burning:

In 1996, the CRRT signed the *Caribbean Regional Response Team Policy for Use of In-Situ Burning in Ocean, Coastal, and Inland Waters*. Preauthorization within the set guidelines of the agreement allows the USCG On-Scene Coordinator (OSC) to employ ISB during daylight or nighttime hours in four zones:

- "A" Zone (Preauthorization for Open Water Burning) – defined as any area in the CRRT region falling exclusively under federal jurisdiction and not classified as a "B", "C", or "R" zone at least 6 mi from any state coastline and outside of any state waters. In the event that state jurisdiction extends beyond 6 mi from a state shoreline, preauthorization for the "A" zone applies only to those areas outside the state jurisdiction. Within "A" zones, the USCG, EPA, DOC, DOI, and the affected state(s) agree that the decision to initiate ISB rests solely with the pre-designated USCG OSC and no further concurrence or consultation is required. The USCG agrees with EPA, DOC, DOI, and the state(s) that the USCG will immediately notify said agencies and state(s) of a decision to conduct

burning within the "A" zone via each agency or state(s)'s respective CRRT representative.

- "B" Zone (Preauthorization with Favorable Wind Conditions) – defined as any areas under CRRT jurisdiction not classified as an "A", "C", or "R" zone at least 3 mi from any state coastline and outside of any state waters. In the event that state jurisdiction extends beyond 3 mi from a state shoreline, preauthorization for the "B" zone applies only to those areas outside the state jurisdiction. Favorable wind conditions means that the prevailing wind direction is decidedly seaward and is expected to remain in the seaward direction for the duration of the planned in-situ burning operations.
- "C" Zone (Waters Requiring Case-by-Case Approval) – defined as areas falling 1) anywhere within state waters; 2) waters less than 30 ft in depth that contain living reefs; 3) waters designated as a marine reserve, National Marine Sanctuary, National or State Wildlife Refuge, unit of the National Park Service, proposed or designated critical habitat; and 4) mangrove areas or coastal wetlands. Coastal wetlands include submerged algal beds, submerged seagrass beds, lagoons, and salt ponds.
- "R" Zones (Exclusion Zones) – defined as the area designated by the USCG, EPA, DOC, DOI, and the state(s) as an exclusion zone. No ISB operations will be conducted in this zone unless 1) ISB is necessary to prevent or mitigate a risk to human health and safety; and/or 2) an emergency modification of this agreement is made on an incident-specific basis. The CRRT currently has not designated any areas as "R" zones but retains the right to include areas for exclusion at a future point in time if it feels this is warranted.

The ISB preauthorization agreement requires that, prior to beginning an in-situ burn, an on-site survey will be conducted to determine if any threatened or endangered species are present in the burn area or otherwise at risk from any burn operations, fire, or smoke. Appropriate natural resource specialists, knowledgeable about any special resource concerns in the area and representing the resource trustee, will conduct the on-site survey prior to conducting any in-situ burn. Measures will be taken to prevent risk of injury to any wildlife, especially ESA-listed species. Examples of potential protection measures may include moving the location of the burn to an area where listed species are not present, temporary employment of auditory or visual hazing techniques to prompt wildlife to leave or avoid the location of the burn, and physical removal of individuals of listed species only under the authority of the trustee agency.

3.2 Project-Specific Review and Consultation

Prior to authorizing the use of dispersants or ISB for a particular spill response activity, the CRRT must complete a project-specific review to ensure all of the relevant PDCs are met.

If the use of dispersants will occur in designated preauthorized areas and/or ISB will occur in "A" or "B" Zones (Section 3.2), the CRRT may proceed without submitting an emergency consultation request to NMFS SERO with the following exceptions:

- The timing of the response activity must be outside the August-October time period when ESA-listed corals may be spawning (see Section 3.5, PDCs); or
- The timing of the response activity must be outside the December-February time period when Nassau grouper may be spawning if the response activity will take place in or near one of the historical spawning aggregation sites (SPAGS) for this species (see Section 3.5, PDCs).

If the CRRT is considering the authorization of the use of dispersants or ISB for a particular spill response activity and the activity will take place:

- Outside the dispersant preauthorization areas but in areas around Puerto Rico with a water depth of at least 30 ft and around USVI that are 1.0 mile from any shoreline and have a water depth of at least 30 ft,
- During the August-October time period when ESA-listed corals may be spawning, regardless of whether the response is located in a dispersant preauthorization area or ISB Zones "A" or "B," or
- During the December-February time period when Nassau grouper may be spawning and the response activity is in or near historical SPAGS, regardless of whether the response is located in a dispersant preauthorization areas or ISB Zones "A" or "B,"

an emergency consultation request must be submitted to NMFS SERO for the response activity. The CRRT will certify compliance with the applicable PDCs along with the information described below to NMFS SERO using SERO's existing emergency consultation email notification system (nmfs.ser.emergency.consult@noaa.gov). The subject line should include a reference to "FPR-2017-9214, Programmatic Consultation with the CRRT for Use of Dispersants and In-Situ Burning" to distinguish the message from other emergency consultation requests. In addition to or as part of the information required by the PDCs discussed above, the submission will include the following information:

1. Date sent to NMFS: This is the date the email was provided to NMFS
2. Location: This is the location of the oil spill
3. Latitude: This is the latitude of the center point of the response area. This shall be formatted in decimal degrees to five places.
4. Longitude: This is the longitude of the center point of the response area. This shall be formatted in decimal degrees to five places. Please provide a negative symbol before the longitude to denote the western hemisphere.
5. Critical habitat unit: This shall be provided in the following acronym style with no spaces or hyphens to allow for accurate sorting. Projects occurring in critical habitat and proposed critical habitat are only authorized if they do not impact the essential features of each critical habitat type
    - A CH (*Acropora* critical habitat)
    - GST CH (green sea turtle critical habitat)
    - HST CH (hawksbill sea turtle critical habitat)

- LBST CH (leatherback sea turtle critical habitat)
- N/A (not applicable because the project is not located within a critical habitat unit)

6. Whether any of the essential features of critical habitat are located within or adjacent to the response footprint where the use of dispersants or ISB will take place. If yes, list the essential features present and their distance to dispersant release, in-situ burns, and associated response activities. If the project is not in a critical habitat unit, write In Compliance with PDCs.
7. Description of benthic habitat and ESA-listed species present within footprints where dispersant use, ISB, and associated response activities, including any associated activities (such as the use of vessels to deploy dispersants or manage a burn area that will anchor resulting in contact with the marine bottom), will take place.
8. All PDCs met: Are all of the applicable PDCs defined in this document being met by the proposed project? Answer yes or no.
9. Response-specific information should also be provided, including copies of any response plans, benthic reports, locations of any temporary buoys or other temporary in-water structures, ESA resource surveys and other information that will enable NMFS to determine whether ESA-listed species or their habitat are present and assess the potential risk of proposed response actions to these resources. The information will also enable NMFS to determine whether additional protective measures for avoidance and minimization of effects of a particular oil spill response activity are required.

Note that the existing *Endangered Species Consultation for Emergency Responses in Puerto Rico and U.S. Virgin Islands* form (Appendix B) can be used to provide all of the information requested above with the exception of the information related to the PDCs (#8), which can be addressed in the email or in the "List any standard protective measures that will be used" box at the end of the form.

For the exceptions noted above when the CRRT needs to submit an emergency consultation request for the use of dispersants or ISB, NMFS SERO will receive the information via email (nmfs.ser.emergency.consult@noaa.gov) from the CRRT. Specifically, this process will be used when:

1. the use of dispersants in pre-authorized areas and/or ISB in Zones "A" or "B" will take place during times of year when ESA-listed corals or Nassau grouper may be spawning and, in the case of Nassau grouper, the response is located in or near historical Nassau grouper SPAGS, or
2. dispersant use is proposed in areas with water depths of at least 30 ft around Puerto Rico or USVI and at least 1.0 miles from any shoreline in the case of USVI that are outside the preauthorization areas.

NMFS will assess the individual proposed activity's compliance with the PDCs identified as applicable by the CRRT and ensure that the additive effects of dispersants and/or ISB and associated response activities do not result in adverse effects to protected species. Due to the emergency nature of response actions, the timeframe for a final response will be within 12 hours of receipt of the CRRT's email. As noted above, because this email address is for general use by all requiring emergency consultations, the subject line should include a reference to "FPR-2017-9214, Programmatic Informal Consultation with the CRRT for Use of Dispersants and In-Situ Burning" to distinguish the message from other requests. If no notice is given by NMFS within 12 hours of submission of information related to the proposed use of dispersants and/or ISB as part of an oil spill response in the U.S. Caribbean by the CRRT, compliance is implied. As noted above, this emergency consultation procedure will be required for the use of dispersants outside preauthorization areas where water depth is at least 30 ft and, in the case of USVI, the response is at least 1.0 mile from shore, and the use of dispersants in preauthorized areas and ISB in Zones "A" and "B" (ISB) if the response activity will take place during periods of ESA-listed coral or Nassau grouper spawning.

Any activities occurring in ISB Zones "C" or "R" or that cannot comply with the PDCs relevant to the particular response will require individual ESA section 7 consultations and are not covered under this programmatic consultation. The CRRT will coordinate with SERO on these individual actions to determine the emergency consultation procedures to be used based on the location of these actions and the potential effects on ESA resources.

3.3 Programmatic Review

The CRRT and NMFS will conduct an annual programmatic review of the use of dispersants and ISB in oil spill response operations only if these response tools have been used in the U.S. Caribbean in a particular year. This review will evaluate, among other things, whether the scope of the activity is consistent with the description of the proposed activities; whether the nature and scale of the effects predicted continue to be valid; whether the PDCs are being complied with and continue to be appropriate; and whether the response-specific consultation procedures are being complied with and are effective. To assist in this annual review, the CRRT will submit an after-action report within 30 days following each use of dispersants and/or ISB in the U.S. Caribbean. If these tools have not been used during a given year, the CRRT will send notification of a negative response to NMFS rather than a report at the end of the corresponding year.

3.4 Project Design Criteria

PDCs have been identified to limit environmental effects of the use of dispersants and ISB during oil spill response, as well as the impacts of associated interdependent and interrelated response activities. These PDCs are taken from the best management practices (BMPs) the CRRT provided as part of the consultation documents and emergency consultations that have been completed in the U.S. Caribbean. These PDCs, when applied to in-water activities

associated with oil spill response involving the use of dispersants and ISB, minimize the environmental effects to ESA-listed species and designated critical habitat. The nature of the response will dictate which of the PDCs will be applicable to the activities covered under this consultation.

General PDCs applicable to all activities addressed in this consultation:

1. Aircraft hovering will be avoided in areas where sea turtles or marine mammals are sighted. If animals are sighted, an altitude of approximately 200 meters (m) will be maintained and aircraft will circle within visual contact but not directly over marine mammals or sea turtles for up to 15 minutes maximum. Sightings of sea turtles and marine mammals should be reported, including sightings of dead animals.

2. Compliance with the *Vessel Operations Best Management Practices* provided by the CRRT is required (Appendix C).

3. If the response is due to a vessel grounding, compliance with the Grounded Vessel Salvage Operations Best Management Practices (Appendix D) provided by the CRRT is required.

4. All anchoring or towing cables associated with response vessels will be maneuvered and positioned so that ropes and cables are not permitted to lay on or sweep over coral reefs, colonized hard bottom, or seagrass. Vessels that are not anchoring should be held stationary over uncolonized sandy bottom to the maximum extent practicable to minimize the potential for damage to ESA resources from slack cables or lines.

5. No anchoring will occur on coral reefs or other coralline habitats containing habitat for ESA-listed corals.

6. Response vessel transit routes will be selected based on the draft of vessels that will participate in the response and any associated salvage operations, if appropriate, to ensure that accidental groundings do not occur.

7. When selecting vessel transit routes, areas containing coral reefs, colonized hard bottoms, or other coralline habitats where ESA-listed corals may be present will be avoided to the extent practicable.

8. A protected resources monitor will be on-site to monitor response impacts, compliance with PDCs, protected species sightings, and prepare daily summaries so that steps can be taken to address issues such as unanticipated impacts to ESA resources that require the implementation of additional measures.

9. Observers must not be assigned other duties that could detract from their ability to keep proper lookout for animals. All observers will be equipped with a two-way radio or other dedicated device to communicate sightings. All sightings will be reported on the *Marine Species Observation Form* (Appendix E) and submitted to NMFS

(nmfs.ser.emergency.consult@noaa.gov) with subject line referencing "FPR-2017-9214, Programmatic Consultation") at the end of each day.

10. Lighting of night operations along the coastline will be minimized and a lighting plan will be developed in coordination with NMFS and USFWS to ensure that nesting female sea turtles are not affected by light pollution. Lighted boom should also use lights that minimize effects to sea turtles and other wildlife.

11. All in-water barriers, including floating oil absorbent material or material placed to stop oil movement, will be made of material in which a sea turtle, marine mammal or Nassau grouper cannot become entangled, be properly secured with taut lines, and be regularly monitored to ensure ESA-listed species do not become entangled or entrapped. Barriers will be checked daily prior to nightfall to ensure they remain floating and do not create a barrier to animal movement or present an entanglement hazard, including to ESA-listed corals.

12. Any floating structures placed in waters adjacent to beaches should be placed as far offshore as possible and remain floating at all times.

13. Oiled boom and other in-water equipment will be replaced when observed.

14. All booms and other floating equipment will be anchored in a way that avoids entanglement or abrasion of ESA-listed corals or entanglement of sea turtles.

15. If a sea turtle or marine mammal is seen within 100 yards of operations other than dispersant application or in-situ burns, all appropriate precautions will be implemented. These precautions should include cessation of operation of vessels, installation of booms, or other in-water actions within 50 ft of a sea turtle or marine mammal. Activities should not resume until the animal has departed the area on its own.

16. The FOSC will ensure that all personnel involved in response operations receive protected species awareness training to inform them of the potential presence of ESA-listed sea turtles, marine mammals, corals, and fish and the civil and criminal penalties that could result from the harassment, injury, or death of these species.

17. Any collision with and/or injury to any sea turtle or marine mammal occurring during the emergency response operation shall be reported immediately to NMFS SERO PRD at 727-824-5312 or by email to takereport.nmfsser@noaa.gov and the local sea turtle and marine mammal stranding/rescue organization(s). Sea turtle and marine mammal stranding/rescue organizations' contact information is available by region at Report a Stranded/Beached Marine Mammal.

18. If at any time during a response operation, the USCG deems it unsafe to continue due to weather conditions or other factors, all in-water equipment will either be removed or

securely anchored to the bottom to ensure the equipment will not present an entanglement hazard to marine life.

19. A copy of Lessons Learned and After-Action reporting prepared for a particular response will be provided to NMFS (nmfs.ser.emergency.consult@noaa.gov with "FPR-2017-9214, Programmatic Consultation" referenced in the subject line) no later than 30 days following conclusion of the response activities.

PDCs applicable only to dispersant operations:

1. Survey flights will be conducted in the area of application one hour prior to and during dispersant operations. No dispersant application will be conducted within 0.5 nm of marine mammals and sea turtles identified through aerial spotting during these flights. If a sea turtle or ESA-listed marine mammal is observed in or within 0.5 nm of a proposed dispersant application site, no dispersant application will begin until the sea turtle or marine mammal has moved out of the area of its own volition unless a delay in dispersant application would result in greater damage to ESA resources from the oil slick.

2. While dispersant application is ongoing, observers will watch for marine mammals and sea turtles using aircraft and vessels. All sightings, including GPS locations of the animals, species (if possible to identify), and description of any encounters with response vessels, aircraft, or dispersants, will be recorded.

3. If weather conditions are poor or deteriorate to the point that proper sighting of animals is not possible, the dispersant application will stop immediately. As weather conditions also influence the effectiveness of dispersant application, stoppage during poor weather conditions will ensure that inaccurate application of dispersants that could impact ESA resources does not occur. If conditions improve to allow observers to properly sight animals and to allow effective dispersant application, the operation may resume.

4. A benthic survey or other characterization of benthic habitat (that may include the use of towed or submersible still cameras) will be conducted in areas where dispersant application is proposed to ensure ESA-listed corals are not present and water depth is adequate to minimize potential impacts of dispersants on ESA-listed corals and green and hawksbill sea turtle habitat.

5. No dispersant application will take place in waters with depths less than 30 ft or where there are reefs, colonized hard bottom or other coralline habitats that have ESA-listed coral colonies growing less than 30 ft from the water surface.

6. No dispersant application will take place in estuarine areas, or semi-enclosed or enclosed embayments that may contain Nassau grouper or habitat for this species, habitat for ESA-listed sea turtles, or ESA-listed coral species.

7. No dispersant application will take place during ESA-listed coral mass spawning events that may occur in August/September or October, depending on the species, regardless of water depth. (Peak spawning for elkhorn and staghorn corals is typically up to 7 days

after the August full moon but sometimes up to 7 days after the September full moon. Peak spawning for lobed, mountainous, and boulder star corals is typically up to 7 days after the September full moon but sometimes up to 7 days after the October full moon instead.)

8. No dispersant application will take place during the historical Nassau grouper spawning season from December to February in sites of historical spawning aggregations (Figure 4).

PDCs applicable only to in-situ burning operations:

1. Compliance with the *In-Situ Burning Operations Best Management Practices* (Appendix F) provided by the CRRT is required to minimize potential impacts to sea turtles and marine mammals, including following *In-Situ Burn Sea Turtle Observer* and *Sea Turtle Retrieval Protocols* (Appendix G) as appropriate.

2. In areas where sea turtle nesting is known to occur, no ISB operations will take place during nighttime or pre-dawn hours to protect nesting females and hatchlings that may be in the water.

3. Unoiled or lightly oiled *Sargassum*, where sea turtle hatchlings and other small animals may raft, will not be burned.

4. No ISB will take place in waters with depths less than 30 ft where mangroves, reefs, colonized hard bottom, other coralline habitats, seagrass beds, or other areas that serve as refuge and foraging habitat for various sea turtle life stages are present, or where ESA-listed coral colonies are within 30 ft of the water surface to minimize potential impacts of burning, particularly the production of tar balls, on ESA-listed corals and sea turtles.

5. No ISB will take place during ESA-listed coral mass spawning events that may occur in August/September or October, depending on the species, regardless of water depth. (Peak spawning for elkhorn and staghorn corals is typically up to 7 days after the August full moon but sometimes up to 7 days after the September full moon instead. Peak spawning for lobed, mountainous, and boulder star corals is typically up to 7 days after the September full moon but sometimes up to 7 days after the October full moon instead.)

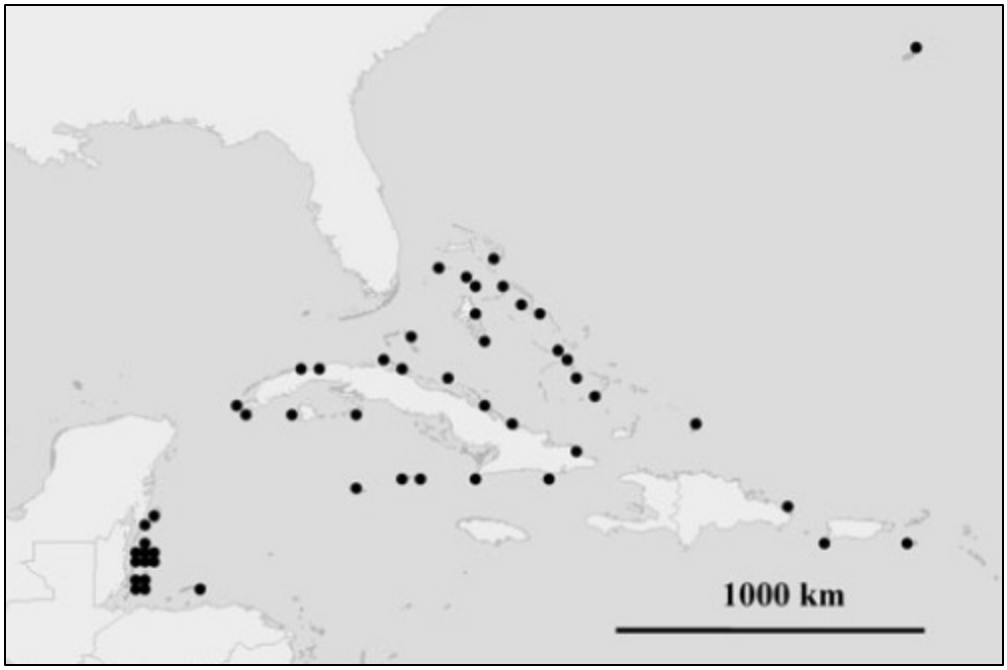


Figure 4. Locations of known historical Nassau grouper spawning aggregations (from NMFS 2013). The sites in the U.S. Caribbean include Bajo de Cico, Tourmaline, and Abrir la Sierra off western Puerto Rico and Red Hind and Grammanik Banks south of St. Thomas, USVI. A number of additional sites were identified around Puerto Rico particularly off the west and south coasts and around Vieques Island through interviews with fishers but these have not been confirmed (Ojeda-Serrano et al. 2007).

4 ACTION AREA

Action area means all areas affected directly, or indirectly, by the Federal action, and not just the immediate area involved in the action (50 C.F.R. §402.02).

The proposed action would occur at any time of year, as it is associated with accidental spills of oil, which cannot be predicted in terms of timing and magnitude. The action would occur in waters of the Commonwealth of Puerto Rico (up to 9 nautical miles [nm] from shore; Figure 5), Territory of the U.S. Virgin Islands (up to 3 nm from shore; Figure 6), and Federal waters of the U.S. Caribbean Exclusive Economic Zone (EEZ; Figure 7).

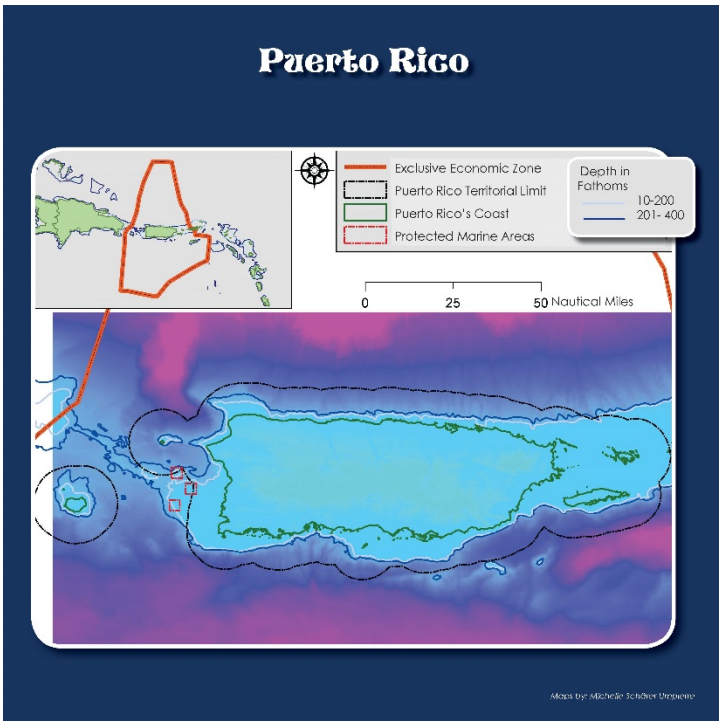


Figure 5. Map showing Puerto Rico's territorial waters (black line in figure) in the context of the EEZ (from Caribbean Fisheries Management Council Puerto Rico Portion of EEZ Map)

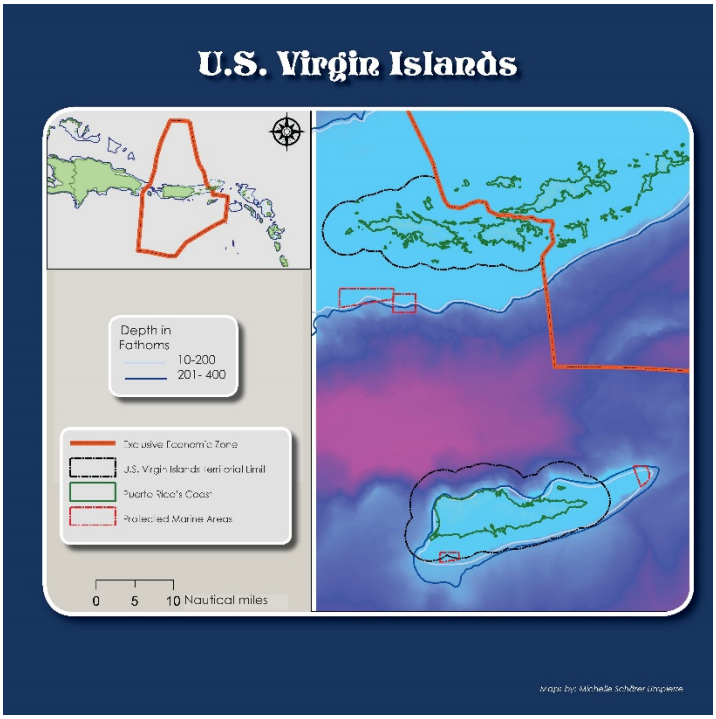


Figure 6. Map showing the U.S. Virgin Islands territorial waters (black line in figure) in the EEZ (from Caribbean Fisheries Management Council USVI Portion of EEZ Map)

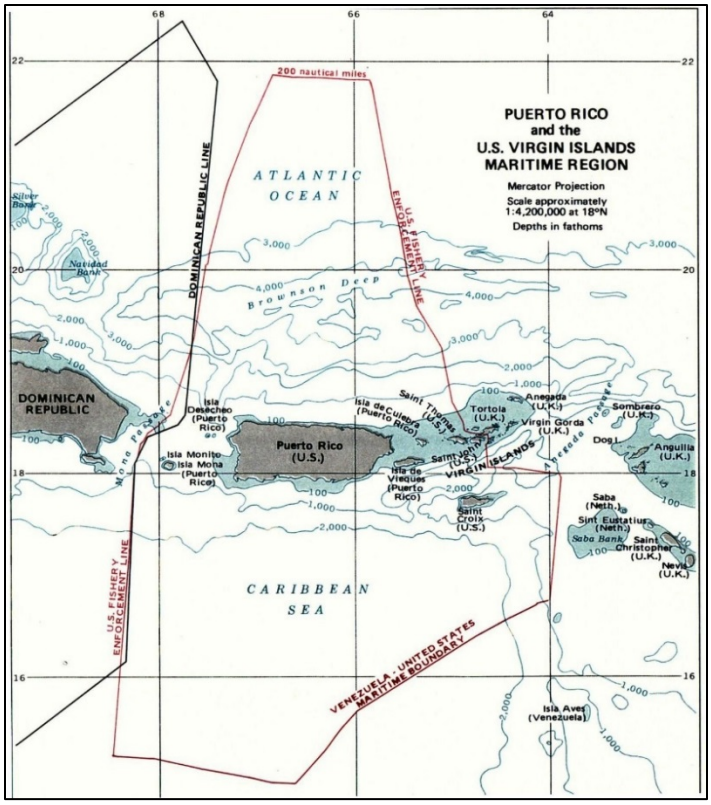


Figure 7. Map showing the Caribbean EEZ boundaries (from Caribbean Fisheries Management Council EEZ Boundaries Map**)**

5 INTERRELATED AND INTERDEPENDENT ACTIONS

Interrelated actions are those that are part of a larger action and depend on that action for their justification (50 C.F.R. §402.02). *Interdependent* actions are those that do not have independent utility apart from the action under consideration (*Id.*).

For this consultation, we consider the following interrelated and interdependent actions:

- transit operations and the use of vessels associated with the application of dispersants and ISB;
- the use of aircraft (i.e., fixed wing airplanes and helicopters) in the application of dispersants and in conducting aerial surveys associated with dispersant application or ISB; and
- the use of mechanical spill response equipment that are part of the larger oil spill response in which dispersants and/or ISB may also be employed during cleanup.

The interdependent actions would not occur if dispersant application and/or ISB were not used as a spill response tool. The interrelated activities may still occur in the event of an oil spill whether or not dispersants or ISB are used as response tools. The potential impacts of these actions are described in the effects analyses in Sections 6.1 and 8.

6 STATUS OF ENDANGERED SPECIES ACT PROTECTED RESOURCES

This section identifies the ESA-listed species that potentially occur within the action area that may be affected by the proposed use of dispersants and/or ISB. It then summarizes the biology and ecology of those species and what is known about their life histories in the action areas. The status is determined by the level of risk that the ESA-listed species and designated critical habitat face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. The species status section helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 C.F.R §402.02. This section also breaks down the species and designated critical habitats that may be affected by the proposed action, describing whether or not those species and designated critical habitats are likely to be adversely affected by the proposed action. More detailed information on the status and trends of these ESA-listed species, and their biology and ecology can be found in the listing regulations and critical habitat designations published in the Federal Register, status reviews, recovery plans, and on NMFS Web site: http://www.nmfs.noaa.gov/pr/species/esa/listed.htm. The species and designated critical habitats deemed likely to be adversely affected by the proposed action are carried forward through the remainder of this opinion.

This section helps to inform the description of the species' current "reproduction, numbers, or distribution" as described in 50 C.F.R §402.02.

The species potentially occurring within the action area that may be affected by the proposed actions are listed in Table 1, along with their regulatory status.

Table 1. Threatened and endangered species that may be affected by the Caribbean Regional Response Team's proposed use of dispersants and/or in-situ burning in the U.S. Caribbean

Species	ESA Status	Recovery Plan	Critical Habitat
Marine Mammals			
Blue whale (*Balaenoptera musculus*)	E – 35 FR 18319, December 2, 1970	07/1998	----
Fin whale (*Balaenoptera physalus*)	E – 35 FR 18319, December 2, 1970	75 FR 47538	----
Sei whale (*Balaenoptera borealis*)	E – 35 FR 18319, December 2, 1970	76 FR 43985	----
Sperm whale (*Physeter macrocephalus*)	E – 35 FR 18319, December 2, 1970	75 FR 81584	----
Fish			

Nassau grouper (*Epinephelus striatus*)	T – 81 FR 42268, June 29, 2016	----	----
Scalloped hammerhead shark (*Sphyrna lewini*), Central and Southwest Atlantic DPS	T – 79 FR 38214, July 3, 2014	----	----
Sea Turtles			
Green sea turtle (*Chelonia mydas*), North Atlantic Distinct Population Segment (DPS)	T – 81 FR 20057, April 6, 2016 (original listing 1978)	63 FR 28359	63 FR 46693
Green sea turtle (*Chelonia mydas*), South Atlantic DPS	T – 81 FR 20057, April 6, 2016	63 FR 28359	----
Hawksbill sea turtle (*Eretmochelys imbricata*)	E – 35 FR 8491, June 2, 1970	12/1993	63 FR 46693
Leatherback sea turtle (*Dermochelys coriacea*)	E – 35 FR 8491, June 2, 1970	63 FR 28359	44 FR 17710
Loggerhead sea turtle (*Caretta caretta*), Northwest Atlantic Ocean DPS	T – 76 FR 58868, September 22, 2011 (original listing 1978)	63 FR 28359	Not in action area
Corals			
Elkhorn coral (*Acropora palmata*)	T – 71 FR 26852, May 9, 2006, and 79 FR 53852, September 10, 2014	80 FR 12146	73 FR 72210
Staghorn coral (*Acropora cervicornis*)	T – 71 FR 26852, May 9, 2006, and 79 FR 53852, September 10, 2014	80 FR 12146	73 FR 72210
Lobed star coral (*Orbicella annularis*)	T – 79 FR 53852, September 10, 2014	----	----
Boulder star coral (*Orbicella franksi*)	T – 79 FR 53852, September 10, 2014	----	----
Mountainous star coral (*Orbicella faveolata*)	T – 79 FR 53852, September 10, 2014	----	----

Pillar coral (*Dendrogyra cylindrus*)	T – 79 FR 53852, September 10, 2014	----	----
Rough cactus coral (*Mycetophyllia ferox*)	T – 79 FR 53852, September 10, 2014	----	----
T = threatened, E = endangered			

The CRRT determined that the proposed action may affect, but is not likely to adversely affect humpback whales. NMFS published a final rule on September 8, 2016 (81 FR 62260) identifying 14 DPSs for humpback whales. The West Indies DPS, which includes Puerto Rico and USVI and is the only humpback DPS likely to be encountered in the action area, was found not to merit listing under the ESA. Therefore, humpback whales are not considered in this consultation.

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

NMFS uses two criteria to identify the ESA-listed species and designated 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 that 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. An 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, is not likely to adversely affect" 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 the level of constituting a take. 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 would be an adverse effect if it did impact a listed species), but it is very unlikely to occur.

6.1.1 ESA-Listed Whales

Effects of Oil: Oil can negatively impact marine mammals if they are exposed to a spill. During the DWH spill, various dolphin species were the most affected. Thirty-three sperm whales were observed with some oil in the deep water area where the spill occurred. In addition, 6% of the population was determined to have died and 5% of females were determined to have suffered reproductive failure due to oiling (DWH Trustees 2016). However, this spill is not comparable to any of the single-vessel oil spills that have occurred in the U.S. Caribbean to date and there have never been reports of any interactions with or impacts to ESA-listed whales associated with oil spills in the U.S. Caribbean.

Surfacing to breathe in an oil slick where whales could inhale oil and toxic petroleum vapors (Helm et al. 2015) is expected to be the greatest risk to these animals during an oil spill.

Dispersants: There are no studies related to the potential toxicity of dispersants to whales. Whales have a specialized dermis that minimizes adherence of oil to their skin as well as a blubber layer that is expected to protect their thermoregulatory system from the effects of oil (Helm et al. 2015). These characteristics are also expected to protect whales from impacts of dispersants. In addition, the broad ranges of ESA-listed whales and their presence in the U.S. Caribbean being largely restricted to the winter migration period (approximately November to March), means any exposure to oil treated with dispersants would be short-term. Because of this, it is extremely unlikely that the short-term increase in oil availability and toxic effects of oil due to the use of dispersants would result in impacts to ESA-listed whales if dispersants were used during a spill in the U.S. Caribbean. Further, as seen in Appendix H, oil spills are rare in the U.S. Caribbean and largely result from vessel groundings, which occur near shore and would therefore not be located in dispersant preauthorization areas or areas with water depths of 30 ft or greater, meaning whale exposure to dispersed oil is likely to be extremely unlikely. PDCs requiring that observers be present and that dispersant application not occur if marine mammals are sighted will protect the animals from potential direct and indirect effects of dispersant application if spills occur in preauthorized areas or areas with a water depth greater than 30 ft in the U.S. Caribbean. Therefore, we believe the effects of dispersant application on ESA-listed whales would be discountable.

Whales may also suffer indirect effects due to modification of prey availability because of the toxic effects of an oil spill (Ridoux et al. 2004) and ingestion of prey contaminated by oil and dispersed oil. Zooplankton analyses conducted before, during, and after the DWH spill suggested that assemblages of these organisms are largely resistant to impacts (Hernandez et al. 2015) meaning baleen whales may not experience declines in prey due to a spill and the use of dispersants. Baleen whales could be affected by ingestion of oil and adherence of oil particles to

baleen plates. An investigation of the impacts of exposure of baleen plates of seven species of whales to crude oil, gasoline, and tar showed the structural and chemical integrity of the plates remained constant and any declines in filtration rates through the plates were minor and short-term (Helm et al. 2015).

Numerous studies have found lethal and sublethal effects to early life stages of fish because of dispersed oil (Adams et al. 2014; Couillard et al. 2005; Brette et al. 2014; Brown et al. 2015; van Balen et al. 2015). Patterson III et al. (2015) also found declines in reef fish numbers and biomass with signs of recovery beginning in the fourth year following the DWH spill. Thus, toothed whales could be more affected by oil spills and dispersant use due to declines in prey species.

As noted above, ESA-listed whales are present in the U.S. Caribbean largely during the winter migration period (approximately November to March), any exposure to prey exposed to oil treated with dispersants in the case of toothed whales would be short-term. In addition, any loss of prey species in the area of a spill would be a localized effect based on information regarding the limited size of oil spills that have taken place in the U.S. Caribbean to date (see Appendix H). Because of this, it is extremely unlikely that the short-term decrease in prey or exposure to contaminated prey due to the use of dispersants in the U.S. Caribbean would result in impacts to ESA-listed whales. PDCs requiring that observers be present and that dispersant application not occur if marine mammals are sighted will protect the animals from potential direct and indirect effects of dispersant application. Therefore, we believe the effects of contamination or localized declines in prey as a result of dispersant application on ESA-listed whales would be insignificant.

In-Situ Burning: Whales are at risk from ISB due to the species' need to surface and breathe. If animals surface in the area of the burn, there is the potential for the animals to be injured or killed due to exposure to burning and the smoke from burning. The burn area is kept small in order to control the burn and burning is of short duration (CRRT Response Technologies Committee 2015), which would limit the potential effects to whales. Whales are more likely to be affected by exposure to oil and vapors when surfacing to breathe. The PDCs require that burning not take place in areas where marine mammals have been sighted and that the burn area be relocated or the burn delayed until any animals present leave the area of their own volition. The DWH spill response used ISB on a number of occasions. Mortality of some whale species, including sperm whales were reported but because ISB took place in the most heavily oiled areas during DWH, mortalities were likely due directly or indirectly to oiling (DWH Trustees 2016). Oil spills that have occurred in the U.S. Caribbean to date have been associated mainly with large vessel groundings as there are no petroleum extraction operations in the region. The PDCs also require monitoring before, during, and after a burn using dedicated observers to be sure marine mammals are not present in the burn area. If marine mammals are sighted in the burn area, burning may be stopped or the burn area relocated. As stated above, ESA-listed whale species are present in U.S. Caribbean waters mainly during their winter migration so there would

be little to no risk of exposure to ISB if spills requiring this clean up method occur outside the months of November-March. For all of these reasons, we believe the effects of the use of ISB on ESA-listed whales that would be authorized by the CRRT would be discountable.

Interrelated and Interdependent Activities: Overflights conducted prior to dispersant application and prior to and during ISB operations, as well as the use of aircraft and vessels during dispersant application and ISB operations, could affect ESA-listed whales due to an increase in noise levels leading to harassment of the animals, causing them to change their behavior such as by swimming away from the noise of the aircraft. The PDCs require that hovering of aircraft in areas where marine mammals are sighted be restricted to 15 minutes and that an altitude of 200 m be maintained in order to reduce the potential for harassment of marine mammals. Therefore, we believe potential harassment of ESA-listed whale species in the U.S. Caribbean associated with overflights related to dispersant use and ISB operations would be insignificant.

The use of vessels during dispersant application and ISB operations could affect ESA-listed whales due to collisions with vessels. There have been a number of oil spills, mainly due to vessel groundings, in the U.S. Caribbean (see Appendix H) and, while none have involved the use of dispersants or ISB to date, many have involved the use of vessels as part of response activities. No vessel collisions or other interactions with marine mammals have been reported as part of this vessel use during response activities. The PDCs require compliance with the *Vessel Operations Best Management Practices* (Appendix C) and that observers continuously monitor for the presence of marine mammals to ensure that equipment operation is ceased if marine mammals are within 50 ft of this operation. The PDCs also require that no ISB operations take place in areas where marine mammals are sighted. Therefore, we believe the potential for vessel collisions with ESA-whales during dispersant operations and ISB activities in the U.S. Caribbean will be discountable.

No other interrelated or interdependent response activities that take place due to the use of dispersants or ISB are expected to affect ESA-listed whales.

6.1.2 Loggerhead Sea Turtles

Loggerhead sea turtles are not common in the U.S. Caribbean but there have been reports of limited nesting on the east coast of Puerto Rico and the island of Culebra, as well as on Buck Island, St. Croix (2 females reported nesting in the early 2000's but no longer reported). There were infrequent stranding reports of this species (rarely equaling one per year) from Puerto Rico and USVI (Puerto Rico Department of Natural and Environmental Resources [PRDNER] and Virgin Islands Department of Planning and Natural Resources [VIDPNR], unpublished data) but there have been no reports of stranding of this species in the past 2 years. To date, there have been no reports of loggerhead sea turtle sightings during response actions that have taken place in the U.S. Caribbean associated with vessel groundings, vessels sinking, and spills of oil and other toxins into marine waters.

Effects of Oil: During the DWH spill, injuries and death of various sea turtle species were documented because of oiling and the ingestion of oil based on necropsies performed on dead turtles (DWH Trustees 2016). Loggerhead sea turtles that utilize habitats in areas with heavy tanker traffic were found to contain PAH contamination in their tissues that could affect their fitness (Camacho et al. 2012). The major route of exposure for adult sea turtle ingestion of oil is thought to be buoyant tarballs that form as non-dispersed oil weathers naturally because turtles are known to ingest these tarballs (CRRT Response Technologies Committee 2015).

Dispersants: Few studies have been done to determine the impacts of dispersants on sea turtles. Sea turtles may be affected by impacts to habitats and prey species caused by oil spills and dispersant use. However, due to the rarity of loggerhead sea turtles in the U.S. Caribbean, the lack of evidence indicating that dispersants affect this species, and the PDCs requiring that dispersant application not take place if sea turtles are sighted, we believe dispersant use is extremely unlikely to have an effect on loggerhead sea turtles and would therefore be discountable.

In-Situ Burning: Loggerhead sea turtles are at risk from ISB because they need to surface to breathe. If loggerhead sea turtles surface in the area of the burn, there is the potential for them to be injured or killed due to exposure to smoke and flames. The PDCs require that ISB not take place in areas where sea turtles have been sighted and that the burn are be relocated or the burn delayed until any animals present leave the area of their own volition. The PDCs also require monitoring before, during, and after a burn using dedicated observers to be sure sea turtles are not present in the burn area. As noted above, loggerhead sea turtles are rarely sighted in the U.S. Caribbean. Therefore, because of the PDCs and the rarity of loggerhead sea turtles in the U.S. Caribbean, we believe the use of ISB is extremely unlikely to have an effect on this species would therefore be discountable.

Interrelated and Interdependent Activities: As for ESA-listed whales, overflights conducted prior to dispersant application and prior to and during ISB operations and the use of aircraft and vessels during dispersant application and ISB operations could affect loggerhead sea turtles due to an increase in noise levels leading to harassment of the animals, causing them to change their behavior such as by swimming away from the noise of the aircraft. The PDCs require that hovering of aircraft in areas where sea turtles are sighted be restricted to 15 minutes and that an altitude of 200 m be maintained in order to reduce the potential for harassment of animals. Therefore, we believe the potential harassment of loggerhead sea turtles in the U.S. Caribbean associated with overflights related to dispersant use and ISB operations would be insignificant.

The use of vessels during dispersant application and ISB operations could affect loggerhead sea turtles due to vessel strikes. No vessel strikes of sea turtles have been reported as part of vessel use during response activities associated with oil spills that have occurred to date in the U.S. Caribbean (see Appendix H). The PDCs require compliance with the *Vessel Operations Best Management Practices* (Appendix C) and that observers continuously monitor for the presence of sea turtles to ensure that equipment operation is ceased if animals are within 50 ft of this

operation. The PDCs also require that no ISB operations take place in areas where sea turtles are sighted. Therefore, we believe the potential for vessel collisions with loggerhead sea turtles during dispersant operations and ISB activities in the U.S. Caribbean will be discountable.

Other response activities associated with the use of dispersants and ISB also could affect loggerhead sea turtles, particularly through potential entanglement in lines associated with boom and potential habitat loss or degradation due to vessel strike. The PDCs include measures to avoid impacts associated with entanglement in lines associated with boom and measures to minimize potential impacts to loggerhead sea turtle habitat such as the requirement that vessels transit in areas with water depths that are adequate for the vessel's draft to minimize accidental groundings and that lines used for salvage operations during response activities be floating to minimize the potential for abrasion and other impacts to marine habitats. Therefore, we believe the effects due to the potential for entanglement and habitat loss or degradation associated with response activities during the use of dispersants or ISB to loggerhead sea turtles in the U.S. Caribbean will be discountable.

6.1.3 Nassau Grouper

Puerto Rico once had significant fisheries landings of Nassau grouper and at least one major spawning aggregation site on the southwest that seems to have disappeared along with the population of this fish (NMFS 2013). There are occasional reports of juvenile settlement in shallow nearshore waters suggesting there are either unknown spawning aggregation sites, mating in small groups, or influxes of larvae from other Caribbean islands (Aguilar-Perera et al. 2006).

Effects of Oil: Studies have shown that the exposure of embryos and larvae of pelagic and nearshore species in both cold and warm climates to PAHs from oil results in developmental defects, particularly associated with cardiac development even at low concentrations (Incardona et al. 2014; Carls and Meador 2009; Hicken et al. 2011; Carls et al. 2008; Incardona et al. 2005; Brette et al. 2014). Reduced swimming performance and fin development and decreased hatching success were also observed due to concentrations of different PAHs (Hicken et al. 2011; Incardona et al. 2014; Adams et al. 2014; Brown et al. 2015). Anemia was seen in fish and other animals exposed to DWH oil and there were documented declines in reef fish numbers and biomass on reefs across the Gulf shelf due to the toxic effects of the spill (Patterson III et al. 2015; DWH Trustees 2016).

Dispersants: When toxicity was expressed as measured concentration of oil in water in dispersed (i.e., oil that has been treated with dispersants) and undispersed oil mixtures, no difference in toxicity was found when fish embryos were exposed to the water accommodated fraction of oil in water and of dispersed oil (Adams et al. 2014; Couillard et al. 2005). Thus, dissolved PAHs are responsible for toxicity in fish although particulate oil can have other effects due to direct contact and uptake in fish tissues (Adams et al. 2014). In an experiment with embryo sheepshead minnow, it was found that even short-term (24 hour) exposure to chemically dispersed oil in early embryonic development can have severe effects on heart development, movement,

hatching success and timing, larval survival, and size when hatched (van Balen et al. 2015). The application of dispersants was also found to alter the suite of PAHs in the water column and increase the relative concentrations of high molecular weight PAHs, which are usually less water soluble (Couillard et al. 2005).

Analyses of reef fish following the DWH spill indicate that exposure to PAHs resulted in declines in reef fish numbers and biomass on natural and artificial reefs across the Gulf shelf and food web impacts leading to reduced growth rates following the spill. Stable isotope analysis of reef fish muscle tissue indicates that food web effects persisted into 2014 (Patterson III et al. 2015). Thus, Nassau grouper could be affected by oiling and the use of dispersants during spill response in the U.S. Caribbean given that this reef fish species may be present on reefs in adult life stages, embryos and early larval stages may be present on the shelf edge, and juveniles may be present in nearshore habitats. The PDCs restricting the use of dispersants to waters greater than 30 ft in depth will protect later larval and juvenile life stages of Nassau grouper. Life stages that use deeper waters could be affected, particularly embryo and early larval stages that seem to be most sensitive to PAHs and the use of dispersants that increases the concentrations and availability of PAHs in the water column. Based on the study by Patterson III et al. (2015), it could take several years for Nassau grouper to recover if the species was to be affected by an oil spill and dispersant use. At this time, Nassau grouper spawning has been observed infrequently at a historical spawning aggregation site in Puerto Rico and one in USVI with very small number of fish of this species. The PDC prohibiting the use of dispersants during the historical spawning period for Nassau grouper at the historical SPAGS in Puerto Rico and USVI where the species is still occasionally observed will protect spawning adults and early life stages of the species. The PDCs restricting the application of dispersants to particular depths and habitats will also minimize the potential effects of dispersant application to various life stages of Nassau grouper. Due to the rarity of Nassau grouper in the U.S. Caribbean, Nassau grouper likely will not be present in an area where dispersant or ISB use may occur. Given the required PDCs to protect the species and the small size of spills in the U.S. Caribbean, and the infrequent nature of these spills, as well as the locations where spills have occurred to date that would exclude the use of dispersants and ISB in the majority of cases, we believe the effects of the use of dispersants on Nassau grouper would be discountable.

In-Situ Burning: There were no documented direct impacts from ISB used during DWH on fish and motile invertebrates, although if these organisms were present in heavy slick areas during burning they would not have been observed due to their small sizes in relation to the size and depth of the slick. As noted, ISB forms tarballs. There were reports of benthic invertebrates, particularly shrimp, being trapped in tarballs in some areas of the Gulf but this type of effect was not reported for fish. Therefore, we believe the effects of in-situ burning on Nassau grouper would be discountable.

Interrelated and Interdependent Activities: Other response activities associated with the use of dispersants and ISB could affect Nassau grouper, particularly those that could impact habitat of

the species. The PDCs include measures to minimize potential impacts to habitats used by various life stages of Nassau grouper like seagrass beds and coral reefs such as the requirement that vessels transit in areas with water depths that are adequate for the vessel's draft to minimize accidental groundings and that lines used for salvage operations during response activities be floating to minimize the potential for abrasion and other impacts to marine habitats. There are large areas of seagrass beds, coral reefs, and colonized hard bottom throughout the U.S. Caribbean. Oil spills to date in the region have been small in size and largely associated with vessel groundings (see Appendix H). Therefore, we believe the effects due to the potential for habitat loss or degradation associated with response activities during the use of dispersants or ISB to Nassau grouper in the U.S. Caribbean will be insignificant.

6.1.4 Scalloped Hammerhead Shark, Central and Southwest Atlantic Distinct Population Segment

Data from the Marine Recreational Information Program (MRIP) from Puerto Rico from 2001 – 2016 show 797 scalloped hammerhead sharks were landed by recreational charter boats using vertical line gear within Puerto Rico's territorial waters, which extend to 9 nm from shore. The greatest number of scalloped hammerhead sharks, 516, were captured in 2003. The other landings were from 2004 (44), 2006 (30), 2012 (98), and 2016 (109). Landed sharks ranged in length from 600 – 800 millimeters (mm), meaning they were likely neonates or juveniles as maturity is reached when males are approximately 1,219 mm and females are 1,981 mm. At least some of the sharks may have been misidentified and were actually bonnetheads and others were included in a general hammerhead shark category and could be species other than scalloped hammerhead, but these are the best data available from recreational fisheries landings (M. Wunderlich, NMFS SERO, pers. comm. to L. Carrubba, NMFS OPR, October 13, 2017). MRIP data are not collected from USVI. However, shark research conducted in St. Thomas and St. John, USVI, in 2004 and 2005 resulted in the capture of a total of nine scalloped hammerhead sharks in Megan's Bay, St. Thomas over both years DeAngelis (2006). The scalloped hammerhead sharks captured by DeAngelis (2006) were all neonates, indicating that the bay provides nursery habitat for the species. Commercial fisheries data for the U.S. Caribbean do not distinguish between hammerhead shark species but NMFS estimates up to two animals per year are captured using line gear in deep offshore waters outside territorial seas (M. Wunderlich, NMFS SERO, pers. comm. to L. Carrubba, NMFS OPR, October 13, 2017). These animals are more likely to be adult sharks due to the water depth and distance from shore as adults tend to be more common in offshore waters while neonates and juveniles are more common in nearshore waters.

Effects of Oil: Sharks and other fish are exposed to oil and its associated chemical components in part when water travels across the surface of their gills or when they ingest contaminated prey. Incardona et al. (2014) showed that the exposure of embryos and larvae of large pelagic predators (tuna) to PAHs from oil results in developmental defects, particularly associated with cardiac development. While scalloped hammerhead sharks have live births and therefore go

through embryo and larval stages in the adult female, the uptake of oil by the female could affect embryonic development, as could exposure to oil by neonates that are still growing. Sampling of sharks exposed to oil from DWH found physiological signs of elevated PAH exposure but no evidence for chromosomal or higher level impacts to sharks in the northern Gulf of Mexico (Heithaus et al. 2014). Blacknose sharks, which undergo limited seasonal migrations in the Gulf, were found to exhibit greater effects of PAH exposure to oil from DWH, likely due to these sharks remaining in the area over longer periods than other species (Walker 2011).

Dispersants: There are no studies of the effects of dispersants on sharks. Given that adult scalloped hammerhead sharks are the most likely to be present in deep waters within preauthorized areas, these are most likely to be exposed to dispersants. However, because commercial fisheries data indicate that these animals are rare in deep waters around the U.S. Caribbean and given the infrequent nature of oil spills in the U.S. Caribbean as well as the fact that the majority of these are associated with vessel groundings (see Appendix H) and would therefore be unlikely to occur in areas with adult scalloped hammerhead sharks, the exposure of these animals to dispersant applications would be extremely limited. Neonate and juvenile scalloped hammerhead sharks are the most common life stages of the species in the U.S. Caribbean based on the recreational fishing data from Puerto Rico and limited shark study done in USVI. Because these animals are typically found in areas with shallow waters nearshore where the PDCs restrict the application of dispersants, they are unlikely to be exposed to dispersant application. Motile prey could be exposed to dispersant application but the limited size of anticipated oil spills in the U.S. Caribbean given past events that required a response coupled with the restrictions on where dispersants can be applied mean that scalloped hammerhead sharks would still have extensive prey available. Therefore, we believe the effects of dispersant application on scalloped hammerhead shark will be discountable.

In-Situ Burning: There were no documented direct impacts from ISB used during DWH on fish, although it is possible that organisms such as sharks were not observed due to the size and depth of the slick. However, because sharks do not need to surface for air, they may not have been exposed to the burning itself. As noted, ISB forms tarballs. There were reports of benthic invertebrates, particularly shrimp, being trapped in tarballs in some areas of the Gulf, which means sharks could have ingested tarballs. However, research on shark exposure to oil from DWH (Heithaus et al. 2014) did not indicate that sampled sharks had tarballs in their gut. Therefore, we believe the effects of in-situ burning on scalloped hammerhead shark will be discountable.

Interrelated and Interdependent Activities: Other response activities associated with the use of dispersants and ISB could affect scalloped hammerhead sharks, particularly those that could impact habitat of the species. The PDCs include measures to minimize potential impacts to habitats used by various life stages of scalloped hammerhead sharks, particularly nearshore neonate and juvenile habitat like coral reefs. Oil spills to date in the region have been small in size and largely associated with vessel groundings (see Appendix H) so large areas of suitable

habitat for scalloped hammerhead sharks would still be available to the species during response activities. Therefore, we believe the effects due to the potential for habitat loss or degradation associated with response activities during the use of dispersants or ISB to scalloped hammerhead sharks in the U.S. Caribbean will be insignificant.

6.1.5 ESA-Listed Corals

Effects of Oil: A study of mature hard coral colonies from the Red Sea found the water-soluble fraction of crude oil did not have a measurable impact on the corals but the dispersants tested had varying levels of toxicity with exposure to some resulting in high survivorship of coral fragments and others complete mortality (Shafir et al. 2007). Fragments were also cultured following acute exposure to oil and dispersed oil-dissolved fractions. Corals that survived exposure continued to live and after a few weeks began growing, though onset of initial tissue growth showed delayed effects of contaminant exposure (Shafir et al. 2007). Similarly, Renegar et al. (2015) found that corals exposed to medium levels of a PAH were able to recover less than two weeks following exposure.

A cellular diagnostic method was used to determine the impacts of an oil spill on hard corals in Micronesia. The studies found changes in cellular physiological condition and reduced genomic integrity that are likely to have sublethal effects and may affect viability of offspring (Downs et al. 2006; Rougee et al. 2006). Coral also demonstrated a dose response with increasing concentrations of the water-soluble fraction of oil leading to biotransformation of cells (Rougee et al. 2006). Thus, while adult corals may survive contaminant exposure from an oil spill and the use of dispersants, there may be affects to growth and reproduction.

Dispersants: A study by Negri and Heyward (2000) found that dispersed oil was slightly more toxic to fertilization than dispersant (Corexit 9527) alone indicating there is an additive effect. This points to a greater risk to spawning corals and larvae because larval metamorphosis was also affected by exposure to dispersed oil (Negri and Heyward 2000; Lane and Harrison 2000). Dispersed oil and dispersant alone dissolved in water were found to be more toxic to coral planulae than dissolved oil alone in a laboratory study with corals from the Great Barrier Reef (Lane and Harrison 2000) and another with stony and soft coral from the Red Sea (Epstein et al. 2000). Epstein et al. (2000) also found that all treatments caused larval morphology deformations, loss of normal swimming behavior, and rapid tissue degeneration as concentrations of oil and dispersed oil water accommodated fractions were increased. Similarly, in a study of two corals from the Florida Keys, including mountainous star coral, regarding the effects of exposure to the water accommodated fraction of oil and dispersed oil on coral planulae, larval survival and settlement were significantly decreased in both constant and spiked exposure experiments as concentrations increased (Goodbody-Gringley et al. 2013). Mountainous star coral planulae larvae were found to be more sensitive than the other non-ESA-listed species tested to oil and dispersed oil water accommodated fractions.

Adult ESA-listed coral colonies are not expected to be exposed to dispersants if used during spill response in the U.S. Caribbean. The majority of oil spills that have occurred in the region to date

have been associated with large vessel groundings on reefs and shorelines in shallow water (see Appendix H). The PDCs restrict the depths and habitat types in which and over which dispersant application will occur and would not allow dispersant use under the circumstances described in this opinion in the majority of oil spill scenarios that have occurred in the U.S. Caribbean in the past. If exposure does occur due to transport of dispersed oil into the water column in shallower areas where ESA-listed coral colonies may be present, there could be impacts to the reproductive success of ESA-listed corals based on previous studies of the impacts of dispersants. The PDC prohibiting the use of dispersants during mass spawning of some ESA-listed coral species under this consultation will minimize the exposure of reproducing adult coral colonies and coral larvae to dispersants. Given the range of ESA-listed corals in the U.S. Caribbean, the limited size of a potential oil spill in the region (which is likely to originate from a large vessel grounding based on past spills and the lack of petroleum production or mining in the U.S. Caribbean), and the PDCs, we believe the effects of the use of dispersants on ESA-listed corals would be discountable.

In-Situ Burning: ISB takes place at the water surface and will not be allowed in depths less than 30 ft or where ESA-listed coral colonies are within 30 ft of the surface. ISB will not be authorized during ESA-listed coral mass spawning periods per the PDCs. If burning were to take place during coral spawning periods, larvae would be lost in the area of the burn as larvae travel at or near the water surface prior to settling. If tarballs that form as a result of ISB settle to the bottom in areas containing ESA-listed coral colonies, the colonies could be affected. Deep-sea corals were reported to be coated with oil residues, likely including tarballs from the DWH spill but this was at such a large volume as to replace the normal marine bottom with black oil residue, leading to impacts to corals and associated organisms. Tarballs have been found to have toxic properties due to the presence of PAHs but would be expected to have only localized effects on particular coral colonies if tarballs settle on these colonies. Tarballs also form during natural weathering of oil so there is a chance that tarballs would affect ESA-listed coral colonies regardless of whether or not burning operations take place, although tarballs from burning operations have been found to have different PAH compounds that can be more toxic to some organisms (Shigenaka et al. 2015). The limited size of a spill that would be likely to occur in the U.S. Caribbean based on past events, and the limited associated use of ISB for such a spill, and PDCs restricting areas where in-situ burning will occur are expected to ensure that tarball generation and associated coating of benthic habitats will be minimal. Therefore, we believe the effects of the use of ISB under the conditions described in this consultation on ESA-listed corals would be discountable.

Interrelated and Interdependent Activities: The use of vessels during dispersant application and ISB operations could affect ESA-listed corals due to the potential for accidental groundings, anchor damage and other physical disturbance to ESA-listed coral colonies. No accidental groundings associated with the use of response vessels have been reported in the past as part of response operations associated with oil spills that have occurred to date in the U.S. Caribbean (see Appendix H). The PDCs require compliance with restrictions on vessel anchoring and

operations in shallow waters and waters containing substrate suitable for the growth of ESA-listed corals in order to minimize the potential for accidental groundings and impacts to coral colonies associated with vessel anchoring and lines from vessels. Therefore, we believe the potential effects to ESA-listed corals from vessel operations during dispersant operations and ISB activities in the U.S. Caribbean will be discountable.

Other response activities associated with the use of dispersants and ISB could affect ESA-listed corals, particularly the placement of boom. The PDCs include measures to avoid impacts associated with entanglement of lines in ESA-listed corals and guide the placement of anchors to secure the boom such that impacts to ESA-listed coral colonies associated with the installation of anchors is avoided. Therefore, we believe the effects due to the potential for entanglement of lines and boom anchor impacts associated with response activities during the use of dispersants or ISB to ESA-listed corals in the U.S. Caribbean will be discountable.

6.1.6 Green (North Atlantic Distinct Population Segment) Sea Turtle Critical Habitat

Dispersants: Critical habitat for the North Atlantic DPS of green sea turtles includes waters extending three nm seaward from the mean high water line of Culebra Island, Puerto Rico, including outlying keys that provide habitat necessary for the continued survival and recovery of green sea turtles in the region. This area provides important green turtle developmental habitat. In particular, it hosts seagrass beds, including turtle grass, which serve as the principal dietary component of juvenile and adult green turtles throughout the Wider Caribbean region. In addition, the coral reefs and other topographic features within the waters around Culebra Island and surrounding islands and cays provide green turtles with shelter during interforaging periods, serving as refuge from predators. The results of the Tropical Oil Pollution Investigations in Coastal Systems (TROPICS) study, including surveys conducted twenty years later (CRRT Response Technologies Committee 2015; Baca et al. 2005), provide evidence that seagrass beds are relatively unaffected by the use of dispersants, although the organisms in the seagrass beds may suffer mortality and then show signs of recovery. There are extensive seagrass beds around Culebra and in areas associated with some of the larger outlying islands and cays such as Culebrita Island and Cayo Norte. Based on benthic habitat mapping by the National Centers for Coastal Ocean Science (NCCOS), there are approximately 1,444 acres (ac) of seagrass and 22,556 ac of coral reefs and colonized hard bottom in waters with depths less than 25 m around all of Culebra and its surrounding islands and cays (Kågesten et al. 2015).

It is possible that a spill could occur within green sea turtle critical habitat. However, no direct impacts to seagrass beds or coral reefs and other refuge habitats for green sea turtles are expected to occur because the PDCs require that dispersant application be restricted to waters more than 30 ft (9 m) deep and prohibit the use of dispersants in areas with reefs, colonized hard bottom or other coralline habitats with ESA-listed coral colonies within 30 ft of the water surface and in estuaries and embayments. Dispersed oil is expected to be concentrated in the first few meters of the water column based on studies of dispersed oil behavior in the marine environment, which means it would not reach benthic habitats used by green sea turtles given the PDCs restricting the

depth and areas where dispersants can be used. In addition, any indirect impacts, such as transport of dispersants and dispersed oil to benthic habitats in shallow waters due to wind and wave action, would be limited in area because of the small size of spills based on the records of past oil spills in the U.S. Caribbean (see Appendix H). Therefore, we believe the effects of dispersant use on green (North Atlantic DPS) sea turtle critical habitat would be insignificant.

In-Situ Burning: Critical habitat for green (North Atlantic DPS) sea turtles would not be directly affected during burning operations due to the PDCs limiting the water depths and habitats in which ISB will occur. The formation of tarballs as a result of ISB could result in impacts to the essential features of these critical habitats through smothering of benthic habitats or due to the toxicity of tarballs. However, there are extensive seagrass beds, coral reefs, and colonized hard bottom within the area designated as critical habitat for green sea turtles around Culebra and its surrounding islands and cays. Due to the expected limited extent of potential burn operations in the U.S. Caribbean (CRRT Response Technologies Committee 2015) and based on the small number and extent of oil spills that have occurred to date, tarball generation and associated impacts to benthic habitats will be minimal. Therefore, we believe the effects of the use of ISB on green (North Atlantic DPS) sea turtle critical habitats would be insignificant.

Interrelated and Interdependent Activities: The use of vessels during dispersant application and ISB operations could affect green sea turtle critical habitat due to the potential for accidental groundings, anchor damage and other physical disturbance to coral and seagrass habitats. No accidental groundings associated with the use of response vessels have been reported in the past as part of response operations associated with oil spills in the U.S. Caribbean. The PDCs require compliance with restrictions on vessel anchoring and operations in shallow waters to protect coral and seagrass habitats from accidental groundings, vessel anchoring and lines from vessels. Therefore, we believe the potential effects to green sea turtle critical habitat around Culebra from vessel operations during dispersant operations and ISB activities will be discountable.

Other response activities associated with the use of dispersants and ISB could affect coral and seagrass habitats, particularly the placement of boom. The PDCs include measures to avoid impacts associated with entanglement of lines in coral habitat and guide the placement of anchors to secure the boom such that impacts to coral and seagrass habitats associated with the installation of anchors is avoided or minimized. Therefore, we believe the effects due to the potential for entanglement of lines and boom anchor impacts associated with response activities during the use of dispersants or ISB to green sea turtle critical habitat around Culebra will be discountable.

6.1.7 Leatherback Sea Turtle Critical Habitat

Dispersants: Critical habitat for the leatherback sea turtle includes waters adjacent to Sandy Point Beach, St. Croix, USVI. This area provides courting and breeding habitat and access to and from leatherback nesting habitat on Sandy Point Beach. We believe the use of dispersants will have no effect on leatherback sea turtle critical habitat because the ability of the habitat to function as a site for leatherback sea turtle courtship and mating adjacent to their nesting beach

would not be affected. There is no information indicating that sea turtles are affected by dispersants or change their behavior in response to the presence of dispersants. In addition, the PDCs require that no dispersant application take place within 0.5 nm of areas where sea turtles have been sighted and the Territory has determined that no dispersant application should occur within 1.0 mile of any shoreline, meaning dispersant application would not be permitted in areas adjacent to the Sandy Point nesting beach.

In-Situ Burning: We believe the use of ISB will have no effect on leatherback critical habitat. Under this consultation, ISB will only take place in Zones "A" and "B", which eliminates the possibility of burning operations in this critical habitat (because Zone "A" is 6 miles from shore and Zone "B" is 3 miles from shore).

Interrelated and Interdependent Activities: Because there will be no dispersant use authorized within 1.0 mile of the shoreline under this consultation or ISB use authorized in leatherback sea turtle critical habitat, impacts to leatherback critical habitat associated with the use of vessels during dispersant application and ISB operations are not likely to occur.

6.1.8 Hawksbill Sea Turtle Critical Habitat

Dispersants: Critical habitat for hawksbill sea turtles includes waters extending from the mean high water line of Mona and Monito Islands to three nm seaward. The essential features for hawksbill sea turtle critical habitat include breeding/nesting areas, food resources, water quality and quantity, and vegetation and soil types. Because the area is designated as a natural reserve by the PRDNER, there is limited vessel traffic in the area. There have been infrequent large vessel groundings on reefs and shorelines associated with Mona Island when vessels transiting between islands in the Caribbean have lost control or had mechanical issues. One of these groundings, the M/V Fortuna Reefer in 1997, is the only time the CRRT has contemplated the use of dispersants during an oil spill with the aim of minimizing shoreline oiling because of the importance of nearshore and beach habitats to hawksbill sea turtles. The PDCs include restrictions preventing the use of dispersants in shallow water areas that would prohibit dispersant use in areas containing the essential feature of hawksbill sea turtle critical habitat under this consultation. If dispersants were to be applied in deeper waters within the three nm limit of critical habitat around Mona and Monito Islands, dispersed oil is expected to be concentrated within the first few meters of the water column based on studies of dispersed oil mixing. These studies also indicate that the largest concentration of dispersed oil into the water column is present within the first hour following dispersant application and then decreases significantly over time. Therefore, the effects of the use of dispersants on hawksbill sea turtle critical habitat would be insignificant.

In-Situ Burning: Critical habitat for hawksbill sea turtles would not be directly affected during burning operations due to the PDCs limiting the water depths and habitats in which ISB may be used as a response tool. The formation of tarballs as a result of in-situ burning could impact the essential feature related to food resources of hawksbill critical habitat through smothering of benthic habitats or due to the toxicity of tarballs affecting prey such as the sponges. Given that hawksbill sea turtles feed preferentially on certain sponge species even in the presence of various

species of sponge, we believe they would avoid ingesting tarballs but the effects of tarball ingestion on hawksbill sea turtles are discussed further in Section 8. Based on benthic habitat mapping by NCCOS, there are approximately 65 ac of seagrass and 2,000 ac of coral reefs and colonized hard bottom around Mona Island (Kendall et al. 2001). Due to the expected limited extent of burn operations in the U.S. Caribbean (CRRT Response Technologies Committee 2015), based on the small number and extent of oil spills that have occurred to date, and the PDCs limiting nearshore use of ISB as a response tool, tarball generation and associated impacts to food resources of hawksbill sea turtles are expected to be minimal. Therefore, the effects of the use of ISB on hawksbill sea turtle critical habitat would be insignificant.

Interrelated and Interdependent Activities: The use of vessels during dispersant application and ISB operations could affect hawksbill sea turtle critical habitat due to the potential for accidental groundings, anchor damage and other physical disturbance. No accidental groundings associated with the use of response vessels have been reported in the past as part of response operations associated with oil spills that have occurred in the area of Mona Island. The PDCs require compliance with restrictions on vessel anchoring and operations in shallow waters containing coral and seagrass habitats to minimize the potential for accidental groundings and impacts associated with vessel anchoring and lines from vessels. Therefore, we believe the potential effects to hawksbill sea turtle critical habitat from vessel operations during dispersant operations and ISB activities around Mona and Monito will be discountable.

Other response activities associated with the use of dispersants and ISB could affect hawksbill sea turtle critical habitat, particularly the placement of boom. The PDCs include measures to minimize impacts associated with entanglement of lines and placement of anchors to secure the boom in coral and seagrass habitats. Therefore, we believe the effects due to the potential for entanglement of lines and boom anchor impacts associated with response activities during the use of dispersants or ISB to hawksbill sea turtle critical habitat around Mona and Monito Islands will be discountable.

6.1.9 Elkhorn and Staghorn Coral Critical Habitat

Dispersants: Critical habitat for elkhorn and staghorn corals in the U.S. Caribbean where dispersant application may be used as a tool during oil spill response includes the Puerto Rico, St. Thomas/St. John, and St. Croix units. The physical feature essential to the conservation of elkhorn and staghorn corals is substrate of suitable quality and availability to support larval settlement and recruitment and reattachment and recruitment of asexual fragments. Substrate of suitable quality and availability is defined as natural consolidated hard substrate or dead coral skeleton that is free from fleshy or turf macroalgae cover and sediment cover. Dispersant application is prohibited in areas with water depths less than 30 ft or ESA-listed coral colonies within 30 ft of the water surface. Studies have shown that dispersants and dispersed oil are mixed in the upper layer of the water column within a few hours of application and would not reach depths of 30 ft during surface applications of dispersants and subsequent mixing with seawater. We believe the use of dispersants will have no effect on elkhorn and staghorn coral critical

habitat because the use of dispersants in surface applications to oil slicks would not affect the essential feature of coral critical habitat. The ability of elkhorn and staghorn coral sexual and asexual recruits to settle and grow in areas containing the essential feature of coral critical habitat would not be affected by dispersant use.

In-Situ Burning: Based on benthic mapping data by NCCOS (Kendall et al. 2001), of the 1,383 square miles (mi^2) within the Puerto Rico unit, approximately 292 mi^2 contain the essential feature of elkhorn and staghorn coral critical habitat, approximately 26 mi^2 of the 121 mi^2 St. Thomas/St. John unit, and 90 mi^2 of the 126 mi^2 St. Croix unit. Critical habitat for elkhorn and staghorn corals would not be directly affected during burning operations due to the PDCs limiting the water depths and habitats in which ISB may be used as a response tool. The formation of tarballs due to in-situ burning could affect the essential feature of coral critical habitat if tarballs coat portions of the habitat, making these areas of habitat unsuitable to settlement by sexual or asexual recruits. The PDCs limit the potential use of ISB, particularly restrictions related to water depths and benthic habitats present. Oil spills in the U.S. Caribbean are infrequent and small based on information from previous years. This means that tarball generation from the use of ISB would affect very small areas in relation to the amount of habitat area likely containing the essential features available to elkhorn and staghorn coral sexual and asexual recruits in the U.S. Caribbean. Therefore, we believe the effects of the use of ISB on elkhorn and staghorn coral critical habitat would be insignificant.

Interrelated and Interdependent Activities: The use of vessels during dispersant application and ISB operations could affect elkhorn and staghorn coral critical habitat due to the potential for accidental groundings, anchor damage and other physical disturbance. No accidental groundings associated with the use of response vessels have been reported in the past as part of response operations associated with oil spills that have occurred to date in the U.S. Caribbean. The PDCs require restrictions on vessel anchoring and operations in shallow waters and waters containing substrate suitable for the growth of ESA-listed corals in order to minimize the potential for accidental groundings and impacts to coral colonies associated with vessel anchoring and lines from vessels, which will also be protective of elkhorn and staghorn coral critical habitat. Therefore, we believe the potential effects to elkhorn and staghorn coral critical habitat from vessel operations during dispersant operations and ISB activities in the U.S. Caribbean will be discountable.

Other response activities associated with the use of dispersants and ISB could affect elkhorn and staghorn coral critical habitat, particularly the placement of boom. The PDCs include measures to avoid impacts associated with entanglement of lines in coral areas and guide the placement of anchors to secure the boom such that impacts to coral habitat are avoided. Therefore, we believe the effects due to the potential for entanglement of lines and boom anchor impacts associated with response activities during the use of dispersants or ISB to elkhorn and staghorn coral critical habitat in the U.S. Caribbean will be discountable.

6.2 Species Likely to be Adversely Affected

6.2.1 General Threats Faced by Green (North and South Atlantic Distinct Population Segments), Leatherback, and Hawksbill Sea Turtles

Sea turtles face numerous natural and man-made threats that shape their status and affect their ability to recover. Many of the threats are the same or similar in nature for all listed sea turtle species, those identified in this section are discussed in a general sense for all sea turtles. Threat information specific to a particular species is then discussed in the corresponding status sections 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 and USFWS 1991;1992;1993;2008; NMFS 2011). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters. These fishing methods include trawls, gillnets, purse seines, hook-and-line gear (including bottom longlines and vertical lines [e.g., bandit gear, handlines, and rod-reel]), pound nets, and trap fisheries. Refer to the Environmental Baseline section of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). The Southeast U.S. shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of sea turtles each year.

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental 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, especially loggerheads and leatherbacks, circumnavigating the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1994; Bolten et al. 1994). Bottom longlines and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

Non-Fishery In-Water Activities

There are also 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 (NMFS 1997). 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 and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, 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 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, respectively (Ackerman 1997; Witherington et al. 2003;2007). In addition, coastal development is usually accompanied by artificial lighting which can alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (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 of wave patterns.

Environmental Contamination

Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g., dichlorodiphenyltrichloroethane [DDT], polychlorinated biphenyls [PCB], and perfluorinated chemicals [PFC]), and others that may cause adverse health effects to sea turtles (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 skin contact with oils (Geraci 1990), inhalation at the water's surface, and ingesting compounds while feeding (Matkin 1997). Hydrocarbons also have the potential to affect prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area.

The April 20, 2010, explosion of the DWH oilrig affected sea turtles in the Gulf of Mexico. An assessment has been completed on the injury to Gulf of Mexico marine life, including sea turtles, resulting from the spill (DWH Trustees 2016). Following the spill, juvenile Kemp's ridley, green, and loggerhead sea turtles were found in *Sargassum* algae mats in the convergence zones, where currents meet and oil collected. Sea turtles found in these areas were often coated in oil and/or had ingested oil. The spill resulted in the direct mortality of many sea turtles and may

have had sublethal effects or caused environmental damage that will affect other sea turtles into the future. Information on the spill impacts to individual sea turtle species is presented in the Status of the Species sections for each species.

Marine debris is a continuing problem for sea turtles. 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) as they feed along oceanographic fronts where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (i.e., leatherbacks, juvenile loggerheads, and juvenile green turtles).

Climate Change

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however, significant impacts to the hatchling sex ratios of sea turtles may result (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 over wash (NMFS and USFWS 2007e). Sea level rise from global 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; Daniels et al. 1993; Fish et al. 2005). The loss of habitat because of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; 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) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton,

zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish) which could ultimately affect the primary foraging areas of sea turtles.

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. Emergent hatchlings are preyed upon by these mammals as well as ghost crabs, laughing gulls, and the exotic South American fire ant (*Solenopsis invicta*). 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 (NMFS and USFWS 2008).

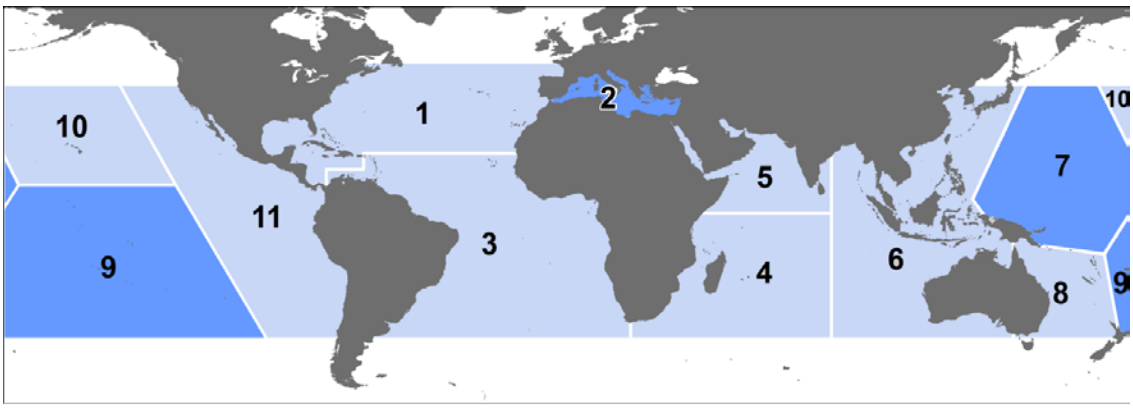
Diseases, toxic blooms from algae and other microorganisms, and cold stunning events are additional sources of mortality that can range from local and limited to wide-scale and affecting hundreds or thousands of animals.

6.2.2 Status of Green Sea Turtles

Species description

The green sea turtle (*Chelonia mydas*) is the largest of the hardshell marine turtles, growing to a weight of 350 lb (159 kg) and a straight carapace length of greater than 3.3 ft (1 m). It has a circumglobal distribution, occurring throughout nearshore tropical, subtropical and, to a lesser extent, temperate waters.

The species was listed under the ESA on July 28, 1978 (43 FR 32800). The species was separated into two listing designations: endangered for breeding populations in Florida and the Pacific coast of Mexico and threatened in all other areas throughout its range. On April 6, 2016, NMFS listed 11 DPSs of green sea turtles as threatened or endangered under the ESA (Figure 8; 81 FR 20057). Eight DPSs are listed as threatened: Central North Pacific, East Indian-West Pacific, East Pacific, North Atlantic, North Indian, South Atlantic, Southwest Indian, and Southwest Pacific. Three DPSs are listed as endangered: Central South Pacific, Central West Pacific, and Mediterranean.



Threatened (light blue) and endangered (dark blue) green turtle DPSs:
1. North Atlantic, 2. Mediterranean, 3. South Atlantic, 4. Southwest Indian, 5. North Indian, 6. East Indian-West Pacific, 7. Central West Pacific, 8. Southwest Pacific, 9. Central South Pacific, 10. Central North Pacific, and 11. East Pacific.

Figure 8. Map depicting DPS boundaries for green turtles.

Life history

Age at first reproduction for females is 20 - 40 years. Green sea turtles lay an average of three nests per season with an average of 100 eggs per nest. The remigration interval (i.e., return to natal beaches) is 2 - 5 years. Nesting occurs primarily on beaches with intact dune structure, native vegetation and appropriate incubation temperatures during summer months. After emerging from the nest, hatchlings swim to offshore areas and go through a post-hatchling pelagic stage where they are believed to live for several years. During this life stage, green sea turtles feed close to the surface on a variety of marine algae and other life associated with drift lines and debris. Adult turtles exhibit site fidelity and migrate hundreds to thousands of kilometers from nesting beaches to foraging areas. Green sea turtles spend the majority of their lives in coastal foraging grounds, which include open coastlines and protected bays and lagoons. Adult green turtles feed primarily on seagrasses and algae, although they also eat jellyfish, sponges and other invertebrate prey.

Population dynamics

Abundance

Worldwide, nesting data at 464 sites indicate that 563,826 to 564,464 females nest each year (Seminoff et al. 2015).

North Atlantic DPS

Compared to other DPSs, the North Atlantic DPS exhibits the highest nester abundance, with approximately 167,424 females at 73 nesting sites Figure 9), and available data indicate an increasing trend in nesting. The largest nesting site in the North Atlantic DPS is in Tortuguero, Costa Rica, which hosts 79% of nesting females for the DPS (Seminoff et al. 2015).

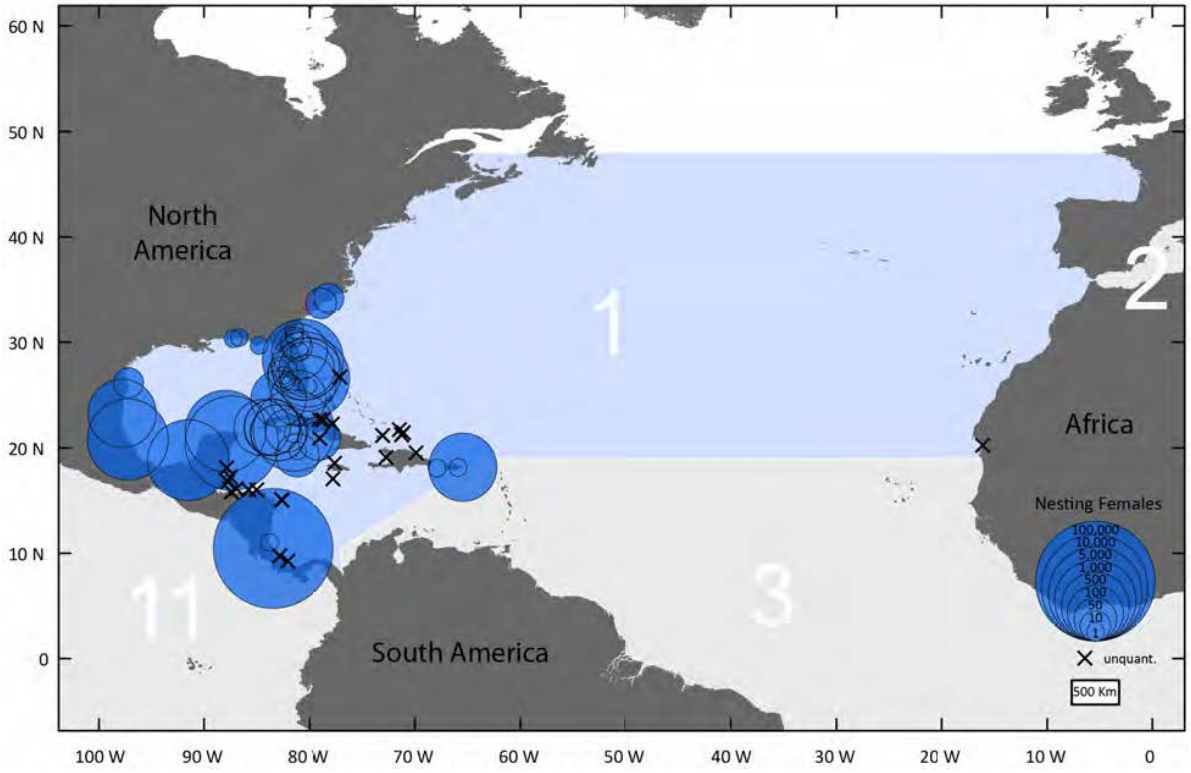


Figure 9: Geographic range of the North Atlantic DPS, with location and abundance of nesting females (from Seminoff et al. 2015).

South Atlantic DPS

The South Atlantic DPS has 51 nesting sites, with an estimated nester abundance of 63,332. The largest nesting site is at Poilão, Guinea-Bissau, which hosts 46% of nesting females for the DPS (Seminoff et al. 2015).

Population Growth Rate

North Atlantic DPS

For the North Atlantic DPS, the available data indicate an increasing trend in nesting. There are no reliable estimates of population growth rate for the DPS as a whole, but estimates have been developed at a localized level. Modeling by Chaloupka et al. (2008) using data sets of 25 years or more show the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9%, and the Tortuguero, Costa Rica, population growing at 4.9%.

South Atlantic DPS

There are 51 nesting sites for the South Atlantic DPS, and many have insufficient data to determine population growth rates or trends. Of the nesting sites where data are available, such as Ascension Island, Suriname, Brazil, Venezuela, Equatorial Guinea, and Guinea-Bissau, there is evidence that population abundance is increasing.

Genetic Diversity

Globally, the green turtle is divided into eleven distinct population segments; available information on the genetic diversity for each of the distinct population segments is presented below.

North Atlantic DPS

The North Atlantic DPS has a globally unique haplotype, which was a factor in defining the discreteness of the population for the DPS. Evidence from mitochondrial DNA studies indicates that there are at least four independent nesting subpopulations in Florida, Cuba, Mexico and Costa Rica (Seminoff et al. 2015). More recent genetic analysis indicates that designating a new western Gulf of Mexico management unit might be appropriate (Shamblin et al. 2015).

South Atlantic DPS

Individuals from nesting sites in Brazil, Ascension Island, and western Africa have a shared haplotype found in high frequencies. Green turtles from rookeries in the eastern Caribbean however, are dominated by a different haplotype.

Distribution

North Atlantic DPS

Green turtles from the North Atlantic DPS range from the boundary of South and Central America (7.5°N, 77°W) in the south, throughout the Caribbean, the Gulf of Mexico, and the U.S. Atlantic coast to New Brunswick, Canada (48°N, 77°W) in the north. The range of the DPS then extends due east along latitudes 48°N and 19°N to the western coasts of Europe and Africa (Figure 8).

South Atlantic DPS

The range of the South Atlantic DPS begins at the border of Panama and Colombia at 7.5^{o}N, 77^{o}W, heads due north to 14^{o}N, 77^{o}W, then east to 14^{o}N, 65.1^{o}W, then north to 19^{o}N, 65.1^{o}W, and along 19^{o}N latitude to Mauritania in Africa. It extends along the coast of Africa to South Africa, with the southern border being 40^{o}S latitude (Figure 8).

Status

We used information available in the 2007 5-Year Review (NMFS and USFWS 2007a) and 2015 Status Review (Seminoff et al. 2015) to summarize the status of the species, as follows.

Once abundant in tropical and subtropical waters, green sea turtles worldwide exist at a fraction of their historical abundance, as a result of over-exploitation. Globally, egg harvest, the harvest of females on nesting beaches and directed hunting of turtles in foraging areas remain the three greatest threats to their recovery. In addition, bycatch in drift net, long-line, set-net, pound-net and trawl fisheries kill thousands of green sea turtles annually. Increasing coastal development (including beach erosion and re-nourishment, construction and artificial lighting) threatens nesting success and hatchling survival. On a regional scale, the different DPSs experience these

threats as well, to varying degrees. Differing levels of abundance combined with different intensities of threats and effectiveness of regional regulatory mechanisms make each DPS uniquely susceptible to future perturbations.

North Atlantic DPS

Historically, green turtles in the North Atlantic DPS were hunted for food, which was the principle cause of the population's decline. Apparent increases in nester abundance for the North Atlantic DPS in recent years are encouraging but must be viewed cautiously, as the datasets represent a fraction of a green sea turtle generation, up to 50 years. While the threats of pollution, habitat loss through coastal development, beachfront lighting, and fisheries bycatch continue, the North Atlantic DPS appears to be somewhat resilient to future perturbations.

South Atlantic DPS

Though there is some evidence that the South Atlantic DPS is increasing, there is a considerable amount of uncertainty over the impacts of threats to the South Atlantic DPS. The DPS is threatened by habitat degradation at nesting beaches, mortality from fisheries bycatch remains a primary concern.

Status Within the Action Area

Nesting by green sea turtles is reported in limited but increasing numbers on Buck Island, St. Croix, and on Sandy Point Beach, St. Croix by the National Park Service (NPS) and the U.S. Fish and Wildlife Service, respectively. Green sea turtle nesting is also reported on other beaches around St. Croix based on unpublished monitoring data from the VIDPNR and The Nature Conservancy. Green sea turtles also nest in small numbers on beaches on Culebra and Vieques Islands and the main island of Puerto Rico with 297 green sea turtle nests reported in 2014 Puerto Rico-wide (PRDNER, unpublished data).

The Culebra archipelago is an important foraging area for juvenile, sub-adult, and adult green sea turtles with other areas in the U.S. Caribbean, particularly around the main island of Puerto Rico and the islands of Vieques and Mona also provide foraging habitat due to the presence of dense seagrass beds along with coral habitats that provide shelter. Adult green sea turtles are also present in small numbers in nearshore waters of the USVI based on data from ESA section 7 consultations for projects in St. Thomas, St. John, and St. Croix, as well as Water Island and some of the cays surrounding St. Thomas and St. John.

Critical Habitat

Northwest Atlantic DPS

On September 2, 1998, NMFS designated critical habitat for green sea turtles, which include coastal waters surrounding Culebra Island, Puerto Rico. Seagrass beds surrounding Culebra provide important foraging resources for juvenile, subadult and adult green sea turtles. Additionally, coral reefs surrounding the island provide resting shelter and protection from predators. This area provides important developmental habitat for the species. Activities that may

affect the critical habitat include beach renourishment, dredge and fill activities, coastal construction, and freshwater discharge. Due to its location, this critical habitat would be accessible by individuals of the North Atlantic DPS.

Recovery Goals

See the 1998 and 1991 recovery plans for the Pacific, East Pacific and Atlantic populations of green turtles for complete down-listing/delisting criteria for recovery goals for the species. Broadly, recovery plan goals emphasize the need to protect and manage nesting and marine habitat, protect and manage populations on nesting beaches and in the marine environment, increase public education, and promote international cooperation on sea turtle conservation topics.

6.2.3 Status of Leatherback Sea Turtles

Species Description

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 (Figure 10). Leatherbacks are the largest living turtle, reaching lengths of six feet long, and weighing up to one ton. Leatherback sea turtles have a distinct black leathery skin covering their carapace with pinkish white skin on their belly (Figure 11). The species was first listed under the Endangered Species Conservation Act and listed as endangered under the ESA since 1973.The summary of the status of the species that follows was taken from information available in the most recent 5-year reviews (NMFS and USFWS 2007d;2013b) and the critical habitat designation.

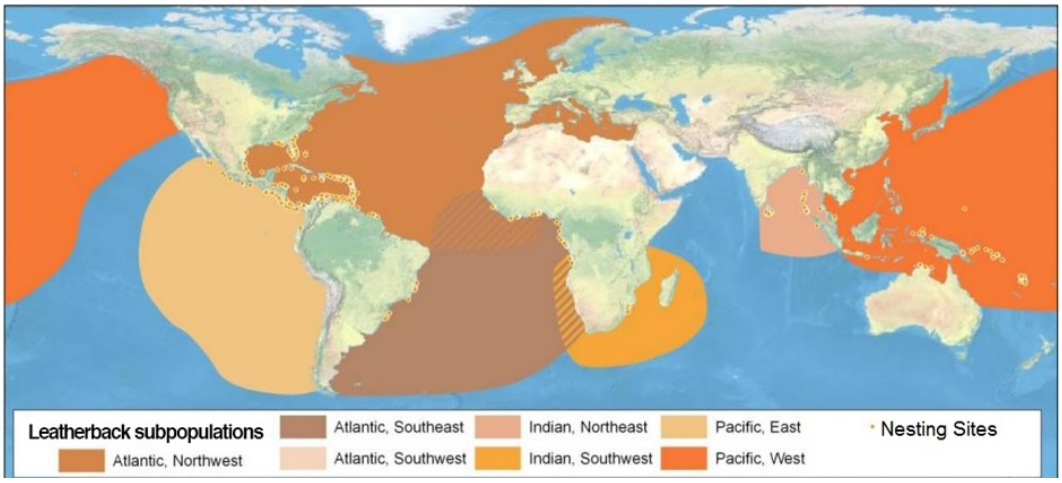


Figure 10. Map identifying the range of the endangered leatherback sea turtle (adapted from Wallace et al. 2013)

Figure 11. Leatherback turtle (*Dermochelys coriacea*; Photo: R. Tapilatu)

Life History

Age at maturity has been difficult to ascertain, with estimates ranging from 5 - 29 years (Avens et al. 2009; Spotila et al. 1996). Females lay up to seven clutches per season, with more than 65 eggs per clutch and eggs weighing >80 g (Reina et al. 2002; Wallace et al. 2007). The number of leatherback hatchlings that make it out of the nest on to the beach (i.e., emergent success) is approximately 50% worldwide (Eckert et al. 2012). Females nest every 1 – 7 years. Natal homing, at least within an ocean basin, results in reproductive isolation between five broad geographic regions: eastern and western Pacific, eastern and western Atlantic, and Indian Ocean. Leatherback sea turtles migrate long, transoceanic distances between their tropical nesting beaches and the highly productive temperate waters where they forage, primarily on jellyfish and tunicates. These gelatinous prey are relatively nutrient-poor, such that leatherbacks must consume large quantities to support their body weight. Leatherbacks weigh ~33 percent more on their foraging grounds than at nesting, indicating that they probably catabolize fat reserves to fuel migration and subsequent reproduction (James et al. 2005; Wallace et al. 2006). Sea turtles must meet an energy threshold before returning to nesting beaches. Therefore, their remigration intervals (the time between nesting) are dependent upon foraging success and duration (Hays 2000; Price et al. 2004).

Population Dynamics

The following is a discussion of the species' population and its variance over time. This section is broken down into: abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the leatherback sea turtle.

Abundance

Leatherbacks are globally distributed, with nesting beaches in the Pacific, Atlantic, and Indian oceans. Detailed population structure is unknown, but is likely dependent upon nesting beach location. Based on estimates calculated from nest count data, there are between 34,000 and 94,000 adult leatherbacks in the North Atlantic (Turtle Expert Working Group [TEWG] 2007). In contrast, leatherback populations in the Pacific are much lower. Overall, Pacific populations

have declined from an estimated 81,000 individuals to less than 3,000 total adults and subadults (Spotila et al. 2000). Population abundance in the Indian Ocean is difficult to assess due to lack of data and inconsistent reporting. Available data from southern Mozambique show that approximately 10 females nest per year from 1994-2004, and about 296 nests per year counted in South Africa (NMFS and USFWS 2013b).

Population Growth Rate

Population growth rates for leatherback sea turtles vary by ocean basin. Counts of leatherbacks at nesting beaches in the western Pacific indicate that the subpopulation has been declining at a rate of almost 6% per year since 1984 (Tapilatu et al. 2013). Leatherback subpopulations in the Atlantic Ocean however are showing signs of improvement. Nesting females in South Africa are increasing at an annual rate of 4 to 5.6%, and from 9 to 13% in Florida and the U.S. Virgin Islands (TEWG 2007), believed to be a result of conservation efforts.

Genetic Diversity

Analyses of mitochondrial DNA from leatherback sea turtles indicates a low level of genetic diversity, pointing to possible difficulties in the future if current population declines continue (Dutton et al. 1999). Further analysis of samples taken from individuals from rookeries in the Atlantic and Indian oceans suggest that each of the rookeries represent demographically independent populations (NMFS and USFWS 2013b).

Distribution

Leatherback sea turtles are distributed in oceans throughout the world (Figure 10). Leatherbacks occur throughout marine waters, from nearshore habitats to oceanic environments (Shoop and Kenney 1992). Movements are largely dependent upon reproductive and feeding cycles and the oceanographic features that concentrate prey, such as frontal systems, eddy features, current boundaries, and coastal retention areas (Benson et al. 2011).

Status

The leatherback sea turtle is an endangered species whose once large nesting populations have experienced steep declines in recent decades. The primary threats to leatherback sea turtles include fisheries bycatch, harvest of nesting females, and egg harvesting. Because of these threats, once large rookeries are now functionally extinct, and there have been range-wide reductions in population abundance. Other threats include loss of nesting habitat due to development, tourism, and sand extraction. Lights on or adjacent to nesting beaches alter nesting adult behavior and are often fatal to emerging hatchlings as they are drawn to light sources and away from the sea. Plastic ingestion is common in leatherbacks and can block gastrointestinal tracts leading to death. Climate change may alter sex ratios (as temperature determines hatchling sex), range (through expansion of foraging habitat), and habitat (through the loss of nesting beaches, because of sea-level rise. The species' resilience to additional perturbation is low.

Status Within the Action Area

In Puerto Rico, the primary nesting beaches are at Fajardo and on the island of Culebra. Nesting between 1978 and 2005 ranged between 469-882 nests and the population has been growing since 1978, with an overall annual growth rate of 1.1% (TEWG 2007). Tiwari et al. (2013) report an estimated three-generation abundance change of -4% and +5,583% at Culebra and Fajardo, respectively. The PRDNER report an increasing trend in nesting with 2,200 nests in 2016 (PRDNER, unpublished data). At the primary nesting beach on St. Croix, the Sandy Point National Wildlife Refuge, nesting has varied from a few hundred nests to a high of 1,008 in 2001, and the average annual growth rate has been approximately 1.1% from 1986-2004 (TEWG 2007). From 2006-2010, Tiwari et al. (2013) report an annual growth rate of +7.5% in St. Croix and a three-generation abundance change of +1,058%.

Critical Habitat

On March 23, 1979, leatherback critical habitat was identified adjacent to Sandy Point, St. Croix, 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 support significant critical habitat deterioration.

On January 20, 2012, NMFS issued a final rule to designate additional critical habitat for the leatherback sea turtle (50 C.F.R Part 226). This designation includes approximately 43,798 km^2 stretching along the California coast from Point Arena to Point Arguello east of the 3,000 m depth contour; and 64,760 km^2 stretching from Cape Flattery, Washington to Cape Blanco, Oregon east of the 2,000 m depth contour. The designated areas comprise approximately 108,558 km^2 of marine habitat and include waters from the ocean surface down to a maximum depth of 80 m. They were designated specifically because of the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (i.e., jellyfish), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

Recovery Goals

See the 1998 and 1991 Recovery Plans for the U.S. Pacific and U.S Caribbean, Gulf of Mexico and Atlantic leatherback sea turtles for complete down listing/delisting criteria for each of their respective recovery goals. The following items were the top five recovery actions identified to support in the Leatherback 5-Year Action Plan:

1. Reduce fisheries interactions
2. Improve nesting beach protection and increase reproductive output
3. International cooperation
4. Monitoring and research

5. Public engagement

6.2.4 Status of Hawksbill Sea Turtles

Species Description

The hawksbill turtle has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical oceans (Figure 12). The hawksbill sea turtle has a sharp, curved, beak-like mouth and a "tortoiseshell" pattern on its carapace, with radiating streaks of brown, black, and amber (Figure 13). The species was first listed under the Endangered Species Conservation Act (35 FR 8491) and listed as endangered under the ESA since 1973. The status of the species is summarized below based on information available in the most recent 5-year reviews (NMFS and USFWS 2007b;2013a).

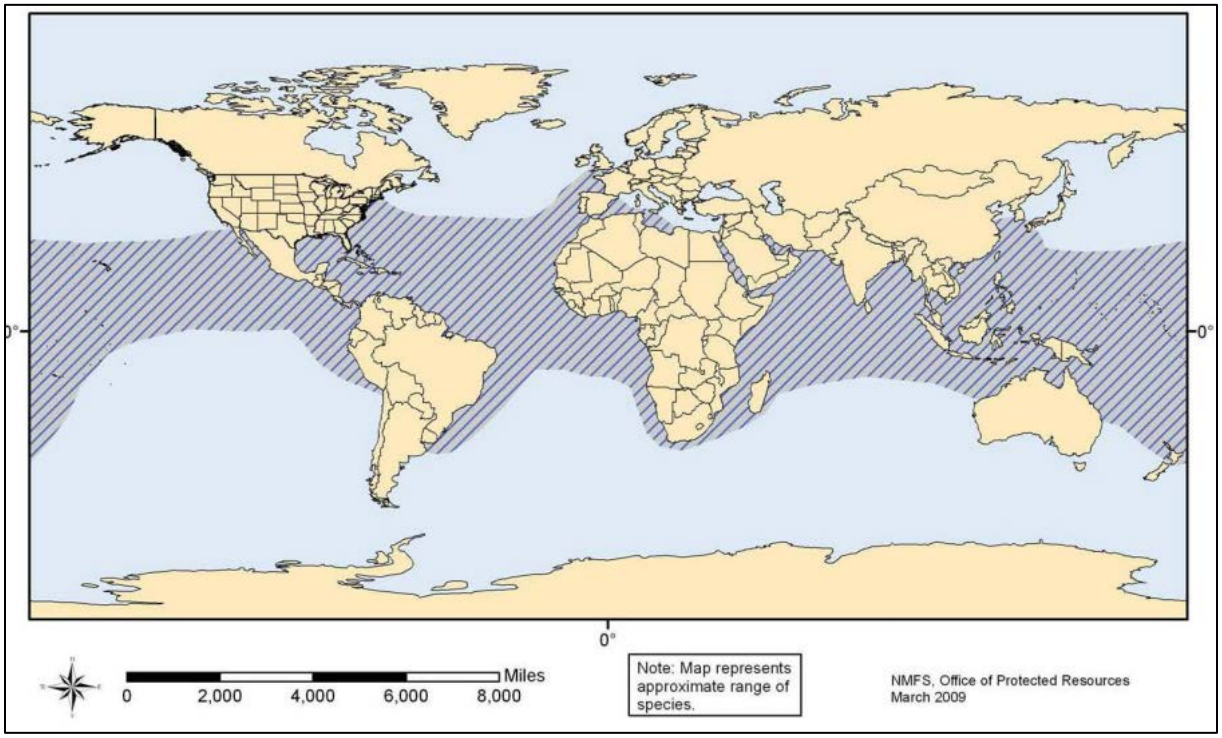


Figure 12. Map identifying the range of the endangered hawksbill sea turtle (http://www.nmfs.noaa.gov/pr/pdfs/rangemaps/hawksbill_turtle.pdf)

Figure 13. Hawksbill sea turtle (*Eretmochelys imbricata*; Photo: J. Chevalier)

Life History

Hawksbill sea turtles reach sexual maturity at 20 – 40 years of age. Females return to their natal beaches every 2 – 5 years to nest (an average of 3 – 5 times per season). Clutch sizes are large (up to 250 eggs). Sex determination is temperature dependent, with warmer incubation producing more females. Hatchlings migrate to and remain in pelagic habitats until they reach approximately 22 – 25 cm in straight carapace length. As juveniles, they take up residency in coastal waters to forage and grow. As adults, hawksbills use their sharp beak-like mouths to feed on sponges and corals. Hawksbill sea turtles are highly migratory and use a wide range of habitats during their lifetimes (Musick and Limpus 1997; Plotkin 2003). Satellite tagged turtles have shown significant variation in movement and migration patterns. Distance traveled between nesting and foraging locations ranges from a few hundred to a few thousand kilometers (Horrocks et al. 2001; Miller 1998).

Population Dynamics

The following is a discussion of the species' population and its variance over time. This section is broken down into: abundance, population growth rate, genetic diversity, and spatial distribution as it relates to the hawksbill sea turtle.

Abundance

Surveys at 88 nesting sites worldwide indicate that 22,004 – 29,035 females nest annually (NMFS and USFWS 2013a). In general, hawksbills are doing better in the Atlantic and Indian Ocean than in the Pacific Ocean, where despite greater overall abundance, a greater proportion of the nesting sites are declining.

Population Growth Rate

From 1980 to 2003, the number of nests at three primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) increased 15 percent annually (Heppell et al. 2005); however, due to recent declines in nest counts, decreased survival at other life stages, and updated population modeling, this rate is not expected to continue (NMFS and USFWS 2013a).

Genetic Diversity

Populations are distinguished generally by ocean basin and more specifically by nesting location. Our understanding of population structure is relatively poor. Genetic analysis of hawksbill sea turtles foraging off the Cape Verde Islands identified three closely-related haplotypes in a large majority of individuals sampled that did not match those of any known nesting population in the western Atlantic, where the vast majority of nesting has been documented (Monzón-Argüello et al. 2010). Hawksbills in the Caribbean seem to have dispersed into separate populations (rookeries) after a bottleneck roughly 100,000-300,000 years ago (Leroux et al. 2012).

Distribution

The hawksbill has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical waters of the Atlantic, Indian, and Pacific Oceans. In their oceanic phase, juvenile hawksbills can be found in *Sargassum* mats; post-oceanic hawksbills may occupy a range of habitats that include coral reefs or other hard-bottom habitats, sea grass, algal beds, mangrove bays and creeks (Bjorndal and Bolten 2010; Musick and Limpus 1997).

Status

Long-term data on the hawksbill sea turtle indicate that 63 sites have declined over the past 20 to 100 years (historic trends are unknown for the remaining 25 sites). Recently, 28 sites (68 %) have experienced nesting declines, 10 have experienced increases, three have remained stable, and 47 have unknown trends. The greatest threats to hawksbill sea turtles are overharvesting of turtles and eggs, degradation of nesting habitat, and fisheries interactions. Adult hawksbills are harvested for their meat and carapace, which is sold as tortoiseshell. Eggs are taken at high levels, especially in Southeast Asia where collection approaches 100 percent in some areas. In addition, lights on or adjacent to nesting beaches are often fatal to emerging hatchlings and alters the behavior of nesting adults. The species' resilience to additional perturbation is low.

Status Within the Action Area

Hawksbills typically laid about 500-1,000 nests in the past on Mona Island, Puerto Rico (Diez and van Dam 2007), but the numbers appear to be increasing as the PRDNER counted nearly 1,600 nests in 2010 and more than 2,000 nests in 2016 (PRDNER, unpublished data). The nests on Mona make up the vast majority of hawksbill nests around Puerto Rico based on the 2,288 total nests reported Puerto Rico-wide by PRDNER in 2014 (PRDNER, unpublished data). In USVI, hawksbill nesting is reported on Buck Island, St. Croix, with 56-150 nests per year (Meylan 1988; Mortimer and Donnelly 2008) and on Sandy Point Beach, St. Croix. Nesting also occurs to a lesser extent on beaches of Culebra and Vieques Islands, Puerto Rico, on beaches around the main island of Puerto Rico, and on additional beaches around St. Croix, St. John, and St. Thomas, USVI.

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 for 58 of the 83 sites and recent abundance trends (within the last 20 years) for 42 of the 83 sites. In terms of 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. Nine of the 10 sites showing increases in abundance were in the Caribbean including an increasing trend in nesting reported for Buck Island, St. Croix (Mackay 2006; Mortimer and Donnelly 2008). The beaches of Buck Island are identified as an index site for hawksbill sea turtle recovery in the eastern Caribbean (NPS 2012).

In the Caribbean, hawksbills are known to feed almost exclusively on sponges (Meylan 1988; Van Dam and Diez 1997), although at times they have been seen foraging on other food items, notably corallimorphs and zooanthids (León and Diez 2000; Mayor 1998; Van Dam and Diez 1997). Coral reefs are reported as prime habitat for this species and area estimates of potential habitat for hawksbill turtles have been created using the distribution of coral reefs (Buitrago and Guada 2002; Prieto et al. 2001), also hawksbills, particularly juveniles, have been reported to use other habitats such as seagrass beds and mangrove-lined coastal embayments (Diez et al. 2003). Mona and Monito Islands, Puerto Rico support a large number of juvenile and sub-adult hawksbill sea turtles that apparently grow to maturity in waters around the island (Diez and Van Dam 2002), which is why the area around these islands is designated critical habitat for hawksbill sea turtles.

Critical Habitat

On September 2, 1998, NMFS established critical habitat for hawksbill sea turtles around Mona and Monito Islands, Puerto Rico (63 FR 46693). Aspects of these areas that are important for hawksbill sea turtle survival and recovery include important natal development habitat, refuge from predation, shelter between foraging periods, and food for hawksbill sea turtle prey.

Recovery Goals

The 1992 and 1998 Recovery Plans for the U.S. Caribbean, Atlantic and Gulf of Mexico, and U.S. Pacific populations of hawksbill sea turtles, respectively, contain complete down listing/delisting criteria for each of their respective recovery goals. The following items were the top recovery actions identified to support in the Recovery Plans:

- Identify important nesting beaches
- Ensure long-term protection and management of important nesting beaches
- Protect and manage nesting habitat; prevent the degradation of nesting habitat caused by seawalls, revetments, sand bags, other erosion-control measures, jetties and breakwaters
- Identify important marine habitats; protect and manage populations in marine habitat

- Protect and manage marine habitat; prevent the degradation or destruction of important [marine] habitats caused by upland and coastal erosion
- Prevent the degradation of reef habitat caused by sewage and other pollutants
- Monitor nesting activity on important nesting beaches with standardized index surveys
- Evaluate nest success and implement appropriate nest-protection on important nesting beaches
- Ensure that law-enforcement activities prevent the illegal exploitation and harassment of sea turtles and increase law-enforcement efforts to reduce illegal exploitation
- Determine nesting beach origins for juveniles and subadult populations

7 ENVIRONMENTAL BASELINE

The "environmental baseline" includes the past and present impacts of all Federal, state, 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 which are contemporaneous with the consultation in process (50 C.F.R. §402.02).

The environmental baseline for this Opinion includes several activities that affect the survival and recovery of ESA-listed sea turtles. We describe these activities' effects in the section below.

7.1 Fisheries

There are federally-managed fisheries that operate in federal waters from 9 nm from shore for Puerto Rico and 3 nm for USVI out to the limits of the Exclusive Economic Zone (EEZ). Threatened and endangered sea turtles are adversely affected by fishing gears used throughout the continental shelf in the action area. There are also commercial and recreational fisheries in Commonwealth and Territorial waters that are regulated by the PRDNER and VIDPNR. Net and hook-and-line gear have been documented as interacting with sea turtles in Puerto Rico based on stranding data from Commonwealth waters (PRDNER unpublished data). Incidental catch in fishing gear accounted for 1% of reported sea turtle strandings in the action area for the period from 1991 – 2008 while directed capture, including shooting, accounted for 40% of strandings (PRDNER unpublished data). Net, hook-and-line gear, and trap fisheries have all been documented as interacting with sea turtles in USVI based on stranding data from Territorial waters (VIDPNR unpublished data). Entanglement in nets, trap lines, and fishing line accounted for 27% of reported sea turtle strandings around St. Croix for the period from 1982-2010 with 43% of the turtles entangled in line being greens, 48% hawksbills, and 9% leatherbacks (VIDPNR unpublished data). Fewer data were available from St. Thomas and St. John, but they reflect similar trends with 40% of strandings caused by entanglement in fishing gear in St. Thomas (of which 88% were greens and 12% were hawksbills) and 22% in St. John (of which 100% were greens) (VIDPNR unpublished data). The USVI Territorial Coral Reef Monitoring Program found derelict fishing gear in the area of the shelf edge reef off the coast of the proposed Amalago Bay project and indications of fishing pressure at several other permanent

monitoring sites around St. Croix (Smith et al. 2011). Abandoned or lost fishing gear can also affect the quality of refuge and foraging habitat for green and hawksbill sea turtles as abandoned gear can lead to abrasion and breakage in hard bottom and coral reef habitats and have shading impacts on seagrass and macroalgae if the gear is large enough such as traps and nets.

For all fisheries for which there is a Fishery Management Plan (FMP) or for which any federal action is taken to manage that fishery, impacts are evaluated under Section 7 of the ESA. All of these opinions found that the actions described were likely to adversely affect, but not likely to jeopardize the continued existence, of sea turtle species. Formal Section 7 consultations have been conducted on the following fisheries occurring in the action area and found fisheries actions to be likely to adversely affect threatened and endangered sea turtles: Caribbean Reef Fish and Caribbean Spiny Lobster FMPs under the jurisdiction of the Caribbean Fishery Management Council (CFMC). Anticipated levels of take associated with these actions reflect the impact on sea turtles and other listed species of each activity anticipated from the date of the ITS forward in time in the waters of the EEZ off Puerto Rico and the U.S. Virgin Islands. Anticipated levels of take under the Caribbean Reef Fish FMP are 75 lethal takes of green sea turtles over 3 years, 51 lethal takes of hawksbill sea turtles with no more than 3 non-lethal takes over 3 years, and 48 lethal takes of leatherback sea turtles over 3 years. No take of loggerhead sea turtles under this FMP is anticipated due to the scarcity of this species in the U.S. Caribbean. Anticipated levels of take under the Spiny Lobster FMP are 12 lethal takes of green and hawksbill sea turtles over 3 years and 9 lethal takes of leatherback sea turtles over 3 years. Informal Section 7 consultations were also completed for the Caribbean Coral and Queen Conch FMPs. NMFS concluded that the implementation of the Coral and Queen Conch FMPs is not likely to adversely affect ESA-listed sea turtles.

Turtles are highly migratory and can be affected by fishery actions throughout their ranges. Anticipated levels of take are also part of Section 7 consultations for FMPs in the Gulf and South Atlantic where sea turtles found in the project area may transit. Anticipated levels of take under the Gulf of Mexico/South Atlantic Spiny Lobster FMP are 1 lethal or nonlethal take for leatherbacks and hawksbills and 3 lethal or nonlethal takes for greens over 3 years. Anticipated levels of take under the South Atlantic Snapper-Grouper FMP are 25 leatherback takes with no more than 15 lethal, 39 green takes with no more than 14 lethal, and 4 hawksbill takes with no more than 1 lethal over 3 years. Anticipated levels of take under the Gulf of Mexico Reef Fish FMP is 11 lethal leatherback takes, 116 green takes with no more than 75 lethal, and 9 hawksbill takes with no more than 8 lethal over 3 years. The Southeast Region also has established anticipated levels of take for highly migratory species (HMS) fisheries. Anticipated levels of take under the Coastal Migratory Pelagics FMP are 2 lethal takes for leatherbacks and hawksbills and 14 lethal takes of greens over 3 years; under the Dolphin-Wahoo FMP, 12 leatherback takes with no more than 1 lethal and up to 3 green or hawksbill takes with no more than 1 lethal over 1 year; under the HMS-Pelagic Longline FMP, 1,764 leatherback takes with no more than 252 lethal and 105 green and/or hawksbill takes with no more than 18 lethal over 3 years; and under the HMS-Shark Fisheries FMP, 18 leatherback takes with no more than 9 lethal, 57 green takes

with no more than 33 lethal, and 18 hawksbill takes with no more than 9 lethal. Anticipated levels of lethal take have also been established for the Southeastern U.S. Shrimp Fishery as 144 leatherback turtle mortalities, 1,453 green turtle mortalities, and 78 hawksbill turtle mortalities are expected per year (NMFS 2014b). The take numbers for the shrimp fishery were estimated based on turtle exclusion device enforcement as a surrogate for actual numbers of animals.

7.2 Vessel Operations and Traffic

Potential sources of adverse effects from federal vessel operations in the action area include operations of the USCG, EPA, and NOAA. NMFS and the USCG completed a programmatic consultation for the USCG's Aids-to-Navigation (ATONS) program to determine the magnitude of the adverse impacts resulting from ATON operations in portions of Florida, Puerto Rico, and the USVI. The consultation ended on August 5, 2013, and NMFS concluded that ATON maintenance activities were not likely to adversely affect sea turtles. In addition, NMFS is currently working on a national programmatic consultation that will determine the magnitude of the adverse impacts resulting from all ATON maintenance nationwide, including those in the U.S. Caribbean. Through the section 7 process, where applicable, NMFS will continue to establish conservation measures for agency vessel operations to avoid or minimize adverse effect to ESA-listed species.

Commercial and recreational vessel traffic can have adverse effects on sea turtles via propeller and boat-strike injuries. NMFS and the USCG completed an informal section 7 consultation for the Caribbean Marine Event Program in 2009 for annually occurring marine events in USVI and Puerto Rico. As a result of this consultation, the USCG now includes guidelines to avoid and minimize potential impacts of marine events, especially events involving motorized vessels such as speedboat races, to listed sea turtles and their habitat as permit conditions the event participants must follow. A programmatic consultation is now in progress with the USCG for their Caribbean Marine Event Program that will include all activities that may be covered by the USCG under the program.

Commercial and recreational vessel traffic can have adverse effects on sea turtles via propeller and boat-strike injuries. None of the sea turtle strandings reported to PRDNER in the area of Guayama and Salinas were found to be due to vessels. Vessel operation and the associated proliferation of docks and other boating facilities have resulted in the loss or degradation of refuge and foraging habitat, particularly for greens and hawksbill sea turtles due to impacts to seagrass and coral habitats from propeller scarring, propeller wash, accidental groundings, and in-water construction. Coastal runoff, marina and dock construction, dredging, industrial operations, increased underwater noise, and boat traffic can degrade marine habitats used by sea turtles. Fueling and pump-out facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive coastal habitats. Although these contaminant concentrations do not likely affect pelagic waters, the species of turtles analyzed in this Opinion travel between nearshore and offshore habitats and various life stages of green and hawksbill sea turtles in particular can be found in nearshore waters in the action area year-round.

Stranding data from VIDPNR reported 77 sea turtles (loggerhead, leatherback, green, and hawksbill) around St. Croix from 2001-2010. Of these, 4 green, 2 leatherback, and 1 unknown species of sea turtle could be confirmed to have been impacted by boats. Thus, approximately 9% of the reported strandings around St. Croix for which a cause could be identified were caused by boat strikes. The majority of these strikes were fatal resulting in massive injuries to the turtles due to the cutting action of the propeller. Similarly, 22% of the reported strandings around St. John and 25% of the reported strandings around St. Thomas were caused by boat strikes. Of these, all of the St. John strandings were greens, 4 of the 5 St. Thomas strandings were greens and the other was a hawksbill. The proliferation of vessels is associated with the proliferation and expansion of docks, the expansion and creation of port facilities, and the expansion and creation of marinas in the USVI, although the majority of these activities have been on the east, north, and south coasts of St. Croix and around St. Thomas and St. John. For Puerto Rico, PRDNER reported stranding of 354 sea turtles (loggerhead, leatherback, green, and hawksbill from 1989-2009. Of these, 16 hawksbill sea turtles could be confirmed to have been impacted by boats. Based on information from the NOAA Restoration Center and NOAA's ResponseLink, reports of accidental groundings are becoming more common in USVI and Puerto Rico and it is likely there are numerous groundings that go unreported despite causing damage to sea turtle habitats. As part of the Section 7 process for dock, port, and marine construction activities under the jurisdiction of the USACE, NMFS also considers the impacts of the vessel traffic from the operation of these facilities and any measures to avoid and minimize adverse impacts to sea turtles.

7.3 Research Activities

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) nonlethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species). In addition, since issuance of the permit is a federal activity, issuance of the permit by NMFS or USFWS 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. At this time, the University of the Virgin Islands holds a NMFS research permit for take of sea turtles. PRDNER held a similar permit but it expired in April 2017, although PRDNER is working to renew the permit.

7.4 Coastal and Marine Development

Federal agencies such as the USACE are responsible for permitting of coastal and marine development activities including the construction of docks, boardwalks along the shoreline, and dredging, all of which are activities that have been permitted within the last 5 years in the action area by the USACE. We have conducted consultations with the USACE for those projects that had the potential to affect ESA resources under our purview. EPA is also responsible for permitting, including under the National Pollutant Discharge Elimination System program.

Sources of pollutants along the coast of Puerto Rico and USVI include stormwater runoff from coastal development, industrial discharges, sewage discharges, and groundwater 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 investigated.

Coastal runoff, marina and dock construction, dredging, industrial operations, increase under water noise, and boat traffic can degrade marine habitats used by sea turtles. The development of marinas and docks can negatively affect nearshore habitats. An increase in the number of docks built thereby increases boat and vessel traffic. Fueling and pump-out facilities at marinas can sometimes discharge oil, gas, and sewage into sensitive coastal habitats. Although these contaminant concentrations do not likely affect more pelagic waters, the species of turtles analyzed in this Opinion travel between nearshore and offshore habitats and various life stages of green and hawksbill sea turtles in particular can be found in nearshore waters of the U.S. Caribbean year-round. Therefore, the species of turtles analyzed in this Opinion may be exposed to and accumulate terrestrial contaminants that are released into the marine environment during their life cycles.

7.5 Natural Disturbances

Hurricanes and large coastal storms can significantly modify both nesting and in-water sea turtle habitat. Beach profiles change in response to wave action and storm-induced erosion on the coast, which can also lead to the loss of nests or the loss of nesting habitat for at least a season if not longer depending on the size of the beach and the extent to which the beach profile is altered. Storms also result in breakage of sessile benthic organisms from extreme wave action and storm surges. Intense storms that cover a broad area can eliminate or damage large expanses of reef or result in blowouts and loss of seagrass habitats. Major hurricanes have caused significant losses in coral cover and changes in the physical structure of many reefs in Puerto Rico and USVI. Flooding from tropical storms and hurricanes also cause significant sedimentation of nearshore areas resulting in impacts to benthic habitats used by green and hawksbill sea turtles. In-water habitat for green and hawksbill sea turtles is temporarily lost or temporarily or permanently degraded (depending on the magnitude of the storm).

7.6 Synthesis of Baseline Impacts

In summary, several factors adversely affect ESA-listed sea turtles in the action area. These factors are ongoing and are expected to occur contemporaneously with the proposed action. Fisheries in the action area have the greatest adverse impacts on sea turtles based on stranding data, although there are also records of vessel strikes associated with the operation of recreational vessels. Over the past 5 years, the impacts to sea turtles associated with fisheries may have been reduced through the Section 7 consultation process and regulations implementing effective bycatch reduction strategies, such as the requirement of turtle release gear in some fisheries. Poaching is another factor that is likely to continue affecting sea turtles in the action area. Other environmental impacts, including the effects of vessel operation, scientific research permits, coastal and marine development and associated pollution, and natural phenomena had and are expected to have adverse effects on sea turtles in the action area. Based on the information discussed in this section, the environmental baseline for sea turtles in the action area is not pristine and has been degraded, particularly by coastal and marine development associated with the construction of residential, commercial, and tourist facilities and point and non-point discharges to the Caribbean Sea and Atlantic Ocean.

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 C.F.R. §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 analysis section is organized following the stressor, exposure, response, risk assessment framework. This means we identify stressors associated with the proposed action, evaluate the potential level of exposure to these stressors, evaluate the response of ESA-listed species to exposure, and assess the risk to individuals of each ESA-listed species that will be exposed to stressors and populations of these species from exposure of individuals from the populations to the stressors, as detailed further in the following sections.

The jeopardy analysis relies upon the regulatory definition of to “jeopardize the continued existence of a listed species,” which is “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 C.F.R. §402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

Effects of Oil

Oil is known to cause mortality in sea turtles, based on the number of oiled turtles that died as a result of exposure to oil during DWH (DWH Trustees 2016). This is one of the few oil spill incidents that resulted in reports of sea turtles being oiled (CRRT Response Technologies

Committee 2015), likely due to the relatively small size of other incidents that have occurred in waters of the United States versus the DWH incident. Oil spills are thought to have the greatest effect on sea turtle nests due to the impacts of oil exposure on developing embryos and hatchling success. PAHs have been shown to significantly impact sea turtle embryos and hatchlings (CRRT Response Technologies Committee 2015). Lutcavage et al. (1995) observed effects of exposure to weathered crude oil in loggerhead sea turtles that included alteration of blood chemistry, respiration and diving patterns, interference with salt gland functioning, and skin lesions and hypothesized that exposure to fresh oil would have been more harmful to the animals. These effects are likely to apply to other species of sea turtles and make sea turtles more vulnerable to predation and disease.

8.1 Stressors Associated with the Proposed Action

Stressors are any physical, chemical, or biological entity that may induce an adverse response either in an ESA-listed species or in their designated critical habitat. Dispersant application on an oil spill and the use of ISB to quickly remove spilled oil from the environment may expose hawksbill, leatherback, and green (North and South Atlantic DPS) sea turtles to a variety of stressors. The potential stressors we expect to result from the proposed action are direct exposure to dispersants, dispersant effects on prey and sea turtle habitat, direct exposure to burning, and ISB impacts to prey and sea turtle habitat. Exposure to interrelated and interdependent activities such as overflights, vessel traffic, and deployment of other response tools such as boom associated with the application of oil dispersant and during ISB is also a potential stressor. See Appendix H for a summary of recorded events for the period from 1968 to 2016, some of which resulted in oil spills and/or response actions but none of which included the use of dispersants or ISB.

8.1.1 Dispersant Application

The CRRT proposes the authorization of dispersant applicant in the preauthorization zones designated between 1991 and 1995 for Puerto Rico and the USVI. The CRRT also proposes the authorization of dispersant use in water depths of 30 ft or greater regardless of the distance from a shoreline as long as there are no coral reefs or other coral habitat in these areas. As an example, the CRRT may authorize the use of dispersants in areas of USVI that have water depths of 30 ft or more and do not have coral reefs or other corals habitat within 30 ft of the surface.

If dispersant use is authorized during leatherback nesting season in the U.S. Caribbean (roughly from February to August with a peak from April to May), adult females and hatchlings could be exposed to dispersants and dispersed oil. Various life stages of green and hawksbill sea turtles, including adults, sub-adults, juveniles, and hatchlings, could be exposed to dispersants and dispersed oil. Hawksbills nest year-round in the U.S. Caribbean, though more nesting is reported between July and November. Green sea turtles nest infrequently and in low numbers in the U.S. Caribbean but juveniles and sub-adults in addition to adults are present in nearshore waters year-round.

As discussed in Section 6.1.2 for loggerhead sea turtles, few studies have been done to determine the effects of dispersants on sea turtles (CRRT Response Technologies Committee 2015).

Dispersant application may affect prey species used by ESA-listed sea turtles. Studies have shown that dispersants and dispersed oil are sometimes more toxic to fish and corals, particularly larval stages of these organisms, than oil alone. Thus, the abundance of prey species of juvenile and adult life stages of hawksbill and leatherback sea turtles and juvenile green sea turtles could experience short-term reductions in abundance if dispersants were applied as part of the response to an oil spill. Adult green sea turtles are not expected to be impacted by losses of foraging habitat because information from studies such as TROPICS indicate that seagrass is relatively unaffected by the use of dispersants (CRRT Response Technologies Committee 2015; Baca et al. 2005).

8.1.2 In-Situ Burning

If ISB is authorized during leatherback nesting season in the U.S. Caribbean, adult females and hatchlings could be in the water. Various life stages of green and hawksbill sea turtles are likely to be present year-round.

As discussed in Section 6.1.2 for loggerhead sea turtles, leatherback, green, and hawksbill sea turtles may be impacted by ISB when they surface to breathe if they do so in the area of a burn due to the burn itself and the smoke generated during burning. For this reason, observers must ensure no sea turtles are present in areas where burns are planned and burns must be rescheduled or relocated to avoid areas with sea turtles. On the other hand, as described in Section 3.1, as part of sea turtle protection measures to be implemented during any planned ISB activities, green, leatherback, and hawksbill sea turtles may be captured for treatment if they have been severely oiled or relocated outside areas with oil if they have suffered only minor oiling. Dead animals that have suffered mortality as a result of oiling may also be collected. Capture and collection of sea turtles will be part of stranding activities during a response performed by persons authorized by NMFS as part of the STSSN for animals that are in the water. These actions will follow all required federal regulations as described in Section 3.1, Sea Turtle Protection Measures under ISB. For this reason, any take related to these capture and collection activities is already authorized under the STSSN consultation and not analyzed in this opinion.

ISB is not expected to impact green and hawksbill sea turtle refuge and foraging habitat because ISB would only be authorized under this consultation in Zones "A" and "B" and these zones restrict the use of this response to areas that do not contain habitats that may be used by various life stages of green and hawksbill sea turtles. ISB could affect leatherback, green, and hawksbill sea turtles due to short-term loss of prey items that are within the surface layer impacted by the burn. However, because these prey items are likely to already be oiled, ingestion would likely result in more serious impacts to sea turtles than the loss of a small quantity of prey due to burning. In addition, because leatherback, green, and hawksbill sea turtles are more likely to forage below the water surface and be at the surface only to breathe, the majority of prey and forage items are likely to be unaffected by ISB.

8.1.3 Interrelated and Interdependent Activities

Other response operations required to deploy dispersants, such as vessels transit and aircraft flying over sites to either survey for animals or deploy dispersants could disturb sea turtles due to the noise generated by vessels and/or aircraft. The use of vessels during dispersant application could affect sea turtles due to the potential for harassment caused by vessel noise and vessel strikes. No vessel strikes of sea turtles have been reported as part of vessel use during response activities associated with oil spills that have occurred to date in the U.S. Caribbean.

Other response activities associated with the use of dispersants could affect hawksbill, green, and leatherback sea turtles, particularly through potential entanglement in lines associated with boom and potential habitat loss or degradation due to vessel strike. No entanglement or other interactions with sea turtles have been reported as part of past spill response activities in the U.S. Caribbean.

8.2 Mitigation to Minimize or Avoid Exposure

Several aspects of the proposed action are designed to minimize ESA-listed species' exposure to the potential stressors associated with the proposed use of dispersants and ISB in the U.S. Caribbean. These are included in the PDCs for this programmatic consultation.

8.3 Exposure Analysis

In the sections above, we described the stressors resulting from the use of dispersants and/or ISB as response tools for oil spills in the U.S. Caribbean. In the following section, we consider the exposures that could cause an effect on ESA-listed species that are likely to co-occur with the actions' effects on the environment in space and time, and identify the nature of that co-occurrence. We consider the frequency and intensity of exposures that could cause an effect on leatherback, green, and hawksbill sea turtles and, as possible, the number, age or life stage, and gender of the individuals likely to be exposed to the actions' effects and the population(s) or subpopulation(s) those individuals represent. We also consider the responses of leatherback, green, and hawksbill sea turtles to exposures and the potential reduction in fitness associated with these responses.

For both dispersants and ISB, if response activities were to take place during leatherback nesting season (roughly from February to August with a peak from April to May), adult and hatchling sea turtles could be affected by the application of dispersants, use of ISB, including capture of oiled individuals for treatment or relocation, and disturbance associated with the use of aircraft to perform overflights and vessels to perform response operations or enable observers to look for sea turtles.

Based on the compilation of ResponseLink reports (Appendix H), of the approximately 75 incidents reported between 1968 and 2016, 33 resulted in spills of oil into marine waters. Most of these spills were located in areas with commercial harbors, particularly San Juan and St. Croix. Of the approximately 75 reported incidents, 35 of the incidents were due to vessel groundings;

13 were oil spills from terrestrial pipelines, shoreline facilities, or vessels moored to shoreline facilities; 10 were due to vessels being adrift or sinking; one was due to a vessel collision; five were mystery spills where the oil slick or tarballs were of unknown origin; and eight were spills of substances other than oil (Appendix H). Juvenile, sub-adult and adult hawksbill and green sea turtles may be present in these areas where benthic habitat such as seagrass, coral reefs, and colonized hard bottom is present. Hawksbill and green sea turtles have been reported in some areas of San Juan Bay based on information in our project files and are common around St. Croix due to the extensive benthic habitats despite the development of commercial harbors. The greatest number of incidents resulting in oil spills occurred in 1999 when 4 incidents resulting in oil spills to nearshore waters occurred. Because of the location of all of these incidents, none of them would have fallen within the dispersant preauthorization zones or within Zones "A" or "B" for the use of ISB and none would have met the PDCS for this programmatic consultation. Of the 75 reported incidents, approximately four took place in offshore areas where the use of dispersants or ISB might be proposed as response strategies.

Therefore, a limited number of incidents would be expected to result in the potential for exposure of various life stages of green (North and South Atlantic DPS) and hawksbill sea turtles and adult and hatchling leatherback sea turtles. However, only approximately 47 of the 75 total incidents took place during leatherback nesting season and, of the 33 oil spill incidents, only 19 took place during the period when leatherbacks may be nesting and therefore could be present in waters affected by a spill and associated response activities. The only response to date in the U.S. Caribbean that had reported impacts to sea turtles was the M/V Jireh that, due to lighting of vessels during the response operation, led to disorientation of approximately 10 adult female hawksbill sea turtles and an increased number of false crawls rather than successful nesting on one of the beaches of Mona Island until a lighting plan was implemented (NMFS 2014a). No dispersant or ISB use has occurred in the U.S. Caribbean and most of the incidents that have occurred to date would not fit the requirements for preauthorization due to their location in terms of water depth and distance from shore and from marine resources. Because of the small number of oil spills that occur in the U.S. Caribbean on an annual basis, information from those incidents, and the lack of responses using dispersants and/or ISB from which to draw data, we are unable to estimate the number of animals that could be affected during a response where dispersants and/or ISB are used.

8.3.1 Discountable and Insignificant Effects

In terms of associated aerial and vessel operations that could result in noise disturbances to leatherback, green, and hawksbill sea turtles, sea turtles could hear low-flying aircraft if they are at or near the water surface but overflights during spill response would be short in duration and the PDCs require that the amount of time spent in an area where sea turtles are sighted be limited to 15 minutes. Sea turtles spend only three to six percent of their time at the sea surface and overflights do not generate sound levels that result in harm to sea turtles (Laney and Cavanagh 2000). Green sea turtles may rely more on visual cues rather than auditory ones (Hazel et al.

2007), meaning the shadow created on the water may cause this species to react rather than aircraft noise.

In terms of vessel movement, Hazel et al. (2007) reported that sea turtles were more likely to flee from slower-moving vessels than from vessels operating at faster speeds, meaning that collisions with fast-moving vessels were more likely. While there have been reports of vessel collisions with sea turtles by PRDNER and VIDPNR, there are no reports of vessel collisions occurring as a result of past response activities for oil spills that have occurred in the U.S. Caribbean (Appendix H). The PDCs require compliance with BMPs designed to minimize potential impacts of vessel operation on sea turtles during response activities. Therefore, we believe the potential effects to leatherback, green (North and South Atlantic DPS), and hawksbill sea turtles as a result of aircraft and vessel operations during dispersant application or the use of ISB in the U.S. Caribbean will be discountable.

In terms of other response activities associated with the use of dispersants and ISB that could affect hawksbill, green, and leatherback sea turtles, particularly boom deployment, the PDCs include measures to avoid impacts associated with entanglement in lines associated with boom. No entanglement or other injuries to sea turtles have been reported as part of past incidents in the U.S. Caribbean. The PDCs also include measures to minimize potential impacts to green and hawksbill sea turtle habitat. In addition, based on the size and number of past incidents, any anchoring of boom would be very limited in extent, leaving large areas of habitat available to green and hawksbill sea turtles. Therefore, we believe the potential effects of response activities associated with dispersant use in the U.S. Caribbean such as boom deployment on hawksbill, green, and leatherback sea turtles will be discountable.

8.4 Response Analysis

Given the exposure discussed above, in this section we describe the range of responses among ESA-listed sea turtles that may result from the stressors associated with the use of dispersants and ISB in the U.S. Caribbean. For the purposes of consultation, our assessment tries to detect potential lethal, sub-lethal (or physiological), or behavioral responses that might reduce the fitness of individuals. Our response analysis considers and weighs evidence of adverse consequences, as well as evidence suggesting the absence of such consequences.

8.4.1 Dispersant Use

Leatherback sea turtles would be affected by an oil spill and associated use of dispersants only if these occurred during nesting season (February to August) when adults and hatchlings are present in nearshore waters or if the spill were to occur in deep waters where adults may be foraging and transiting. To date, none of the oil spills that have occurred in the U.S. Caribbean were in deep waters (see Appendix H) and the majority of the spills have been associated with vessel groundings and in nearshore or coastal areas where the preauthorization agreements and the PDCs would prohibit the use of dispersants. The PDCs also require that no dispersant be applied within 0.5 nm of areas where sea turtles have been sighted.

There are no studies regarding the actual effects of dispersants on sea turtles. Based on observations of sea turtles in areas where dispersant application has taken place, it is thought that they are not directly affected by dispersants. The greatest impact to leatherback sea turtles is likely to be a short-term decrease in prey items, and depending on the toxicity of the dispersant used there could be effects to larger leatherback prey such as squid. However, dispersants do not mix throughout the water column so not all prey items would be affected. The PDCs require that observers be present to ensure no sea turtles are in areas where dispersant application may occur and to continue watching for sea turtles during any dispersant application to ensure exposure of turtles to dispersants is minimized. Given the required PDCs, the fact that leatherback sea turtles are present on the insular shelves of Puerto Rico and USVI only during their nesting season, and the rarity of incidents resulting in oil spills in the U.S. Caribbean (Appendix H) during time periods when leatherback nesting occurs (estimated as 19 of 33 oil spill events from 1968 to 2016 with one to three events in a given year), we do not anticipate that the use of dispersants will result in a reduction in fitness of leatherback sea turtles.

Adult and juvenile green and hawksbill sea turtles are common in U.S. Caribbean waters year-round. These are the species most likely to be exposed to dispersants, although there are no studies indicating that dispersants are toxic to sea turtles (CRRT Response Technologies Committee 2015). As noted above, the PDCs require that no dispersant application occur within 0.5 nm of where sea turtles have been sighted, which will minimize the possibility for sea turtles to be directly exposed to dispersants. There is also no evidence that dispersants are toxic to sea turtles and, given that they become undetectable in the water column within hours of application, any exposure would be very short-term. Foraging habitat and prey items consumed by adult and juvenile green and hawksbill sea turtles are not likely to be affected by the use of dispersants because green and hawksbill sea turtles are largely benthic feeders. Dispersants are applied at the water surface and studies have shown that dispersed oil generally mixes into the first 5 m of the water column (Bejarano et al. 2013; Joeckel et al. 2011; CRRT Response Technologies Committee 2015). The PDCs restrict the use of dispersants to waters that are 30 ft (9 m) in depth or that have coral habitats within 30 ft of the water surface. These restrictions are protective of green and hawksbill sea turtle habitat in shallow waters such as seagrass beds and colonized hard bottom, preventing direct exposure to dispersants and also reducing the possibility of ingestion of prey that has been exposed to dispersants. Based on information from the DWH spill, mortality of sea turtles was caused by exposure to oil or oiled prey and there is no evidence that the use of dispersants contributed to mortality (DWH Trustees 2016). Therefore, dispersant use as part of response operations would not reduce the fitness of green (North and South Atlantic DPS) and hawksbill sea turtles under the circumstances described in this consultation, specifically in preauthorization zones for dispersant application or in areas closer to shore but with water depths of at least 30 ft and in compliance with the PDCs.

8.4.2 In-Situ Burning

The DWH spill response used in-situ burning on a number of occasions. While mortality of large numbers of sea turtles, particularly juveniles but also adults were reported as part of DWH, the majority of these deaths are thought to be from oiling (DWH Trustees 2016). Response activities such as in-situ burning may have contributed to some mortality of animals if they were trapped in the burn area, but because in-situ burning took place in the most heavily oiled areas during DWH, any turtles that were burned were likely already dead or dying due to exposure to oil (DWH Trustees 2016). The PDCs require that sea turtle observers look for sea turtles prior to any burn operation and that sea turtle rescue be conducted prior to any burn operation. Burn operations only take place in heavily oiled areas, not in areas with minimal surface oil. Oil spills that have occurred in the U.S. Caribbean to date have been associated mainly with large vessel groundings as there are no petroleum extraction operations in the region. Of the incidents resulting in oil spills, ISB might have been appropriate for consideration as a response option in four of them that took place offshore. The PDCs require that no burning operations take place at night in areas where sea turtle nesting is known to occur and that unoiled or lightly oiled *Sargassum* where hatchlings may be present not be burned. Further, ISB will not be conducted in waters with depths less than 30 ft where sea turtle habitat is likely to occur, which will further minimize the potential for sea turtles to be present in areas where in-situ burning will occur in the U.S. Caribbean. ISB will only be authorized under this consultation in Zones "A" and "B."

Anemia was seen in fish and other animals exposed to DWH oil (Patterson III et al. 2015; DWH Trustees 2016). As noted, in-situ burning forms tarballs. There were reports of benthic invertebrates, particularly shrimp, being trapped in tarballs in some areas of the Gulf. Therefore, prey items of different life stages of leatherback, hawksbill, and green sea turtles could be affected by ISB residue, particularly tarballs, although this effect would be minimal for prey species that are in the water column. This means that effects could be greater for hawksbill sea turtles that prefer certain species of sponges in their diet and for green sea turtles that eat seagrass, depending on the extent of tarball production from the use of ISB and the transport of these tarballs to areas used for foraging by green and hawksbill sea turtles. Given the PDCs and zone restrictions for use of ISB, we expect that affects to prey and foraging habitat of green (North and South Atlantic DPS) and hawksbill sea turtles would be minimal. In-situ burning takes place at the water surface and will not be allowed in depths less than 30 ft. Deep-sea corals were reported to be coated with oil residues, likely including tarballs from the DWH spill but this was at such a large volume as to replace the normal marine bottom with black oil residue, leading to impacts to corals and associated organisms. The limited size of a spill that could occur in the U.S. Caribbean based on past events and PDCs restricting areas where in-situ burning will occur are expected to ensure that tarball generation and associated coating of benthic habitats will be minimal. Therefore, we do not expect the use of ISB during spill response will result in a decrease in fitness of leatherback, green (North and South Atlantic DPS), and hawksbill sea turtles.

8.5 Risk Analysis

In this section we assess the consequences of the responses to the individuals that have been exposed, the populations those individuals represent, and the species those populations comprise. Whereas the Response Analysis identified the potential responses of ESA-listed species to the proposed action, this section summarizes our analysis of the expected risk to individuals, populations, and species given the expected exposure to those stressors and the expected responses to those stressors.

We measure risks to individuals of endangered or threatened species using changes in the individuals' fitness, which may be indicated by changes in the individual's growth, survival, annual reproductive success, and lifetime reproductive success. When we do not expect ESA-listed animals exposed to an action's effects to experience reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise.

As discussed in Section 8.4, we do not expect the use of dispersants or ISB as oil spill response tools in the U.S. Caribbean in the areas and following the PDCs described in this consultation to result in a reduction in fitness for leatherback, green, or hawksbill sea turtles that is not caused by the oil spill event itself. Instead, we expect the use of dispersants and ISB to quickly remove large amounts of oil from the marine environment, thereby reducing the risk of exposure to oil on sea turtles and their habitats and prey and resulting in a benefit to sea turtles. Thus, the activities proposed under this consultation are not expected to have population or species-level effects. Therefore, we conclude that there will be no reduction in population viability for leatherback, green (North and South Atlantic DPS), and hawksbill sea turtles as a result of dispersant use and/or ISB under the conditions described in this programmatic consultation under which these response tools may be authorized. Because the proposed action is not likely to have a measurable effect on population size of leatherback, green (North and South Atlantic DPS), and hawksbill sea turtles and is not likely to reduce the population viability of these species, we conclude that the proposed action is not likely to reduce the viability of leatherback, green (North and South Atlantic DPS) or hawksbill sea turtles.

9 CUMULATIVE EFFECTS

"Cumulative effects" are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 C.F.R. §402.02). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative effects from unrelated, non-federal actions occurring around Puerto Rico and USVI may affect hawksbill, leatherback, and green (North and South Atlantic DPSs) sea turtles. The threats leading to these impacts were discussed in Section 6.2 for each species. Stranding data from Puerto Rico and USVI indicate that sea turtles die of causes including human activities,

such as incidental capture in state fisheries, ingestion of/entanglement in debris, vessel strikes, and poaching, although the cause of death is unknown for many stranded sea turtles (PRDNER and VIDPNR, unpublished data). Many activities affecting hawksbill, leatherback, and green sea turtles, such as fishing in federal waters, directed take for scientific research, federal vessel operations, and coastal and in-water constructions are federally regulated. Therefore, many future activities within the action area of the U.S. Caribbean will likely require ESA section 7 consultation. As these activities are unrelated to the proposed action, they are not considered as part of the cumulative effects analysis. However, much of the development occurring in Puerto Rico and USVI that has been shown to affect water and in-water habitat quality for ESA-listed green and hawksbill sea turtles, in particular through increases in sediment transport to nearshore waters, does not have a federal nexus and thus is not subject to the consultation requirements under section 7 of the ESA. These activities are part of the cumulative effects analysis. Depending on the number and location of development projects, sediment and nutrient loading to nearshore waters could become a chronic stressor to refuge and foraging habitats of hawksbill and green sea turtles such as coral habitats and seagrass beds.

The fishing and other extractive uses in territorial waters (which extend up to nine nm from shore around Puerto Rico and three nm from shore in USVI) of the action area are expected to continue into the foreseeable future. Fisheries in federal waters of the action area are regulated by the CFMC and FMPs such as that for reef fish undergo ESA section 7 consultation. NMFS is not aware of any proposed or anticipated changes to fisheries in territorial waters discussed in the environmental baseline (Section 7) that would substantially change the impacts that the fisheries have on hawksbill, leatherback, and green (North and South Atlantic DPS) sea turtles covered by this Opinion. Therefore, NMFS expects that the levels of interactions between fisheries and sea turtles described in the environmental baseline (Section 7) for fisheries activities will continue at similar levels into the foreseeable future.

NMFS also is not aware of any proposed or anticipated changes in other human-related actions such as those leading to habitat degradation from development or natural conditions (e.g., overabundance of predators, changes in oceanic conditions) that would substantially change the impacts that each threat has on hawksbill, leatherback, and green (North and South Atlantic DPS) covered by this opinion. However, the impacts of Hurricanes Irma and Maria in August and September 2017 are likely to result in numerous coastal and nearshore projects to rebuild infrastructure and commercial, residential, public, and industrial properties. It is not possible for us to predict the number, type and scale of these projects in Puerto Rico and USVI at this time but we believe the majority of projects would require federal authorization and ESA section 7 consultations. We also expect the majority of the projects to be for rebuilding rather than new construction. Therefore, NMFS expects that the effects to in-water habitat of green and hawksbill sea turtles from continued development will continue at similar levels into the foreseeable future.

10 INTEGRATION AND SYNTHESIS

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat because of implementing the proposed action. In this section, we add the Effects of the Action (Section 8) to the Environmental Baseline (Section 7) and the Cumulative Effects (Section 9) to formulate the agency's biological opinion as to whether the proposed action is likely to: (1) reduce appreciably the likelihood of both the survival and recovery of a ESA-listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) reduce the value of designated or proposed critical habitat for the conservation of the species. In this case, we consider only the impacts of the action on the survival and recovery of leatherback, green (North and South Atlantic DPS), and hawksbill sea turtles. This assessment is made in full consideration of the Status of the Species (Section 6).

The following discussions separately summarize the probable risks the proposed action poses to the sea turtle species that are likely to be exposed. These summaries integrate the exposure profiles presented previously with the results of our response analyses for each of the actions considered in this opinion.

The CRRT proposes authorization of the use of dispersants in preauthorized areas and potentially other areas with water depths of 30 ft or more (provided the required PDCs can be met) and ISB in Zones "A" and "B" (Section 3.2). The action area includes all Commonwealth and Territorial waters and the EEZ of the U.S. Caribbean. Dispersant application and in-situ burning operations would also require aerial and vessel operations. No mortalities of ESA-listed leatherback, green (North and South Atlantic DPS) or hawksbill sea turtles are proposed or anticipated. Any capture of sea turtles completed prior to ISB operations would be directed captures to attempt to rescue and rehabilitate sea turtles in heavily oiled areas in compliance with NMFS STSSN requirements and federal regulations associated with sea turtle capture and resuscitation (Section 3.1, Sea Turtle Protection Measures under ISB).

10.1 North and South Atlantic Distinct Population Segment Green Sea Turtle

No reduction in the distributions of green sea turtles from the North or South Atlantic DPS is expected because of the use of dispersants and/or ISB during oil spill response activities in the U.S. Caribbean.

The 2007 5-year status review for green turtles states that of the seven green sea turtle nesting concentrations in the Atlantic Basin for which abundance trend is available, all were determined to be either stable or increasing (NMFS and USFWS 2007a). Additionally, the 2014 status review for green sea turtles, which also suggested possible DPSs, determined that there were over 167,000 nesting females in the North Atlantic DPS and over 63,000 in the South Atlantic DPS (NMFS and USFWS 2015). These estimates did not include multiple smaller sites for which nesting data were not available. All major nesting populations in the North Atlantic DPS demonstrate long-term increases in abundance (Seminoff et al. 2015). Data availability for the South Atlantic DPS is poor with 37 of the 51 identified nesting sites not having sufficient data to

estimate the number of nesters or trends (Seminoff et al. 2015). No reduction in numbers is anticipated as part of the proposed action. As noted previously, any mortalities of sea turtles are anticipated to be from exposure to oil and not from response activities. Therefore, no reduction in reproduction is expected as a result of the proposed action. It is expected that any reductions in reproduction would occur due to the impacts of exposure to oil rather than response activities.

Because we do not anticipate a reduction in numbers or reproduction of green turtles as a result of the proposed activities, a reduction in the species' likelihood of survival is not expected.

The Atlantic Recovery Plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991) lists recovery objectives for the species. The following recovery objective over a period of 25 continuous years is relevant to the impacts of the proposed action:

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

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States and U.S. Caribbean. Since 2000, sea turtle surveys in Culebra have resulted in the capture of 553 green sea turtles and all have been juveniles or subadults based on size and testosterone levels suggesting Culebra is an important developmental habitat (Diez and Van Dam 2007). It is also important to note that in the years following research indicating capture in the commercial artisanal green turtle fishery in Nicaragua and other Latin American countries might influence survivorship, nesting in Tortuguero and elsewhere throughout the Caribbean and Atlantic has continued to increase, and it is likely that numbers on foraging grounds have increased similarly. Because no mortalities or effects on the distribution of North and South Atlantic DPS green sea turtle populations are expected as a result of the proposed action, we do not anticipate the proposed activities will impede the recovery objectives for green sea turtles. In conclusion, we believe the effects associated with the proposed action are not expected to cause a reduction in the likelihood of survival and recovery of green sea turtles (North and South Atlantic DPS) in the wild.

10.2 Leatherback Sea Turtle

No reduction in the distribution of leatherback sea turtles is expected as a result of the use of dispersants and/or ISB during oil spill response activities in the U.S. Caribbean.

The Leatherback TEWG estimates there are between 34,000 to 95,000 total adults (20,000 to 56,000 adult females; 10,000 to 21,000 nesting females) in the North Atlantic. Of the five leatherback populations or groups of populations in the North Atlantic, three show an increasing or stable trend (Florida, Northern Caribbean, and Southern Caribbean). There is not enough information available on the West African population to conduct a trend analysis and a slight decline in annual population growth rate was detected for the Western Caribbean (TEWG 2007). It is expected that any reductions in numbers or reproduction of leatherback sea turtles would occur due to the impacts of exposure to oil rather than response activities.

Because we do not anticipate a reduction in numbers or reproduction of leatherback turtles as a result of the proposed activities, a reduction in the species' likelihood of survival is not expected.

The Atlantic Recovery Plan for the U.S. population of leatherback sea turtles (NMFS and USFWS 1992) lists recovery objectives for the species. The following recovery objective is relevant to the impacts of the proposed action:

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

In Puerto Rico, the main nesting areas for leatherback sea turtles are in Fajardo on the main island and on the island of Culebra. Between 1978 and 2005, nesting increased from a minimum of 9 nests recorded in 1978 to 469-882 nests recorded each year between 2000 and 2005 throughout Puerto Rico. Reports from nesting in Fajardo in particular indicate that this increase in nesting has continued. In the U.S. Virgin Islands, researchers estimated a population growth of approximately 13 percent per year on Sandy Point Beach, St. Croix from 1994 through 2001. These numbers also continue increasing. Because no mortalities or effects on the distribution of leatherback sea turtle populations are expected, we do not anticipate the proposed activities will impede the recovery objectives for leatherback sea turtles. In conclusion, we believe the effects associated with the proposed action are not expected to cause a reduction in the likelihood of survival and recovery of leatherback sea turtles in the wild.

10.3 Hawksbill Sea Turtle

No reduction in the distribution of hawksbill sea turtles is expected because of the use of dispersants and/or ISB during oil spill response activities in the U.S. Caribbean.

Surveys at 88 nesting sites worldwide indicate that 22,004 – 29,035 females nest annually (NMFS and USFWS 2013a). From 1980 to 2003, the number of nests at three primary nesting beaches increased 15 percent annually. However, recent declines in nest counts, decreased survival at other life stages, and updated population modeling, indicate this rate is not expected to continue though in general, hawksbills are doing better in the Atlantic and Indian Ocean than in the Pacific Ocean where a greater proportion of nesting sites are declining. Mortimer and Donnelly (2008) found that for nesting populations in the Atlantic (especially in the Insular Caribbean and Western Caribbean Mainland), nine of the ten sites with recent data (within the past 20 years) that show nesting increases were located in the Caribbean. It is expected that any reductions in numbers and resultant reductions in reproduction of hawksbill sea turtles would occur due to the impacts of exposure to oil rather than response activities.

Because we do not anticipate a reduction in numbers or reproduction of hawksbill sea turtles as a result of the proposed activities, a reduction in the species' likelihood of survival is not expected.

The Recovery Plan for hawksbill sea turtles (NMFS and USFWS 1992) lists recovery objectives for the species. The relevant recovery objectives are relevant for the impacts of the proposed action:

- The adult female population is increasing, as evidenced by a statistically significant trend in the annual number of nests at five index beaches, including Mona Island and Buck Island Reef National Monument.
- The numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, U.S. Virgin Islands, and Florida.

Of the hawksbill sea turtle rookeries regularly monitored, Mona Island and Buck Island Reef National Monument, as well as Jumby Bay (Antigua/Barbuda), all show increasing trends in the annual number of nests. In-water research projects at Mona Island indicate that the area provides developmental habitat for juvenile and subadult hawksbill sea turtles and numbers appear to be increasing, along with numbers of nests, though data have not been incorporated into a published trend assessment. Because no mortalities or effects on the distribution of hawksbill sea turtle populations are expected, we do not anticipate the proposed activities will impede the recovery objectives for hawksbill sea turtles. In conclusion, we believe the effects associated with the proposed action are not expected to cause a reduction in the likelihood of survival and recovery of hawksbill sea turtles in the wild.

11 CONCLUSION

After reviewing the current status of the ESA-listed species, the environmental baseline within the action area, the effects of the proposed action, any effects of interrelated and interdependent actions, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of hawksbill, leatherback, or green (North and South Atlantic DPS) sea turtles. NMFS determined the proposed action will have no effect on leatherback sea turtle critical habitat (Section 6.1.6). NMFS also determined the proposed action is not likely to adversely affect designated critical habitat for the green sea turtle North Atlantic DPS or hawksbill sea turtles (Sections 6.1.5 and 6.1.7).

12 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 a 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 regulation 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.

Harass is further defined as an act that "creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (NMFSPD 02-110-19).

Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this incidental take statement. Incidental take statements serve a number of functions, including identifying reasonable and prudent measures (RPMs) that will minimize the impact of anticipated take. For this consultation, no incidental take of ESA-listed species is anticipated or authorized because the take that will occur was authorized in the STSSN consultation. Therefore, no RPMs are provided for this consultation because directed take of sea turtles captured for relocation outside planned ISB areas, for treatment or for analysis of dead animals is covered under the existing STSSN consultation. Appropriate measures to avoid take of ESA-listed species are reflected in the PDCs for this programmatic consultation.

13 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 the threatened and endangered 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 develop information (50 C.F.R. §402.02).

We believe the following conservation recommendation would further the conservation of ESA-listed whales, sea turtles, corals, Nassau grouper, and designated critical habitat for leatherback, hawksbill, and green (North Atlantic DPS) sea turtles, and elkhorn and staghorn corals in the U.S. Caribbean.

1. The CRRT should develop, in coordination with the Puerto Rico and USVI Area Planning Committees and partners such as industry and academia, a science plan to determine the fate and effect of oil, dispersed oil, ISB, and tarballs from ISB that could be implemented should a spill occur in the U.S. Caribbean. The science plan should focus on impacts to ESA-listed species and their habitat.

In order for NMFS' Office of Protected Resources Endangered Species Act Interagency Cooperation Division to be kept informed of actions minimizing or avoiding adverse effects on, or benefiting, ESA-listed species or their critical habitat, the CRRT should notify the Endangered Species Act Interagency Cooperation Division of any conservation recommendations they implement in their final action.

14 REINITIATION NOTICE

This concludes formal consultation for the use of dispersants and ISB as oil spill response tools during spill response in the U.S. Caribbean by the CRRT. Consistent with 50 C.F.R. §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

(1) If take occurs as a result of response actions involving dispersant application or ISB, such as if vessel strikes occur that affect ESA-listed whales or sea turtles or vessel groundings occur that affect ESA-listed corals.
(2) If sea turtles suffer mortality due to mishandling during rescue and recovery efforts associated with the use of ISB as a response tool.
(3) New information reveals effects of the agency action that may affect ESA-listed species or critical habitat in a manner or to an extent not previously considered.
(4) The identified action is subsequently modified in a manner that causes an effect to ESA-listed species or designated critical habitat that was not considered in this opinion.
(5) A new species is listed or critical habitat designated under the ESA that may be affected by the action.

15 REFERENCES

15.1 Federal Register Notices Cited

35 FR 8491. June 2, 1970. Conservation of Endangered Species and Other Fish or Wildlife. Federal Register 35(106): 8491-8498.

35 FR 18319. February 2, 1970. Conservation of Endangered Species and Other Fish or Wildlife: List of Endangered Foreign Fish or Wildlife. Federal Register 35(233): 18319-18322.

43 FR 32800. July 28, 1978. Listing and Protecting Loggerhead Sea Turtles as "Threatened Species" and Populations of Green and Olive Ridley Sea Turtles as Threatened Species or "Endangered Species". Federal Register 43(146): 32800-32811.

44 FR 17710. March 23, 1979. Determination of Critical Habitat for Leatherback Sea Turtle. Federal Register 44(58): 17710-17712.

61 FR 17. January 2, 1996. Endangered and Threatened Wildlife; Status Reviews of Listed Sea Turtles. Federal Register 61(1): 17.

63 FR 28359. May 22, 1998. Endangered and Threatened Wildlife; Recovery Plans for Listed Sea Turtles. Federal Register 63(99): 28359.

63 FR 46693. September 2, 1998. Designated Critical Habitat; Green and Hawksbill Sea Turtles. Federal Register 63(170): 46693-46701.

68 FR 1628. January 13, 2003. Endangered and Threatened Wildlife and Plants; Guidance on Streamlining Section 7 Consultation on Hazardous Fuels Treatment Projects. Federal Register 68(8): 1628-1629.

71 FR 26852. May 9, 2006. Endangered and Threatened Species: Final Listing Determinations for Elkhorn Coral and Staghorn Coral. Federal Register 71(89): 26852-26872.

73 FR 72210. November 26, 2008. Endangered and Threatened Species: Critical Habitat for Threatened Elkhorn and Staghorn Corals; Final Rule. Federal Register 73(229): 72210-72240.

75 FR 47538. August 6, 2010. Endangered and Threatened Species; Recovery Plans. Federal Register 75(151): 47538-47540.

75 FR 81584. December 28, 2010. Endangered and Threatened Species; Recovery Plan for the Sperm Whale. Federal Register 75(248): 81584-81585.

76 FR 43985. July 22, 2011. Endangered and Threatened Species; Recovery Plan for the Sei Whale. Federal Register 76(141): 43985-43986.

76 FR 58868. September 22, 2011. Endangered and Threatened Species; Determination of Nine Distinct Population Segments of Loggerhead Sea Turtle as Endangered or Threatened. Federal Register 76(184): 58868-58952.

77 FR 61573. October 10, 2012. Endangered and Threatened Species; Initiation of 5-Year Review for Kemp's Ridley, Olive Ridley, Leatherback, and Hawksbill Sea Turtles. Federal Register 77(196): 61573-61574.

79 FR 53852. September 10, 2014. Endangered and Threatened Wildlife and Plants: Final Listing Determinations on Proposal to List 66 Reef-Building Coral Species and To Reclassify Elkhorn and Staghorn Corals. Federal Register 79(175): 53852-54123.

80 FR 12146. March 6, 2015. Endangered and Threatened Species; Availability of the Final Recovery Plan for Staghorn and Elkhorn Corals. Federal Register 80(44): 12146.

80 FR 71774. November 17, 2015. Endangered and Threatened Species; Determination on the Designation of Critical Habitat for Three Scalloped Hammerhead Shark Distinct Population Segments. Federal Register 80(221): 71774-71784.

81 FR 20057. April 6, 2016. Endangered and Threatened Wildlife and Plants; Final Rule to List Eleven Population Segments of the Green Sea Turtle (*Chelonia mydas*) as Endangered or Threatened and Revision of Current Listings Under the Endangered Species Act. Federal Register 81(66): 20058-20090.

81 FR 42268. June 29, 2016. Endangered and Threatened Wildlife and Plants: Final Listing Determination on the Proposal to List the Nassau Grouper as Threatened Under the Endangered Species Act. Federal Register 81(125): 42268-42265.

81 FR 62259. September 8, 2016. Final rule: Endangered and Threatened Species; Identification of 14 Distinct Population Segments of the Humpback Whale (*Megaptera novaeangliae*) and Revision of Species-Wide Listing. Federal Register 81(174): 62259-62320.

15.2 Literature Cited

Ackerman, R. A. 1997. The nest environment and the embryonic development of sea turtles. Pages 83-106 *in* P. L. Lutz and J. A. Musick, editors. The Biology of Sea Turtles. CRC Press, Boca Raton, Florida.

Adams, J., M. Sweezey, and P. V. Hodson. 2014. Oil and oil dispersant do not cause synergistic toxicity to fish embryos. Environmental Toxicology and Chemistry **33**:107-114.

Aguilar-Perera, A., M. Shärer, and M. Nemeth. 2006. Occurrence of juvenile Nassau grouper, *Epinephelus striatus* (Teleostei: Serranidae) off Mona Island, Puerto Rico: Considerations of recruitment potential. Caribbean Journal of Science **42**:264-267.

Aguilar, R., J. Mas, and X. Pastor. 1994. Impact of Spanish swordfish longline fisheries on the loggerhead sea turtle *Caretta caretta* population in the western Mediterranean. Pages 91-96 *in* J. I. Richardson and T. H. Richardson, editors. Proceedings of the 12th Annual Workshop on Sea Turtle Biology and Conservation. U.S. Department of Commerce, Jekyll Island, Georgia.

Antonelis, G. A., J. D. Baker, T. C. Johanos, R. C. Braun, and A. L. Harting. 2006. Hawaiian monk seal (*Monachus schauinslandi*): status and conservation issues. Atoll Research Bulletin **543**:75-101.

Avens, L., J. C. Taylor, L. R. Goshe, T. T. Jones, and M. Hastings. 2009. Use of skeletochronological analysis to estimate the age of leatherback sea turtles (*Dermochelys coriacea*) in the western North Atlantic. Endangered Species Research **8**:165-177.

Baca, B., G. A. Ward, C. H. Lane, and P. A. Schuler. 2005. Net environmental benefit analysis (NEBA) of dispersed oil on nearshore tropical ecosystems derived from the 20 year "TROPICS" field study.*in* 2005 International Oil Spill Conference.

Baker, J. D., C. L. Littnan, and D. W. Johnston. 2006. Potential effects of sea level rise on the terrestrial habitats of endangered and endemic megafauna in the Northwestern Hawaiian Islands. Endangered Species Research **2**:21-30.

Bejarano, A. C., E. Levine, and A. J. Mearns. 2013. Effectiveness and potential ecological effects of offshore surface dispersant use during the Deepwater Horizon oil spill: A retrospective analysis of monitoring data. Environmental Monitoring and Assessment **185**:10281-10295.

Benson, S. R., T. Eguchi, D. G. Foley, K. A. Forney, H. Bailey, C. Hitipeuw, B. P. Samber, R. F. Tapilatu, V. Rei, P. Ramohia, J. Pita, and P. H. Dutton. 2011. Large-scale movements and high-use areas of western Pacific leatherback turtles, *Dermochelys coriacea*. Ecosphere **2**:1-27.

Bjorndal, K. A., and A. B. Bolten. 2010. Hawksbill sea turtles in seagrass pastures: Success in a peripheral habitat. Marine Biology **157**:135-145.

Bolten, A. B., K. A. Bjorndal, and H. R. Martins. 1994. Life history model for the loggerhead sea turtle (*Caretta caretta*) populations in the Atlantic: Potential impacts of a longline fishery. Pages 48-55 *in* G. J. Balazs and S. G. Pooley, editors. Research Plan to Assess Marine Turtle Hooking Mortality. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center.

Bouchard, S., K. Moran, M. Tiwari, D. Wood, A. Bolten, P. J. Eliazar, and K. A. Bjorndal. 1998. Effects of exposed pilings on sea turtle nesting at Melbourne Beach, Florida. Page 145 *in* S. P. Epperly and J. Braun, editors. Seventeenth Annual Sea Turtle Symposium.

Brette, F., B. Machado, C. Cros, J. P. Incardona, N. L. Scholz, and B. A. Block. 2014. Crude oil impacts cardiaz excitation-contraction coupling in fish. Science **343**:772-776.

Brown, C. A., C. Green, A. Kuhl, and F. Galvez. 2015. The impacts of Macondo-252 crude and Corexit-9500 on embryonic development in the Gulf killifish, Fundulus grandis, subjected to varying salinities. 2015 Gulf of Mexico Oil Spill & Ecosystem Science Conference.

Buitrago, J., and H. J. Guada. 2002. The hawksbill turtle (*Eretmochelys imbricata*) in Venezuela. Interciencia **27**:392-+.

Camacho, M., L. D. Boada, J. Orós, P. Calabuig, M. Zumbado, and O. P. Luzardo. 2012. Comparative study of polycyclic aromatic hydrocarbons (PAHs) in plasma of Eastern Atlantic juvenile and adult nesting loggerhead sea turtles (*Caretta caretta*). Marine Pollution Bulletin **64**:1974-1980.

Carls, M. G., L. Holland, M. Larsen, T. K. Collier, N. L. Scholz, and J. P. Incardona. 2008. Fish embryos are damaged by dissolved PAHs, not oil particles. Aquatic Toxicology **88**:121-127.

Carls, M. G., and J. P. Meador. 2009. A perspective on the toxicity of petrogenic PAHs to developing fish embryos related to environmental chemistry. Human and Ecological Risk Assessment: An International Journal **15**:1084-1098.

Chaloupka, M., K. A. Bjorndal, G. H. Balazs, A. B. Bolten, L. M. Ehrhart, C. J. Limpus, H. Suganuma, S. Troeeng, and M. Yamaguchi. 2008. Encouraging outlook for recovery of a once severely exploited marine megaherbivore. Global Ecology and Biogeography **17**:297-304.

Couillard, C. M., K. Lee, B. Legare, and T. L. King. 2005. Effect of dispersant on the composition of the water-accommodated fraction of crude oil and its toxicity to larval marine fish. Environmental Toxicology and Chemistry **24**:1496-1504.

CRRT Response Technologies Committee. 2015. Use of Oil Spill Dispersants and In-Situ Burning as Part of Response Actions Considered by the Caribbean Regional Response Team. Caribbean Regional Response Team.

Daniels, R. C., T. W. White, and K. K. Chapman. 1993. Sea-level rise - destruction of threatened and endangered species habitat in South Carolina. Environmental Management **17**:373-385.

DeAngelis, B. M. 2006. The Distribution of Elasmobranchs in St. Thomas and St. John, United States Virgin Islands with an Emphasis on Shark Nursery Areas. University of Rhode Island, Rhode Island.

Diez, C. E., and R. P. Van Dam. 2002. Habitat effect on hawksbill turtle growth rates on feeding grounds at Mona and Monito Islands, Puerto Rico. Marine Ecology Progress Series **234**:301-309.

Diez, C. E., and R. P. Van Dam. 2007. In-water surveys for marine turtles at foraging grounds of Culebra Archipelago, Puerto Rico

Diez, C. E., X. Velez-Zuazo, and R. P. Van Dam. 2003. Hawksbill turtles in seagrass beds. Marine Turtle Newsletter **102**:8-10.

Downs, C. A., R. H. Richmond, W. J. Mendiola, L. Rougee, and G. K. Ostrander. 2006. Cellular physiological effects of the MV *Kyowa Violet* fuel-oil spill on the hard coral, *Porites lobata*. Environmental Toxicology and Chemistry **25**:3171-3180.

Dutton, P. H., B. W. Bowen, D. W. Owens, A. Barragan, and S. K. Davis. 1999. Global phylogeography of the leatherback turtle (*Dermochelys coriacea)*. Journal of Zoology **248**:397-409.

DWH Trustees. 2016. Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement. Retrieved from http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/.

Eckert, K. L., B. P. Wallace, J. G. Frazier, S. A. Eckert, and P. C. H. Pritchard. 2012. Synopsis of the biological data on the leatherback sea turtle (*Dermochelys coriacea*). U.S. Fish and Wildlife Service.

Epstein, N., R. P. M. Bak, and B. Rinkevich. 2000. Toxicity of third generation dispersants and dispersed Egyptian crude oil on Red Sea coral larvae. Marine Pollution Bulletin **40**:497-503.

Fish, M. R., I. M. Cote, J. A. Gill, A. P. Jones, S. Renshoff, and A. R. Watkinson. 2005. Predicting the Impact of Sea-Level Rise on Caribbean Sea Turtle Nesting Habitat. Conservation Biology **19**:482-491.

Garrett, C. 2004. Priority Substances of Interest in the Georgia Basin - Profiles and background information on current toxics issues. GBAP Publication No. EC/GB/04/79, Canadian Toxics Work Group Puget Sound, Georgia Basin International Task Force.

Geraci, J. R. 1990. Physiologic and toxic effects on cetaceans. Pages 167-197 *in* J. R. Geraci and D. J. S. Aubin, editors. Sea Mammals and Oil: Confronting the Risks. Academic Press, San Diego.

Goodbody-Gringley, G., D. L. Wetzel, D. Gillon, E. Pulster, A. Miller, and K. B. Ritchie. 2013. Toxicity of Deepwater Horizon source oil and the chemical dispersant, Corexit(R) 9500, to coral larvae. PLoS ONE **8**:e45574.

Grant, S. C. H., and P. S. Ross. 2002. Southern Resident killer whales at risk: Toxic chemicals in the British Columbia and Washington environment. Department of Fisheries and Oceans Canada, Sidney, B.C.

Hartwell, S. I. 2004. Distribution of DDT in sediments off the central California coast. Marine Pollution Bulletin **49**:299-305.

Hays, G. C. 2000. The implications of variable remigration intervals for the assessment of population size in marine turtles. Journal of Theoretical Biology **206**:221-227.

Hazel, J., I. R. Lawler, H. Marsh, and S. Robson. 2007. Vessel speed increases collision risk for the green turtle *Chelonia mydas*. Endangered Species Research **3**:105-113.

Heithaus, M. R., J. Gelsleichter, and M. Shivji. 2014. Assessing impacts of oil exposure to deep sea ecosystems of the Gulf of Mexico using sharks and scavengers as integrative models, FIO Block Grants Final Report. Florida International University, Universiity of North Florida, and Nova Southeastern University, Florida.

Helm, R. C., D. P. Costa, T. D. Debruyn, T. J. O'Shea, R. S. Wells, and T. M. Williams. 2015. Overview of effects of oil spills on marine mammals. Pages 455-475 *in* M. Fingas, editor. Handbook of Oil Spill Science and Technology.

Heppell, S. S., D. T. Crouse, L. B. Crowder, S. P. Epperly, W. Gabriel, T. Henwood, R. Márquez, and N. B. Thompson. 2005. A population model to estimate recovery time, population size, and management impacts on Kemp's ridley sea turtles. Chelonian Conservation and Biology **4**:767-773.

Hernandez, F., J. Filbrun, J. Ransom, J. Fang, and C. Culpepper. 2015. Taxon-specific variability in condition among larval fishes collected before, during, and after the Deepwater Horizon oil spill. 2015 Gulf of Mexico Oil Spill & Ecosystem Science Conference.

Hicken, C. E., T. L. Linbo, D. H. Baldwin, M. L. Willis, M. S. Myers, L. Holland, M. Larsen, M. S. Stekoll, S. D. Rice, T. K. Collier, N. L. Scholz, and J. P. Incardona. 2011. Sublethal exposure to crude oil during embryonic development alters cardiac morphology and reduces aerobic capacity in adult fish. Proceedings of the National Academy of Sciences **108**:7086-7090.

Horrocks, J. A., L. A. Vermeer, B. Krueger, M. Coyne, B. A. Schroeder, and G. H. Balazs. 2001. Migration routes and destination characteristics of post-nesting hawksbill turtles satellite-tracked from Barbados, West Indies. Chelonian Conservation and Biology **4**:107-114.

Incardona, J. P., M. G. Carls, H. Teraoka, C. A. Sloan, T. K. Collier, and N. L. Scholz. 2005. Aryl hydrocarbon receptor-independent toxicity of weathered crude oil during fish development. Environmental Health Perspectives **113**:1755-1762.

Incardona, J. P., L. D. Gardner, T. L. Linbo, T. L. Brown, A. J. Esbaugh, E. M. Mager, J. D. Stieglitz, B. L. French, J. S. Labenia, C. A. Laetz, M. Tagal, C. A. Sloan, A. Elizur, D. D. Benetti, M. Grosell, B. A. Block, and N. L. Scholz. 2014. Deepwater Horizon crude oil impacts the developing hearts of large predatory pelagic fish. Proceedings of the National Academy of Sciences **111**:E1510-E1518.

ITOPF. 2011. Use of Dispersants to Treat Oil Spills. The International Tanker Owners Pollution Federation Limited, United Kingdom.

Iwata, H., S. Tanabe, N. Sakai, and R. Tatsukawa. 1993. Distribution of persistent organochlorines in the oceanic air and surface seawater and the role of ocean on their global transport and fate. Environmental Science and Technology **27**:1080-1098.

James, M. C., S. A. Eckert, and R. A. Myers. 2005. Migratory and reproductive movements of male leatherback turtles (*Dermochelys coriacea*). Marine Biology **147**:845-853.

Joeckel, J., A. Hayward Walker, D. Scholz, and C. Huber. 2011. Dispersant use approval: Before, during and after Deepwater Horizon. 2011 International Oil Spill Conference.

Kågesten, G., W. Sautter, K. Edwards, B. Costa, L. Kracker, and T. Battista. 2015. Shallow-Water Benthic Habitats of Northeast Puerto Rico and Culebra Island. NOS NCCOS, Silver Spring, MD.

Kendall, M. S., C. R. Kruer, K. R. K. R. Buja, J. D. Christensen, M. Finkbeiner, R. A. Warner, and M. E. Monaco. 2001. Methods used to map the benthic habitats of Puerto Rico and the US Virgin Islands. NOAA National Ocean Service, National Centers for Coastal Ocean Science, Center for Coastal Monitoring and Assessment, Biogeography Team.

Lane, A., and P. L. Harrison. 2000. Effects of oil contaminants on survivorship of larvae of the scleractinian reef corals *Acropora tenuis*, *Goniastrea aspera* and *Platygyra sinensis* from the Great Barrier Reef. Proceedings 9th International Coral Reef Symposium, Bali, Indonesia.

Laney, H., and R. C. Cavanagh. 2000. Supersonic aircraft noise at and beneath the ocean surface: Estimation of risk for effects on marine mammals. United States Air Force Research Laboratory.

León, Y. M., and C. E. Diez. 2000. Ecology and population biology of hawksbill turtles at a Caribbean feeding ground. Pages 32-33 *in* F. A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez-Millán, and L. Sarti-Martinez, editors. Eighteenth International Sea Turtle Symposium. U.S. Department of Commerce, Mazatlán, Sinaloa, México.

Leroux, R. A., P. H. Dutton, F. A. Abreu-Grobois, C. J. Lagueux, C. L. Campbell, E. Delcroix, J. Chevalier, J. A. Horrocks, Z. Hillis-Starr, S. Troeng, E. Harrison, and S. Stapleton. 2012. Re-examination of population structure and phylogeography of hawksbill turtles in the wider Caribbean using longer mtDNA sequences. Journal of Heredity **103**:806-820.

Lutcavage, M. E., P. L. Lutz, G. D. Bossart, and D. M. Hudson. 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology **28**:417-422.

Lutcavage, M. E. P. P. B. E. W. P. L. L. 1997. Human impacts on sea turtle survival. Pages 387-409 *in* P. L. L. J. A. Musick, editor. The Biology of Sea Turtles. CRC Press, New York, New York.

Mackay, A. L. 2006. 2005 sea turtle monitoring program the East End beaches (Jack's, Isaac's, and East End Bay) St. Croix, U.S. Virgin Islands. Nature Conservancy.

Matkin, C. O. S., E. 1997. Restoration notebook: Killer whale (*Orcinus orca*). *Exxon Valdez* Oil Spill Trustee Council, Anchorage, Alaska.

Mayor, P. A. P., B.; Hillis-Starr, Z-M. 1998. Results of the stomach content analysis on the juvenile hawksbill turtles of Buck Island Reef National Monument, U.S.V.I. Pages 230-233 *in* S. P. B. Epperly, J. , editor. Seventeenth Annual Sea Turtle Symposium.

Meylan, A. 1988. Spongivory in hawksbill turtles: a diet of glass. Science **239**:393-395.

Miller, J. D. D., Kirstin A.; Limpus, Colin J.; Mattocks, Neil; Landry Jr., Andre M. 1998. Long-distance migrations by the hawksbill turtle, *Eretmochelys imbricata*, from north-eastern Australia. Wildlife Research **25**:89-95.

Monzón-Argüello, C., C. Rico, A. Marco, P. López, and L. F. López-Jurado. 2010. Genetic characterization of eastern Atlantic hawksbill turtles at a foraging group indicates major undiscovered nesting populations in the region. Journal of Experimental Marine Biology and Ecology.

Mortimer, J. A., and M. Donnelly. 2008. Status of the hawksbill at the beginning of the 21st Century. Pages 99-100 *in* A. F. Rees, M. Frick, A. Panagopoulou, and K. Williams, editors. Twenty-Seventh Annual Symposium on Sea Turtle Biology and Conservation.

Musick, J. A., and C. J. Limpus. 1997. Habitat utilization and migration in juvenile sea turtles. Pages 137-163 *in* P. L. Lutz and J. A. Musick, editors. The Biology of Sea Turtles. CRC Press, New York, New York.

Negri, A. P., and A. J. Heyward. 2000. Inhibition of fertilization and larval metamorphosis of the coral *Acropora millepora* (Ehrenberg, 1834) by petroleum products. Marine Pollution Bulletin **41**:420-427.

NMFS. 1997. Endangered Species Act Section 7 Consultation - Biological Opinion on Channel Maintenance Dredging Using Hopper Dredge in the Galveston and New Orleans Districts of the Army Corps of Engineers. Biological Opinion.

NMFS. 2011. National overview. U.S. National Bycatch Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

NMFS. 2013. Nassau grouper, *Epinephelus striatus* (Bloch 1792): Biological Report. National Marine Fisheries Service.

NMFS. 2014a. Endangered Species Act Section 7 Consultation - Biological Opinion for the M/V Jireh Grounding Response, Mona Island. Southeast Regional Office, St. Petersburg, FL.

NMFS. 2014b. Endangered Species Act Section 7 Consultation - Biological Opinion on the Continued Implementation of the Sea Turtle Conservation Regulations under the ESA and the Continued Authorization of the Southeast U.S. Shrimp Fisheries in Federal

Waters under the Magnuson-Stevens Fishery Management and Conservation Act (MSFMCA). St. Petersburg, Florida.

NMFS, and USFWS. 1991. Recovery plan for U.S. population of the Atlantic green turtle *Chelonia mydas*. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources, Washington, D. C.

NMFS, and USFWS. 1992. Recovery plan for leatherback turtles *Dermochelys coriacea* in the U. S. Carribean, Atlantic and Gulf of Mexico. National Marine Fisheries Service and U.S. Fish and Wildlife Service, Silver Spring, Maryland.

NMFS, and USFWS. 1993. Recovery plan for the hawksbill turtle *Eretmochelys imbricata* in the U.S. Caribbean, Atlantic and Gulf of Mexico. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, St. Petersburg, Florida.

NMFS, and USFWS. 2007a. 5-year review: Summary and evaluation, green sea turtle (*Chelonia mydas*). National Oceanic and Atmospheric Administration, National Marine Fisheries Service and U.S. Fish and Wildlife Service.

NMFS, and USFWS. 2007b. Hawksbill sea turtle (*Eretmochelys imbricata*) 5-year review: Summary and evaluation National Marine Fisheries Service and U.S. Fish and Wildlife Service, Silver Spring, Maryland.

NMFS, and USFWS. 2007c. Kemp's ridley sea turtle (*Lepidochelys kempii*) 5-year review: summary and evaluation. National Marine Fisheries Service and U.S. Fish and Wildlife Service, Silver Spring, Maryland.

NMFS, and USFWS. 2007d. Leatherback sea turtle (*Dermochelys coriacea*) 5-year review: Summary and evaluation. National Marine Fisheries Service and U.S. Fish and Wildlife Service, Silver Spring, Maryland.

NMFS, and USFWS. 2007e. Loggerhead sea turtle (*Caretta caretta*) 5-year review: Summary and evaluation. National Marine Fisheries Service and U.S. Fish and Wildlife Service, Silver Spring, Maryland.

NMFS, and USFWS. 2008. Recovery plan for the northwest Atlantic population of the loggerhead sea turtle (*Caretta caretta*), second revision., National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Protected Resources, Silver Spring, Maryland.

NMFS, and USFWS. 2013a. Hawksbill sea turtle (*Eremochelys imbricata*) 5-year review: Summary and evaluation. National Marine Fisheries Service and U.S. Fish and Wildlife Service.

NMFS, and USFWS. 2013b. Leatherback sea turtle (*Dermochelys coriacea*) 5-year review: Summary and evaluation. NOAA, National Marine Fisheries Service, Office of Protected Resources and U.S. Fish and Wildlife Service, Southeast Region, Jacksonville Ecological Services Office.

NMFS, and USFWS. 2015. Memorandum of Understanding Defining the Roles of the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in Joint Administration of the Endangered Species Act of 1973 as to Sea Turtles. Page 6.

NPS. 2012. Buck Island Reef National Monument Draft General Management Plan/Environmental Impact Statement. St. Croix, VI.

NRC. 1990. Sea turtle mortality associated with human activities. Pages 74-117 *in* N. R. Council, editor. Decline of the Sea Turtles: Causes and Prevention. National Academy Press, National Research Council Committee on Sea Turtle Conservation, Washington, D. C.

Ojeda-Serrano, E., R. Appeldoorn, and I. Ruiz-Valentin. 2007. Reef fish spawning aggregations of the Puerto Rican shelf. University of Puerto Rico, Mayagüez, PR.

Patterson III, W. F., D. J. Hollander, C. H. Jagoe, M. O. James, S. A. Murawski, I. C. Romero, and J. H. Tarnecki. 2015. Reef fishes and the Deepwater Horizon oil spill: Chronic effects and evidence of system resiliency. 2015 Gulf of Mexico Oil Spill & Ecosystem Science Conference.

Plotkin, P. T. 2003. Adult migrations and habitat use. Pages 225-241 *in* P. L. Lutz, J. A. Musick, and J. Wyneken, editors. The Biology of Sea Turtles. CRC Press.

Price, E. R., B. P. Wallace, R. D. Reina, J. R. Spotila, F. V. Paladino, R. Piedra, and E. Vélez. 2004. Size, growth, and reproductive output of adult female leatherback turtles *Dermochelys coriacea*. Endangered Species Research **5**:1-8.

Prieto, A., F. Moncada, G. Nodarse, R. Puga, M. E. de Leon, R. Diaz-Femandez, G. Espinosa, D. Castillo, M. Hemandez, E. Peregrin, M. de Arazoza, D. Salabarria, E. Morales, G. Webb, C. Manolis, and R. Gomez. 2001. Biological and ecological aspects of the hawksbill turtle population in Cuban waters. Republic of Cuba, Mexico City.

Reina, R. D., P. A. Mayor, J. R. Spotila, R. Piedra, and F. V. Paladino. 2002. Nesting ecology of the leatherback turtle, *Dermochelys coriacea*, at Parque Nacional Marino Las Baulas, Costa Rica: 1988-1989 to 1999-2000. Copeia **2002**:653-664.

Renegar, D. A., N. R. Turner, B. M. Riegl, R. E. Dodge, A. H. Knap, and P. A. Schuler. 2015. Quantifying hydrocarbon toxicity to shallow-water corals: Improving NEBA for dispersant decision-making. 2015 Gulf of Mexico Oil Spill & Ecosystem Science Conference.

Ridoux, V., L. Lafontaine, P. Bustamante, F. Caurant, W. Dabin, C. Delcroix, S. Hassani, L. Meynier, V. Pereira Da Silva, S. Simonin, M. Robert, J. Spitz, and O. Van Canneyt. 2004. The impact of the Erika oil spill on pelagic and coastal marine mammals: Combining demographic, ecological, trace metals and biomarker evidences. Aquatic Living Resources **17**:379-387.

Rougee, L., C. A. Downs, R. H. Richmond, and G. K. Ostrander. 2006. Alteration of normal cellular profiles in the scleractinian coral (*Pocillopora damicornis*) following laboratory exposure to fuel oil Environmental Toxicology and Chemistry **25**:3181-3187.

Schmidt, C. W. 2010. Between the devil and the deep blue sea: Dispersants in the Gulf of Mexico. Environmental Health Perspectives **118**:A 337-344.

Seminoff, J. A., C. A. Allen, G. H. Balazs, P. H. Dutton, T. Eguchi, H. L. Haas, S. A. Hargrove, M. Jensen, D. L. Klemm, A. M. Lauritsen, S. L. MacPherson, P. Opay, E. E. Possardt, S. Pultz, E. Seney, K. S. Van Houtan, and R. S. Waples. 2015. Status review of the green turtle (*Chelonia mydas*) under the Endangered Species Act. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southwest Fisheries Science Center.

Shafir, S., J. van Rijn, and B. Rinkevich. 2007. Short and long term toxicity of crude oil and oil dispersants to two representative coral species. Environmental Science and Technology **41**:5571-5574.

Shamblin, B. M., P. H. Dutton, K. A. Bjorndal, A. B. Bolten, E. Naro-Maciel, A. J. Barsante Santos, C. Bellini, C. Baptistotte, M. A. Ngela Marcovaldi, and C. J. Nairn. 2015. Deeper mitochondrial sequencing reveals cryptic diversity and structure in Brazilian green turtle rookeries. Chelonian Conservation and Biology **14**:167-172.

Shigenaka, G., E. Overton, B. Meyer, H. Gao, and S. Miles. 2015. Physical and chemical characteristics of in-situ burn residue and other environmental oil samples collected during the Deepwater Horizon oil spill response. Interspill 2015, Amsterdam.

Shoop, C. R., and R. D. Kenney. 1992. Seasonal distributions and abundances of loggerhead and leatherback sea turtles in waters of the northeastern United States. Herpetological Monographs **6**:43-67.

Smith, T. B., E. Kadison, L. Henderson, M. E. Brandt, J. Gyory, M. Kammann, V. Wright, and R. S. Nemeth. 2011. The United States Virgin Islands Territorial Coral Reef Monitoring Program. Year 11 Annual Report.

Spotila, J. R., A. E. Dunham, A. J. Leslie, A. C. Steyermark, P. T. Plotkin, and F. V. Paladino. 1996. Worldwide population decline of *Dermochelys coriacea*: Are leatherback turtles going extinct? Chelonian Conservation and Biology **2**:209-222.

Spotila, J. R., R. D. Reina, A. C. Steyermark, P. T. Plotkin, and F. V. Paladino. 2000. Pacific leatherback turtles face extinction. Nature **405**:529-530.

Tapilatu, R. F., P. H. Dutton, M. Tiwari, T. Wibbels, H. V. Ferdinandus, W. G. Iwanggin, and G. H. Nugroho. 2013. Long-term decline of the western Pacific leatherback, *Dermochelys coriacea*: A globally important sea turtle population. Ecosphere **4**:15.

TEWG. 2007. An assessment of the leatherback turtle population in the Atlantic Ocean. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Turtle Expert Working Group.

Tiwari, M., B. P. Wallace, and M. Girondot. 2013. Dermochelys coriacea (Northwest Atlantic Ocean subpopulation). Page 17 The IUCN Red List of Threatened Species. IUCN.

van Balen, L., R. Vroom, T. Bosker, S. DeGuise, C. Perkins, M. S. Sepulveda, and R. J. Griffitt. 2015. The combined effect of environmental and anthropogenic stressors on fish health. 2015 Gulf of Mexico Oil Spill & Ecosystem Science Conference.

Van Dam, R. P., and C. E. Diez. 1997. Predation by hawksbill turtles on sponges at Mona Island, Puerto Rico. Pages 1421-1426 Eighth International Coral Reef Symposium.

Vargo, S., P. Lutz, D. Odell, E. Van Vleet, and G. Bossart. 1986. Study of the effects of oil on marine turtles. U.S. Department of the Interior, Minerals Management Service, Vienna, Virginia.

Walker, C. J. 2011. Assessing the Effects of Pollutant Exposure on Sharks: A Biomarker Approach. University of North Florida, Florida.

Wallace, B. P., S. S. Kilham, F. V. Paladino, and J. R. Spotila. 2006. Energy budget calculations indicate resource limitation in Eastern Pacific leatherback turtles. Marine Ecology Progress Series **318**:263-270.

Wallace, B. P., P. R. Sotherland, P. Santidrian Tomillo, R. D. Reina, J. R. Spotila, and F. V. Paladino. 2007. Maternal investment in reproduction and its consequences in leatherback turtles. Oecologia **152**:37-47.

Wallace, B. P., M. Tiwari, and M. Girondot. 2013. *Dermochelys coriacea*. Page 23 The IUCN Red List of Threatened Species. IUCN.

Witherington, B., S. Hirama, and A. Moiser. 2003. Effects of beach armoring structures on marine turtle nesting. U.S. Fish and Wildlife Service.

Witherington, B., S. Hirama, and A. Moiser. 2007. Changes to armoring and other barriers to sea turtle nesting following severe hurricanes striking Florida beaches. U.S. Fish and Wildlife Service.

Witherington, B. E. 1992. Behavioral responses of nesting sea turtles to artificial lighting. Herpetologica **48**:31-39.

Witherington, B. E., and K. A. Bjorndal. 1991. Influences of artificial lighting on the seaward orientation of hatchling loggerhead turtles *Caretta caretta*. Biological Conservation **55**:139-149.

16 APPENDICES

Appendix A. Protocols for the Application of Dispersants and Use of In-Situ Burning Dispersant Protocols

THE FOLLOWING REQUIREMENTS APPLY TO THE APPLICATION OF ALL DISPERSANTS UNDER THE PROVISIONS SET FORTH IN THIS POLICY.

1. Dispersants will only be used to mitigate the effects of spilled oil and to protect public health and welfare and the environment.

2. The USCG-OSC will immediately notify EPA, DOC, DOI, and the affected State(s) of the decision to use dispersants under the provisions of this agreement. This initial notification will include, but not necessarily limited to, the following information:

   a) Date, time, and location of the incident;

   b) Type and amount of oil discharged;

   c) Area affected;

   d) The projected area of impact if the oil is not dispersed;

   e) Reasons why dispersants or chemical agents have been selected;

   f) Dispersant to be used; and

   g) On-scene weather and forecast.

3. The USCG will make every effort to continuously evaluate the decision to use dispersant by considering the advice of the EPA, DOI, DOC and the affected State(s). The use of dispersants will be discontinued if so requested by the EPA, DOI, DOC or the affected State(s). Such request may be verbal followed by written documentation.

4. The USCG-OSC shall comply will all occupational Health and Safety Administration (OSHA) regulations.

5. The USCG-OSC shall make every reasonable effort to provide EPA, DOI, DOC and the affected State(s) the opportunity to observe dispersant application operations. The inability to have or take advantage of the opportunity will not be cause for cessation of application operations.

6. Monitoring will be conducted to evaluate the decision to continue dispersant application and to document results. Recommended monitoring procedures are included in Appendix III.

7. Prior to commencing application operations, an on-site survey will be conducted, in consultation with natural resource specialists, to determine if any threatened or endangered species are present in the projected application area or otherwise at risk from dispersant operations. Measures will be taken to prevent impacts to wildlife, especially threatened and endangered species. Survey flights in the area of application will be conducted during dispersant operations.

8. When dispersant application is proposed in a Green Zone area that is adjacent to or near an area less than 60 feet in depth, due consideration shall be given to the trajectory of the dispersed oil. If resources in adjacent shallow areas are at risk, consultation with the trustees must be conducted. The zone maps contained in Appendix I showing the 60 foot depth contour should be used for general reference only. Nautical or bathometric charts should be consulted for more detail.

9. A dispersant use post-incident report shall be completed by the OSC within 45 days of dispersant application operations. This report shall include the Documentation/Application Form contained in Appendix IV. Recommendations for changes or modifications to this agreement may be presented in the report. This report will be provided to the CRRT.

10. Only those products listed on the EPA nation Contingency Plan's Product Schedule as dispersants will be considered for use under the provisions of this agreement.

11. The dispersant use decision elements contained in Appendix IV shall be reviewed by the OSC and used to help guide the decision to use or request the use of dispersants.

Protocols for the Use of In-Situ Burning

The following requirements apply to the use of all burning operations under the provisions of this policy:

1. Health and Safety Concerns

   a) Operators: Assuring workers' health and safety is the responsibility of employers and the USCG OSC who must comply with all Occupational Safety and Health Administration (OSHA) regulations. Prior to any in-situ burn operations, a site safety plan must be submitted and approved by the OSC.

b) Public: The burning should be stopped if it is determined that it becomes an unacceptable health hazard due to operational or smoke exposure concerns to responders or the general public. If at any time, exposure limits are expected to exceed national federal air quality standards in downwind populated areas, as a result of in-situ burning operations, then in-situ burning operations will immediately cease. The Level of Concern (LOC) for particulates for the general public in the CRRT region is 150 ug/m3 (PM-10) averaged over 1 hour. Public advisories may be required prior to initiating a burn.

2. Monitors representing the USCG, EPA, federal trustee agencies, the affected state(s), OSHA, and the responsible party will have the opportunity to monitor in-situ burning operations:

a) Monitoring to establish "Continue/Discontinue" data for input to the OSC will be conducted in accordance with protocols established by the USCG, EPA, DOC, DOI, and the affected state(s), and as outlined in the monitoring program mentioned in Appendix IV. For all burns, which require case-by-case approval, air monitoring will be required, as outlined in Appendix IV, and will be in place prior to the start of burn operations. The inability to conduct this monitoring would require that the OSC consult with EPA, the state(s), and natural resource trustees prior to conducting a burn. It is advisable and should be given due consideration to implement the monitoring program for any in-situ burn whenever feasible.

b) All burns must incorporate visual monitoring at the burn site to record the disposition of burn residues and to monitor the burn site for potential impact to any natural resource in the area. Samples of the residue will be collected if feasible.

c) All burns must incorporate constant visual observations to monitor smoke plume behavior. The OSC, EPA, DOC/NOAA. DOI and the affected state(s) should determine, prior to initiation of the burn, under what conditions the burn should be stopped if the plume contacts or threatens to contact the ground or elevated structures in populated or environmentally sensitive areas. A trial burn may be conducted to better estimate plume behavior prior to operational burning.

3. Prior to any in-situ burning operations, the OSC will apply the decision tree contained in Appendix VI.

4. The Application\Checklist Form in Appendix VI shall be completed for all burns and provided to EPA, DOC, DOI, and the affected state(s) in a timely manner for documentation and informational purposes. If the responsible Party (RP) requests the use of in-situ burning, members of this organization will be responsible for completing the checklist in Appendix VI. If the RP is unknown, and the request to burn is made by another party, the OSC will be responsible for completing the checklist.

5. The USCG will make every reasonable effort to continuously evaluate the decision to burn, and allow CRRT agencies and affected state(s) the opportunity to comment. Cognizant representatives from USCG, EPA, DOI, DOC, and the potentially impacted state(s), will have the responsibility and authority to determine under what conditions a burn should be discontinued if the plume contacts or threatens to contact populated or environmentally sensitive areas. Those cognizant representatives will be identified by their respective agencies prior to commencement of a burn, and will have the verbal authority to call for the burn to be discontinued. The reason and justification for their request, however, will be subsequently documented and submitted to the OSC for the record.

6. Burning will be conducted in a way that allows for effective control of the burn, to the maximum extent feasible, including the ability to rapidly stop the burn if necessary. Contained and controlled burning is recognized as the preferred method of burning using fire-resistant boom. All practical efforts will be made to control and contain the burn and prevent accidental ignition of the source. Generally it is not recommended that the source or adjacent un-contained slicks be allowed to ignite during in-situ burning operations. Certain circumstances, however, may warrant consideration of carefully planned source ignition.

7. Mechanical recovery equipment shall be mobilized on-scene, when feasible, for backup and complimentary response capability. Provisions must be made for collection of burn residue following the burn(s).

8. In-situ burning will be conducted in accordance with any consultations approved by the USFWS and the NMFS, under Section 7 of the Endangered Species Act. Prior to beginning an in-situ burn, an on-site survey will be conducted to determine if any threatened or endangered species are present in the burn area or otherwise at risk from any burn operations, fire, or smoke. Appropriate natural resource specialists, knowledgeable with any special resource concern in the area and representing the resource trustee, will be consulted prior to conducting any in-situ burn. Measures will be taken to prevent risk of injury to any wildlife, especially endangered or threatened species. Examples of potential protection measures may include: moving the location of the burn to an area where listed species are not present; temporary employment of hazing techniques, if effective; and physical removal of individuals of listed species only under the authority of the trustee agency.

9. In-situ burning is advised only when the meteorological and sea conditions are operationally favorable for a successful burn. The OSC will give due consideration to the direction of the wind, and the possibility of the wind blowing precipitate over population centers or sensitive resources onshore. A safety margin of 45 degrees of arc on either side of predicted wind vectors should be considered for shifts in wind direction.

10. Any use of in-situ burning requires that a post-incident report be provided by the OSC, or a designated member of the OSC's staff, within 45 days of in-situ burning operations. Recommendations for changes or modification to this policy should be presented in the report, if appropriate. This report will be presented at a CRRT meeting, if requested by the CRRT.

Appendix B: Endangered Species Act Consultation for Emergency Responses in Puerto Rico and the U.S. Virgin Islands

ENDANGERED SPECIES CONSULTATION FOR EMERGENCY RESPONSES IN PUERTO RICO AND U.S. VIRGIN ISLANDS

This form is intended for documentation of emergency consultation with the National Marine Fisheries Service (NMFS) Protected Resources Division (PRD) and/or the U.S. Fish and Wildlife Service (USFWS) for species listed and critical habitat designated under the Endangered Species Act (ESA) and with NMFS Habitat Conservation Division (HCD) for fishery habitat designated as essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). This form is intended to streamline consultation when emergency response activities in coastal or marine areas may adversely affect listed species or designated critical habitat and/or habitats designated as EFH.

An emergency is a situation involving an act of God, disasters, casualties, national defense or security emergencies, chemical releases, etc., and includes response activities that must be taken to prevent imminent loss of human life and property (see 50 CFR 402.05). Spill responses and groundings may also be covered under this emergency consultation so that response activities may proceed without waiting for a response from NMFS and/or USFWS.

Emergency Contact: For the U.S. Caribbean, NMFS PRD should be contacted as soon as possible by telephone at 787-851-3700, NMFS HCD at 727-824-5317 and USFWS at 787-851-7297 or 787-851-7273. This form will be completed by the responder no later than 24 hours following notification of the emergency and transmitted via e-mail to NMFS (nmfs.ser.emergency.consult@noaa.gov) or fax at 787-851-5588 (PRD) and 727-824-5300 (HCD) and/or to USFWS (marelisa_rivera@fws.gov) or fax at 787-851-7440 regarding emergency response actions.

Instructions for Completing the Form

Pages 1 - 4, 6: The Federal On Scene Coordinator (FOSC), or designee for ESA and EFH consultation should complete pages 1-4 to include all response actions and the section on page 6 regarding standard protective measures that will be used, including any standard practices to avoid or minimize impacts to ESA resources and EFH should be indicated.

Pages 4 - 6: NMFS and/or USFWS will assist in determining the presence of protected resources and habitats in the response area, but the initial checklist should be referenced by the FOSC, lead federal agency, or designated representative for ESA and EFH consultations. NMFS PRD and/or USFWS will indicate if the response will jeopardize the continued existence of any ESA-listed species or result in the adverse modification of any designated critical habitat and NMFS HCD will indicate whether the response will impact EFH. Recommendations to avoid and minimize any potential adverse effects to protected species and habitats will be provided to the FOSC contact (page 1) within 24 hours of notification receipt.

The responding agency will implement as many avoidance and minimization recommendations and conservation measures as feasible **without delaying the response**. NMFS and/or USFWS will be available for further coordination as requested.

Post Emergency

Once the emergency response is over, NMFS and/or USFWS will be notified of the measures that were implemented, how they were implemented, and notified if any incidental take or adverse modification or destruction of critical habitat occurred. If no adverse impacts occurred, ESA consultation is complete. If any adverse impacts resulted from the emergency response actions, formal ESA consultation with NMFS and/or USFWS will be required.

CRRT EMERGENCY RESPONSE ESA AND EFH CONSULTATION FOR RESPONSES IN COASTAL AND MARINE AREAS, PUERTO RICO AND U.S. VIRGIN ISLANDS

Date of Transmittal

FROM:		NAME:	Tel:
		E-MAIL:	Fax:
TO: NMFS		nmfs.ser.emergency.consult@noaa.gov	787-851-3700(PRD); 727-824-5317(HCD) Fax:787-851-5588(PRD);727-824-5300(HCD)
TO: USFWS, Caribbean Ecological Services Field Office		marelisa_rivera@fws.gov	787-851-7297, -7273 Fax: 787-851-7440

Date of Incident:

Center Location (NAD 83)	Latitude		Longitude
Approximate Distance from Shore			

Location Type	Check All That Apply	Name/Landmarks
Industrial/Canal	☐	
Port	☐	
Riverine	☐	
Inshore/Estuarine	☐	
Nearshore/Coastal	☐	
Offshore/EEZ	☐	

Description of Incident: (Please be as specific as possible and include information on the type and amount of material spilled and/or the nature of the emergency, and any other relevant information.)

Response Actions (Check All That Apply)

OIL SPILLS	
ACTION: Mechanical	DETAILS/NOTES
☐ Boom	
☐ Skimmer	
☐ Barriers/Berms/ Fences	
☐ Trenching	
☐ Pre-oiling debris removal	
☐ Vegetation removal	
☐ Sediment removal	
☐ Oiled debris removal	
☐ Flooding/Flushing	
☐ Sorbents	
☐ Access Construction	
ACTION: Alternate Response Techniques	DETAILS/NOTES
☐ Chemical Agent	Chemical Applications
☐ Dispersants	
☐ In-situ burning	
☐ Bioremediation	
☐ Natural Recovery	
STORMS	
ACTION	DETAILS/NOTES
☐ Container/Drum removal	
☐ Debris removal (vegetation, construction, etc.)	
☐ Vessel removal	
☐ ATON restoration	

Response Actions, continued (Check All That Apply)

GROUNDINGS	
ACTION	DETAILS/NOTES
☐ Boom deployment (in anticipation of spill)	
☐ Pre-oiling debris and vegetation removal (in event of spill)	
☐ Vessel removal	
☐ Salvage operations	
☐ Pre-oiling debris removal	
CHEMICAL RELEASE	
ACTION:Mechanical	DETAILS/NOTES
☐ Vacuuming or Vac trucks	
☐ Debris removal	
☐ Excavation	
☐ Container or drum removal	
☐ Access Construction (temporary roadways)	
ACTION: Other	DETAILS/NOTES
☐ Soil treatments/ stabilization	
Vessels/Vehicles	
☐ Motorized and non-motorized vessels (including anchoring)	
☐ Vehicular traffic	
☐ Heavy equipment	
☐ Foot traffic	
☐ Staging areas	

Other Events/ Response Actions	

CRRT Emergency Consultation
Threatened and Endangered Species Checklist (see Appendix A for sources of information)

SPECIES	Occurs in response area	RESPONSE: Likely to Adversely Affect	RESPONSE: Not Likely to Adversely Affect	Service Response	AGENCY
Loggerhead sea turtle	☐	☐	☐		NMFS/USFWS*
Green sea turtle	☐	☐	☐		NMFS/USFWS*
Leatherback sea turtle	☐	☐	☐		NMFS/USFWS*
Hawksbill sea turtle	☐	☐	☐		NMFS/USFWS*
Nassau grouper	☐	☐	☐		NMFS
Elkhorn coral	☐	☐	☐		NMFS
Staghorn coral	☐	☐	☐		NMFS
Pillar coral	☐	☐	☐		NMFS
Lobed star coral	☐	☐	☐		NMFS
Mountainous star coral	☐	☐	☐		NMFS
Boulder star coral	☐	☐	☐		NMFS
Rough cactus coral	☐	☐	☐		NMFS
Right whales	☐	☐	☐		NMFS
Humpback whales	☐	☐	☐		NMFS
Sperm whales	☐	☐	☐		NMFS
Sei whales	☐	☐	☐		NMFS
Finback whales	☐	☐	☐		NMFS
Blue whales	☐	☐	☐		NMFS
West Indian manatee	☐	☐	☐		USFWS
Other Marine Mammals**	☐	☐	☐		NMFS
Migratory Birds***	☐	☐	☐		USFWS
Roseate tern	☐	☐	☐		USFWS
Other	☐	☐	☐		

*For the purposes of section 7 consultation, NMFS has jurisdiction over sea turtles while they are in the water and USFWS has jurisdiction while they are on land
**Although all marine mammals are not listed as threatened or endangered, all marine mammals are protected under the Marine Mammal Protection Act and should be considered during response activities.
***Although migratory birds may not be listed, they are protected under the Migratory Bird Treaty Act and should be considered during response activities.

Explanation for Effects Determination	

CRRT Emergency Consultation
Designated Critical Habitat Checklist (see Appendix A for Sources of Information

CRITICAL HABITAT	Occurs in Response Area	RESPONSE: Will Adversely Modify	RESPONSE: Will Not Adversely Modify	Service Response	AGENCY
Acropora (Puerto Rico Unit)	☐	☐	☐		NMFS
Acropora (St. Thomas/St. John Unit)	☐	☐	☐		NMFS
Acropora (St. Croix Unit)	☐	☐	☐		NMFS
Green Sea Turtle (3 nm Culebra Island, PR)	☐	☐	☐		NMFS
Hawksbill Sea Turtle (3 nm Mona and Monito, PR)	☐	☐	☐		NMFS
Leatherback Sea Turtle (3 nm Sandy Point, St. Croix)	☐	☐	☐		NMFS
Leatherback Turtle (Beach, Sandy Point, St. Croix)	☐	☐	☐		USFWS
Hawksbill Turtle (Beaches, Mona Island, PR)	☐	☐	☐		USFWS
Sea Turtles (Bravo, Resaca, Cayo Norte, Culebrita Beaches, Culebra, PR)	☐	☐	☐		USFWS

HABITAT TYPE CHECKLIST (see ESI Maps and NOAA benthic habitat maps)

Habitat Type	Check all that apply	Response will affect	Response will not affect	How response will affect or why it won't affect
Seagrass	☐	☐	☐	
Live and Hard Bottoms	☐	☐	☐	
Coral Reef	☐	☐	☐	
Algal Plains	☐	☐	☐	
Sand and Shell Substrate	☐	☐	☐	
Salt Marsh/Herbaceous Wetland	☐	☐	☐	
Intertidal Flats/Salt Ponds	☐	☐	☐	
Coastal Lagoon	☐	☐	☐	
Mangrove/Pterocarpus Wetland	☐	☐	☐	
Sandy Beach	☐	☐	☐	
Rocky Shore	☐	☐	☐	
Other	☐	☐	☐	

List any standard protective measures that will be used

NMFS PRD or USFWS Recommendations for Listed Species or Critical Habitat Likely to be Adversely Affected and NMFS HCD EFH Recommendations

APPENDICES

A. CRITICAL HABITAT MAPS AND BENTHIC HABITAT MAPS

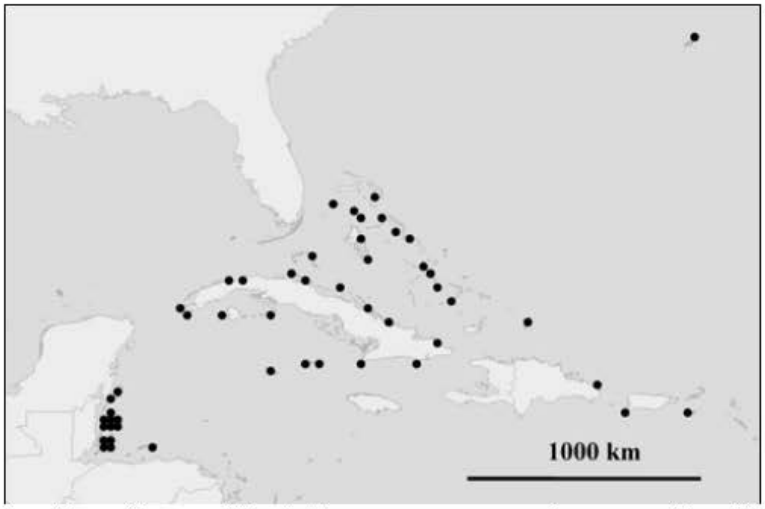
NMFS, Southeast Region, Critical Habitat Maps
Southeast U.S. and U.S. Caribbean critical habitat metadata can be found on NMFS GIS page at:
http://sero.nmfs.noaa.gov/maps_gis_data/protected_resources/critical_habitat/index.html

Maps and Metadata are available for: Elkhorn
and Staghorn Coral
Green Sea Turtle Hawksbill
Sea Turtle Leatherback Sea
Turtle

USFWS, Listed Species in the U.S. Caribbean, Critical Habitat Maps
http://www.fws.gov/caribbean/es/PDF/CaribbeanCH.pdf

NOAA, National Ocean Service, Biogeography Program, Benthic Habitat Maps
http://ccma.nos.noaa.gov/ecosystems/coralreef/usvi_pr_mapping.html
or http://www.caribbeanfmc.com/Benthic%20Maps.html

B. MAP OF HISTORIC NASSAU GROUPER SPAWNING AGGREGATIONS



Locations of known historic Nassau grouper spawning aggregations (from NMFS 2013[1]). The sites in the U.S. Caribbean include Bajo de Cico, Tourmaline, and Abrir la Sierra off western Puerto Rico and Red Hind and Grammanik Banks south of St. Thomas, USVI. A number of additional sites were identified around Puerto Rico particularly off the west and south coasts and around Vieques Island through interviews with fishers but these have not been confirmed (Ojeda-Serrano et al. 2007[2]).

[1] NMFS. 2013. Nassau Grouper, *Epinephelus striatus* (Bloch 1792), Biological Report
[2] Ojeda-Serrano, E., R. Appledoorn, and I. Ruiz-Valentin. 2007. Reef fish spawning aggregations of the Puerto Rican shelf. University of Puerto Rico, Mayagüez, Puerto Rico

Appendix C: Vessel Operations Best Management Practices from CRRT

Vessel Operations
Best Management Practices

All response vessels should be required to comply with NMFS's *Vessel Strike Avoidance Measures and Reporting for Mariners*. (Attachment 2)

Operate vessels at appropriate speeds to watch for and avoid collision with wildlife, and to avoid accidental groundings. Report all turtle sightings, all distressed or dead birds, sharks, rays, and marine mammals to the appropriate incident hotline.

> **Clarification/Rationale** – Operate all vessels at speeds that minimize the likelihood of hitting any wildlife (e.g., shorebirds, seabirds, marine mammals, nesting or hatching sea turtles) or accidentally grounding the vessel. Report distressed or dead wildlife to the appropriate agency and/or hotline. Any clearly visible band or tag numbers encountered on dead or injured birds should be reported to www.reportband.gov. Only freshly oiled intact bird carcasses should be reported to the hotline. All other bird carcasses should be left in situ. Report vessel groundings to the USCG.

If operating vessels in shallow water, avoid impacts to seagrass beds, reef or colonized hard ground. This could be an issue for some nearshore clean-up efforts

> **Clarification/Rationale** – Minimize impacts to sensitive habitats by avoiding them to the maximum extent practicable by maintaining a distance of no less than 10 feet, and traveling through established corridors

Operation of vessels only during daylight hours is recommended. If nighttime operations are necessary, avoid night-time activities in identified exclusion areas to allow longer periods without disturbance to wildlife and to minimize vessel damage to within optimal habitat. In areas where sea turtle nesting is known to occur, deck lighting at night should be minimized so as not to attract sea turtle hatchlings or disorient nesting females. Lighting of night operations should be shielded to avoid attracting in-water sea turtle hatchlings to the response area.

> **Clarification/Rationale** – Night work increases the likelihood of accidental encounters with wildlife, as well as movement into areas with ESA-listed coral colonies. Generally, adult sea turtle nesting and egg hatching occurs at night. Nesting shorebirds and seabirds are more sensitive and prone to nest abandonment when disturbed at night.

All vessels shall operate at "no wake/idle" speed in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels shall follow deep water routes whenever possible.

> **Clarification/Rationale** – The intent of this BMP is to avoid and minimize scouring and prop-scarring of submerged aquatic vegetation and coral habitats, as well as collision with marine mammals or other aquatic life. When not feasible, vessel operators should take all precautions to avoid impacts to submerged aquatic vegetation and coral habitats.

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Operate in idle within 50 feet of shorelines to avoid damage from wakes. Use caution in areas where sea turtles marine mammals are frequently observed.

Land or stage boats to avoid crushing the shoreline vegetation.

Clarification/Rationale – The intent of this BMP is to avoid and minimize adverse impacts to important shoreline habitat during cleanup operations.

For actions such as towing of vessels, anchoring, and spudding, areas shall be selected in coordination with NMFS and based on benthic surveys, in order to minimize impacts to ESA-listed species and designated critical habitat.

Anchoring of all response vessels should be in uncolonized sand bottoms only. The installation of mooring pins or other anchor systems that eliminate the use of non-floating line and minimize impacts to bottom substrate is preferred if uncolonized sand areas are not available or are not large enough to anchor the vessels. Anchor methods and anchor and spud locations should be selected in coordination with NMFS for all response vessels associated with a particular response action.

The response area should be surveyed daily by divers to ensure proper placement of anchors, lines, and other equipment, and to remove debris and other materials to avoid damage to ESA resources, including corals, sea turtles, and designated critical habitat.

Properly tie-down or secure all equipment in designated areas to prevent accidental loss of equipment into the water. Any debris that accidentally falls into the water during response actions should be retrieved immediately.

In shallow waters, in order to minimize the potential for propeller wash damage to ESA resources, the use of propulsion systems and high RPMs should be avoided. If this is not possible, then areas for these operations should be selected in coordination with NMFS and based on benthic surveys of the site.

Appendix D: Grounded Vessel Salvage Operations Best Management Practices

Grounded Vessel Salvage Operations
Best Management Practices

In June 2012, the ***M/V Jireh*** grounded on the west side of Mona Island, Puerto Rico. The area contains designated critical habitat for elkhorn and staghorn corals and for hawksbill sea turtles, the area also contains ESA-listed corals and hawksbill sea turtle nesting habitat. The response was closely coordinated with NMFS, USFWS, and other local and federal resource agencies, and local and federal trustees. Despite the implementation of avoidance and minimization recommendations to protect ESA resources, some impacts occurred to nesting sea turtles related to disorientation from lights, and to ESA-listed corals related to anchoring by response vessels, anchoring of boom, and the movement of the vessel during storms. Below are the recommendations NMFS developed to inform the USCG during future response actions. These are general recommendations only and some of these BMPs are also included in other sections of this document. BMPs specific to a particular response may also be necessary based on site-specific conditions.

- NMFS should be included in early conversations with the salvor to discuss specifics of the response operation in order to select which BMPs are most appropriate or develop BMPs relevant to a particular response as necessary.

- Based on the methodology for the salvage operation, areas shall be selected in coordination with NMFS and based on benthic surveys for actions such as towing of vessels, anchoring, and spudding in order to minimize impacts to ESA-listed species and designated critical habitat.

- Cargo should be assessed early in the process and organics should be removed quickly to avoid hazardous build-up of gases in the hold and the potential use of chemicals to reduce hazardous levels of the gas to protect response workers as these chemicals could impact marine resources. If cargo cannot be removed quickly, then a seawater pumping and filtering system similar to that used during the M/V Jireh response should be designed and implemented in coordination with NMFS and USFWS.

- Fuel and cargo should be offloaded from the grounded vessel to reduce the vessel's draft and minimize the potential for environmental hazards, such as spills.

- Boom should be deployed around the grounded vessel to minimize the potential for transport of materials outside the immediate area of the grounding. The location of boom anchors should be coordinated with NMFS based on surveys of the area immediately following the grounding as long as sea state permits the safe completion of these surveys. Booms and other underwater equipment should be monitored during the response action to ensure they do not cause damage to ESA-listed species, including breakage or abrasion of corals and entrapment of sea turtles.

- All response vessels should be required to comply with NMFS's *Vessel Strike Avoidance Measures and Reporting for Mariners*. (Attachment 2)

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- When applicable to the response action, compliance with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* should be required.

- Anchoring of all response vessels should be in uncolonized sand bottoms only. The installation of mooring pins or other anchor systems that eliminate the use of non-floating line and minimize impacts to bottom substrate is preferred if uncolonized sand areas are not available or are not large enough to anchor the vessels. Anchor methods and anchor and spud locations should be selected in coordination with NMFS for all response vessels associated with a particular response action.

- Salvage activities should be conducted at high tide to facilitate refloating the grounded vessel over areas containing ESA-listed species and designated critical habitat.

- The response area should be surveyed daily by divers to ensure proper placement of anchors, lines, and other equipment, and to remove debris and other materials to avoid damage to ESA resources, including corals, sea turtles, and designated critical habitat.

- Properly tie-down or secure all equipment in designated areas to prevent accidental loss of equipment into the water. Any debris that accidentally falls into the water during response actions should be retrieved immediately.

- A protected resources monitor should be on-site to monitor response impacts, BMP compliance, protected species sightings, and prepare daily summaries so that steps can be taken to address issues such as BMP non-compliance or unanticipated impacts to ESA resources that require the implementation of additional BMPs.

- In areas where sea turtle nesting is known to occur, deck lighting at night should be minimized so as not to attract sea turtle hatchlings or disorient nesting females. Lighting of night operations should be shielded to avoid attracting in-water sea turtle hatchlings to the response area. Similarly, lighting of night operations along the coastline should be minimized and a lighting plan developed in coordination with NMFS and USFWS to ensure that nesting females are not affected by light pollution.

- If a vessel will be refloated and towed out of an area, an extraction path having the least impact on ESA resources shall be selected in coordination with NMFS and based on benthic surveys of the area. This path may not be the same as the ingress path. Once the extraction path has been agreed upon, temporary buoys should be used to mark the extraction path and GPS plots of the path should be input into the grounded vessel's GPS and all towing vessels' navigation systems to assist the salvors in staying on course.

- In shallow waters, in order to minimize the potential for propeller wash damage to ESA resources, the use of propulsion systems and high RPMs should be avoided. If this is not possible, then areas for these operations should be selected in coordination with NMFS and based on benthic surveys of the site.

- If a vessel will be scuttled, after obtaining all required permissions, alternative locations for scuttling the vessel both close to the grounding site in deep water and further offshore in deep water should be selected in case the vessel proves too unstable to float a long distance from the grounding site. Appropriate measures should also be taken to secure the vessel at the scuttling location to minimize the risk of movement of the sunken vessel during storms.

- The BMPs required for the protection of ESA resources for a particular response shall be included in the salvage plans and IAPs for each response.

Appendix E: Marine Species Observation Form

MARINE SPECIES OBSERVATION FORM			ANIMALS SIGHTED: Y OR N
			ANIMALS RETRIEVED: Y OR N
OBSERVER#:			PAGE: OF:
TRIP#:			DATE (MM/DD/YY):
SURVEY#:			SKIMMER TYPE:
OBSERVATION PLATFORM:			
LOCATION			
	START LAT/LONG (DD.MM.mmm)		START TIME(24hr)
	END LAT/LONG (DD.MM.mmm)		END TIME(24hr)
SOURCE □NON-SOURCE □NEARSHORE □BEACH □			

TARGET OIL		HABITAT TYPES	
HEAVY(dork block/brown) □	SARGASSUM WEEDLINE: OIL: □ NO OIL: □	OIL LINE NO SARGASSUM: □	
MEDIUM (brown to peanut color) □	DISPERSED SARGASSUM: OIL: □ NO OIL: □	OTHER: □	
LIGHT (sliver/rainbow sheen, metallic bm)□	HEAVY CONINUOUS OIL NO SARGASSUM□		
Emulsified (orange)□	DISPERSED PATCHES OF OIL NO SARGASSUM □		

LENGTH OF BOOM (FT):	SKIRT HIEGHT (INCHES):	
START BURN OR DISPERSANT TIME (24hr):	WEATHER DESCRIPTION:	VISIBILITY (FT):
		SEA STATE:

ANIMAL OBSERVATION SUMMARY

ANIMAL TYPE	NUMBER OF ANIMALS	
	ALIVE	DECEASED
Sea turtles		
Dolphins		
Whales		
Manatees		
Sea birds		
Other (Specify):		

COMMENTS ***(Describe any interactions with equipment, species identification, characteristics, behavioral characteristics, etc.)***

SIGHTING AND RETRIEVALS – ADDITIONAL INFORMATION							
SPEC. #	**SPECIES**	**CONDITION**	**PHOTOS (Y OR N)**	**LATITUDE**	**LONGITUDE**	**SURVEY PHASE**	**COMMENT (Y OR N)**

Appendix F: In-Situ Burning Operations Best Management Practices from CRRT

In-Situ Burning Operations
Best Management Practices

If possible, avoid burn operations where sea turtles or marine mammals have been spotted. If a sea turtle or marine mammal is spotted during operations, stop the operations if possible, until the animal is outside the operations area.

If possible, send wildlife rescue vessels (with trained rescue personnel if available) into the projected burn area to search for and rescue turtles in accordance with the attached Sea Turtle Observer and Retrieval protocols (Attachment 1). Feasibility will depend on the size of the projected area and whether material has already been boomed or otherwise collected. If this is not possible, then the following should be considered:

- Have a trained observer (if available) or a crew member dedicated to looking for sea turtles and marine mammals during burn operations and record each sighting event, including GPS location, species (if known), and description of encounter on the Marine Species Observation Form (Attachment 1). The observer or crew member should be looking for marine mammals and sea turtles that may be affected by the burn or are impacted by oil.
- A survey for marine mammals/sea turtles must be conducted by the ignitor vessel by a designated observer or other personnel as assigned. The sea turtle and marine mammal observer on the ignition vessel will monitor the following areas prior to the burn:
  - The area in front of the collection vessels,
  - The oil concentrated in the boom, and
  - Any oil trailing behind the boom.
- If conditions on the burn platform allow (e.g. size and space of vessel), without risk to human safety, collect live and dead sea turtles according to the attached Sea Turtle Retrieval Protocols.
- Report distressed or dead wildlife to the appropriate agency and/or hotline. Contact the Sec 7 Resources at Risk (RAR) Specialist to report the turtle/marine mammals immediately.
- If marine mammals/sea turtles are sighted in the in-situ burn safety zone, measures must be taken to prevent harm such as implementing sea turtle retrieval protocols, relocating the burn area, or standing down until the animals exit the area.
- Observers will submit a Marine Species Observation Form (Attachment 1) to the Environmental Unit RAR Specialist at the end of each burn day.

A survey should be conducted in the burn area after the burn is complete. Any dead sea turtles or marine mammals should be counted and collected if possible. Contact the Environmental Unit or your supervisor to report any sea turtle or marine mammal that is impacted by burn operations or that has signs of oil impacts also report this to the Wildlife Branch as quickly as possible.

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NOAA's Vessel Strike Avoidance Measures and Reporting for Mariners (Attachment 2) should be implemented to reduce the risk associated with vessel strikes or disturbance of protected species to discountable levels. If a sea turtle or marine mammal is seen within 100 yards of the vessel, all appropriate precautions shall be implemented to ensure its protection. Operations should cease if a marine mammal approaches within 100 yards of the vessel until the marine mammal moves away from the operational area of its own volition. Operations should cease if a sea turtle approaches within 50 yards of a vessel until the turtle moves away from the operational area of its own volition.

Any collision with and/or injury to a marine mammal or sea turtle shall be reported immediately to the NMFS Southeast Regional Office by email (takereport.nmfsser@noaa.gov), using the attached Ship Strike Reporting form (Attachment 3). Any collision with a manatee should be reported to USFWS Caribbean Ecological Services Field Office and Puerto Rico Department of Natural and Environmental Resources Marine Resources Division. In addition, the local authorized sea turtle and marine mammal stranding/rescue organizations should be also be notified. For manatee strandings, contact the Puerto Rico Manatee Conservation Center at InterAmerican University's Bayamon Campus (www.manatipr.org). Additional contact information can be found in the Antillean Manatee Response Plan Annex of the PR & USVI Area Contingency Plan.

Avoid burning unoiled or lightly oiled sargassum.

Do not burn areas known to contain rafting birds.

Comatose Sea Turtles

If a turtle appears to be comatose (unconscious), crews should attempt to revive it before release per 66 CFR 67495, December 31, 2001. Place the turtle on its plastron (lower shell) and elevate the hindquarters several inches to permit the lungs to drain off water. A comatose but live sea turtle may, in some cases, exhibit absolutely no movement or signs of life (no muscle reflexes). In other cases, an unconscious turtle may show some evidence of eyelid or tail movement when touched. Sea turtles may take some time to revive; do not give up too quickly.

Contact the Section 7 RAR Specialist and Wildlife Group for recovery.

Regulations allow holding a sea turtle on deck up to 24 hours for resuscitation purposes without a permit. Even turtles successfully resuscitated benefit from being held as long as possible to allow toxins that built up as a result of stress to dissipate from the body. Keep the skin, and especially the eyes, moist while the turtle is on deck by covering the animal's body with a wet towel, periodically spraying it with water, or by applying petroleum jelly to its skin and carapace.

Appendix G: In-Situ Burn Sea Turtle Observer Protocol from CRRT

IN-SITU BURN SEA TURTLE OBSERVER PROTOCOL

Preferably the observer will be stationed on the ignition boat and conduct the survey from a position that optimizes visibility. A general header data collection sheet will be filled out by the observer that includes information on the time survey begins, location, sea state, a general description of the oil and habitat, and unique information to track the survey data.

A sea turtle survey includes monitoring of 3 areas prior to the burn including: 1) the area in front of the boom boats; 2) oil concentrated in the boom; and, 3) any oil trailing behind the boom. As part of the survey, observers will note the type of oil encountered during the survey, the type of habitat (e.g. sea weed or other aquatic vegetation) encountered during the survey.

Sea turtles encountered during the survey that can be removed from the oil will be captured with a dip net. The sea turtle will be boarded and the observer will provide a cursory assessment of its status. Data relative to condition, location, and survey phase will be recorded. Sea turtles will be placed in a confined urea/container and covered with a wet towel to minimize stress if the animal is alive. The sea turtle will be transported to the support vessel and the observer will notify the support vessel to arrange transport the sea turtle back to land.

SEA TURTLE RETRIEVAL PROTOCOL

All live and dead sea turtles (includes oiled turtles) should be recorded and retrieved (if possible) and taken to an onshore facility for cleaning and rehabilitation or salvage/necropsy. Animals can be netted at the surface using dip nets or other hoists. Once on board, sea turtles need to be carefully handled and transported to shore as soon as possible, in accordance with NMFS guidance.

BE SURE TO USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT
(Gloves, Tyvek suits, boots, and goggles if necessary)

Sea Turtle Retrieval Kit (1 per boat) Includes:

- Large Diameter dip net
- Large Plastic Crate
- PPE (Gloves, Tyvek, goggles)
- Several beach towels

1. Bring turtle on board (dip nets are useful for small turtles less than - 3 ft length). Do not pick up turtles by their flippers, but rather, lift them by grasping both sides of the carapace. If the turtle attempts to evade capture, do not pursue. When handling turtles, be aware of the head and flippers - they will bite and have powerful flippers with claws.

2. Determine position at sea (latitude/longitude coordinates as DD.dddd).

3. Contact the RAR Sec 7 or your supervisor to report the turtle as quickly as possible.

4. Place a wet towel in the bottom of the transport crate. Place the turtle on top of the towel. Put the crate with the turtle inside in the shade. Do not add more water to the crate.

5. If the turtle appears to be dead, follow the same process but roll the towel up to raise the hind end a few inches higher than the head. Keep the crate in the shade. (Note: live turtles may appear comatose for up to 24 hours!)

6. Deliver the sea turtle (live or dead) to the designated Response Center. Transport turtles in individual containers when possible. Be sure to provide location, date and time data, and a chain of custody form with each turtle.

Appendix H. Table of Incidents Recorded in NOAA's ResponseLink that Occurred in the U.S. Caribbean.

The open date reflects the date the incident was reported to NOAA. Whether or not oil was known to enter the water is noted and a brief description, taken from the information in ResponseLink records, is also provided for each incident. The maximum potential release in gallons represents the known fuel storage capacity based on the type of vessel involved in an incident not the total amount of oil spilled, which is instead noted in the description section if known.

Open Date	Name	Location	Material Spilled	Maximum Potential Release (gallons)	Oil Entered Water (Y/N)	Brief Description
3/3/1968	Ocean Eagle	San Juan, Puerto Rico	Venezuelan light crude oil	2940000	Y	Tanker Ocean Eagle grounded in San Juan Harbor. The vessel broke in two several hours after the grounding, spilling Venezuelan light crude oil into the harbor. The aft section of the vessel drifted farther into the harbor and grounded, while the forward section was anchored in place. Three days later, U. S. Navy tugs tried to tow the forward section out. Adverse weather hindered the operation and drove the forward section farther into the harbor. On March 10, the forward section broke open in heavy seas and released more oil. By the first week of April, both parts of the tanker were lightered and towed out to sea where they were sunk.
3/18/1973	Zoe Colocotronis	Cabo Rojo, Puerto Rico	Venezuelan crude oil	1580000	Y	Zoe Colocotronis en route to Guayarilla ran aground on a reef 3.5 miles off La Parguera on SW coast. The master ordered water and cargo from the forward tank jettisoned to help get the vessel off the reef, so 37,579 barrels of crude oil were intentionally released. Oil started coming ashore on the beaches of Cabo Rojo, on the Bahia Sucia side, by the evening of the grounding.

12/9/1975	Z-102	Ensenada de Boca Vieja, San Juan, Puerto Rico	Bunker C, Diesel Fuel	323000	Y	Tank barge Z-102 grounded at the mouth of Ensenada de Boca Vieja, northwest of the entrance to San Juan Harbor. The unmanned barge was loaded with 10,476 barrels of Bunker C and 2,403 barrels of diesel fuel oil when its tow line broke. Attempts to free the vessel from the surf line failed. Heavy surf pounded the vessel for over a week, eventually damaging all ten of the cargo tanks. An estimated 7,679 barrels of Bunker C and diesel fuel were released over the next 30 days. The barge was eventually lightered and beached.
12/19/1978	Peck Slip	Cabo San Juan, Puerto Rico	Bunker C	462000	Y	T/B Peck Slip struck the bottom near Cabo San Juan off the northeast corner of Puerto Rico. The barge, carrying 80,000 barrels of Bunker C crude oil, suffered structural damage and immediately began to spill oil. The barge was towed back to Yabucoa Harbor. An investigation determined that an estimated 11,000 barrels spilled from the Peck Slip.
2/15/1985	M/V A. Regina	Isla de Mona, Caribbean	IFO 40	138000	Y	A 350 ft passenger vessel, A. Regina, grounded on south side of Mona Island, 20 miles west of Puerto Rico. Vessel has 218 people and 138,000 gallons of IFO 40, which is a 40/60 mix of #2 and #6. Oil leaking from rear starboard and middle port sides and already impacting beach.
3/27/1985	F/V Alan E	Piedras Blancas, Puerto Rico		300	Y	F/V Alan E. broke up on the rocks 10 miles N of Piedras Blancas. Vessel lost its entire fuel cargo of 300 gallons of diesel. A sheen was reported 30'wide and 1/4-1/2 mile long. F/V Alan E tied up to F/V Nancy J.
3/27/1985	Cruise Ship M/V Festival	St.Thomas, Virgin Islands			N	M/V Festival (Cruise Ship) ran aground on east side of Hassel Island off St. Thomas. Ship trying to pull herself off bottom. Cargo is unknown.

4/24/1985	M/V Honduras and T/V Andrew McAllister	San Juan Harbor, Puerto Rico	TETRAMETHYLETHYLENEDIAMINE		Y	Collision between M/V Honduras and tug Andrew McAllister in San Juan Harbor. The tug was impaled on the bow of the Honduras then caught fire along with spilled diesel on the water. After fire was out, the Honduras pushed tug to head of San Antonio channel where it became free and sank. Other vessel with minor damage to bow and moored at Pier 11. Fire was put out on vessel. Dangerous cargo onboard listed as Tetramethylethylenediamine. Tug spilled 2000+ gallons of diesel.
2/6/1986	St. Thomas Barge Grounding	St. Thomas, VI			Y	Grounding of the barge St. Thomas in Crown Bay, St Thomas. Barge struck a submerged car and punctured its bottom. Barge carrying approximately 100,000 gallons of #6, initial estimate that approximately 20,000 gallons in the water.
2/6/1986	Barge St. Thomas	St. Thomas, VI	Intermediate fuel oil	50400	Y	Barge St. Thomas, in tow by the Todd W. Boudreaux, struck a submerged piling as it was entering port in Crown Bay, St. Thomas. Approximately 1,200 barrels of an intermediate fuel oil leaked through a four-foot long hole in the barge's no. 1 starboard tank, approximately 50 feet away from the bulkhead in Crown Bay.
4/3/1986	Mystery Spill, St. Croix	St. Croix to Puerto Rico	Oil		Y	U.S. Coast Guard received reports from several commercial aircraft that a massive oil slick extended from St. Croix to Puerto Rico. The U.S. Coast Guard Marine Safety Detachment in St. Croix dispatched a small boat to the slick location. The crew of the small boat had great difficulty locating the slick, although a commercial aircraft flying overhead confirmed that they were in the locale of the reported slick. The boat crew reported that the material was lightly concentrated, with only small patches of the product observable. The boat crew took a

						sample of the material, which had accumulated on the side of their boat.
8/25/1986	M/V Ibn Khallikan	San Juan, Puerto Rico	Phosphorus pentasulfide		N	U.S. Coast Guard Marine Safety Office, San Juan was notified by the master of the M/V. Ibn Khallikan, which docked in San Juan Harbor, of a possible leak of phosphorus pentasulfide from the vessel. The master moved three 20-foot shipping containers, which had a rotten egg smell, from below decks to the top deck in an effort to vent any vapors. The shipping containers, believed to presently have only empty cylinders inside, had last held phosphorus pentasulfide. The cylinders had subsequently been washed with caustic soda and had been rendered inert before shipment.
12/1/1986	Roosevelt Roads Spill	Ensenada Honda Bay, Puerto Rico	JP-5		Y	U.S. Navy Base at Roosevelt Roads in Puerto Rico discovered a spill of JP-5 in Ensenada Honda Bay. The source of the leak was traced back to a tank which held 907,000 gal. of JP-5. The tank (#85) was discovered leaking fuel out of an old flange. Workman had just completed installing a new tank bottom by installing it several feet above the old bottom. In between the two bottoms was filled with sand. The tank passed a standard vacuum test and then was filled with fuel on Wednesday. Fuel was found pouring out of the flange to the old tank bottom on Thursday morning. A shut off valve to the old tank bottom was in an open position which allowed the fuel to pour out onto the ground. The fuel filled a depression in the ground and then overflowed into an area which contained a

						drainage pipe. The fuel flowed down this drainage pipe directly into the bay.
11/17/1987	Sealand Shipping Company	San Juan, Puerto Rico	Tetraethyl lead	2800	N	Two 1,400-gallon tanks of tetraethyl lead overturned at the Sealand Shipping Company facility in San Juan. The tanks suffered some minor damage, but none were leaking.
5/22/1988	Texaco Caribbean	St. Croix, U.S. Virgin Islands	Diesel, gasoline	33600	Y	An oil spill occurred at the Texaco Caribbean terminal on St. Croix. The spill resulted from a 1/4-inch hole in a 16-inch feeder line that runs from the offshore terminal to the inland storage tanks. Approximately 400 barrels of diesel and 400 barrels of gasoline escaped before being detected. The majority of the spilled oil remained in the sand near the rupture but an undetermined amount entered the water.
6/5/1988	Barge MOBILE	St. Croix, U.S. Virgin Islands	Penexate		N	At the request of the U.S. Coast Guard Marine Safety Office, San Juan, NOAA contacted the Agency for Toxic Substances and Disease Registry (ATSDR) for advice on the health effects of exposure to penexate due to accidental exposure of crewmen.
7/28/1988	C/S DISCOVERY	San Juan, Puerto Rico	Flammable liquids, corrosives, marine diesel		N	Sea Land container ship DISCOVERY ran hard aground in San Juan Harbor between buoys 6 and 8. Cargo included containers of hazardous materials such as poisons, flammable liquids and corrosives, among others, as well as over 18,200 barrels of marine diesel.

7/29/1988	Mystery Oil Spill	Mona Island, Puerto Rico	heavy black oil		Y	U.S. Coast Guard Marine Safety Office, San Juan received a report of "heavy black oil" washing ashore on the entire south coast of Mona Island, 40 miles west of Puerto Rico. Upon further investigation, it was determined that on July 13 or 14, an oil spill of unknown origin and quantity had occurred off of the southeast coast of Mona Island, with especially heavy impacts on the Playa de Pajaros beach area.
8/28/1988	Pier 11	San Juan, Puerto Rico	Hydrofluoric acid		N	During a routine harbor patrol at Pier 11 on August 28, 1988, the U.S. Coast Guard Marine Safety Office, San Juan discovered three damaged 25-gallon drums of hydrofluoric acid. One of the drums was leaking and emitting fumes. There were scattered showers and, as a result, what appeared to be a large puddle of acid and water on the concrete pier.
10/3/1988	Centro Medico Hospital	San Juan, Puerto Rico	Number 6 Oil	1500	Y	A ruptured pipeline at the Centro Medico Hospital released approximately 1,500 gallons of number 6 oil. The oil entered a storm drain and flowed into Josefina Creek, Rio Piedras, Martin Peña Channel, and San Juan Harbor. The major contamination was in the creek, canal, and Rio Piedras, where there was extensive oiling of the mangrove shorelines.
7/31/1989	AMAZON VENTURE	Tallaboa, Puerto Rico	Number 6 fuel oil	8500	Y	NOAA/OMA was notified of the incident by the Coast Guard Marine Safety Office, San Juan, and was asked to provide information on environmental resources-at-risk from the spill and on the slick's probable trajectory.

9/18/1989	Virgin Islands Water and Power Authority	Christiansted, St. Croix, U.S. Virgin Islands	No. 6 Fuel Oil	42000	Y	Hurricane Hugo hit the island of St. Croix with winds in excess of 140 miles per hour, damaging the steel containment walls around two of the main No. 6 fuel oil storage tanks at the Virgin Islands Water and Power Authority (VIWAPA) power plant in Christiansted Harbor on the north coast of St. Croix. Oil leaked from a severed discharge line near the bottom of one or both of these 54,000-barrel capacity tanks. It then overflowed the containment dike and moved toward the beach 250 feet away. U.S. Coast Guard Marine Safety OfficeSan Juan personnel flew over the area on September 21 and estimated that approximately 48 barrels of oil had overflowed the trench and entered the harbor. The containment wall had been blown by the wind onto a ten-inch transfer pipe, rupturing the pipe. An open valve had permitted the oil to escape through the broken pipe. A total of 14,076 barrels escaped from this tank between September 18 and 25. Approximately 1,000 barrels overflowed the containment area and entered the water. Three miles of sand beaches were heavily oiled, with some impacts east of the power plant in the harbor area.
9/22/1989	Hess Oil Refinery	Limetree Bay, St. Croix, US Virgin Islands	Number 6 fuel oil		Y	Hurricane Hugo hit the island of St. Croix, severely damaging the Hess Oil Refinery in Limetree Bay, on the island's south coast. Twelve tanks were damaged; three of the twelve ruptured, spilling oil into their containment areas. Some number 6 fuel oil leaked into the north end of Limetree Bay in the Hess pier area, where it was held in by the weather conditions.

6/8/1993	Diesel Truck	Guanajibo Ward, Cabo Rojo, Puerto Rico	diesel	7000	Y	Release of diesel from a tank truck in southwest Puerto Rico. The release occurred approximately three quarters of a mile inland near Guanajibo Bay (area of Cabo Rojo). The supporting legs of a stationary tank truck collapsed resulting in the puncture of the tank and subsequent release of approximately 7,000 gal. of diesel. The product saturated the ground, impacting a nearby marsh and associated tidal creek.
1/7/1994	BARGE MORRIS J. BERMAN	San Juan, Puerto Rico	# 6 fuel oil		Y	Barge Morris J. Berman went aground in the surf zone off Escambron Beach in San Juan on a hard bottom consisting of rocky substrate with scattered coral after its towing cable parted. The barge had a capacity of three million gallons but was reportedly only half full. The cargo, a heavy #6 fuel oil, began spilling and impacted nearby shoreline and shallow intertidal habitats immediately. Due to strong northerly winds, the surf at the grounding site was quite strong creating a hazardous situation as they pounded the deck of the vessel. Skimming and lightering operations were effective and removed an estimated 17,700 barrels of oil from the water and leaking barge. Barge continued to leak fresh oil. On January 15, the barge was refloated, towed to a scuttling site 20 miles northeast of San Juan, and sunk.
12/5/1994	T/S El Guanuco	Guayanilla, Puerto Rico	asphalt	3670000	N	A Venezuelan tanker carrying 87,480 barrels of asphalt ran aground three miles off the coast of Guayanilla, Puerto Rico just southeast of the entrance to Guayanilla Bay. The USCG arranged for a lightering vessel to arrive by week's end. However, by December 8, swells in the area had increased; large swell hit the ship broadside and refloated it without incident.

1/16/1997	Mystery Spill - San Juan Harbor	Isla Grande, Puerto Rico	heavy fuel oil	3000	Y	Harbor master reported a slick in San Juan Harbor. Initially the amount of oil was estimated to be 500 gallons of heavy fuel oil, type unknown; the source of the spill was also unknown. The USCG investigated and determined that the slick was 1/4 to 1/3 mile long and the amount of oil in the water was about 3000 gallons.
7/24/1997	Freighter Fortuna Reefer	Mona Island, Puerto Rico	IFO 180 and marine diesel	133000	N	USCG MSO in San Juan was notified that the freighter Fortuna Reefer had run aground just 300 yards southeast of Mona Island. The vessel had departed Mayagüez, Puerto Rico, en route to the western Pacific with no cargo. Fuel onboard consisted of 100,000 gallons of heavy fuel oil, IFO 180, and 33,000 gallons of marine diesel. All fuel was distributed in several double-bottom tanks.
5/29/1998	Barge Domar #6502	Aguirre, Puerto Rico	#2 fuel oil	2310000	N	The T/B Domar 6502, a single hull and bottom vessel ran aground off the south east coast of Puerto Rico. The vessel's position was near the town of Aguirre, approximately 25 miles east of Ponce. The vessel was approximately 1000 yards offshore in about 17 feet of water and reportedly carrying 55,000 barrels of #6 fuel oil.
6/21/1998	MT Kapitan Egora	Guayanilla harbor, Puerto Rico	#6 fuel oil	298000	N	M/T Kapitan Egorov ran aground in Puerto Rico at Guayanilla Harbor near Bouy #1. The vessel was 206 meters long and carrying 298,000 gallons of #6 fuel oil.
9/8/1998	M/V Author	Ponce, Puerto Rico	Diesel, heavy fuel oil	4800000	N	Container ship M/V Author was hard aground on the south coast of Puerto Rico near Ponce. Onboard were 414 metric tons of diesel and 1979 metric tons of heavy fuel oil. No product was released when the grounding occurred.

1/28/1999	Puerto Rico Mystery Tarballs	Condado, San Juan	oil		Y	Reports of tarballs on the beaches in the Condado area of San Juan were received by MSO San Juan. The oil reported to be fresh semi-liquid ranging from dime size to pancake size tarballs and patties. The source of this oil was unknown.
2/4/1999	Enighed Pond	St Johns, U.S. Virgin Islands	diesel	1000	Y	Virgin Island Police discovered and reported an overturned oil tank trailer adjacent to Enighed Pond. MSO San Juan responded and estimated that the overturned tank, with a capacity of 8000 gallons, spilled approximately 1000 gallons of diesel into the pond. Most of the oil pocketed on the north and west sides of the pond where response personnel contained the fuel with boom and pumped out the pocketed oil.
10/20/1999	Roosevelt Roads JP5 Spill	Naval Air Station Roosevelt Roads, Cieba, Puerto Rico	JP-5 jet fuel (Navy formulation)	112000	Y	Personnel at the US Navy Base Roosevelt Roads, Puerto Rico reported a spill of JP5 fuel from a day-tank near hanger 200. The cause is under investigation by USN, but it is clear that a valve was left open which overfilled a day tank, fed from a larger storage facility. Initially, the USN reported to the National Response Center that 1,000 gallons of fuel had been spilled. Soon after that report, the amount was updated to 20,000 gallons and then to 100,000 gallons. The official spillage finally was determined to be 112,000 gallons. The oil flowed from the day tank into an underground drainage pipe, which runs under a runway and several roads for several hundred yards. The pipe empties into an open drainage ditch, which drains to a 29-acre mangrove forest. This forest drains through a culvert into Ensenada Honda Bay. Estimated that 1.5 square miles of mangroves were affected immediately following the spill.

11/18/1999	MV S. Zakariadze	San Juan Harbor, Puerto Rico	fuel oil, lube oil	510000	Y	Cement carrier M/V Sergo Zakariadze ran aground at the entrance to San Juan Harbor, Puerto Rico. The actual amount of fuel and lube oil onboard was unknown, however the vessel's fuel oil capacity was 480,000 gallons and lube oil capacity was 30,000 gallons. The vessel sustained hull damage to three ballast tanks and the engine room. The vessel was exposed to eight foot seas and pushed against the rocks.
8/4/2000	MV Marina	23 miles east of St Johns, US Virgin Islands	diesel	88000	Y	The 314 foot freight vessel, M/V Marina began taking on water around midnight approximately 23 miles east of St John, USVI. It was reported to have 88,000 gallons of diesel on board and assumed to have sunk or be sinking.
2/2/2002	MV Lorine	S of St. Johns Is, Virgin Islands	oil		Y	M/V LORINE had a main space fire as a result of an explosion in the engine room. Persons on board recovered by the C/S Crystal Harmony. Vessel remained adrift and burning. Over flight February 2 found vessel still smoldering east of Vieques Island. M/V Lorine was taken in tow at February 2 but the vessel re-ignited and shortly after lost stability and sank. On February 3, overflight found a sheen of approximately 1/4 mile wide by 5 miles long near Dog Island USVI, no shore side impact expected; product not recoverable.
9/18/2003	M/V Kent Reliant Grounded	Entrance San Juan Harbor, PR	IFO-180	50000	N	M/V Kent Reliant runs aground. No pollution released. Refloated Oct 3, 2003.
3/21/2005	Commonwealth Oil Refining Company	Guayanilla Bay, PR	#6 Fuel Oil	294000	N	Spill of 6000 to 7000 BBL (250,000-300,000 gallons) of #6 fuel oil was lost from a ruptured pipeline at the Commonwealth Oil Refining Company, Guayanilla Bay during a transfer operation when the pipeline supplying fuel to a vessel apparently ruptured due to corrosion. The rupture occured 5000 yards inland. An

						estimated 50 gallons of oil entered the waterway. The remainder of the release (7000 Bbls or 294,000 gallons) was mostly contained on land in a containment area of pipes and an adjacent ditch.
3/27/2005	MV Sea Cloud	St. Croix, US Virgin Islands	#6 Fuel Oil, diesel		N	The vessel MV Sea Cloud, a 132 foot container ship grounded on coral or hard bottom on the south central coast of St Croix at the Alucroix port channel near the Hovensa facility. Fuel on board was initially reported as 500 metric tons of #6 fuel oil. This information was later updated to be 180 metric tons of #6 and an unknown quantity of diesel fuel. After lightering the majority of fuel, the vessel was successfully re-floated without incident the morning of March 28 and taken into dock for hull inspection.
6/10/2005	MV Sea Astride	Cabo Rojo, PR	diesel, lube oil	2250	N	M/V Sea Astride, a 150 foot Haitian coastal freighter, adrift with no power and taking on water 3/4 miles off Cabo Rojo, Puerto Rico. The vessel grounded and remained firmly aground and water entered the vessel's engine room. The vessel was reported to have 2000 gallons of diesel and 250 gallons of lube oil on board. On July 13, the vessel had been refloated and taken into port in San Juan. Approval to sink the vessel offshore was requested and approved after most pollution removed. On August 26, 2005, the vessel was towed to deep water and scuttled 12-15 nm northeast of San Juan.
11/21/2005	T/V Sperchious	Bahia de Guayanilla, Puerto Rico	#6 fuel oil	13400000	N	T/V Sperchious grounded on the south coast of Puerto Rico, outside Bahia de Guayanilla. The vessel had a cargo of 50K metric tons or 13.4M gallons of #6 fuel oil.

4/27/2006	T/V Margara	Tallaboa, Puerto Rico	#6 HFO	13000000	N	Double bottom Tank Vessel Maragara is hard aground outside Guayanilla Port with over 308000 Bbls of #6 fuel oil on board.
4/28/2006	Barge Hygrade 42	St Croix, US Virgin Islands	diesel fuel	630000	N	Hovensa Barge Hygrade 42 with tug Grape Tree Bay went aground North of Providence Cay in the WAPA channel. Product Onboard was 15000 Bbls of diesel fuel.
5/2/2006	M/V Horizon Producer	San Juan, Puerto Rico	Fungicide: Commercial Name Fungitrol; UN# 3082	165	N	Container vessel 80 miles from San Juan, Puerto Rico enroute reported leaking container of fungicide chemical. Crew members reporting ill effects.
3/17/2007	Ferry American Pride	USVI	diesel	1000	N	100' ferry grounded about 1/2 mile offshore about 2 miles SE of Charlotte Amalie Harbor. Potential spill.
4/24/2007	M/V Fifty-First Lady	St Thomas, USVI	diesel	600	N	52 foot motor vessel with 600 gal of diesel on board grounded in Saphire Bay which is between Red Hook Pt and Red Bay in St. Thomas
4/24/2007	S/V Diva N Shore St Croix	USVI	gasoline	15	N	35 foot sailing vessel grounded at Coakley Bay on North shore of St Croix
8/30/2007	Mystery oil slick-south coast of PR	Guanica-Bahia de Guayanilla, Puerto Rico	Unknown oil, but included weathered tarballs and lighter diesel like fractions	11500	Y	USCG Sector San Juan began receiving various reports of tarballs and oil slicks in the area of Guanico-Bahia de Guayanilla, Puerto Rico.
9/13/2008	San Juan Harbor diesel pipeline.	San Juan Harbor, Puerto Rico	diesel	2100	Y	Release of about 50 barrels of diesel fuel oil spilled into the southern end of San Juan Harbor, Puerto Rico.
3/21/2009	Ammonia Tank Released	Lime Tree Bay, St. Croix			N	During transfer, a 8000 lb. Anhydrous Ammonia intermodal tank was dropped, and is now wedged between a Bunkering Barge and the ship. It is partially submerged, and there is ammonia bubbling up.
8/25/2009	Ammonia leak	St Croix, USVI	ammonia	2000	N	A tank containing pressurized ammonia began leaking this morning after a worker damaged a valve on the tank. Initial reports from the USCG indicate the leak has been on-going all day.

10/23/2009	Caribbean Petroleum Corporation (CAPECO)	San Juan, Puerto Rico	gasoline and diesel		N	USCG in San Juan, Puerto Rico reported that the oil storage facility associated with a pipeline Gulf Cupeco had 5 of about 16 tanks on fire. The tanks contain gasoline and diesel fuel.
10/27/2009	Port Stewart	Yabacoa, Puerto Rico	HFO	0	N	Oil tank ship went aground near buoy number two inbound to the Shell facility in Yabucoa, Puerto Rico. The vessel only remained aground for an hour or less. Fuel was transferred and vessel refloated and continued inbound to the pier.
12/10/2009	S/V RULING ANGEL-Coral Grounding	St. Croix, USVI	DIesel	800	N	S/V RULING ANGEL, an 80' Custom Sailboat, became disoriented as a squall hit and subsequently grounding on Round Reef just to the north of Christiansted Harbor in St. Croix. The vessel had 800 gallon of diesel in its tanks, which was secured. After 6 hours of salvage efforts by local tow boats the vessel was subsequently freed and towed to Christiansted Marina.
12/15/2009	LNG Carrier Matthew - Coral Grounding	Guayanilla, PR			N	920' LNG Carrier Matthew grounded on a reef while inbound to Guayanilla. The vessel's starboard bow was reported as aground. The vessel was able to free herself by transferring ballast and bunker fuel aft.
10/12/2010	M/V CSL METIS	Guayama, Puerto Rico	#6 Fuel Oil	270000	N	M/V CSL METIS went aground while approaching the AES Facility in Guayama. The vessel was pulled off via tug boats prior to receiving the report. It was a dry bulk vessel carrying coal, but had approximately 270K gallons of #6 Fuel Oil onboard.
12/2/2010	M/V Nelson	130 miles south of St Croix, USVI	diesel and lube oils	3300	Y	M/V Nelson, a 108 foot fishing vessel, sank 130 miles south of St Croix in 11,550 feet of water. Fuel onboard was 3000 gallons of diesel and 300 gallons of lube oil.
5/31/2011	CFS PAMPLONA	Barceloneta, PR			N	CFS PAMPLONA, a 475' container ship reported drifting 2 miles north of Barceloneta. Vessel had 75 metric tonnes of diesel.

5/11/2012	MSC Idil	59 nm north of Puerto Rico	IFO 380 & Diesel		Y	MSC Idil, a container ship, experienced an explosion on board and was adrift 59 nm north of San Juan. The vessel was reported to have 244 metric tons of IFO 380 and 207 metric tons of diesel fuel on board.
6/21/2012	MV Jireh	Mona Island, PR	Diesel		N	Grounding of the M/V Jireh, a 200-ft vessl, on the west shore of Mona Island, Puerto Rico. The vessel was hard aground on coral, rock and sand bottom.
4/25/2013	Mystery slick off Puerto Rico	6 miles off SW corner of Puerto Rico	May or may not be oil, brown with no sheen		Y	Overflight reported a 12 mile slick oriented N to S and about 5-6 miles off the SW tip of Puerto Rico. Photos show a brown substance in the water with no sheen.
6/2/2013	M/V Matthew I	83 NM South of Vieques Island, Puerto Rico	diesel, other oil and containers	9250	Y	An 187 foot cargo freighter, the Matthew I, burned, capsized and sank 83 nm south of Vieques. There was reportedly 35,000 liters of diesel and 40 liters of other oil on board as well as containers.
6/23/2013	aircraft crash Dorado Beach, Puerto Rico	near shoreline at Dorado Beach, Puerto Rico	100 octane avgas	30	Y	Small single engine aircraft crashed near shoreline at Dorado Beach, Puerto Rico. Reported fuel onboard was 30 gallons of 100 octane avgas. PRDNER reports plane is on a reef and pilot was taken to hospital.
6/25/2013	Antilles Gas Propane leak	Christianstead, St Croix, USVI	propane	2100	N	Propane truck parked at the Hotel Holger Dansk in downtown Christianstead was leaking propane since day before.
2/1/2014	M/V Commander	Gallows Bay St Croix USVI	diesel	5000	N	M/V Commander, a 221 foot RO/RO (roll-on, roll-off) vessel ran aground on a reef outside the channel in Gallows Bay near Christiansted, St Croix. The vessel had 5000 gallons of diesel fuel onboard. No spill reported.
9/23/2014	42ft. Vessel collision/sinking	9 mi ENE of Vieques, PR	Diesel fuel	250	Y	A 42' pleasure craft sank 9 miles ENE of Vieques Island. The pleasure craft sank with a maximum capcity of 250 gallons of diesel fuel and 2 gallons of lube oil in approximately 129 ft of water.
10/24/2014	Pleasure Craft Marimar	Salinas Bay, Puerto Rico	diesel	250	Y	Report of a sunken 33.8' pleasure craft "MARIMAR II" at the Marina De Salinas,

						in Salinas Bay. The vessel was submerged and aground on its starboard side.
11/26/2014	S/V Aurora	St Johns, USVI	diesel	300	N	A 50 foot sailing vessel grounded on the east side of St Johns Island near Drunk Bay on November 24. The vessel had 300 gallons of diesel onboard. No pollution reported.
5/15/2015	M/V Aubi	Punta Tuna, Arecibo, Puerto Rico	diesel fuel	800	N	M/V Aubi, a powered catamaran, ran aground in the vicinity of Punta Tuna, Aercibo, Puerto Rico. The aluminum vessel was reported to contain 800 gallons of diesel fuel. The vessel was hard aground and there were coral in the area.
7/6/2015	Sacraficio II	Mona Island, Puerto Rico	diesel	320	N	The 50 foot passenger vessel, Sacraficio II, grounded on Mona Island on July 5. The vessel had 320 gallons of diesel onboard.
7/6/2015	Private Recreation Vessel	Patricia Cay, St Thomas, USVI	gasoline	12	N	A 22 foot recreational vessel grounded on a reef in St. Thomas. The vessel reportedly had 12 gallons of gasoline aboard and there may have been impacts to coral associated with the grounding.
8/17/2016	Ferry Caribbean Fantasy	San Juan, Puerto Rico	Passenger & car ferry / cruise ship	263718	Y	The ferry Caribbean Fantasy was reported on fire outside San Juan Bay. USCG reported 6279 bbl of #6 fuel oil and assorted container cargo.