Guidelines for Oil Spill Response and Natural Resource Damage Assessment: Sea Turtles

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U.S. Department of Commerce

National Oceanic and Atmospheric Administration

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NOAA Technical Memorandum NMFS-OPR-61

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U.S. Department of Commerce
Wilbur Ross, Secretary

National Oceanic and Atmospheric Administration
Neil Jacobs, Under Secretary for Oceans and Atmosphere (Acting)

National Marine Fisheries Service
Chris Oliver, Assistant Administrator for Fisheries

Recommended citation:

Stacy, B. A., B. P. Wallace, T. Brosnan, S. M. Wissmann, B. A. Schroeder, A. M. Lauritsen, R. F. Hardy, J. L. Keene, and S. A. Hargrove. 2019. Guidelines for Oil Spill Response and Natural Resource Damage Assessment: Sea Turtles. U.S. Department of Commerce, National Marine Fisheries Service and National Ocean Service, NOAA Technical Memorandum NMFS-OPR-61, 197 p.

Copies of this report may be obtained from:
Office of Protected Resources
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
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https://response.restoration.noaa.gov/oil-and-chemical-spills/research-publications.html

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Preface

The principal purpose of this document is to provide updated and practical information to personnel charged with protecting, assessing, and restoring sea turtles injured by oil spills, under provisions of the Oil Pollution Act of 1990. These guidelines specifically cover actions that may be undertaken during emergency response to oil spills or subsequent Natural Resource Damage Assessment (NRDA). Individuals involved in spill response and NRDA may include a diverse body of governmental and non-governmental personnel, thus this document is written to be understandable to a broad audience with different areas of expertise and various degrees of knowledge and experience related to oil spills and sea turtles.

The circumstances of each oil spill vary significantly (e.g., type of oil, volume spilled, duration, location, resources at risk, season), thus the information in this document is not meant to be strictly prescriptive. Rather, it is intended to supplement existing rules, regulations, policy or guidance and to accomplish the following:

- inform oil spill response to be protective of sea turtles and their habitats;
- inform federal and state oil spill coordinating bodies and the development of and updates to Area Contingency Plans;
- foster understanding, communication, and coordination among federal and state agencies that are responsible for protecting sea turtles and their habitats during oil spills;
- serve as a starting point for the development of conceptual models and sampling plans in coordination with sea turtle experts and permit holders and NRDA case teams; and
- provide a list of potential scientific tools to evaluate exposure and injury to sea turtles resulting from oil spills.

Other investigations may take place in parallel with oil spill response and NRDA, including enforcement actions and requirements under the Endangered Species Act, National Marine Sanctuaries Act, System Unit Resource Protection Act, state laws, and Executive Orders. Studies, samples, and information gained from activities included in these guidelines may also be useful for these other actions. Actual restoration of lost sea turtle resources and services is beyond the scope of this document and is not covered in detail; however, considerations during the damage assessment process that are important for planning and development of restoration activities are reviewed.

Acknowledgements

Many reviewers provided valuable input for these guidelines including Mark Dodd, Alyce Fritz, Simeon Hahn, Kristen Hart, Holly Herod, Amy Hanley, Dennis Klemm, Ed Levine, Danya McLamb, Shawn Murakawa, Matthew Parry, Michelle Pate, Christopher Plaisted, Kate Sampson, Jeff Seminoff, Donna Shaver, Gary Shigenaka, Benjamin Shorr, Jeff Smith, Laurie Sullivan, Carrie Upite, Diane Wehner, Gina Ylitalo, and Sarah Wilkin. We especially thank Allen Foley, Branden Blum, Jill Bodnar, Simona Ceriani, Barry Forsythe, T. Todd Jones, Clare Lee, Chip Wood, Meghan Koperski, Robbin Trindell, Michael Ziccardi, and Tracy Collier for their in-depth review, helpful comments, and important content additions. Cara Field, Lydia Staggs, and Secret Holmes contributed to elements of these guidelines related to care and treatment of oiled sea turtles and preparation of rehabilitation facilities. Much of the information included in these guidelines would not have been possible without the efforts of the many dedicated individuals that responded to the Deepwater Horizon (DWH) oil spill of 2010, contributed to the Natural Resource Damage Assessment, and served various other roles related to the DWH spill. In addition to some of those listed above, this group includes Blair Witherington, Sandy MacPherson, Tomo Hirama, Jane Provancha, Mandy Tumlin, Jonathan Gorham, Michael Bresette, Nicole Stacy, Robert MacLean, Michelle Kelly, Rob DiGiovanni, Julika Wocial, Alexis Gutierrez, Trent McDonald, George Graettinger, Eric Ruder, Tracy Collier, Carys Mitchelmore, Christine Bishop, Gina Ylitalo, Kristy Juaire, Lance Garrison, Wendy Teas, Michael Hooper, and Kevin Reynolds.

Acronyms used in guidelines

Note: If an acronym is specific to or part of a department or agency (for the purposes of this document), the name of that organization is provided in parentheses.

Departments, agencies, and bureaus

DOC	Department of Commerce
DOI	Department of the Interior
EPA	Environmental Protection Agency
NMFS	National Marine Fisheries Service (NOAA)
NOAA	National Oceanic and Atmospheric Administration (DOC)
NOS	National Ocean Service (NOAA)
NPS	National Park Service (DOI)
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service (DOI)
USGS	U.S. Geological Survey (DOI)

Offices within federal agencies

OEPC	Office of Environmental Policy and Compliance (DOI)
ONMS	Office of National Marine Sanctuaries (NOAA)
OPR	Office of Protected Resources (NOAA-NMFS)
ORR	Office of Response and Restoration (NOAA-NOS)
ORDA	Office of Restoration and Damage Assessment (DOI)

Other acronyms

ACP	Area Contingency Plan
AST	Aspartate aminotransferase
BMP	Best Management Practices
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act OF 1980
CFR	Code of Federal Regulations
COC	Chain of custody
CNMI	Commonwealth of the Northern Mariana Islands
CBC	Complete blood cell count
CITES	Convention on International Trade in Endangered Species
CPK	Creatine phosphokinase
CYP1A	Cytochrome P450, family 1, subfamily A, polypeptide 1
EEZ	Exclusive economic zone
ESA	U.S. Endangered Species Act of 1973
ERD	Emergency Response Division (NOAA-NOS)
FSRC	Field Spill Response Coordinator (USFWS)
FWC	Florida Fish and Wildlife Conservation Commission
DARRP	Damage Assessment, Remediation and Restoration Program (NOAA)
DARTS	Damage Assessment and Restoration Tracking System (DOI)
DIVER	Data Integration Visualization Exploration and Reporting (NOAA)
DWH	Deepwater Horizon
DPS	Distinct population segment

ERMA	Environmental Response Management Application (NOAA)
FOSC	Federal On-Scene Coordinator
HAZWOPER	Hazardous Waste Operations and Emergency Response
IAP	Incident Action Plan
ICS	Incident Command System
IAC	Inter-American Convention for the Protection and Conservation of Sea Turtles
IUCN	International Union for the Conservation of Nature
JIC	Joint Information Center
MTBAP	Marine Turtle Biology and Assessment Program (NOAA-NMFS – Pacific Islands)
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act of 1970
NIMS	National Incident Management System
NMS	National Marine Sanctuaries
NMSA	National Marine Sanctuaries Act of 1972
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPFC	National Pollution Funds Center (USCG)
NRA	Natural Resource Advisors (DOI)
NRC	National Response Center (USCG)
NRDA	Natural Resource Damage Assessment
NRDAR	Natural Resource Damage Assessment and Restoration program (DOI)
NRT	National Response Team
OPA	Oil Pollution Act of 1990
SCAT	Shoreline Clean-up and Assessment Technique
PPE	Personal protection equipment
PRFA	Pollution Removal Funding Authorization (PRFA)
PAH	Polycyclic aromatic hydrocarbon
REO	Regional Environmental Officer (DOI)
RO	Regional Office (NOAA-NMFS)
RRT	Regional Response Teams
RSRC	Regional Spill Response Coordinators (USFWS)
READS	Resource Advisors (DOI)
RAR	Resources at risk
RP	Responsible Party
STSSN	Sea Turtle Stranding and Salvage Network
SC	Science Center (NOAA-NMFS)
SSC	Scientific Support Coordinator
SST	Scientific Support Teams
SSP	Site Safety Plan
SEFSC	Southeast Fisheries Science Center (NOAA-NMFS)
SOSC	State On-Scene Coordinator
SCL	Straight carapace length
SURPA	System Unit Resource Protection Act of 1996
TWG	Technical Working Group
UC	Unified Command
UAV	Unmanned aerial vehicle

Executive Summary

Sea turtles are vulnerable to oil spills on land and at sea. All six species found within U.S. and territorial waters are listed as threatened or endangered under the Endangered Species Act of 1973, as amended (16 USC § 1531 et seq.). Sea turtles have complex life histories and rely on a variety of habitats that may be negatively affected by oil and response to oil spills. Effective response to oil spills and assessment of injury under Natural Resource Damage Assessment (NRDA), as provided by the Oil Pollution Act of 1990, should integrate the unique biology of each species and consider the specific risks to each life stage. Oil on nesting beaches can affect adult female turtles, eggs, and hatchlings, whereas sea turtles of all sizes, from hatchlings to adults, can be exposed to oil at sea. Smaller life stages of turtles (i.e., post-hatchlings and oceanic phase juveniles) spend much of their time at the surface and associate with oceanographic features that tend to accumulate oil, making them especially at-risk during some spills. Exposure to oil and dispersants occurs via direct contact, inhalation, or ingestion. Many of the demonstrated effects of oil on sea turtles are related to physical fouling. High rates of oil ingestion documented during previous spills and high risk of inhalational exposure are concerns with regard to toxicological effects. Response activities, such as controlled burns, shoreline cleaning, oil boom deployment, use of dispersants, oil skimming, and vessel traffic, pose additional hazards.

Effective response to oil spills requires early identification of species and life stages at risk, timely deployment of knowledgeable personnel and other assets, efficient preparation of emergency responders, and judicious collection of information that will only be available during and shortly following a spill. These measures also are critical for informing a damage assessment. Tools available to understand the magnitude of potential injuries to sea turtles as a result of an oil spill include: surveys of nesting beaches and marine habitats (e.g., vessel-based and aerial) to document sea turtle presence, abundance, and oil exposure; evaluation of oiled turtles and nests encountered during rescue efforts, stranding response, and other activities to document exposure and effects (including those caused by response activities); and for larger spills, integration of field observations, remote sensing data, and other information over time to evaluate the magnitude and persistence of injuries to sea turtles and their habitats.

These guidelines provide an in-depth review of considerations for response and NRDA for sea turtles and incorporates knowledge gained from previous oil spills, especially the *2010 Deepwater Horizon* (Macondo 252) spill within the northern Gulf of Mexico. Included in this document are essential tools and information pertinent to sea turtles found within U.S. waters to aid preparations for future oil spills, promote an effective spill response, and facilitate damage assessment.

Introduction: Intent and organization of the guidelines

Thousands of oil spills occur in U.S. waters each year. While most are small (less than one barrel of oil), there have been at least 44 oil spills over 10,000 barrels (420,000 gallons) since 1969 that affected U.S. waters (Figure I-1). Even relatively small spills can cause major environmental and economic harm, depending on location, time of year, sensitivity of environmental resources, amount and type of oil, duration of the release, and effectiveness of response actions (i.e., clean-up and/or containment). A wide variety of wildlife have been impacted by these spills, including sea turtles, their habitats, and food resources.

Federal agencies, in cooperation with states and parties liable for the spill, are responsible for protection and restoration of natural resources impacted by oil spills. These responsibilities include providing scientific support for response operations, including protection, capture, and rehabilitation of wildlife (if warranted). Additionally, federal agencies, states, and tribes have authority to pursue a Natural Resource Damage Assessment (NRDA) and seek damages for natural resources and their services that the government's own, manage, or control that are injured or lost. The National Oceanic and Atmospheric Administration (NOAA) and agencies within the Department of the Interior (DOI) (including the U.S. Fish and Wildlife Service [USFWS] and the National Park Service [NPS] with support from U.S. Geological Survey [USGS]) have responded to oil spills for over 25 years under a variety of authorities (see Section 2). However, experience in responding to and assessing effects of oil spills on sea turtles is limited compared to that of other resources such as marine mammals, fish, shellfish, birds, corals, and wetlands. The life history of sea turtles presents a number of challenges related to documenting exposure and effects of oil.

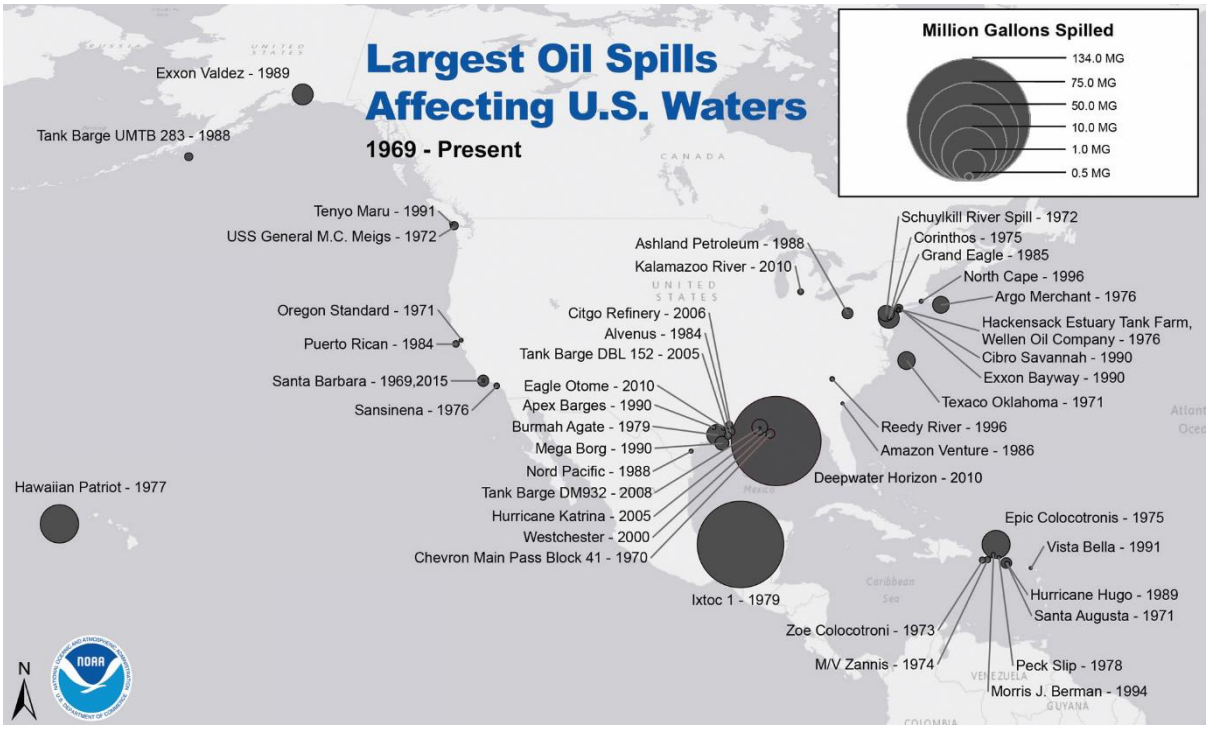


Figure I-1. Significant oil spills (>10,000 barrels (420,000 gallons) affecting U.S. waters since 1969. Modified from: http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/largest-oil-spills-affecting-us-waters-1969.html.

This document focuses on response to oil spills and possible techniques for conducting a NRDA within areas inhabited by threatened and endangered sea turtles managed by NOAA's National Marine Fisheries Service and DOI. Although oil spill response and NRDA have different objectives, as reviewed herein, their missions are closely related and benefit from regular communication and coordination. The overarching purposes of this document are to: 1) reduce impacts to sea turtles in the event of a spill by identifying and implementing key response measures; and 2) support documentation of exposure and injuries to sea turtles, if any, as a result of the oil and/or oil spill response in order to inform the NRDA, including injury determination and restoration of injured sea turtles.

Each section of these guidelines provides important information for the variety of people that may be involved with oil spill response and NRDA, from high level coordinators to field responders, including governmental and non-governmental personnel. This diverse group is the target audience of these guidelines. A description of each section is provided in Table I-1 for ease of reference. The reader can determine which content is most relevant to their specific role or immediate needs.

Table I-1. Quick reference section descriptions.

Section	Description	Page
1	**Sea turtle biology and potential vulnerabilities to oil, related contaminants, and spill response:** Review of sea turtle biology, life history, and distribution within the U.S. and territories with an emphasis on vulnerability to oil spills.	4
2	**Roles and responsibilities of government agencies for sea turtles during an oil spill:** Principal federal laws and regulations that dictate responsibilities of governmental agencies related to oil spills, sea turtles, and protected areas.	12
3	**Key elements of oil spill response and operational guidelines for sea turtles:** 1) Process for initiation of an oil spill response, incident command structure, and important response considerations for different sea turtle species and life stages. 2) Specific operational guidelines for common activities, including field response, stranding response, decontamination and rehabilitation of oiled turtles, postmortem examination (necropsy), sampling, and evidence collection and handling.	21
4	**NRDA and sea turtles: conceptual model, integrating response data, and tools for assessment:** Assessment of exposure and injury for sea turtles under NRDA, including important types of data, resources, and studies.	61
Appendices	**Information resources and protocols for sea turtle related activities during oil spills:** These materials can be modified, if needed, based on the specific needs of future spills.	97

1. Sea turtle biology and potential vulnerabilities to oil and related contaminants

1.1. Sea turtle biology and status

There are seven species of sea turtles worldwide. Most species have global distributions, with nesting beaches restricted to the tropics and subtropics, and marine ranges extending into high latitudes and cold water (typically not less than 10–15°C/50–60°F), as in the case of the leatherback turtle (Eckert et al. 2012). Six species of sea turtles inhabit the United States' (U.S.) Exclusive Economic Zone (Figure 1-1), including overseas territories: Kemp's ridley (*Lepidochelys kempii*), olive ridley (*Lepidochelys olivacea*), hawksbill (*Eretmochelys imbricata*), green turtle (*Chelonia mydas*), loggerhead (*Caretta caretta*), and leatherback (*Dermochelys coriacea*) (See Appendix 2). The National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) have designated U.S. Endangered Species Act (1973, ESA) critical habitats in U.S. territorial waters for loggerheads, green turtles, hawksbills, and leatherbacks.

All sea turtle species that occur within U.S. jurisdiction are listed as either threatened or endangered under the ESA (Table 1-1). Some species have distinct population segments (DPSs), which are the smallest divisions of a taxa recognized under the ESA. Kemp's ridleys, hawksbills, and leatherbacks are listed as endangered. Loggerheads in the Northwest Atlantic Ocean and Gulf of Mexico belong to the Northwest Atlantic Ocean DPS and are listed as threatened, while loggerheads in the North Pacific Ocean DPS are endangered. Six green turtle DPSs occur within waters of the U.S. and its territories. The Central South Pacific (American Samoa) and Central West Pacific (Guam and Commonwealth of the Northern Mariana Islands) DPSs are endangered and the Central North Pacific (Hawaii), East Pacific

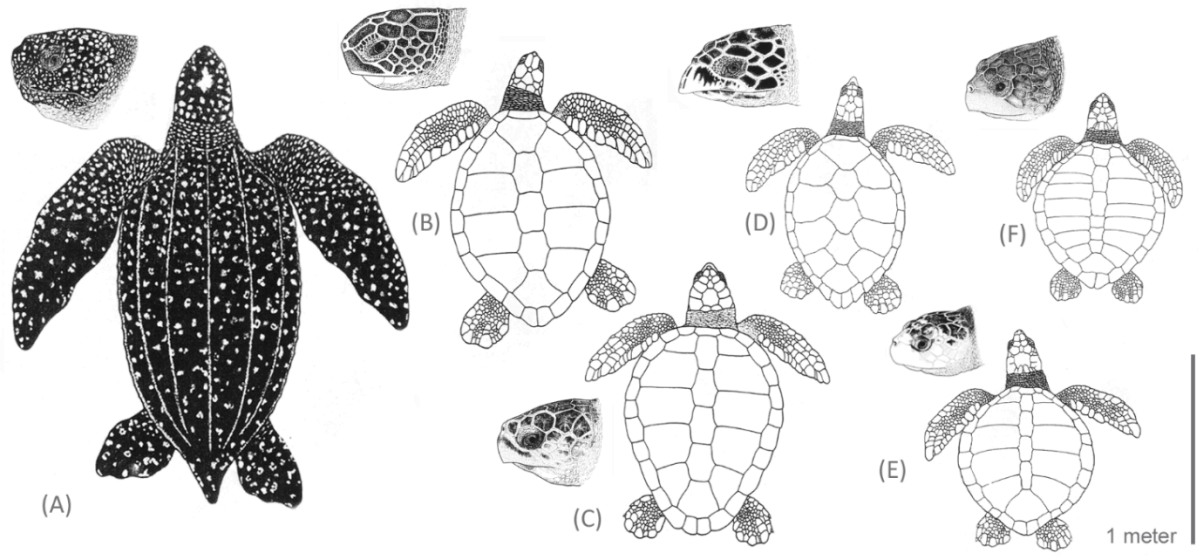


Figure 1-1. Sea turtle species found in U.S. waters (to scale by average adult size): (A) leatherback (*Dermochelys coriacea)*, (B) green turtle (*Chelonia mydas)*, (C) loggerhead (*Caretta caretta)*, (D) hawksbill (*Eretmochelys imbricata)*, (E) Kemp's ridley (*Lepidochelys kempii)*, (F) olive ridley (*Lepidochelys olivacea*). Original illustrations by Thomas McFarland, used with permission.

(California), North Atlantic (SE U.S. including Puerto Rico), and South Atlantic (U.S. Virgin Islands) DPSs are threatened. In addition, the U.S. is a party to several international conservation treaties and agreements that provide further protections for sea turtles, including the Inter-American Convention for the Protection and Conservation of Sea Turtles (IAC), Convention on International Trade in Endangered Species (CITES), and International Union for the Conservation of Nature (IUCN).

Table 1-1. Current status of sea turtles under the U.S. Endangered Species Act (ESA). Distinct population segments (DPSs) have been designated and assessed for green turtles and loggerheads; ESA listing status for each of these DPSs is shown. DPSs have not been designated for other species, although the Pacific Mexico population of olive ridleys was assessed separately from other populations of this species.

Species	Threatened	Endangered	ESA listing reference
Green turtle (*Chelonia mydas)*	Central North Pacific, East Indian-West Pacific, East Pacific, North Atlantic, North Indian, South Atlantic, Southwest Indian, Southwest Pacific	Central South Pacific, Central West Pacific, Mediterranean	81 FR 20057
Hawksbill (*Eretmochelys imbricata)*		All	35 FR 8491
Kemp's ridley (*Lepidochelys kempii)*		All	35 FR 18319
Leatherback (*Dermochelys coriacea)*		All	35 FR 8491
Loggerhead (*Caretta caretta)*	Northwest Atlantic, South Atlantic, Southeast Indo-Pacific, Southwest Indian	NE Atlantic, Mediterranean, North Indian, North Pacific, South Pacific	76 FR 58868
Olive ridley (*Lepidochelys olivacea*)	All other populations	Pacific Mexico	43 FR 32800

Although sea turtles are geographically widespread, human threats have significantly reduced many sea turtle populations in recent centuries (Bjorndal and Jackson 2003). Important anthropogenic threats to sea turtles include bycatch in fishing gear; human consumption of turtle eggs and meat (and other turtle-derived products) for subsistence and commercial purposes; coastal development; as well as pollution and other forms of habitat degradation, including oil spills (Bolten et al. 2011; Wallace et al. 2011). Sea turtle populations are particularly vulnerable to the effects of increased mortality from human activities because they grow slowly, take many years to mature (one to several decades depending on species), have long life spans, and do not reproduce every year (Musick 1999). These life history traits make their populations prone to rapid declines with slow recoveries from significant losses. Therefore, sea turtles require long-term, consistent, effective protection to prevent further population declines and encourage recovery.

1.2. Sea turtle life stages and habitat use

The sea turtle life cycle includes both marine and terrestrial life stages (Figure 2-2). Despite spending the vast majority of their lives at sea, sea turtles remain tied to sand beaches for reproduction. Approximately every two to four years, female sea turtles haul out on sand beaches to dig their nests and lay their eggs; individuals lay multiple clutches per season. Embryos obtain oxygen, water, and heat from the surrounding sand in order to develop (Ackerman 1997). After around 45 to 60 days of incubation (depending on temperature and location), hatchlings emerge from their nests, quickly crawl to the surf, and begin a marathon swim to find refuge within offshore areas. Following hatching, male sea turtles spend their entire lives at sea. Pacific green turtles are an exception. Juveniles and adults of both sexes crawl onto shore to bask in the Hawaiian Islands and other areas of the Pacific.

What happens next with regard to where sea turtles go to grow and mature, and the habitats they use, varies by species and region. The following is intended as a general description. For most hard-shelled species (i.e., those other than leatherbacks, including green turtles, loggerheads, hawksbills, and ridleys), small *post-hatchling* turtles that have left their nesting beach live in the oceanic zone during what is called the *oceanic* or *surface-pelagic* juvenile life stage. This life stage is so named because these turtles remain at or near the surface and often associate with convergence fronts and other oceanographic features, where they feed, grow, and evade predators for several years (Bolten 2003). After this oceanic juvenile phase, turtles move (recruit) into the neritic zone where they continue growing to maturity, which requires several years or even decades, as in the case of loggerheads, green turtles, and hawksbills (Bolten 2003). The transition from oceanic to neritic habitat usage may involve a period of multiple movements back and forth between these zones (McClellan and Read 2007; Mansfield pers. com.).

Oceanic zone: open ocean where water depths are greater than 200 m (Bolten 2003).

Neritic zone: inshore waters less than 200 m depth, which encompasses areas over continental and insular shelves and includes bays, sounds, and estuaries (Bolten 2003).

Convergence fronts: boundary between two water masses that forms as a result of wind, currents, or the Coriolis forces. These fronts tend to accumulate floating material and organisms, such as *Sargassum* seaweed.

Large juvenile and adult hard-shelled turtles mostly remain in neritic areas, from shallow coastal habitat to deeper waters over continental and insular shelves, but may also inhabit the oceanic zone to some degree for foraging and migration, and during seasonal movements (e.g., Hawkes et al. 2007). In temperate areas, sea turtles also may move in to warmer oceanic waters during cold months (Williard et al. 2017). In contrast, leatherback turtles and olive ridleys in the Pacific frequent both shelf and oceanic waters.

Sea turtles have evolved extremely accurate navigational systems that allow them to migrate between sometimes widely separated feeding grounds and breeding areas. Adult females return to nest in the same region or even the same beaches where they hatched (i.e., natal beaches), decades after imprinting on those areas as hatchlings (Lohmann et al. 1997). Neritic juveniles and adults can also exhibit site-fidelity to specific foraging grounds (Hart et al. 2014; Shaver et al. 2013).

Because sea turtles occupy different habitats depending upon species, life stage, and reproductive phase, these aspects of their life history influence their vulnerability to oil spills. Therefore, different approaches for responding to oil spills and assessing effects are necessary for the various species and life stages and must consider how sea turtles are distributed in both time and space as related to threats posed by spills.

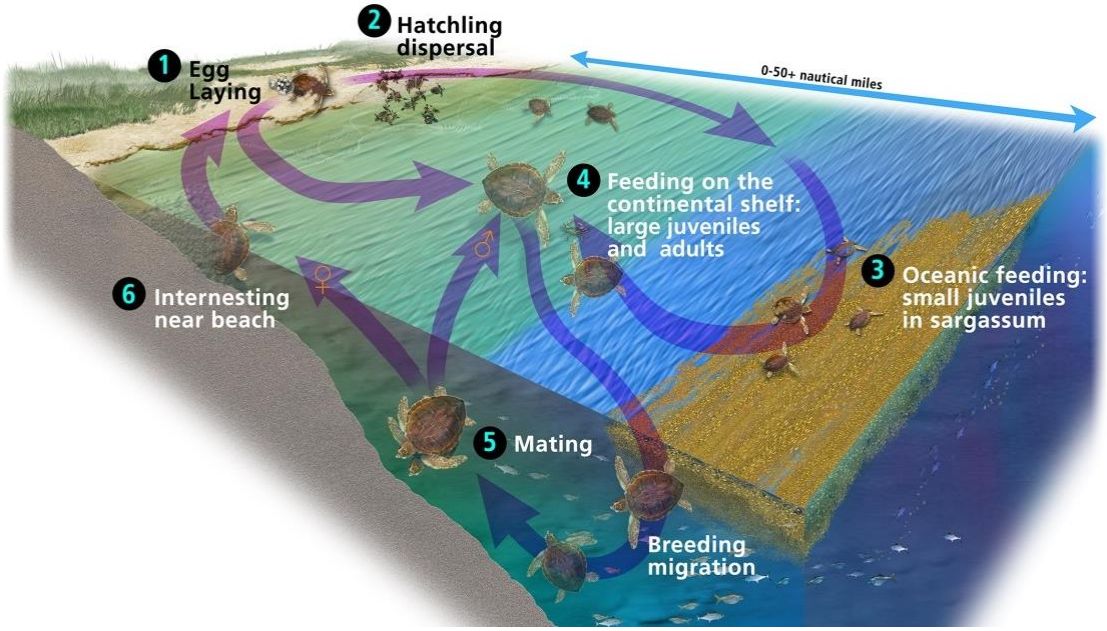


Figure 1-2. Generalized sea turtle lifecycle. 1) The lifecycle starts with egg laying. 2) Hatchlings then leave nesting beaches and swim away from the coast to reach oceanic (i.e., offshore, depths typically > 200 meters) areas, where they remain for several years as *oceanic* juveniles associated with surface habitats (3) (e.g., *Sargassum* seaweed). 4) After growing larger, they move into waters of the continental (or insular) shelf closer to shore (including bays, sounds, and estuaries) as *neritic* juveniles until reaching adulthood. 5) Adults undergo breeding migrations to the areas where they were born, sometimes across oceanic areas, to find mates. Adult male turtles return to foraging areas after mating, while adult females remain near nesting beaches (6) where each turtle lays multiple clutches over a period of around 1–2 months. Hatchlings emerge from eggs laid on sandy beaches, which initiates a new cycle. Illustration by Kate Sweeney for NOAA.

Within U.S. waters and on coastlines, presence and relative abundance of different life stages and species of sea turtles vary seasonally and regionally (Table 1-2). Identifying the species and life stages that are present in a given area at the time of a spill is a fundamental first step to developing and implementing appropriate response and NRDA activities. Although abundance of different species and life stages is variable, sea turtles are generally present to some extent year-round in all U.S. regions except Alaska. Leatherbacks are an exception, although their occurrence in sub-arctic and polar latitudes is rare. For regions where water temperatures consistently remain below around 10-15˚Celsius during winter months, turtles tend to exhibit strong seasonal movements, migrating to warmer areas (Benson et al. 2007; Dodge et al. 2014). In the Northeast U.S., sea turtles are most common within nearshore waters from April to November and are infrequently encountered or absent during winter months. Sea turtles are consistently present throughout the year in the Southeast U.S., Gulf of Mexico, Caribbean, and Pacific Islands region. Within these regions, reproduction occurs in the spring/early summer, peaks

during the summer months, and decreases in late summer and early fall. A summary of temporal presence and relative abundance of sea turtles by species, life stage, and region is provided in Appendix 3 as a guide for response and NRDA personnel.

Table 1-2. Summary of sea turtle life stages and habitats discussed in this section. See Appendix 3 for tabular representation of presence of various life stages by species in each U.S. region

Life stage	Habitat in the U.S.	Behavioral characteristics	Seasonality
Nesting females, eggs, hatchlings	Sandy beaches mainly in the Southeast U.S., Hawaii, and overseas territories	Females nest on beaches; embryos develop while buried in sand; hatchlings emerge and enter the ocean	Southeast U.S. and Hawaii: mating occurs between March-June, nesting occurs between March-October, hatchlings emerge between May-November
Post-hatchlings and small juveniles	Open ocean; including surface habitats throughout Atlantic Ocean (including the Gulf of Mexico) and Pacific Ocean	Spend more than 80 percent of their time at or near the sea surface; limited diving ability; tend to associate with floating *Sargassum* in the Atlantic and Gulf of Mexico; drift and swim to remain in surface currents	Year-round
Large juveniles and adults	Continental and insular shelves; nearshore and inshore habitats; and beaches (basking, Hawaii only)	Use the entire water column, from surface to bottom; active swimmers; dive frequently and typically deeper than 20 meters; spend on average 10 percent of time at the surface; exhibit seasonal and non-seasonal migrations; individuals consistently use the same breeding and foraging areas; in Hawaii, green turtles bask on beaches	Turtles are present in many areas year-round, but in higher densities near nesting beaches, foraging areas, and along reproductive corridors prior to and during the nesting season (summer months), and lower densities at higher latitudes during winter months; female turtles remain in the vicinity of the nesting beach until they have nested multiple times in a season

1.3. Oil spills and sea turtles

An oil spill poses myriad threats to sea turtles in both terrestrial and marine environments. Dangers result from exposure to oil (including petroleum, fuel oil, sludge, oil refuse) as well as from the various response methods used to minimize the extent and harm resulting from an oil spill, such as collection of oil from shorelines and water, *in situ* burning, use of various forms of oil booms, and application of dispersants. A number of factors influence risks to sea turtles, including the seasonal timing and location of the spill, the volume and nature of spilled product, environmental conditions, and response tactics employed. The distribution of different turtle life stages and seasonal movements related to reproductive status, foraging strategies, and environmental factors influence the scale and nature of any resulting spill-related impacts.

Sea turtles, their habitats, and prey/forage can be exposed to oil in multiple ways (Figure 1-3). Turtles may be exposed by contact with their skin, ingestion, or inhalation. Developing embryos may be exposed within nests through their eggshells or, potentially, by passage of oil-related compounds from females during egg development (Shigenaka 2003). Sea turtles do not appear to avoid oil slicks and may

ingest oil because they either mistake it for food or incidentally as they consume contaminated food or water (Vargo et al. 1986). Sea turtles feed upon a variety of organisms found on or within the sea floor and water column that may contain oil or related compounds. Because sea turtles must surface to breathe air, they may be exposed to volatile compounds and aerosolized oil. Potential for exposure continues as long as oil persists in the environment. Sea turtles do not avoid oil and will continue to forage in oiled areas (Vargo et al. 1986; Vander Zanden et al. 2016).

The sea turtle life stages affected by a spill depend on the ecological zone(s) that is impacted. Oceanic juvenile turtles found in offshore areas rely upon ephemeral convergence fronts, which collect anything floating at the surface. In the Atlantic Ocean and Gulf of Mexico, these fronts aggregate rich biological communities associated with floating seaweed (*Sargassum* species). Spills within or reaching offshore waters may cause surface oil to accumulate within these habitats, posing an especially acute risk to these small turtles. Larger, older neritic turtles may be exposed to oil within waters of continental or insular shelves and nearshore habitats as they forage, breed, or migrate within this zone. When oil comes ashore on turtle nesting beaches, females, eggs, hatchlings, and nesting habitat are at risk. Section 3 and Section 4 describe how life history traits and habitat types should be considered when planning and implementing an oil spill response and conducting a NRDA.

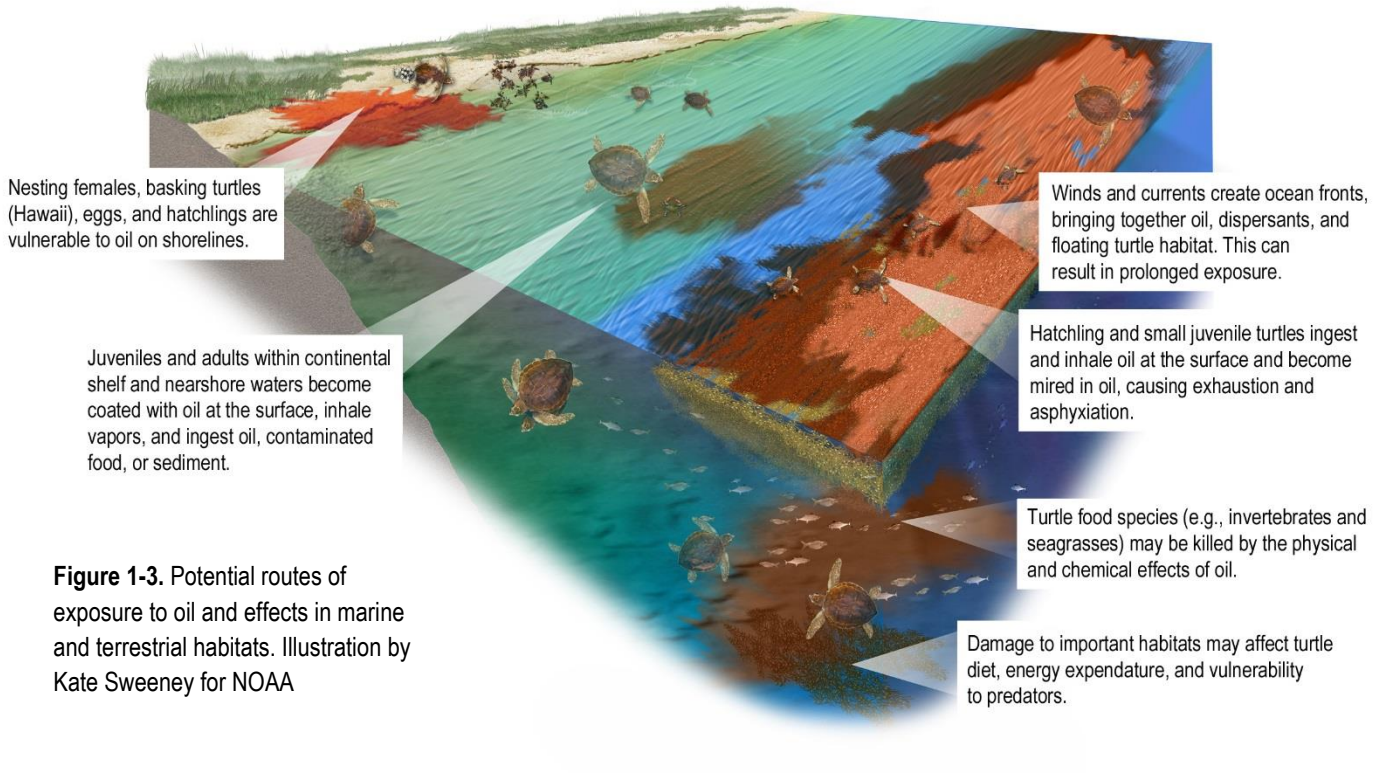


Figure 1-3. Potential routes of exposure to oil and effects in marine and terrestrial habitats. Illustration by Kate Sweeney for NOAA

Although oiling of sea turtles and resulting mortality have been documented during previous spills in various locations around the world, detailed information, especially with regard to sublethal effects of oil, was generally sparse prior to the *Deepwater Horizon* (DWH) oil spill in 2010 (see Shigenaka 2003 for review). The most readily apparent, acute effects of oil on sea turtles documented during the DWH spill were caused by physical fouling in oil (Stacy 2012; DWH NRDA Trustees 2016; McDonald et al. 2017;

Stacy et al. 2017). Those turtles encountering the most heavily oiled areas were unlikely to have survived without intervention. Observed effects included direct mortality from aspiration of oil, impeded movement, physical exhaustion, and dehydration aggravated by hyperthermia from contact with thick, dark, hot oil at the surface under summer conditions (Stacy 2012). High rates of oil ingestion also were documented (Stacy 2012).

Toxicological effects of oil exposure on sea turtles have not been demonstrated as clearly as physical effects (Shigenaka 2003; DWH NRDA Trustees 2016). Similarly, the effects of dispersants and various oil constituent compounds on sea turtles are poorly understood. This is partially due to a general lack of empirical studies and controlled experiments (for review see Shigenaka 2003 and Mitchelmore et al. 2017). Developmental effects and embryo mortality have been demonstrated in multiple species of turtles, including sea turtles, under different circumstances, but results have been quite variable (e.g., Fritts and McGehee 1982). With regard to effects of oil on sea turtles after they hatch, mortality resulting from oil toxicity has not been documented conclusively, and sublethal physiological effects vary widely and can be difficult to evaluate (Lutcavage et al. 1995; Camacho et al. 2013; Harms et al. 2014; Mitchelmore and Rowe 2015; Mitchelmore et al. 2017; Stacy et al. 2017). For example, blood abnormalities in oiled turtles admitted to rehabilitation centers during the DWH spill included nonspecific metabolic and physiological abnormalities attributable to stress, dehydration, and exertion caused by oiling, capture, and transport (Stacy et al. 2017). Freshwater turtles (i.e., surrogates for federally protected sea turtles) orally exposed to crude oil on a daily basis for 14 days did not show severe, life-threatening physiological derangements or mortality (Mitchelmore and Rowe 2015). Short-term exposure of loggerhead hatchings to dispersant (Corexit 9500A) and a mixture of oil/dispersant affected hydration and weight gain (Harms et al. 2014). Potential effects of longer exposures and chronic effects remain a concern in sea turtles based on observations in other animals, but remain largely unexplored. Section 4.3 reviews in more detail study selection and design considerations related to toxicological effects of oil exposure on sea turtles.

In addition to effects from oil exposure, sea turtles are also at-risk from response activities undertaken during oil spills (Figure 1-4). For example, oil removal via skimming or burning can incidentally entrap and kill sea turtles. In addition, increased vessel traffic servicing a spill response can result in greater numbers of turtles struck and killed by watercraft (Stacy 2012, 2015; Stacy and Schroeder 2014). On beaches where sea turtles nest, response activities are associated with increased artificial lighting at night, increased human presence, and mechanized clean-up operations to physically remove contaminated sand which can interfere with nesting females (Michel et al. 2015). Additionally, placement of booms at the waterline to protect beaches from oil can interfere with nesting females and hatchlings attempting to move onto or off the beach. Alterations of the beach profile and composition during oil recovery can have undetermined effects on subsequent nesting. As with exposure to the oil itself, the potential adverse effects on sea turtles caused by oil spill response activities vary depending on the presence and abundance of sea turtles in affected areas. For example, spills that occur near nesting beaches during the nesting season have great potential to affect multiple life stages concentrated within these areas (Table 1-2 above).

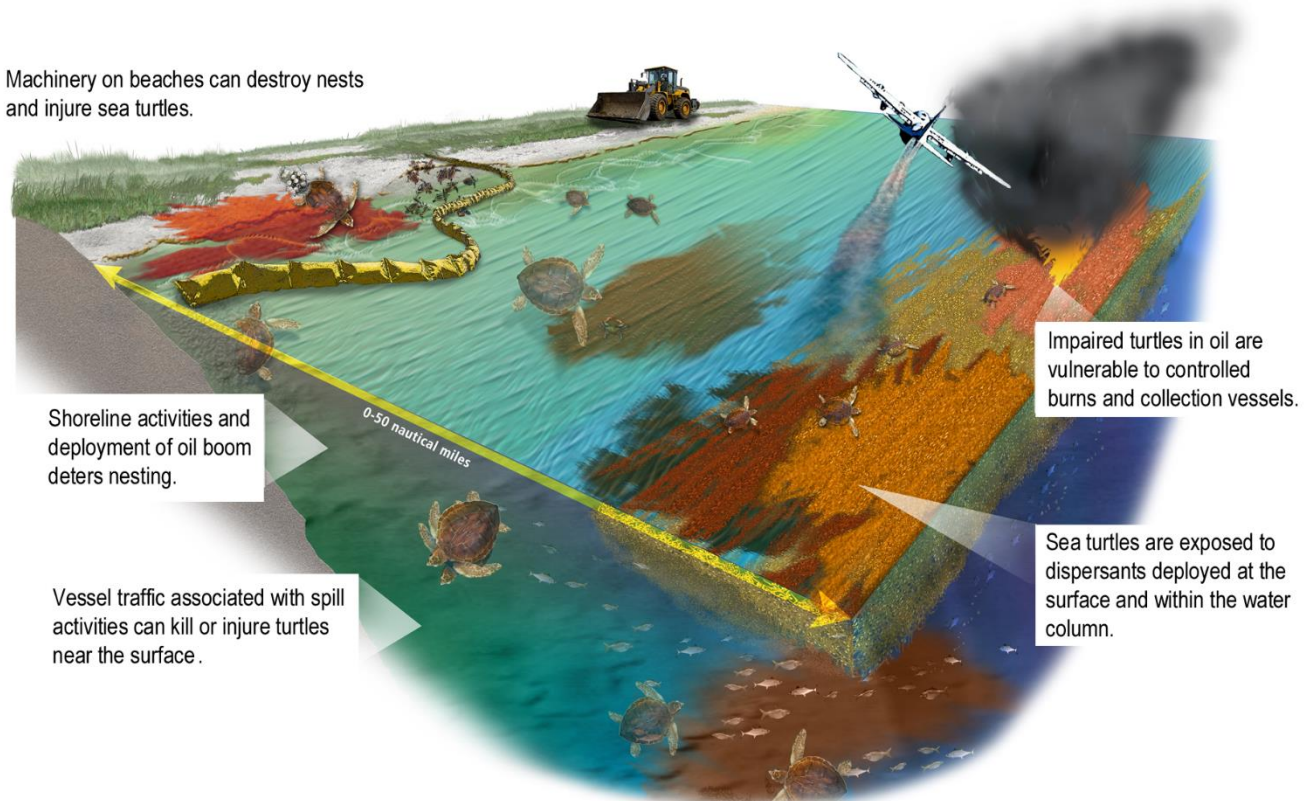


Figure 1-4. Potential injuries caused by spill response activities. Modified from illustration by Kate Sweeney for NOAA.

2. Government agency roles and responsibilities for sea turtles during an oil spill

2.1. Laws and regulations

2.1.1. Oil Pollution Act: spill response and Natural Resource Damage Assessment

The Oil Pollution Act of 1990 (OPA) was enacted largely in response to the Exxon Valdez oil spill (Prince William Sound, AK, 1989) to strengthen the Nation's ability to prevent and respond to oil spills. OPA provides key planning and response elements, including: 1) requirements for contingency planning by government and industry; 2) the creation of the Oil Spill Liability Trust Fund (OLSTF), which is managed by the U.S. Coast Guard (USCG); and 3) a liability scheme that was designed to ensure that, in the event of a spill or discharge of *oil*, or the substantial threat of a discharge of oil, into or upon U.S. waters, the Responsible Party(ies) (RP) is liable for the response costs and damages that result from the incident. The National Contingency Plan (NCP) provides that federal departments and agencies, including the National Oceanic and Atmospheric Administration (NOAA) within Department of Commerce (DOC) and agencies under the Department of the Interior (DOI), may be called upon during response to provide assistance in their areas of jurisdiction and/or special expertise, consistent with agency legal authorities and capabilities.

> ***Oil*** *- under OPA, means "oil of any kind or in any form, including petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil, but does not include any substance which is specifically listed or designated as a hazardous substance [under the] Comprehensive Environmental Response, Compensation, and Liability Act (42 USC 9601)."*

Under OPA, agencies with jurisdictional authority for natural resources, which include NOAA and agencies under DOI, have three key roles as outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR § 300.145):

- serve as scientific advisors to the Federal On-Scene Coordinator (FOSC), with duties including oil trajectory predictions, overflight observations of oil on water, identification of high value or sensitive habitats or resources, and shoreline surveys of oil to determine clean-up priorities;
- represent the interests of their respective Departments in oil spill response planning and decision-making through National Response Teams (NRTs) and Regional Response Teams (RRTs). Through this process, resource agencies are involved in the development of oil spill response planning documents, including Area Contingency Plans (ACPs) and Wildlife Response Plans (including sea turtle and marine mammal response considerations), at both regional and area levels; and
- serve as natural resource Trustees for impacted resources and, as appropriate, conduct a Natural Resource Damage Assessment (NRDA), jointly with other Trustees (i.e., state resource agencies, tribal nations), with the goal of restoring resources and their services harmed by the spill.

Oil spill emergency response

The USCG's or the Environmental Protection Agency (EPA)'s FOSC oversees response to oil spills in U.S. waters, as that term is defined by the U.S. Army Corps and EPA. Oil spill response activities follow the Incident Command System (ICS) structure specified by the National Incident Management System (NIMS), modified for oil spill response by the NRT; all response activities are coordinated by the Unified Command (UC). Funding for response activities is provided through a Pollution Removal Funding Authorization (PRFA) from the Oil Spill Liability Trust Fund, which is administered by the USCG's National Pollution Funds Center (NPFC).

If an oil spill occurs in an area that sea turtles are known to inhabit, the FOSC requests NOAA-NMFS Office of Protected Resources (typically through the NOAA SSC) and USFWS Ecological Services to participate in wildlife response. The notification process; integration of sea turtle interests into the spill response organizational structure; and cooperative engagement of federal, state, and non-governmental personnel in oil spill response are reviewed in Section 3.

Natural Resource Damage Assessment and Restoration

Under OPA, responsibility for acting on behalf of the public lies with designated federal, state, tribal, and foreign natural resource Trustees. These Trustees are authorized to assess and restore natural resource *injuries* resulting from a discharge of oil, or the substantial threat of such a discharge (e.g., vessel groundings), and associated response activities. Under the NCP, DOC and DOI are designated as Federal Trustees for a wide variety of coastal resources, including fisheries, migratory birds, protected species, and habitats (e.g., wetlands, mangroves, mudflats, beaches, and reefs). Federal and state resource agencies serve as Co-trustees for sea turtles.

Injury *- an observable or measurable adverse change in a natural resource or impairment of a natural resource service. Injury may occur directly or indirectly to a natural resource and/or service. Injury incorporates the terms "destruction," "loss," and "loss of use" as provided in OPA (OPA regulations at 15 CFR § 990.30).*

Within NOAA, NRDA is conducted by the Damage Assessment, Remediation, and Restoration Program (DARRP), comprised of ORR's Assessment and Restoration Division (ARD), NMFS Restoration Center, and the Natural Resources Section of the NOAA General Counsel's Office. More information on DARRP, including information on current and past cases can be found at the DARRP website. Within DOI, the Office of Restoration and Damage Assessment (ORDA) is the lead for DOI's Natural Resource Damage Assessment and Restoration (NRDAR) program, which is conducted by employees of affected bureaus with trustee jurisdiction (e.g., Fish and Wildlife Service, National Park Service, Bureau of Indian Affairs, Bureau of Land Management, and Bureau of Reclamation). In addition, DOI NRDAR case managers can be supported by DOI's Office of the Solicitor; economists from DOI's Office of Policy Analysis, or an affected bureau; the U.S. Geological Survey; and/or ORDA's Restoration Support Unit. More information on NRDAR, including information on current and past cases, can be found at the Damage Assessment and Restoration Tracking System website as well as manuals provided by the USFWS and National Park Service (NPS).

OPA authorizes Trustees to conduct a NRDA to: 1) return injured natural resources and services they provide to *baseline*, the condition they would have been in if the incident had not occurred; and 2) implement additional restoration to compensate for interim losses of such natural resources and services (15 CFR § 990.10). NRDA is a restoration-focused, statutorily-based process for the identification, evaluation, and quantification of injuries to natural resources and services, and development and selection of restoration actions for injured resources and their services. A NRDA is not necessarily initiated for all oil spills, e.g., if outside of jurisdiction, if injuries unlikely to result, or response actions are likely to address injury (15 CFR § 990.41-42).

The NRDA process encourages cooperation between the parties to promote expeditious and cost-effective restoration. The affected Co-trustees make decisions through consensus. In addition, under OPA NRDA regulations, Trustees are required to invite the RPs to participate in the NRDA. If the RP is amenable to a cooperative NRDA, the degree of RP participation is determined by the Trustees, varies from case to case, and is based on Trustees considering such factors as the willingness of the RP to fund assessment activities and to conduct assessment activities, including restoration planning, in a technically sound and timely manner. The intent of this cooperation is to allow NRDA studies to be conducted in a more efficient and cost-effective manner and to facilitate the resolution of legal claims, essentially expediting restoration.

A NRDA claim is not punitive. The damages recovered by the Trustees from the RP (i.e., funds recovered in a settlement or litigation) may include the reasonable costs incurred conducting the assessment, restoration planning costs, and restoration funds. Restoration funds may only be used to restore resources injured and services lost as a result of the oil spill. If a RP is not cooperative or there is no viable RP, assessment and restoration funds may be secured through the OSLTF that is administered by the USCG's National Pollution Funds Center (NPFC). In the case of an uncooperative RP, the NPFC will then pursue reimbursement for assessment and restoration costs from the RP.

Under OPA, there are three general phases of NRDA: 1) Preassessment; 2) Restoration Planning; and 3) Restoration Implementation (Figure 2-1, 15 CFR § 990.12). During the Preassessment phase, the Trustees determine whether they have jurisdiction to pursue restoration under OPA (15 CFR § 990.41) and, if so, whether to conduct restoration planning by proceeding with the injury assessment and restoration planning process (e.g., to ascertain whether or not response actions to the oil spill adequately addressed injuries resulting from the spill) (15 CFR § 990.42). In addition, Trustees may collect and analyze data during the Preassessment Phase that is likely to be lost (ephemeral data), that is pertinent to determination of jurisdiction or the decision whether to proceed with restoration planning, or that is necessary to design or implement anticipated assessment procedures. Within the Restoration Planning phase, Trustees evaluate and quantify potential injuries to natural resources and their services from exposure to oil and/or response actions and use that information to determine the need for and scale of restoration actions (15 CFR § 990.50). Generally, this process includes: 1) demonstration of exposure (and pathway) of natural resources to the oil discharged during the spill (15 CFR § 990.51[d]); 2) determination and quantification of injury/injuries resulting from exposure to the discharged oil (15 CFR § 990.51 [c] and [e-f]; § 990.52); and 3) identification and evaluation of a reasonable range of restoration alternatives and selection of preferred alternative(s) to compensate the public for the

injured and/or lost natural resources and services (15 CFR § 990.53-990.55). In addition, the Trustees may consider injury to natural resources and services caused by response activities, such as closure of beaches (15 CFR § 990.51[e]). Based on this assessment, the Trustees determine damages. This injury assessment process is the focus of the NRDA element of these guidelines and is covered in detail in Section 4. OPA requires that damages be based on a plan developed with opportunity for public review and comment. To meet this requirement, Trustees must develop a Draft and Final Restoration Plan (15 CFR § 990.55[a]). In the Restoration Implementation phase, the Trustees seek to recover the damages, including reasonable costs of assessment, from the RP or, in the event of no RP or an uncooperative RP, present a claim to the OSLTF or file a judicial action for damages (15 CFR § 990.62 and § 990.64). Once damages are recovered, the Trustees implement their plan for restoration, rehabilitation, replacement, or acquisition of the equivalent of injured or lost resources and services (e.g., recreational use). It is in the best interest of resource recovery to consider restoration options early in the case, and to select assessment endpoints and options for measuring (quantifying) injury that most effectively inform restoration.

Depending on the size and complexity of the spill, the NRDA phases may overlap to various degrees, but it is more common for Restoration Implementation to follow completion of the Restoration Planning Phase. The entire assessment process may take months to years, depending on the intricacies of the case and other factors. Restoration Planning typically begins early during the course of a spill and Restoration Implementation generally continues as the longest phase.

NRDA planning and activities may be concurrent with oil spill response activities (see above). Communication and coordination among those engaged in both of these efforts allows for timely data collection and sharing, maximizes information gathering efficiency, saves time and money, allows prompt notification of trustee agencies and the RP, and may result in earlier completion of restoration (BLM 2008). For example, rescue of oiled sea turtles during response provides direct evidence of exposure and can be used to demonstrate injury.

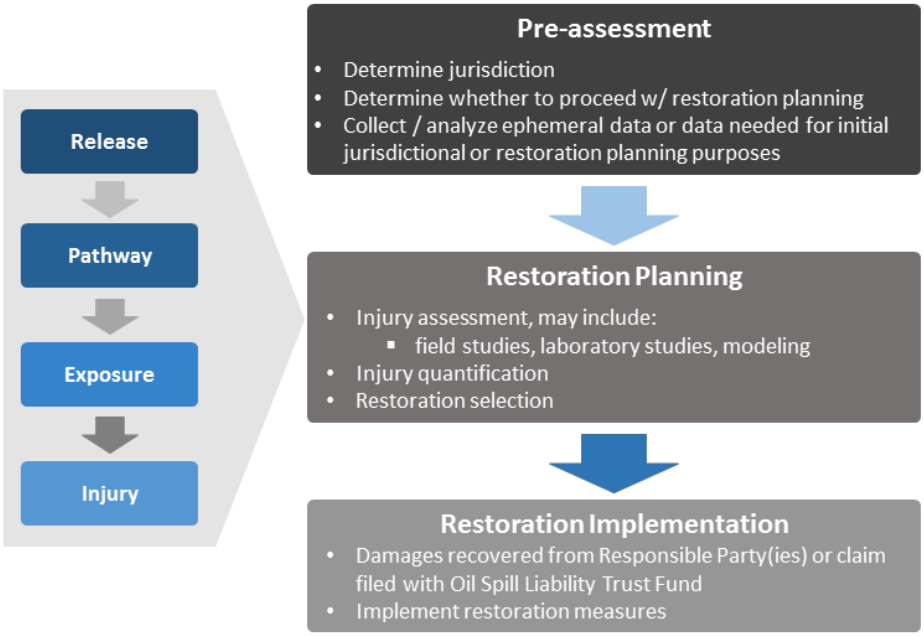


Figure 2-1. Three phases of OPA Natural Resource Damage Assessment. As part of injury assessment, Trustees conduct studies to demonstrate the pathway by which oil was released, exposure of natural resources to the oil, and injuries caused by the release.

2.1.2. Endangered Species Act

The Endangered Species Act as amended (ESA; 16 USC § 1531 et seq.) of 1973 provides for the conservation of species that are endangered or threatened with extinction, and the conservation of the ecosystems on which they depend. A species is considered endangered if it is at risk of extinction throughout all or a significant portion of its range. If a species is likely to become endangered in the foreseeable future, it is listed as threatened.

All species of sea turtles found in the U.S. are listed as either endangered or threatened under the ESA and therefore are afforded its protections. NOAA-NMFS and USFWS have joint jurisdiction for sea turtles in accordance with a Memorandum of Understanding (MOU) between the two agencies (Appendix 16). NOAA-NMFS primarily oversees ESA-related responsibilities for sea turtles in the marine domain, whereas USFWS has primary responsibility in the terrestrial environment; however, efforts expended by both agencies frequently overlap (e.g., recovery planning, stranding response).

The listing of a species as endangered makes it illegal to "take" that species. “Take” is broadly defined as to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” (16 USC § 1532[19]). Similar prohibitions extend to threatened sea turtle species. Notably, ESA also protects against the adverse modification of critical habitat (§ 4), which includes designated areas (land or water) with physical and biological features necessary to recover species listed under the ESA. Section 7 of the ESA requires consultation by federal agencies conducting activities that may affect listed species. Section 7 consultations may result in the issuance of a Biological Opinion which may include an Incidental Take Statement that specifies the anticipated take (lethal and/or non-lethal) that is expected to occur during the action. Section 10(a)(1)(A) of the ESA may authorize take for scientific purposes or to enhance the propagation or survival of the listed species through 10(a)(1)(A) permits. Section 10(a)(1)(B) of the ESA may authorize take incidental to (not the purpose of) otherwise lawful non-federal activities through a 10(a)(1)(B) permit and an associated Habitat Conservation Plan.

Many of the oil spill response actions involving sea turtles and their habitats fall under ESA prohibitions. The USCG or EPA serve as the FOSC, and have full oversight over oil spill response, thus making it a federal action. Therefore, the federal action agency, represented by the FOSC, is responsible for initiating ESA Section 7 consultation (including emergency consultation) with NOAA-NMFS and USFWS for any response activities that might affect sea turtles. In such emergencies, consultation is expedited so that federal agencies can complete their missions in a timely manner, while still maintaining compliance with the ESA and providing protections to listed species. Oil spill planning and response duties under the ESA are addressed specifically in a Memorandum of Agreement (Appendix 16) among the USCG, EPA, USFWS, and NOAA (NMFS and NOS).

Section 7 consultation does not stand in the way of oil spill response. An emergency response action is the only circumstance under which federal agencies may initiate ESA consultation after an action is implemented. For example, during the *Deepwater Horizon* (DWH) spill, the USCG coordinated with federal agencies to obtain recommendations for avoiding and minimizing adverse effects of response activities to listed species and critical habitats. The USCG Biological Assessment of the Action, which

accompanied its request to initiate consultation, described how these recommendations were implemented, and assessed the effects of the action after-the-fact. A typical Biological Opinion for a proposed federal action prospectively examines whether an action is likely to jeopardize species or destroy or adversely modify critical habitat. In contrast, a post-incident response consultation assesses whether the completed action jeopardized species or destroyed/adversely modified critical habitat, examines how the action changed the status of the listed species and critical habitats, and provides conservation recommendations to inform planning for responding to future oil spills. All discretionary USCG involvement is terminated when the action is concluded.

Emergency Section 7 consultation only includes take related to response activities, not take resulting from the oil spill itself. In addition, activities beyond oil spill response actions that involve sea turtles, such as projects implemented or studies undertaken under NRDA, may require an ESA Section 7 consultation or an ESA Section 10 permit. This permitting process may include review and comment periods; *thus, the need for ESA permits should be anticipated early in NRDA planning*. Furthermore, authorizations from USFWS (or state if under delegated authority) also are required for the transportation and possession of sea turtles (live or dead) or any parts of sea turtles (e.g., biological samples). The relevant permitting offices should be consulted to determine permit requirements and the most appropriate, efficient means of application preparation and review.

In addition, under the ESA, enforcement actions may be taken against a RP for unauthorized take associated with an oil spill. These actions may result in civil or criminal charges. ESA enforcement investigations are performed and funded separately from both the OPA response and the NRDA, although information may be used for both NRDA and ESA enforcement actions.

2.1.3. National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1970 establishes a policy to "foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans" (42 USC § 4331). NEPA's basic policy assures that federal agencies give proper consideration to the environment prior to undertaking any major federal action that will have significant environmental effects and to encourage and facilitate public involvement in decisions which affect the quality of the human environment (40 CFR § 1500.1). NEPA applies to restoration actions by Federal Trustees, except where a categorical exclusion or other exception to NEPA applies (15 CFR § 990.23).

2.1.4. National Marine Sanctuaries Act

The National Marine Sanctuaries Act (NMSA) of 1972 gives the Secretary of Commerce the authority to designate and protect areas of the coastal and marine environment that prove to be of special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, archeological, educational value, or for esthetic qualities. Living marine resources, including sea turtles, are included under NMSA. Sites designated as national marine sanctuaries are managed by NOAA's

Office of National Marine Sanctuaries (ONMS). ONMS also manages/co-manages two of four Marine National Monuments designated under the Antiquities Act and one Coral Reef Ecosystem Reserve.

NMSA provides regulations for each sanctuary that specify which activities are allowed and which are prohibited. The Act has a consultation requirement under § 304(d) for any federal activity that could impact site resources. The NMSA also provides for both civil penalties (under § 307) and for NRDA damages (under § 312). The NRDA authority parallels those found in OPA, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the System Unit Resource Protection Act (SURPA). Under § 310 of the Act, NMSA permits are issued for otherwise prohibited activities. Sanctuary superintendents hold permits for a range of activities within sites that generally include those that may occur during an oil spill response.

It is unlawful to destroy, cause the loss of, or injure any sanctuary resource. Site-specific regulations may include "enter and injure" provisions. Federal agencies are required to consult on actions that would harm sanctuary resources under § 304(d). Site-specific exemptions are found in site regulations. Emergency response activities are generally exempt.

During oil spills that affect marine sanctuaries, ONMS is active in the planning and operations section of the response protocol to provide information on avoiding or minimizing harm to sanctuary resources. ONMS may participate as part of the NRDA, depending on the complexity of the spill, resources affected, and expertise available.

Six National Marine Sanctuaries (NMS) have significant sea turtle presence for at least part of the year, including Gray's Reef NMS (Atlantic), Florida Keys NMS (Gulf of Mexico), Flower Garden Banks NMS (Gulf of Mexico), Papahānaumokuākea Marine National Monument (Pacific), Hawaiian Islands Humpback Whale NMS (Pacific), and the NMS of American Samoa (Pacific). Sea turtles also are present to some degree (either in lower numbers or transiently) in sanctuaries off the coast of California, including Monterey Bay, Cordell Bank, Channel Islands, and the Greater Farallones, as well as Stellwagen Bank NMS (Atlantic) and Monitor NMS (Atlantic). A map of these sanctuaries and monuments can be found at https://sanctuaries.noaa.gov/.

2.1.5. System Unit Resource Protection Act

Similar to the NMSA for marine resources under the DOC, the SURPA (54 USC 100721-100725) of 1996 requires the Secretary of the Interior to assess and monitor injuries to resources within the National Park System. Response costs and damages may be recovered from the RP to reimburse for expenses created by a spill and restore, replace, or acquire resources and/or their services equivalent to those that were lost. A large number of federally protected coastal and insular lands are under the jurisdiction of the NPS and are covered under SURPA, such as the Padre Island National Seashore, Canaveral National Seashore, Dry Tortugas National Park, and U.S. Virgin Islands National Park. A complete list of national parks can be found at https://www.nps.gov/hfc/cfm/carto.cfm.

2.1.6. State resource agencies and applicable legislation

Sea turtles also are protected by certain state laws and local regulations, which may be similar to or exceed protections of the ESA. For example, Florida has the Marine Turtle Protection Act, which provides explicit protections to sea turtles and their habitats, similar to ESA, and requires a state-issued permit for all conservation activities and provides a framework for review of coastal construction that may affect sea turtles, their nests, or hatchlings. Some of the other states have similar laws. In addition, the USFWS has entered into a cooperative agreement, in accordance with Section 6 of the ESA, with state resource agencies in Florida, Georgia, Florida, South Carolina, and North Carolina to carry out the activities identified in their sea turtle conservation programs.

2.2. Sea turtle stranding networks

Oil spills affecting sea turtles likely will require engagement of *stranding* networks, which respond to and document dead and impaired sea turtles in coastal areas. Under their shared jurisdiction and MOU, NOAA-NMFS and USFWS oversee operations of these stranding networks. NMFS has the primary coordination role to ensure that data are collected in a manner sufficient for conservation management, monitoring, and research purposes and to facilitate its use to meet ESA recovery objectives. The USFWS (or state resource agency in accordance with 50 CFR § 17.21[c][3]) issues the actual authorization (designation of agents) for stranding response and rehabilitation activities. Three sea turtle stranding networks cover the geographical areas included in these guidelines and are described below. These networks involve both governmental and non-governmental participants (including volunteers), depending on the area. Responders undergo training in procedures and methodologies as part of the permit authorization requirements. Some organizations and individuals participate in both sea turtle and marine mammal stranding response, but mammal and sea turtle networks generally function as separate entities in most instances. Stranding networks likely continue to operate during an oil spill, although additional human safety, documentation, and reporting requirements typically are required (see Section 3.4.6).

Stranding– *refers to any sea turtle found on land or in water that is either dead or incapable of normal activity or behavior (e.g., swimming, diving, foraging) due to any illness, injury, or other problem.*

Under standard operations (outside of a spill event), disposition of stranded sea turtles varies among and within networks according to resources and management needs. Unless there are extenuating circumstances, all live turtles are recovered for medical evaluation and possible rehabilitation. With regard to sea turtles that are found dead, generally only those with minimal or no decomposition are collected for necropsy under laboratory conditions. In some circumstances, decomposed turtles and/or those in which collection is impractical (e.g., large animals, remote locations) receive examinations in the field and are then buried on-site or disposed of by other means. Decisions on which animals are salvaged for a more thorough necropsy, including those that are more decomposed, are often dictated by management priorities or characteristics of sea turtle mortality within a given region. Note that the convention used to designate the condition of stranded sea turtles (i.e., live, degree of decomposition) may be different than that used by mammal stranding networks.

Standardized stranding report forms are completed for all documented turtles. These data forms document stranding location, date, species, biomorphometrics, samples collected, condition (live or degree of decomposition), presence of any identifying tags, and major external abnormalities (see Appendix 8).

2.2.1. Atlantic, Gulf of Mexico, and U.S. Caribbean

The Sea Turtle Stranding and Salvage Network (STSSN) operating in the Gulf of Mexico and along the U.S. Atlantic coast (and U.S. Caribbean) officially came into existence in the early 1980's. The STSSN is coordinated nationally by the STSSN Coordinator (located at the NOAA-NMFS Southeast Fisheries Science Center, Miami Laboratory), NOAA's National Sea Turtle Coordinator (NOAA-NMFS Office of Protected Resources, OPR), and NOAA's Sea Turtle Veterinary Medical Officer (NMFS-OPR). In addition, a Northeast Regional STSSN Coordinator is housed at the NMFS Greater Atlantic Regional Fisheries Office. Each state, as well as Puerto Rico and the U.S. Virgin Islands, is served by one or more State Coordinators who manage the day-to-day operations of the STSSN in their respective state. Many of these coordinators are federal or state resource agency personnel that coordinate networks comprised of other agency employees, non-governmental organizations, and volunteers. The data collected in each state are contributed to the national database housed at NOAA-NMFS (managed by STSSN Coordinator).

2.2.2. Pacific Islands, Hawaii, and American Samoa

The NOAA-NMFS Pacific Island Fisheries Science Center, Marine Turtle Biology and Assessment Program (MTBAP) coordinates the sea turtle stranding program in the Hawaiian Archipelago. This activity is in partnership with NOAA-NMFS Pacific Islands Regional Office, the state of Hawaii Department of Land and Natural Resources, local universities, other organizations such as the Hawaii Marine Animal Response network and the Maui Ocean Center Marine Institute, and volunteers. In American Samoa, the Department of Marine and Wildlife Resources of the American Samoan government coordinates strandings mainly on Tutuila island with opportunistic reporting from the Manua Islands (Ofu, Olosenga, and Tau), and Rose Atoll by USFWS and the MTBAP when surveys are performed. In Guam, the Department of Aquatic and Wildlife Resources of the Guam government coordinates the stranding response program in collaboration with other federal agencies such as the Air Force and Navy. In the Commonwealth of the Northern Mariana Islands (CNMI), the Department of Land and Natural Resources of the CNMI government coordinates stranding response on the islands of Saipan, Tinian, and Rota.

2.2.3. Pacific coast, continental U.S.

The NOAA-NMFS West Coast Regional Office (based out of Seattle, Washington and Long Beach, California) coordinates the stranding network for the Pacific coast of the continental U.S. As in other regions, this network relies on non-governmental participants, including personnel affiliated with aquaria and rehabilitation organizations. NOAA's Southwest Fisheries Science Center is also involved in responding to strandings and provides rehabilitation facilities with recommendations on timing and location of sea turtles releases following treatment. This region typically has less than 50 strandings per year (compared to the thousands on the Atlantic and Gulf coasts and hundreds in the Pacific Islands).

3. Key elements of oil spill response and operational considerations for sea turtles

3.1. General

As described in Section 2, there are a number of statutes that govern how the planning and response to oil spill incidents occur in the U.S. and its territories. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) provides key planning and response elements, including the establishment of a three-tiered contingency planning process, which consists of the National or Regional Response Teams (NRT and RRT, respectively), Area Committees (required to develop Area Contingency Plans [ACPs]), and owners and operators of vessels and other facilities that hold or transport oil (required to develop Facility Response Plans). It is important for planning efforts to consider wildlife concerns, including sea turtles, so that appropriate, timely actions are taken in the event of a spill.

Efforts to avoid and minimize harm to wildlife during an oil spill and collect information related to exposure and injury are pursued to the extent feasible in the context of broader response activities, which include halting and containing the discharge, recovering as much oil as possible from the environment, and securing human health and safety in the process. The reality of response to an oil spill means that allocation of effort and response assets must be well-organized and prioritized to ensure maximum effectiveness, especially during the initial period when there is the greatest potential to avoid or minimize negative effects. Thus, it is imperative for individuals responsible for wildlife response to understand the framework of spill response operations in order to clearly and effectively communicate needs and animal concerns. In addition, clear explanation of the need for specific response measures and timely, effective communication of observations and their importance are necessary to justify expenses. Human and material resources available for wildlife during an oil spill are not limitless.

This section is divided into three additional subsections. Subsection 3.2 outlines the process of alerting government agencies in the event of a spill, mobilizing resources, and response operations. Subsection 3.3 introduces key elements of response to a spill within areas inhabited by sea turtles and discusses important considerations for the different sea turtle life stages and their habitats. Subsection 3.4 presents operational activities that may be undertaken to rescue, protect, and document sea turtles and their nests during an oil spill. In addition, specific protocols and data forms are provided as references in the Appendices and are referred to throughout Subsection 3.4. These materials are based on experience obtained from previous spills and can be modified if necessary to meet the specific needs of future incidents. It is important to note that every oil spill is different. Some are smaller and relatively manageable; others are larger or more protracted and present many challenges. This section comprehensively reviews various aspects of response that are relevant to sea turtles, but efforts inevitably should be appropriately scaled and adapted to the unique circumstances of each oil spill.

Information collected during response may be crucial for the Natural Resource Damage Assessment (NRDA). Although individuals working on oil spill response may not necessarily be involved with NRDA, and vice versa, it is important for these efforts to be closely coordinated. Section 4 provides detailed discussion of NRDA considerations for sea turtles.

3.2. Notification, activation, response structure

3.2.1. Incident reporting and resource activation

When an oil spill occurs within waters of the U.S., there are specific reporting requirements mandated by the Federal Government, through the National Response Center (NRC). Once the NRC receives the report, notification is made to a U.S. Coast Guard (USCG) or Environmental Protection Agency Federal On-Scene Coordinator (FOSC), who determines whether further federal action is required. If the FOSC determines that federal involvement is required, he/she assumes control of all spill response operations at the site as part of the initial Incident Command System (ICS), and obtains and directs all needed resources. If adequate personnel, equipment, and other necessary support are not available through the Responsible Party (RP), the FOSC can activate additional spill contractors using funds from the Oil Spill Liability Trust Fund (OSLTF, administered by the USCG's National Pollution Funds Center [NPFC]), as well as activate the RRT to provide broader technical advice, equipment, or personnel. As part of this activation process, the FOSC notifies federal and state agencies about the potential impact to natural resources under their ownership, management, or control. Oil spill notification schemes within agencies vary. Those for the National Oceanic and Atmospheric Administration (NOAA) and U.S. Fish and Wildlife Service (USFWS) are presented in the next subsection. Once agency notification has occurred, NMFS-OPR, USFWS, and other DOI bureau (as appropriate) sea turtle programs coordinate on response activities and stranding response needs under their joint jurisdiction over these species. Each agency will obtain a Pollution Removal Funding Authorization (PRFA) from the FOSC to support response costs. These OSLTF monies are then tracked by each agency and amendments and cost documentation reports submitted to the NPFC.

Notification

For NOAA, notification of spills potentially impacting marine animals, including sea turtles, will most likely occur through the Scientific Support Coordinator (SSC) who is within NOAA's Emergency Response Division (ERD) and provides directed support to the FOSC. NOAA staff also may be notified by the FOSC directly, or through a Liaison Office, or through a party or mechanism designated within the ACP or the RP's response plan. If the USCG is not involved or NOAA-ERD is not activated, NOAA staff sometimes also find out about developing incidents from state and federal colleagues, members of the public, or the media. Once NOAA-ERD is involved, an incident is created in the internal NOAA website ResponseLink, which provides current information and updates about the spill and response. Email notification via ResponseLink is another means by which NOAA staff may be notified of spills.

With regard to agencies within the DOI, which include USFWS and the National Park Service (NPS), the FOSC is obligated to notify the Regional Environmental Officer (REO), from the Department's Office of Environmental Policy and Compliance (OEPC). The REO then relays the notification to each affected bureau. The REO will then notify affected USFWS Regional Spill Response Coordinators (RSRCs) and Field Spill Response Coordinators (FSRCs).

For an oil spill within areas inhabited by sea turtles (see Chapter 1), four key groups should be notified: 1) National Sea Turtle Program staff within NOAA/National Marine Fisheries Service (NMFS) Office of Protected Resources (NMFS-OPR), 2) USFWS local Ecological Services Field Office and the USFWS Field or Regional Spill Response Coordinator, 3) the nearest NOAA-NMFS Regional Office (NMFS-RO) and Science Center (NMFS-SC) and 4) the state natural resource agency(ies) that manage sea turtles within the area of the spill (Figure 3-1). Additional confirmatory notification among NMFS-OPR, USFWS, and other DOI bureaus (including but not limited to NPS and USGS), NMFS-RO/NMFS-SC leads, and state agency leads should be undertaken to ensure awareness of a spill. NMFS-OPR and the USFWS Field Spill Response Coordinator coordinate an agency assessment of the need for wildlife response and determines the optimal protection methods. Notification of the NMFS-RO and the USFWS local Ecological Services Field Office is required for Endangered Species Act Section 7 consultation. For a larger spill, the neighboring RO/SC also may be notified. NMFS-OPR ensures notification of the National Stranding Coordinator, regional coordinator, and relevant state stranding coordinators. These individuals also may be notified through other means depending on their agency affiliation. Depending on the type of response required (i.e., deployment of vessels, initiation of aerial surveys, enhancement of stranding response, preparation of rehabilitation facilities, or enhanced efforts on nesting beaches), NMFS-OPR and USFWS also contact other state and federal agencies, organizations, and institutions for assistance, as needed. A link to an updated web-based directory of personnel and contact information is provided in Appendix 1.

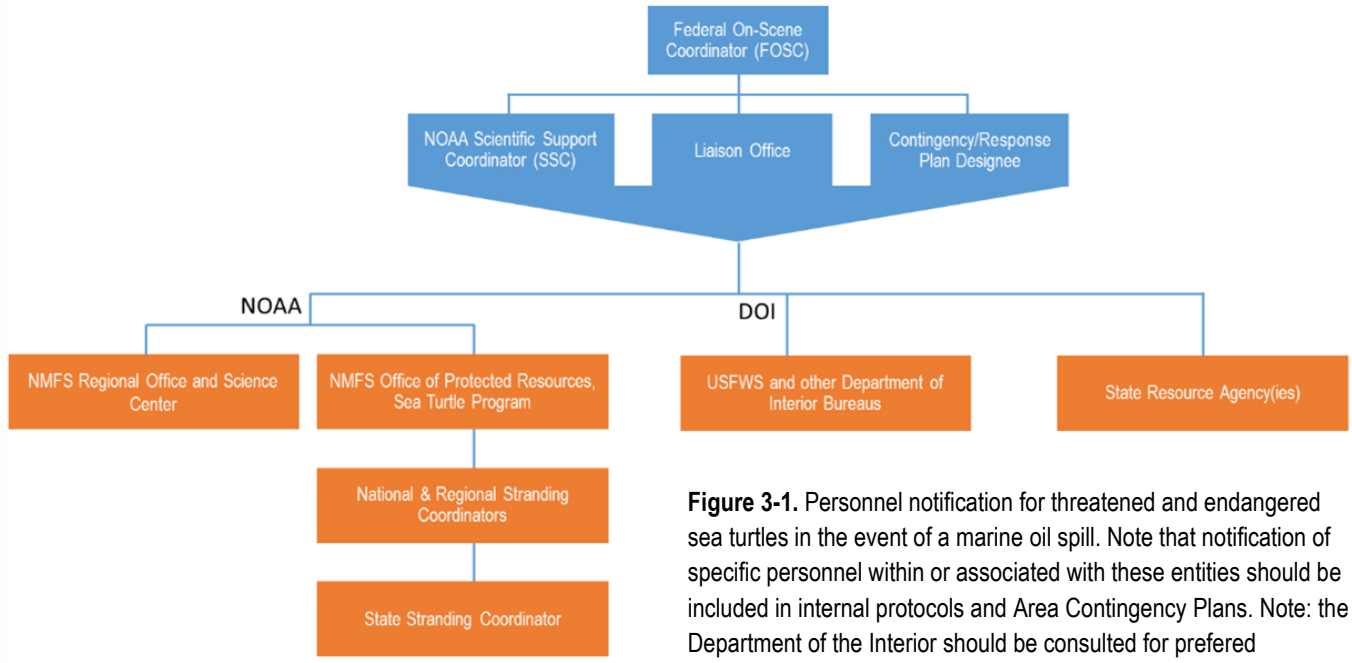


Figure 3-1. Personnel notification for threatened and endangered sea turtles in the event of a marine oil spill. Note that notification of specific personnel within or associated with these entities should be included in internal protocols and Area Contingency Plans. Note: the Department of the Interior should be consulted for prefered notification of its bureaus and personnel.

Once the appropriate regional stranding network is alerted, it is placed on standby for possible mobilization under wildlife operations as part of the ICS, as outlined in the next section. If a state agency or stranding network organization is contacted directly by a RP or their representative regarding a spill, they should immediately contact their stranding coordinator, who should then notify the NMFS-OPR National Sea Turtle Program to ensure coordination within the ICS, across the range of the spill, and across levels of responsible governmental authorities.

In some instances, individual oiled sea turtles may be encountered by the public and/or wildlife professionals without a spill being reported (e.g., from illegal discharges, unreported spills, natural seeps, animals entering waste facilities, non-petroleum oils from fishing activities). The presence of these oiled sea turtles does not normally necessitate activation of an oil spill response, yet the sea turtle stranding response community is often placed in a situation where recovery and rehabilitation is warranted. Additionally, these turtles may be the first evidence that a spill has occurred or is occurring, so these data may be important for subsequent response. At a minimum, individual oiled sea turtles will be documented according to standard regional stranding protocols and collected for further examination and sampling whenever possible. Multiple strandings of oiled sea turtles occurring within a short period of time (days to weeks) will be immediately reported to the NMFS-OPR National Sea Turtle Program by the state or regional stranding coordinator who will report the incident to the National Response Center (1-800-424-8802) to determine whether further investigation or other action is warranted.

3.2.2. Incident Command System

All oil spill responses in the U.S. are managed under an ICS structure as standardized by the National Incident Management System (NIMS) and modified for oil and hazardous substance spill response by the NRT (USCG 2014). The ICS is modelled after military chain of command and was originally developed for fighting wildfires. Leading the response is the Unified Command (UC) made up of the FOSC (usually a Coast Guard Captain of the port for the affected area), a State On-Scene Coordinator (SOSC), and a qualified individual from the RP, if known and applicable. The NRT may be activated in addition to RRTs to support the FOSC. When appropriate, tribal or local government representatives also are included in the UC. The FOSC has the ultimate responsibility for directing the oil spill response if a consensus cannot be reached among the members of the UC. Directly assisting the UC are several individuals or groups serving in Command Staff functions. These include:

- *Information Officer*: responsible for developing and releasing information about the incident, often generated through a Joint Information Center (JIC) that he/she manages.
- *Liaison Officer*: responsible for coordinating input from, and delivering information to, those agencies that are not represented within the UC. These responsibilities also include functions that are not necessarily represented within the response structure, such as NRDA, law enforcement, and land management agencies (e.g., refuges and parks).
- *Safety Officer*: responsible for developing and recommending measures for assuring personnel safety, including the drafting of Site Safety Plans (SSPs).

- *Scientific Support Coordinator (SSC)*: principal advisor to the FOSC for scientific issues. Generally, SSCs and their Scientific Support Teams (SSTs) are provided by NOAA in the coastal zones and by EPA in the inland zones. The FOSC can request SSC support directly from the SSC assigned to the area or from a RRT member. Responsibilities of the SSC include: determine resource needs, identify resources at risk, facilitate issues related to protected species (including Section 7 consultation), integrate knowledge from governmental and non-governmental sources, facilitate coordination between response and NRDA, and serve other roles. Within USFWS, the Spill Response Coordinator or other positions also can provide similar support.

Key activities within the spill's ICS are broken down into the following four discrete Sections, each with a Section Chief that acts as General Staff to the UC:

- *Planning*: responsible for the collection, evaluation, dissemination, and use of incident information, including maintaining status of assigned assets. This is primarily accomplished through the completion of Incident Action Plans (IAPs), which describe project plans and human and physical resources needed for the next operational period. The Environmental Unit is included within the Planning Section. The SSC coordinates with the Environmental Unit Leader.
- *Operations*: responsible for all tactical operations, including recovery/protection, air support, and wildlife operations.
- *Logistics*: responsible for providing facilities, services, and material in support of the incident.
- *Finance/Administration*: responsible for all financial, administrative, and cost analysis aspects of the incident.

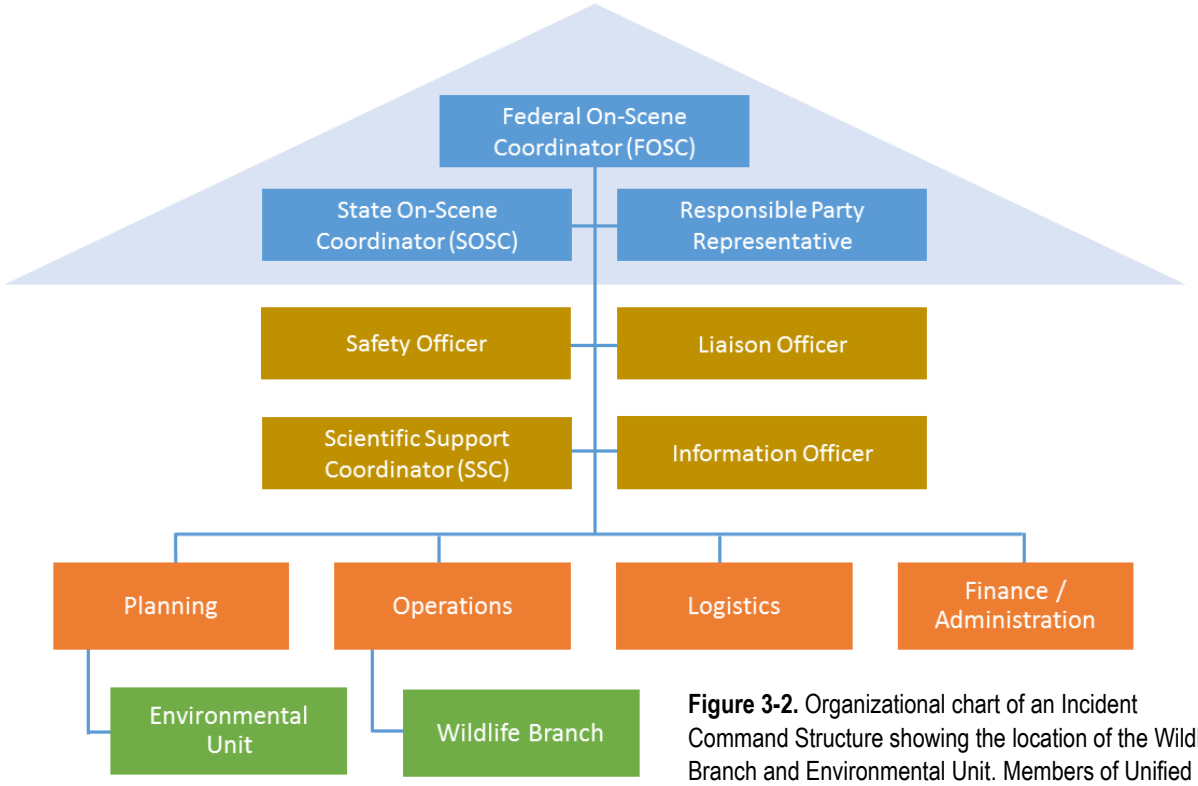


Figure 3-2. Organizational chart of an Incident Command Structure showing the location of the Wildlife Branch and Environmental Unit. Members of Unified Command are shown in blue, Command Staff are in yellow. The primary sections of response are in orange.

Coordination of response activities directed at wildlife – including reconnaissance, deterrence of wildlife from affected areas, capture and care of affected wildlife – usually occurs within the Wildlife Branch, which works under the Operations Section within the ICS (Figure 3-2). Notably, other actions related to wildlife, and sea turtles specifically, may occur within the Environmental Unit of the Planning Section. These activities include identification of natural resources at risk, assessment of ESA Section 7 issues, GIS/mapping services, provision of trained wildlife observers (including Resource Advisors (READs) on federal lands, and Natural Resource Advisors (NRAs) on non-federal lands) to monitor response operations and collection of oiled shoreline information. The Environmental Unit also provides Best Management Practices (BMPs) for minimizing impacts from response and it is the role of READs and NRAs to ensure compliance with BMPs by response personnel. Data management also is within the Planning Section and determines procedures related to handling, collection, and storage of the many types of data that may be generated by wildlife operations (e.g., photographs, data forms, records). The Logistics Section enlists and deploys equipment and personnel.

Guidance for dealing with oiled wildlife is not specifically provided in the National Oil and Hazardous Substances Pollution Contingency Plan; therefore, the Wildlife Branch operational plan is developed uniquely within each Regional and Area Contingency Plan based on the specific natural resources present locally and with federal agency involvement.

The principal objectives of the Wildlife Branch are to:

- conduct all operations in a safe manner for people and wildlife;
- minimize injuries to wildlife and habitats from the contamination;
- help minimize injuries to wildlife and habitats from the response effort;
- provide the best achievable care to impacted and/or threatened wildlife;
- collect all data, samples, and animals in a manner that fulfills legal requirements;
- document for the UC (and potentially other efforts) the immediate impacts to wildlife of the oil spill and response operations;
- report to the UC (via the Operations Section Chief) in a timely and complete manner all pertinent data and information necessary to ensure clarity of wildlife operations; and
- support the efforts of the JIC in disseminating information (much of which may be real-time) to the media, public, and other interested parties.

To ensure that these objectives are achieved with maximum efficiency, the Wildlife Branch manages and coordinates the activities of the federal, state, and local agencies along with commercial and non-profit organizations responsible for sea turtle protection and management who fall under the authority of the UC during spill response. In addition, for sea turtles, coordination with permit holders who may already be conducting studies in the area potentially impacted from the oil spill may be helpful.

Development and implementation of a sea turtle response plan ensures timely mobilization of dedicated staff, equipment, and volunteers. The size of the wildlife response effort is flexible and scalable to the magnitude of the oil spill such that only those positions necessary and appropriate for a specific spill incident are filled. Once the UC activates the Wildlife Branch, several components of oiled wildlife response targeting sea turtles may be initiated: reconnaissance to determine what sea turtle

species and habitats are at greatest risk; search and rescue for live and dead oiled sea turtles; reconnaissance of sea turtle nesting and protection of nests; treatment and rehabilitation of oiled sea turtles; release and monitoring of recovered sea turtles; and other response activities, as needed.

Depending on the size and scope of the spill, NOAA or DOI may determine that physical presence in the Incident Command Post is necessary to effectively and efficiently communicate information regarding sea turtle concerns to the FOSC. If not, the response will be operated remotely with NMFS-OPR and DOI serving a lead coordination role. The command structure may be relatively simple for smaller spills or complex for larger ones. Figure 3-3 shows a hypothetical structure of a designated Sea Turtle Group within the Wildlife Branch and identifies lead positions that coordinate primary types of operations. A Veterinary Officer may act as an assistant to the Group Supervisor because medical and medicolegal issues related to animal welfare, treatment, and postmortem examination are inherent to most types of operations. In addition, a Data Coordinator also assists the Sea Turtle Group Supervisor by managing and summarizing sea turtle-related information collected under field operations, creating products necessary to inform these operations (e.g., maps, oil forecast information, prohibited areas), coordinating with the Response and NRDA Data Management Leads to share agreed-upon data with other responders, and fulfilling any data reporting required by the UC. For a large-scale spill, additional coordinators to oversee units for stranding response, directed capture efforts, rehabilitation activities, nesting activities, and observer functions may be added to organize logistical support and liaise with other operations. Also, additional coordinators may be necessary to organize enlistment and deployment of personnel for functions that require larger numbers of people. In smaller spills, these units can be combined as appropriate.

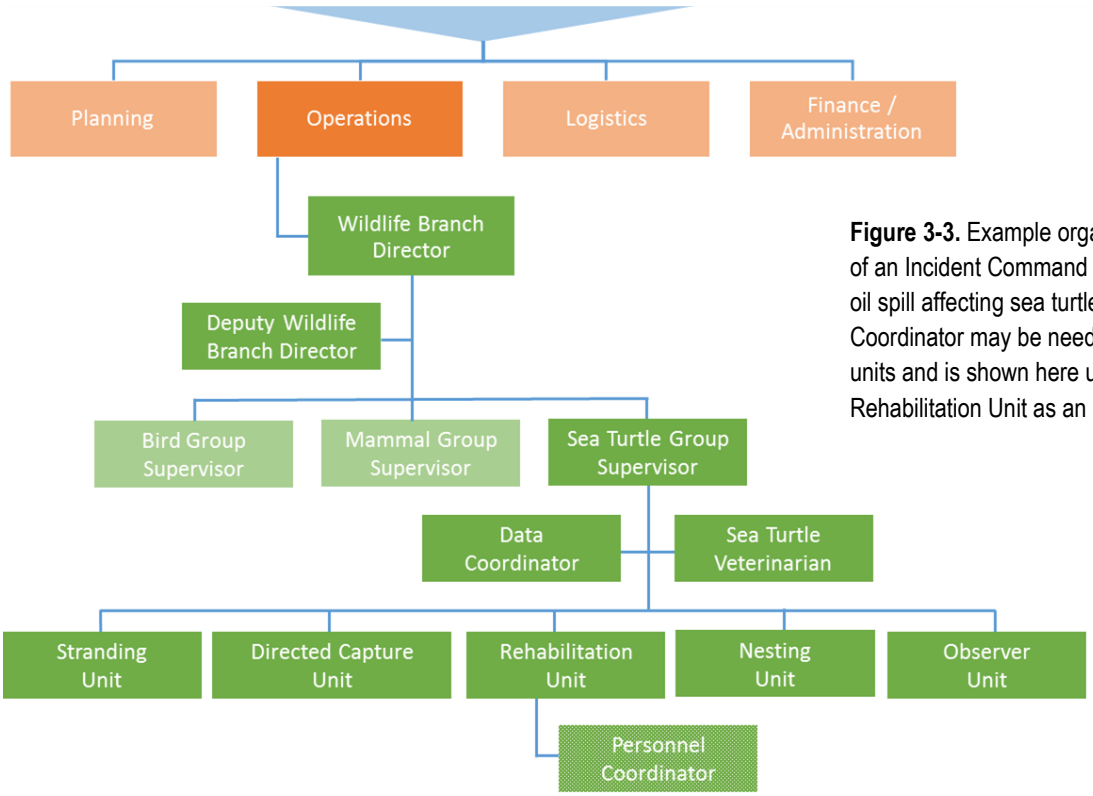


Figure 3-3. Example organizational chart of an Incident Command Structure for an oil spill affecting sea turtles. A Personnel Coordinator may be needed for large units and is shown here under the Rehabilitation Unit as an example.

Although different wildlife taxa might be grouped under the command structure for some purposes, it is important to note that different groups (i.e., birds, mammals, sea turtles) draw upon different types of resources and experts that are not necessarily universal or well-known to those that do not work with these taxa. Therefore, for larger spills *taxa-specific groups within the Wildlife Branch are strongly recommended as the most effective*. Branch positions that address sea turtle needs should be staffed by individuals familiar with sea turtles and ICS from federal and state resource agencies. All groups still report to the Wildlife Branch Director.

The Wildlife Branch coordinates response activities and information collection across resources to the extent feasible, particularly where response activities are implemented in areas where multiple types of wildlife co-occur and might be affected simultaneously. Wildlife operations targeting specific taxa (e.g., birds) may opportunistically assist or document other animals and should have the necessary operational flexibility and appropriate instructions. Similarly, efforts to contain and remove oil from the marine or terrestrial environments should include trained wildlife observers (see definition in Appendix 5) from the onset of response activities. It can be difficult to find sufficient numbers of properly trained observers for a large spill. The need for observers should be identified early in the planning process so that appropriate training can be accommodated.

3.3. Quick reference: oil spill response considerations for sea turtles by life stage and habitat

This subsection provides a quick reference for response considerations for sea turtles during an oil spill by ecological zone and life stage that may be impacted. Specific bulleted response elements discussed herein (Table 3-1) are covered in additional detail under Operational Guidelines in Subsection 3.4. The colored tabs within the right margin provide hyperlinks and page references for specific sections where more information can be found. In addition to the specific considerations provided for each ecological zone, response to an oil spill involving any of these zones typically entails early preparation of the relevant stranding network and area rehabilitation facilities, which is covered in Subsections 3.4.6 and 3.4.7, respectively.

See Section 3.4.6, **pg. 42**

See Section 3.4.7, **pg. 45**

As discussed in Section 1, sea turtles exhibit complex life history traits, population characteristics, and differential habitat use patterns that must be accounted for when planning and implementing oil spill response and NRDA activities. Below, specific considerations are discussed for life stages found in three primary ecological zones that may be affected by an oil spill: the terrestrial zone (nesting beaches), the oceanic zone (offshore areas greater than 200 m deep), and the neritic zone (continental and insular shelves/nearshore waters less than 200 m deep) (Bolten 2003). In addition, the temporal occurrence of different life stages of the sea turtle species within regions of the U.S. and its territories is summarized in Appendix 3. Decisions related to intervention, such as capture of turtles or manipulation of nests, consider a number of different factors unique to each spill, including the magnitude of the threat posed by a spill, risks to specific life stages, potential benefits and negative consequences of different actions, and logistics.

Table 3-1. Response considerations for sea turtles by ecological zone and life stage.

Nesting beaches (terrestrial zone)	Open ocean (oceanic) zone	Nearshore-shelf (neritic) zone
Eggs, hatchlings, nesting females	**Post-hatchlings, small juveniles**	**Large juveniles, adults**
Engage nesting monitoring & stranding response programs • Understand current status & location of nests and nesting activity • Monitor beaches for impacted nests and turtles	Engage stranding response network • Respond to reports of oiled, dead, or debilitated sea turtles • Ensure adequate surveillance of spill area	Engage stranding response network • Respond to reports of oiled, dead, or debilitated sea turtles • Ensure adequate surveillance of spill area
Prepare rehabilitation facilities • Respond to any live turtle needs	Prepare rehabilitation facilities • Respond to any live stranded turtles • Support rescue operations	Prepare rehabilitation facilities • Respond to any live stranded turtles • Support rescue operations
Communicate with shoreline response operations • Minimize disruption of nesting • Minimize damage to nests; injury of nesting turtles	Communicate with offshore response operations • Minimize impacts on sea turtles & habitat ○ Controlled burns ○ Booming/skimming	Communication with nearshore response operations • Minimize impacts on sea turtles & habitat ○ Controlled burns ○ Booming/skimming
Protect eggs & hatchlings • *In situ* • *Ex situ*	Deploy response vessels to survey slicks & convergence fronts for pelagic turtles • Rescue any oiled turtles • Document live and dead sea turtles (including whether visibly oiled) in spill area Deployment of aerial surveys • Inform response operations regarding sea turtles & habitat within spill area	Deploy response vessels to survey oiled area for turtles • Rescue of any oiled turtles • Document live and dead sea turtles (including whether visibly oiled) in spill area Deployment of aerial surveys • Inform response operations regarding sea turtles within spill area

Nesting beach (terrestrial) zone

Sea turtle nesting beaches are especially vulnerable to oil spills because spills often occur near shore or oil is eventually deposited on shorelines by wind and currents. Oil impacting nesting beaches can have a number of harmful effects on sea turtles depending on the timing of the spill relative to egg laying, incubation, and emergence of hatchlings. Oil can cause embryo mortality and adversely affect development (Fritts and McGehee 1982; Bell et al. 2006; Van Meter et al. 2006). Hatchlings can easily become mired in oil as they emerge from their nest and transit to the ocean or as they attempt to swim to offshore areas. Nesting females may be exposed (repeatedly) as they crawl through contaminated areas or while they remain at sea near their nesting beaches between emergences. Unrelated to reproduction, green turtles in the Hawaiian Islands haul out onto beaches to bask and may be similarly exposed to oil.

Response operations on and adjacent to nesting beaches also pose significant threats to adult turtles, nests, and hatchlings (Figure 3-2). Clean-up and removal equipment can destroy nests and injure or kill nesting females and hatchlings, or deter nesting females from emerging onto beaches. Activity on nesting beaches and deployment of shoreline booms also may deter females from nesting, possibly causing them to forego reproduction (Lauritsen et al. 2017; DWH NRDA Trustees 2016). Booming material can entangle or otherwise entrap turtles, and lighting associated with clean-up activities can deter and/or disorient nesting females and disorient hatchlings. Adult turtles of both sexes may be at increased risk of being struck by watercraft involved in oil spill response activities.

Figure 3-2. Examples of threats to sea turtles and nests posed by shoreline spill response activities. Booms (A, B) can obstruct access to nesting beaches or the water, and result in entrapment/entanglements. Clean-up by workers and heavy equipment (C, D) can destroy nests, injure sea turtles, and deter nesting.

With regard to protecting sea turtles, the first step in responding to an oil spill that threatens the terrestrial zone is to determine if sea turtle nesting or hatching is occurring within the area during the time of the spill. Primary nesting areas and seasons are provided in Appendix 2, Appendix 3, and Appendix 4. It is important to take into account ongoing nesting activities, as well as nesting events (emergence of females, hatching) that are expected to occur during the course of a spill or clean-up operations. In the U.S., nesting beach monitoring programs count and/or monitor nests primarily by conducting early morning daytime nesting surveys and evaluating turtle tracks to identify nests and non-

nesting emergences (false crawls). Fewer programs conduct nighttime surveys to document nesting. One notable exception to nighttime nesting is the Kemp's ridley turtle, which commonly nests during the day. Nesting monitoring for Kemp's ridleys in Texas occurs during daylight hours.

Year-to-year variability in the timing and magnitude of nesting is normal and results from a number of potential factors. However, the beginning and ending of nesting and hatching seasons are well defined (Appendix 4). Nest-monitoring programs are coordinated by the USFWS and the respective federal and state natural resource agency (see Appendix 1) and can provide valuable data and information for particular locations. In the Pacific Islands region, nest-monitoring programs are managed or co-managed by the NMFS and private organizations. It is important to note that nesting surveys may only occur periodically, or not at all, on remote beaches or those where nesting is rare (e.g., Mississippi, Louisiana). If a spill occurs within a known nesting range and during the nesting season, it is prudent to *assume nests are present even if nesting surveys have not been conducted*.

Specific response measures to consider:

See Section 3.4.9, **pg. 52**

- **Communication with shoreline response operations**. Regular communication is required between the Wildlife Branch and shore-based operations under the Operation Section (Shoreline Clean-up and Assessment Technique response, SCAT) to ensure BMPs are included in the IAP and made available to Operations Team Leaders. Changes to operational activities and/or awareness protocols, as necessary, can be made in the IAP typically through liaising with the Environmental Unit.
- **Protection of eggs and hatchlings *in situ.*** All shoreline operations should be evaluated for the need to deploy onsite observers to work directly with response personnel to protect and record any observable negative effects to sea turtles and/or their eggs and hatchlings. Sea turtle nests within response areas should be regularly monitored (minimum of daily) and clearly marked to identify their location and prevent accidental harm or destruction. Accurate GPS mapping of nest locations allows coordination of response activities and helps ensure protection of eggs and emerging hatchlings. Nests should be left *in situ* (or otherwise managed according to usual practices under non-spill conditions)[1] unless there is high likelihood that nests and emerging hatchlings will be injured by oil or oil spill response activities, and these injuries cannot be prevented. If a spill and beach-based response activities occur during hatchling emergence (Appendix 4), measures to protect hatchlings may be necessary.
- **Protection of eggs and hatchlings *ex situ***. Translocation of nests or hatchlings away from beaches affected by a spill to unaffected sites by experienced ESA-permitted personnel may be required for areas that may be heavily inundated by oil or under conditions where *in situ* protection is impractical or unlikely to be effective. Examples include: an inability to protect nests from oil or response actions, or the presence of an oil spill in an area where hatchlings are expected to traverse (see Box 3-1). Specific execution of translocations, including release

[1] *Ex situ* protection is a management practice of last resort in circumstances when threats have not been mitigated. These measures are used in some areas of Texas and to a lesser degree in some other states, principally because of beach driving.

location and strategy, will depend on the logistical feasibility, risks to the incubating eggs and hatchlings (on the beach and in the water), and the timing of the spill relative to the stage of incubation.

- **Nesting female considerations.** For most sea turtle species, females primarily nest at night and are only encountered if nighttime surveys or response actions are conducted. An exception is female Kemp's ridley turtles, which nest during the day and must be considered during response actions. Documentation of oiled females, including samples of oil may be desired to assist in documentation of the immediate effects of a spill for the UC, as may be relevant to wildlife response operations. As subsequently discussed, oiled female turtles are allowed to return to the sea unless they are debilitated and unable to do so.

Box 3-1. Egg translocation during Deepwater Horizon oil spill. The largest nest transrelocation effort in response to an oil spill occurred during the DWH spill. Over 28,000 eggs (274 individual nests) were relocated from the Gulf of Mexico to the Atlantic coast of Florida due to persistent oiling of offshore habitat into which hatchlings would swim. Nests were marked and left *in situ* until within approximately 1 week of hatching to minimize movement-related mortality. It proved more logistically feasible to coordinate large-scale transport of eggs at the end of the incubation period rather than during the short period of safe-handling immediately after laying. Eggs were transported in styrofoam coolers aboard designated, temperature controlled vehicles provided by FedEx. The hatching rate of translocated nests was similar to *in situ* nests (Provancha and Mukherjee 2001). Although this effort accomplished animal welfare goals by preventing hatchlings from entering oiled waters offshore from nesting beaches, the magnitude and duration of the DWH spill required that turtles be released into a different ocean basin. Therefore, these hatchlings were considered lost to their natural, genetically defined populations under the NRDA. Photo courtesy of FedEx.

Open ocean (oceanic) zone

Some sea turtle life stages and species are predominantly found in the oceanic zone (Section 1.2). These turtles also may occur in shallower areas such as continental or insular shelf waters, but they most frequently are found distant from shore. The distribution and life history characteristics of sea turtles occupying oceanic habitats require specific consideration during an oil spill. In this section, threats and response measures are discussed for two general groups of turtles found in the oceanic zone: 1) oceanic juveniles and 2) large juveniles and adults.

Oceanic (surface-pelagic) juveniles

Much of this discussion pertains to oceanic juveniles of hard-shelled (cheloniid) species because small juvenile leatherbacks are rarely encountered and thus are poorly understood at this time. The oceanic juvenile life stage includes post-hatchlings, which are under 10 cm (straight carapace length, SCL) and have recently left their nesting beaches, and small juveniles less than 25 cm SCL (Witherington et al. 2012). Notably, this life stage for loggerheads in the Northwestern Atlantic Ocean can include animals up to about 60 cm in carapace length (Bolten 2003). Within waters of the U.S. and its territories, oceanic juveniles have been the most well-studied in the Northwest Atlantic and the Gulf of Mexico.

Although they certainly occur in the Pacific, they are not found in the same densities observed within frontal zones and *Sargassum* communities of the Atlantic and Gulf, at least within U.S. waters. Oceanic juveniles can be predictably found year-round within offshore habitats of the Atlantic and Gulf. Their distribution and numbers vary depending on oceanographic conditions, time of year, and productivity of nesting beaches.

This early life stage is extremely vulnerable to oil spills because: 1) oil tends to collect within convergence fronts that provide important habitat for these turtles; and 2) the small size of these turtles limits their ability to extricate themselves from surface oil (Figure 3-3). Small turtles can become heavily mired in oil and may not be able to escape, leading to physical exhaustion, inability to thermoregulate, and aspiration of oil (Stacy 2012; DWH NRDA Trustees 2016). In addition, as observed during the DWH spill, turtles may ingest oil as a consequence of indiscriminant feeding behavior or consumption of contaminated food items (Stacy 2012). These small turtles are difficult to see and are at risk from response operations during which they may be incidentally captured, injured by activities associated with skimming and booming, killed during controlled burns, and exposed to dispersants. Thus, the potential presence of these animals must be taken into account when developing any environmental benefit analysis or weighing alternative response techniques in open water.

Figure 3-3. Upper left: oil accumulation within a convergence front containing *Sargassum* seaweed (B. Witherington, FWC). Upper right: rescue of a heavily oiled oceanic juvenile Kemp's ridley (T. Hirama, FWC). Lower left: Oil and *Sargassum* corralled for burning. Lower right: controlled burn of the material shown in the left image (M. Dodd, GADNR).

The following are response measures that should be taken to document and prevent (to the degree possible) injuries of oceanic juvenile sea turtles. Considering the high abundance of nesting sea turtles along the Southeastern U.S. and Gulf of Mexico coastlines, and the well-documented presence of oceanic juveniles originating from those beaches and other regions, *dedicated effort should be considered for any spill that occurs within or enters offshore areas in the Northwestern Atlantic or Gulf of Mexico.*

Specific response measures to consider:

- **Communication with offshore response operations**. All offshore operations, especially those involving skimming and booming vessels and controlled burn teams, should be made aware of the presence of small sea turtles and should have the means of rescuing animals from oil (Appendix 5). Any operation that collects oil from the water surface has the potential to incidentally capture and kill small sea turtles. Per pre-authorizations for burn operations, deployment of wildlife observers is required to help sight and recover animals prior to igniting oil, especially if knowledge of a given area and period indicate a high risk of interaction.
- **Deployment of dedicated response vessels to survey slicks and convergences (directed capture).** Because oceanic juvenile turtles are primarily found far from shore, they are unlikely to be detected by shore-based observations, such as stranding response. They are also too small to be seen from aircraft used in standard aerial surveys. Miring in oil presents a significant threat to health and survival of these turtles, thus rescue of oiled turtles may reduce mortality and help to address animal welfare concerns associated with response activities. The co-location of oil and small turtles within convergence fronts allows search crews to effectively target areas with greatest risk of interaction. Oiled turtles can be safely collected using dip nets and transported to shore for de-oiling, care, and treatment. In addition to instituting a successful rehabilitation effort towards individual animals, information collected from these oiled turtles and associated sampling (veterinary evaluations, necropsy findings, forensic analysis of oil) are also extremely valuable for informing animal care protocols and documenting spill effects (Section 4).

See Section 3.4.10, **pg. 55**

Large juveniles and adults

Large juvenile and adult sea turtles also occur in the oceanic zone. Leatherbacks and olive ridley turtles are best known for inhabiting offshore areas, but other species also forage in or seasonally inhabit the oceanic zone, or may transit through it as they migrate between breeding areas and neritic foraging grounds or between/among foraging areas. Turtles are susceptible to exposure to oil, dispersants, and associated effects as they breathe or bask at the surface or potentially as they dive and feed within the water column. Density of turtles can be high in offshore areas where certain prey types (e.g., jellyfish) are abundant. As with smaller oceanic stage turtles, response personnel involved with offshore operations should be made aware of these animals and provided with information on how to report sightings and other observations.

As discussed in the next subsection, feasibility of direct intervention (capture) of large juveniles and adults is limited due to their size, dispersed distribution, difficulty of capture in open water, and human-health/safety constraints of capture within a spill zone. This is especially true for leatherback turtles, which are very large (exceeding 150 cm in length and 400 kg) and difficult to keep in captivity. Dead or debilitated oiled individuals are recovered if possible.

Specific response measures to consider:

- **Documentation of large juvenile and adult turtles during a spill and response activities.** Although direct intervention and capture of free-swimming large juvenile and adult sea turtles, particularly leatherbacks, is generally impractical, all observations of turtles within the spill area, including time, location, and oiling status, should be recorded as this information is valuable for response actions (to minimize potential injury from response actions) and NRDA. Documenting instances of turtles in oil or with oil on them, including by photography, is especially important.
- **Aerial surveys.** Although larger juvenile and adult turtles can be readily sighted from vessels, aerial surveys are a more effective method for observing them and should be conducted at multiple time points over the duration of a spill, if warranted. In addition to twin-engine aircraft that are often used or standard aerial surveys, smaller aircraft or unmanned aerial vehicles (UAVs) equipped with cameras may be advantageous under some circumstances (e.g., nearshore spills).

See Section 3.4.11, **pg. 57**

Nearshore-shelf (neritic) zone

Nearshore and inshore spills in almost all areas of the U.S. and its territories (except Alaska) have the potential to affect sea turtles. Sea turtles are found within bays, sounds, estuaries, tidal creeks, and open shelf waters, where they forage within many different habitat types, such as hard and soft bottom, seagrass beds, and various types of reefs. Man-made structures, such as rock jetties, also are used by sea turtles.

Sea turtles within the neritic zone are exposed to oil by many of the same routes discussed for other life stages. They are exposed to slicks and fumes when they surface to breathe or while resting or basking, they may ingest oil or oil-related compounds through contaminated prey or incidental ingestion of oil, and they may be exposed to submerged oil or oil entrained within sediments. The latter may occur when species such as loggerheads and Kemp's ridleys dig into benthic sediments to capture invertebrate prey (e.g., Burke et al. 1994; Frick et al. 2001). Less is known about the effects of oil on larger life stages of sea turtles as harmful effects have not been well documented during previous spills. They have greater physical ability to escape surface oil compared to oceanic juveniles, but reports of sporadic strandings of larger, oiled turtles (Shigenaka 2003; Camacho et al. 2013) indicate that oiling can cause significant impairment, at least under some circumstances.

As with other life stages, response operations can threaten sea turtles in nearshore areas. Increased vessel traffic can result in greater numbers of sea turtles that sustain vessel strike injuries. Turtles can become entangled in boom material and associated lines. Controlled burns, which typically are conducted offshore but may still overlap with neritic areas, also can injure or kill turtles that may remain at the surface if they are incapacitated or injured, or as they surface to breathe.

Response efforts typically focus on providing aid to debilitated turtles that are stranded or found floating and collecting observational data that may help avoid injury to sea turtles by response operations. Directed capture of free-swimming oiled neritic phase juvenile and adult turtles (as performed with smaller life stages) poses a number of challenges and is likely impractical under many circumstances for the following reasons: 1) turtles are relatively dispersed and spend 80-90% of their time submerged; 2) capture techniques within contaminated areas must not risk human health and safety from increased exposure to oil, which can preclude some common techniques such as netting and in-water hand capture of free-swimming turtles; 3) hard-shelled species often return to the area of capture, thus limiting the effectiveness of relocation as a means of deterrence; and 4) capacity to hold larger turtles in rehabilitation facilities for a prolonged period is relatively limited. The latter is a concern because most sea turtles will significantly injure each other if housed together, especially larger turtles in close quarters.

Figure 3-4. Large juvenile or adult loggerhead turtle near an oil slick photographed during an aerial survey during the DWH spill.

Considering these challenges, the risks and benefits of proposed response actions must be carefully weighed. In addition to stranding response, actions targeting sea turtles in neritic habitats that are likely to be effective and produce useful data could include the following:

- **Communication with clean-up operations**. All operations working in inshore areas and shorelines should be made aware of the presence of sea turtles and be provided with a protocol for contacting Wildlife Branch personnel regarding any sightings of oiled turtles or turtles in distress. Specific protected species observers should be considered for any operations with a high likelihood of interaction with sea turtles (e.g., booming and collection of oil or burning of oil within areas of known high sea turtle density).

  Vessel and aerial surveys. Depending on the size of the spill and location, both vessel-based and aerial surveys may be needed to document sea turtle presence and inform response actions related to sea turtles. Aircraft provide a superior means of detection of animals over 40-45 cm (Figure 3-4), whereas vessels or other means are needed to detect smaller turtles, which often make up a significant proportion of sea turtles within a given area (Rees et al. 2018; Sykora-Brodie et al. 2018). In addition, vessel observations are needed to aid any oiled, debilitated turtles and to document exposures of sea turtles to oil and environmental conditions on a finer scale and in more detail than is observable from manned aircraft. Personnel with experience in capturing and sighting turtles should be deployed as a designated sea turtle response effort or embedded within other wildlife operations, depending on the scale of the spill and response. Vessel crews should have the experience and equipment to capture debilitated oiled turtles and recover carcasses.

See Section 3.4.12, **pg. 59**

See Sections 3.4.10, 3.4.11, **pgs. 55, 57**

3.4. Operational guidelines

In this section, guidelines for conducting various common response operations and procedures are described, including evidence collection and handling, sampling and documentation, and specific response activities focused on documenting, rescuing, and rehabilitating sea turtles during an oil spill. These guidelines incorporate aforementioned considerations related to sea turtle life stage and habitat use, as well as important aspects of collecting information that could be relevant in a NRDA (See Section 4), should a spill incident advance to that stage.

Personal protection equipment (PPE) and training for different activities is determined or approved by the Safety Officer (and their support staff) or existing government agency guidance and standards (for government personnel) and must be followed. For handling oiled wildlife or entering oiled areas, this generally includes protective outerwear (e.g., Tyvek® suit), nitrile or rubber gloves, oil and water resistant footwear, and eye protection.

All participating responders and organizations must be informed of operational protocols, including any potential legal requirements involving the collection, use, transfer, or disposal of sea turtles, samples, and other data and materials collected in connection with an oil spill. Questions regarding legal requirements should be directed to the UC, and the NOAA General Counsel (Natural Resources Section) and/or DOI's Office of Solicitor (Environmental Restoration Branch) for matters relevant to NRDA

(whether occurring during response or afterwards). In addition, any funding or reimbursement that may be available to organizations for services, supplies, equipment, and other expenses should be clarified prior to their engagement in spill response. Such funding or reimbursement must be consistent with applicable law.

3.4.1. General evidence collection and handling

Important data and samples are collected during oil spill response that ultimately may be used to assess exposure of sea turtles to oil and injuries resulting from that exposure. This information and material ultimately may be used for legal purposes including both criminal and civil proceedings. The potential for litigation associated with an oil spill requires specific measures when collecting, handling, and transferring samples and data. For the purposes of this document, *evidence* includes (but is not limited to) the following:

- live sea turtles
- carcasses
- samples of oil or suspected oil collected from the skin
- any biological samples collected from turtles (e.g., blood, tissue, fluids, feces)
- digital and hard-copy images, data, and documents (e.g., photographs, data forms, field notes, medical records, electronic storage devices)

See Appendix 6, **pg. 125**

As protocols may be updated and new technologies become available and applicable over time, the latest instructions should be confirmed with NOAA General Counsel (Natural Resources Section) or DOI's Office of Solicitor (Environmental Restoration Branch), as appropriate.

A chain-of-custody (COC) is initiated whenever any of the above are acquired and accompanies the animal, sample, or material whenever it changes hands. A complete protocol for COC procedures is provided in Appendix 6. Whenever there is any question as to whether COC should be followed, the best option is to consult with a supervisor in the appropriate chain of command and follow COC procedures in the interim.

There typically are legal prohibitions against disposing of, deleting, or otherwise discarding any materials collected during an oil spill without judicial or other appropriate approval. Legal prohibitions on disposal of potentially relevant information/documents involving the oil spill frequently also apply to field notes and supporting documentation, analytical data, and internal communications regarding the spill, responses, and investigations. It is best to assume that any materials, including carcasses, should not be discarded unless specific permission has been obtained to do so from: (i) the UC (regarding response activities), and (ii) the NOAA General Counsel's Office and the DOI Office of the Solicitor regarding any samples/materials/information potentially relevant to assessing injuries to natural resources and associated restoration planning. Logistics needed to store samples and sea turtle carcasses (e.g., freezers) may become an issue, depending upon the size of the spill and the number of turtles impacted, and should be a relatively immediate consideration if carcass retention is required. Moreover, any samples or data collected during spill response (or NRDA) are subject to requests to provide them to the Trustees. It is important to have all items clearly labelled, as described in the protocols accompanying these guidelines, and to be organized in a manner that allows them to be

readily located. Data are to be managed and archived in a system agreed upon by the UC (or by the Trustees with regard to NRDA) to preserve their integrity. See Section 4.5 for details.

Wildlife operations present some unique challenges to evidence handling requirements that often must be resolved early in response. For example, most animal care facilities ship samples to commercial laboratories for common diagnostic tests, such as blood analyses and microbial cultures. Some of these laboratories do not have in-house COC or sample retention procedures and will not accommodate these requirements. Moreover, blood samples may be frequently collected from individual patients, resulting in a considerable workload to ensure tracking and documentation of samples. Acquisition of important clinical information and optimal care are of foremost importance and always take priority over potential legal procedure. For example, if the preferred laboratory used by a care facility cannot meet COC or other requirements, but provides an essential service needed to ensure optimal care, sample submission will not be prohibited. If any aspect of a protocol cannot be followed for any reason, the best approach is to communicate the issue through the UC and document any deviation (e.g., within the medical record) so that an appropriate solution can be identified and the disposition of any sample or other material can be clearly followed.

Materials maintained under COC require close control to ensure that they are not tampered with in any way. For individual items, specially designed evidence tape is applied over the opening of containers and signed by the collector in a way that will be easily observable if the item is accessed (Appendix 6). Any access to an item (e.g., for subsequent examination or analysis) must be documented in an evidence record. Evidentiary materials must be stored in a locked area accessible only to specifically designated individuals. Access to the area must be recorded by a written log that describes the purpose of the access and action taken (e.g., removal of sample [including its specific identifier] from a secure freezer for analysis). These requirements can be onerous for facilities that do not regularly work with COC and must be carefully considered when staffing locations during response. *For a larger oil spill involving collection of large numbers of samples, personnel may be needed whose specific role is to facilitate proper evidence handling.*

3.4.2. Basic sampling considerations

There are a number of considerations related to sampling of sea turtles during an oil spill. All species found in U.S. waters are protected under the ESA and require specific permits from NOAA-NMFS (in-water) or USFWS or the state agency with delegated authority (on land) to conduct any sampling. Legal obligations under OPA may dictate which laboratories perform some analyses. This constraint generally does not apply to analyses necessary for medical diagnosis and treatment, but may restrict providing samples for oil-related testing and analyses that fall more within the realm of investigational or applied research. As such, sampling sea turtles collected during response must be conducted according to protocols approved by UC (or under NRDA), as well as with necessary ESA authorizations. In addition, sampling of sea turtles should never compromise an animal's health or the diagnostic value of a sample. For example, the amount of blood or tissue collected from a live turtle should be the minimum amount necessary for the intended objective and well within the margin of safety as determined by the attending veterinarian and existing permit(s). Extra blood or tissue should not be collected from live turtles strictly to accommodate requests for duplicative sample sets without a clear and ESA-permitted

purpose. In addition, samples should not be divided into duplicative sample sets if doing so will yield an insufficient volume for an intended analysis (e.g., chemical testing), or will jeopardize the diagnostic value of the sample (e.g., histology). To help guide collection, minimum volumes required should be indicated in all sampling protocols, such as provided in the appendices at the end of these guidelines.

3.4.3. Handling digital media

See Appendix 6, **pg. 125**

Information collected during response to an oil spill is often recorded on replaceable and interchangeable memory cards or hard drives that store digital media. These cards or drives are used in digital cameras, GPS units, and other devices. Much of the information related to the history of creation, access, and modification of data, whether an image or other type of file, is automatically captured within electronic metadata. Personnel working on the response need to take considerable care to appropriately preserve data collected onto these digital devices in order to maintain its integrity and make the data operationally and legally useful for a variety of purposes. The general considerations provided below are intended to preserve a secure, immutable, "original" copy, which is necessary to prove the origin of the data or photo for potential litigation.

In addition to the general considerations below, government agency employees should consult their agency guidelines and/or legal counsel for any alternative or additional requirements. Also, response operations may have a Data Management Lead or group that oversees collection and storage of various types of data during a spill. Further instructions related to capture and preservation of specific data types may be provided through the UC.

Please note that technology evolves rapidly. *In the event of a spill, if necessary, updated instructions must be provided to responders, researchers, and others as quickly as possible to avoid loss or compromise of evidentiary materials.*

General considerations for handling digital media for purposes of preservation:

1. **Do not collect images or data on personal devices (e.g., personal camera, cell phone, tablet).** If personal devices are used to capture data, there is a potential that those personal devices may need to be turned over for evidentiary purposes in the event of litigation.

2. **Ensure that the date and time are set accurately on devices.** The metadata on when a file was created reflects these settings. An accurate date and time will allow the file to be more easily corroborated with other information.

3. **Do not manipulate, delete, or modify files in any way prior to making evidentiary copies.** For digital images or other files that are created with sequential file names, all sequential files should be present and accounted for. For digital cameras, it is often easiest to keep track of images if the camera is set to reset the image numbers every time a blank memory card is inserted. This will mean that the file name of the first image taken always ends in "1."

4. **Provide geolocation for field photographs.** The GPS coordinates of the location should be documented within a photographic series using a photo placard or photograph of the actual GPS unit unless the camera is GPS-enabled.

5. **Avoid using smartphone cameras.** Smartphone cameras should not be used because photos taken on these devices tend to be easier to manipulate, delete, and accidentally tamper with. Therefore, it is recommended that field personnel be equipped with dedicated field equipment such as a GPS-enabled digital camera or a GPS and camera used together.

The digital data should be kept as an "original" unopened, immutable file copy in its evidentiary form that is maintained securely. There are multiple ways in which "original" files may be captured, stored, and preserved for evidentiary purposes during an oil spill. The original, unaltered memory card or drive can be stored in a secure location. Alternatively files can be directly transferred to another physical media, such as a designated secure hard drive or other device or non-rewritable CD or DVD, or transfer to a secure cloud-based system - the critical point being to securely maintain data identical to that which was captured on the original device. A secure cloud-based system eliminates the dependency on external media, its storage, and inevitable inability to be accessed as it ages and technology changes. Each individual should consult his or her agency's guidelines - or the guidelines of the receiving agency - when selecting a means to transfer and store data.

To copy digital media onto a non-rewritable CD or DVD. Digital files are transferred directly to a data CD or DVD using a computer equipped with a disk recording device. At least two disk copies are made and each is viewed to ensure that the data were transferred. Disks are labelled with indelible ink or a proper adhesive label to clearly identify the source of the data and are stored in a secure location.

If a means of creating unaltered copies is unavailable or a device does not have a memory card, keep the memory card or device in a secure location and contact a supervisor or team/group leader for further instructions. After digital files are preserved in the designated evidentiary form, the user should follow agency policy or guidance related to creation of "working" copies and reuse of memory cards or devices. Such instructions are subject to vary among spills and government agencies.

3.4.4. Documentation of sea turtles

During response to an oil spill, sea turtles may be encountered by three general groups of response personnel (depending on the size and location of the spill): 1) stranding personnel that respond to and document turtles that are found on or near the coastline; 2) personnel participating in directed at-sea wildlife operations (surveys, directed capture, and rescue of oiled animals); and 3) field personnel (including protected species observers) that opportunistically encounter turtles during the course of other operations (e.g., skimming/booming vessels, *in situ* burns, SCAT teams, shoreline assessments, beach clean-up). Personnel must be informed about what to do in the event a sea turtle is encountered, especially any that are oiled, dead, injured, or otherwise debilitated. In particular, sea turtle response personnel should coordinate with other wildlife operations personnel to ensure efficient response efforts and information sharing across taxa. In addition, documentation of sightings and observations of sea turtles, including location, whether oiled or non-oiled, and state of the turtle is important. Workers

See Appendix 5, **pg. 119**

should have access to an efficient information reporting system and basic data collection forms. Moreover, this information must pass efficiently to the appropriate channels of wildlife operations in order to ensure the information is recorded and any necessary response is undertaken. Data forms and protocols designed for personnel performing various functions during spill response are provided in the appendices.

See Appendix 7, **pg. 137**

3.4.5. Collecting external samples of oil or suspicious material

An external sample should be collected from any sea turtle that is visibly oiled, that smells of oil, or has any substance on it that is suspected to be oil or other material of interest for a spill. In general, samples are not collected from non-visibly contaminated sea turtles during a spill involving heavier, readily visible chemicals, such as crude oil. For a spill involving transparent petroleum products, such as lighter or refined fuels, all observed sea turtles may be sampled. Two general types of material can be used: wooden tongue depressors or gauze (Teflon™ or cotton). Tongue depressors generally are only used if there is a large quantity of oil present. Gauze is used for any amount, including collection of limited quantities of material. Ideally, sample kits with materials that have been specifically prepared are used to minimize interference with analyses (i.e., certified glass, Teflon™ sampling pads), *especially when sampling trace material*. These high-grade kits typically are prepared in a laboratory prior to use. However, adequate samples can also be collected using off-the-shelf components (aluminum foil, cotton gauze, sealable plastic bags) if the sample includes globs or heavy pastes of suspect material. Important considerations for sampling include wearing proper PPE, decontaminating any non-disposable instruments or other materials between uses, and following COC procedures (see Appendix 12).

3.4.6. Stranding response

See Appendix 8, **pg. 139**

Response to an oil spill in areas inhabited by sea turtles typically entails some degree of enhancement of regular stranding response operations, including more rapid response to and reporting of stranded animals, use of more detailed documentation protocols, implementation of evidence handling procedures, and recovery and retention of carcasses that might typically be left in the field. In addition, some locations may require dedicated surveillance effort for detection of stranded turtles in addition to that considered part of usual (i.e., non-spill) network operations.

The implementation of enhanced stranding response protocols required during a spill response is communicated to responders and directed by the Wildlife Branch within the Operations Section of the UC, working at the direction of the Federal or State On-Scene Coordinator. This communication may occur through Wildlife Branch personnel working remotely or on-site in the Command Post. Specific activation and demobilization procedures are required by the UC in order for stranding responders to participate in an oil spill response. Multiple governmental and non-governmental organizations and individuals may comprise the network of stranding responders for a given area.

Logistical and procedural considerations related to stranding response during an oil spill

Stranding response procedures and capacity

During an oil spill, the regional stranding network typically is engaged in response activities because network members are located nearby the spill and are familiar with their response area. Stranding response is enhanced during a spill in order to increase the likelihood of sea turtle survival and also to obtain information about the potential effects of the spill, which is relevant to both the spill response and NRDA. This enhancement may include additional documentation (including use of COC procedures), training and appropriate use of PPE, collection of oil from oiled turtles, increased collection of carcasses, and more rapid reporting. This increased effort may require additional dedicated personnel, especially if human safety concerns and training requirements (e.g., HAZWOPER) limit or prevent involvement of some participants. All response protocols related to stranding response must be communicated to responders; typically this is done through the state, regional, or national sea turtle stranding coordinator.

For any stranded sea turtle, determination of whether impairment or death was related to an oil spill (or response activities) often is deferred[2] until response has been concluded and all available data are evaluated. Considerable time and effort are required to investigate all possible links between strandings and potential spill-related effects. Therefore, if effects on sea turtles are a concern, the extra response and documentation requirements implemented during an oil spill typically are applied to all strandings during a response, regardless of whether or not turtles are visibly oiled. Historical stranding data should be reviewed at the onset of a response in order to gauge the minimum number of animals that may be documented, as well as where and when strandings typically occur, so that the necessary human and physical resources can be allocated effectively.

Although field disposal of sea turtle carcasses is commonplace under regular operations in some areas, during an oil spill, all sea turtle carcasses are collected from the response zone, if feasible, regardless of whether they are visibly oiled. Collection of dead turtles facilitates any necessary subsequent examination, prevents duplicative reporting of animals, and removes any contaminating substance on or within the carcass from the environment. Unified Command must approve any disposal of carcasses in the field or decision not to salvage carcasses.

In addition, it is common practice during an oil spill that all collected sea turtle carcasses from within the spill zone are examined (necropsied) to the extent afforded by postmortem condition. Carcasses within a spill zone, especially decomposed animals, may be frozen for later examination due to logistical constraints and to maximize preservation. Therefore, adequate freezer space must be available. The necessary capacity can be gauged by examining historical stranding numbers and budgeting space accordingly. Minimally, contingencies should be in place for temporary freezer capacity for a worst-case scenario. Legal counsel within the UC should be consulted regarding requirements (related to spill

[2]An exception is injuries or deaths of wildlife caused by response-related activities. Immediate consideration by the UC may lead to alteration of current practices under the Incident Action Plan to minimize harm from the response activity.

response) for preservation of remains following examination. In addition, the NOAA General Counsel's Office (Natural Resources Section) and the DOI Office of the Solicitor (Environmental Restoration Branch) should be consulted for preservation requirements associated with NRDA, which may apply to samples and other data or materials created or collected during response. See Subsection 3.4.1 for additional information on legal requirements to preserve samples, information, and documents.

Sparsely or irregularly surveyed locations

Remote areas (e.g., uninhabited islands or coastline) may not be surveyed regularly by networks and may require dedicated patrols by response personnel or other means. It is important to note that aerial surveys by manned aircraft that are commonly used to look for stranded marine mammals only detect larger sea turtles (>45 cm carapace length). Such surveys are inadequate for detection of stranded sea turtles in many areas because a significant number of turtles are too small to be reliably seen by air and are easily obscured by shoreline debris. If surveys by foot or all-terrain vehicle (or similar) are impractical for detection of smaller stranded turtles, other aircraft and UAVs that can fly lower and with less speed, if permissions allow, are another consideration.

Alignment of reporting mechanisms

Stranding networks have 24-hour response hotlines for the public to report stranded turtles. These phone numbers generally are widely advertised and well-known in coastal areas where sea turtles occur. Many animals are reported by the public, especially in areas were the coast is inhabited or regularly visited by people. It is common for spill response operations to set up a dedicated call center for reporting oiled wildlife. Multiple phone numbers and call centers can result in loss of information and delay response to stranded animals. If new hotlines are created, information must pass efficiently to members of the stranding network or other appropriate designated responders. Likewise, information collected from existing hotlines must be communicated expediently to the UC.

Data collection and summaries/analyses needed for response

The regular operations of the stranding network provide important information for assessing spill-related injuries to sea turtles, including documentation of the timing and locations of strandings, life history information, presence or absence of visible oil, and any obvious external abnormalities. Additional information is collected from live or dead turtles that are transported for clinical evaluation or necropsy. The Wildlife Branch typically requires daily reporting of turtle numbers, including the number of visibly oiled turtles and status (live or dead). These data also are accessible for NRDA purposes. During the preliminary reporting phases, sea turtles are classified as visibly oiled or non-visibly oiled. The designation of non-visibly oiled does not imply lack of exposure, especially for a spill of lower viscosity oil products.

Funding considerations for stranding response organizations

During an oil spill, funding may become available to cover certain costs of a stranding response once an entity (organization or individual) is activated by the Wildlife Branch. The RP may contract with members of the stranding network for assistance in responding to a spill, or funding may become

available through the UC via the NPFC administered by USCG. If funding is provided, the Logistics Section or entity making payments (i.e., the RP), will likely require specific procedures for cost documentation.

If a NRDA is pursued for a spill and a stranding network participant's activities would support the NRDA, and the participant is not receiving compensation from a RP or UC (no contract was entered or it has ended, e.g., after the official spill response concludes), certain costs associated with stranding response activities may be eligible to be reimbursed by the natural resource Trustees pursuant to OPA. The commitment to reimburse stranding network participants for activities in support of the NRDA is determined solely by the natural resource Trustees (e.g., NOAA and DOI). The Trustees will notify stranding network participants of potential assessment needs. Stranding network participant(s) should reach agreement with the relevant natural resource Trustee regarding details concerning reimbursement (including activities eligible for reimbursement and the amount of reimbursement) prior to performing reimbursable activities.

3.4.7. Live turtle intervention

De-oiling and rehabilitation facilities

Area rehabilitation facilities are alerted by their state or regional coordinator if a spill is identified within their geographic response area. A link to a current list of rehabilitation facilities by state or territory is provided in resources listed in Appendix 1. Most rehabilitation facilities are operated by private entities and non-governmental organizations, thus the Wildlife Branch within the ICS must work closely with each facility's representatives and internal administration to ensure that activities are linked into and supported by the UC. In addition, specific federal or state agency staff coordinate rehabilitation facilities either regionally or by state. The Sea Turtle Group within the Wildlife Branch will either include these individuals or will work closely with them to identify the facilities that are most likely to receive animals.

See Appendix 11, **pg. 157**

Organization of rehabilitation facilities

For the purposes of oil spill response, rehabilitation centers are designated by Wildlife Branch as either primary or secondary facilities. Primary facilities are defined as those that actually wash oil from sea turtles and thus are equipped with appropriate hazardous waste disposal facilities on site, site safety plans, and other requisite safety measures in place. In addition, staff are required to have the level of HAZWOPER or other training dictated for a spill. Primary facilities also must be staffed to meet the demands of response operations. For example, on-water recovery operations may not return with animals until the late afternoon or evening. *For these reasons, primary facilities should be identified and prepared as early in response as possible.* This consideration is especially important for a spill involving inshore areas or if any operations are deployed that may collect oiled turtles, such as directed captures, as these circumstances are most likely to imminently yield animals requiring care. Secondary facilities are those that receive de-oiled turtles for subsequent rehabilitation - they play a vital role in maintaining capacity at primary facilities for incoming oiled turtles. Secondary facilities also may be used to temporarily hold animals prior to release and for rehabilitation of turtles without visible oil exposure that strand within the response zone. Facility location relative to the spill area and willingness and ability to serve as a primary facility are factors that influence designation of specific facility roles. It can be

challenging to predict sea turtle impacts from a spill and to appropriately scale preparations of care and treatment of oiled turtles. At least one primary facility should be identified within a spill area to care for oiled sea turtles.

Primary facilities are organized by a facility plan according to contaminant zone designations to minimize exposure of people, animals, and equipment to hazardous materials. Oiled sea turtles are admitted into the *exclusion zone* "hot or red zone" for evaluation and decontamination. Washed animals that may still have some oil on them or are defecating oil are maintained in the *reduction zone* "warm or yellow zone." Once turtles are believed to be decontaminated, they transition to the *support zone* "cold or green zone" for the remainder of their care. Standard PPE requirements are defined for each zone. Secondary facilities only receive non-visibly oiled and fully decontaminated (i.e., "green zone") sea turtles; therefore, they do not require these hazardous material measures and procedures.

Equipment necessary for de-oiling and hazardous waste containment usually is provided by response operations. Oiled turtles will continue to pass ingested oil in the feces, so they are most easily maintained initially by conducting water changes (dump and fill) to avoid contaminating filtration systems. It may take a week or more for animals to stop defecating visibly detectable oil observed as a sheen on the tank surface or film on the sides of the tank walls. Therefore, a large capacity waste water collection system, with regular removal and replacement, is needed even for small numbers of turtles. In the initial phases of response, water can be collected into large plastic drums, which are readily available, until facilities transition to a more efficient collection system.

Remote locations and portable facilities

Temporary or portable facilities may be required for areas that are remote or otherwise do not have brick-and-mortar rehabilitation facilities. In these situations, animals are stabilized and decontaminated to the degree possible and transported to the closest facility for further evaluation and care. Minimally, facilities should be equipped with the following (in addition to staffing): 1) means of capturing or disposing of contaminated wastewater or materials; 2) appropriately-sized, temperature-controlled (as needed) tanks for housing turtles; 3) materials and instruments for decontaminating sea turtles; 4) medical supplies for stabilizing animals and treating immediately life-threatening conditions; 5) field diagnostic equipment (capability of measuring packed cell volume, total solids, blood gas, and basic blood chemistry parameters); and 6) an uncontaminated salt water source (natural, artificial, or imported). The field unit should include an experienced sea turtle veterinarian to oversee stabilization and any necessary triage. It is recommended that additional specific preparations be included in ACPs where portable facilities may be needed.

Care and treatment of live oiled turtles

Field

In many instances, oiled turtles encountered in the field are brought into captivity to be cleaned and for medical care. There are some exceptions that depend on the specific circumstances of each spill. For example, nesting females and other large turtles are not typically captured unless they are obviously impaired. Also, turtles that are very lightly oiled (see Box 3-2), but otherwise apparently normal, may be

cared for in the field unless there is a clear benefit to bringing them to a facility. The decision whether or not to capture turtles typically is based on the magnitude of the threat posed by a spill (which likely varies among life stages), environmental conditions (i.e., the stage of the response, how much oil remains in the water, etc.), and the condition and behavior of the animal.

See Appendix 10, **pg. 156**

Many oiled turtles are initially documented by stranding responders and personnel with turtle expertise that are deployed for wildlife rescue operations. These individuals also take external evidentiary samples of the substance and may transport the animal(s) to a care facility. If the animal will receive care within a few hours or less, the turtle is sheltered from environmental conditions and transported in a manner that abides by the parameters provided in Appendix 10. If transport is delayed (e.g., day-long operations, multi-day deployments), it is preferable to remove as much of the substance from the animal as possible in the field in order to minimize continued exposure. A large amount of oil can be removed using oil-absorbent pads; therefore, operations should be equipped with the necessary PPE and cleaning materials. Additional medical evaluations may be warranted in the field and can be especially relevant to injury assessment. For example, during the DWH spill, physiological derangements were evident in clinical chemistry analyses of oiled turtles, but physiological changes resulting from handling and transportation to animal care facilities complicated interpretation (Stacy et al. 2017). Measurement of health parameters upon capture (i.e., using point-of-care analyzers) could provide an immediate measure of any physiological effects of oiling without the confounding effects of subsequent handling and transport.

See Appendix 5, **pg. 119**

Personnel involved in various types of operations, but without training in the care and handling of sea turtles, also may encounter sea turtles and have the opportunity to capture oiled, debilitated animals for treatment. In these situations, the primary objectives are safe capture (if possible) and handling of the animal, immediate notification of the Wildlife Branch to coordinate transfer to an appropriate wildlife responder, and documentation of the event. Non-wildlife response personnel that may encounter sea turtles should be provided with clear and relatively simple protocols, as well as appropriate collection equipment.

Medical facility

See Appendix 11, **pg. 157**

Admission procedures and records

Within an area defined as the response zone, procedures for documentation must be followed for all recovered sea turtles, including those that are not visibly oiled. Upon admission, a COC Form is initiated or passed to a representative of the care facility. For turtles recovered by stranding responders or field personnel, the appropriate field data form should also accompany the animal. The care facility reviews all forms and completes any missing data fields (e.g., body weight, measurements). The COC is reviewed to ascertain whether: 1) an evidentiary sample of any external material has been collected and 2) dorsal and ventral photographs have been taken. If not, then a sample should be collected as per the protocol in Appendix 8. Unless otherwise directed by UC, all evidentiary samples collected or received with turtle are kept by designated facility staff under the pertinent COC. A Live Oiled Sea Turtle Intake Form is completed by the care facility for each animal and retained with the medical record. This form

contains important questions specific to oiling and general condition of sea turtles. Appendix 11 includes a simplified outline of these admission and documentation procedures.

In addition to the Intake Form, the rehabilitation facility's standard forms for stranded sea turtles and medical records system can be used to record physical examination findings, laboratory values, treatments, and feedings, provided that all information is clearly documented and assigned to each specific turtle. The importance of complete medical records cannot be over-emphasized as they are viewed as potential evidence for legal purposes. Whenever medications are administered, the name of the drug, dose, and route (oral, subcutaneous, intramuscular, intravenous) should be recorded, as well as the initials of the person who administered the medication. Any notation of care or treatment administered needs to be initialed by the provider or otherwise be traceable digitally.

Identification of individual sea turtles is important and can be challenging if large numbers of animals are admitted. Any identifier assigned by a facility should be clearly cross-referenced with the identifier assigned on the COC (e.g., stranding network number, field ID). Individuals can be temporarily identified using a waterproof marker on the carapace or Tyvek® flipper band (Figure 3-5). Admitted turtles may receive metal flipper and Passive Integrated Transponder (PIT) tags pursuant to usual facility operating protocols under non-spill conditions. Clinical stability and need for individual identification are considered when determining timing of tag placement relative to other procedures. Aseptic technique shall be practiced for all tagging procedures and tagging shall only be performed by trained, permitted individuals. If insertion of a PIT tag is delayed, the temporary markings or bands must be maintained and replaced as necessary to ensure that individuals can be specifically identified until they receive more permanent tags.

Physical examination - A brief physical examination is performed upon admission. A veterinarian or animal care specialist familiar with sea turtles should conduct the evaluation and identify conditions that are considered to be life threatening. The capture, transport, and intake process can be stressful and an oiled animal's condition may be unstable. The intake area should be as dark and quiet as is practicable, and animals must be monitored during the examination and intake process. If an animal's condition deteriorates and a veterinarian is not participating in the examination, the animal care specialist should seek appropriate veterinary advice immediately. An intake protocol adapted from the system used by the Audubon Nature Institute is provided in Appendix 11. This protocol is based on experience with over 100 oil-exposed sea turtles treated during the DWH spill.

Figure 3-5. Use of temporary identifiers to keep track of individual turtles. Arm bands and tags must be monitored to ensure they are not causing abrasions. Waterproof paint markers are a good option, but to maintain legibility must be replenished as they wear.

A thorough examination of the entire body is conducted, making note of the degree and nature of oil contamination. Oil may have been removed in the field (this should be noted on the field form accompanying the turtle). Behavior, activity level, and alertness are assessed. Veterinary assistance is provided for any turtles that are lethargic, having difficulty breathing, or if there is froth or fluid discharge from the nostrils (indications of aspiration). Respiratory rate and body temperature are recorded. Hyperthermia or hypothermia is a significant concern in oiled turtles, depending on environmental conditions, thus body temperature may be measured using either a cloacal thermometer or digital, infrared laser thermometer aimed at prefemoral or prescapular areas. Temperatures above 88-90°F (30-32.2°C) or under 50-55°F (10-15°C) indicate the need for immediate treatment. This may include gradual warming or cooling of the animal, fluid therapy, and other medical intervention by a qualified veterinarian. Evaluate overall body condition (eyes, soft tissues of the neck, condition of the plastron) and assess the presence of epibiota. Unlike mammals, hydration status is not easily assessed in sea turtles, and most likely will require a combination of physical examination and evaluation of blood values.

The eyes and mouth are carefully examined; noting any oil. Most sea turtles will open their mouths if the gular area and sides of the upper beak are retracted. Be careful to avoid being bitten and do not attempt this if unfamiliar with sea turtles. Using a flashlight or other light source, look for any oil within the oral cavity, pharynx, and upper esophagus. Mouth gags, medical speculums, tooth brush handles, Nylabones®, or padded PVC pipe can be used to facilitate oral examination and removal of oil or tar. Examine any feces for presence of oil (sheen produced following exposure to water).

Diagnostic evaluation - The priority of live sea turtle intervention is to ensure recovery and eventual release, thus medical care should be provided as with any other sea turtle patient. *No aspect of oil spill response procedure (or any requested sampling) should jeopardize the health or welfare of sea turtles under care.* Any procedure or test necessary for diagnosis and optimization of care is available to the attending veterinarian (including imaging, blood analyses, etc.). The minimum clinical data collected from all oiled sea turtles should include standard hematology and blood chemistry. Blood gas analyses (i.e., measured using a point-of care analyzer) and dorsoventral and craniocaudal radiographs (with additional projections as indicated) also may be of value for initial stabilization and detection of any abnormalities.

Hematology and blood chemistry should be analyzed upon admission (if sufficiently stable) and as frequently as indicated by clinical assessment. The preferred anticoagulant for reptile plasma chemistry is lithium heparin (green-top tube). Blood films can be made from either freshly collected blood (without anticoagulant) or from whole blood in lithium heparin. A minimum of four blood films are made per animal; two are left unstained. Standard blood parameters measured in sea turtles for clinical evaluation include the following: complete blood cell count (CBC), packed cell volume, hemoglobin concentration, an estimation of white cell blood count, red cell blood count, and morphological evaluation of cells (using a blood smear). Analytes included in a standard plasma chemistry profile include: glucose, urea nitrogen, total protein, aspartate aminotransferase (AST), albumin, calcium, phosphorus, sodium, potassium, chloride, globulin, creatine phosphokinase (CPK), and uric acid.

Special biomedical sampling for spills - At times, protocols may be provided for additional blood samples for other tests (e.g., immune function assays, serum protein electrophoresis, polycyclic aromatic hydrocarbon (PAH) analysis). Other biomedical samples (e.g., urine sample, fecal sample, microbiological culture, skin biopsy) may also be collected at the discretion of the attending veterinarian or opportunistically, provided that samples are documented and handled as described in Appendix 6.

Decontamination - It is anticipated that most stable turtles will be washed soon after an immediate examination is performed; however, the attending veterinarian or animal care specialist will evaluate the condition of each animal and may provide any necessary initial therapy, such as supportive fluids and ophthalmic medications prior to washing.

Washing procedures are similar to those described for other taxa. A key exception is that cooler water temperatures (not to exceed 80-85˚F) should be used and water temperatures should be within 5˚F of the turtle's body temperature to avoid sudden changes. Depending on the situation and animal numbers, risk of hyperthermia should be considered and body temperature monitored as necessary. Liquid dishwashing detergent (Dawn® is a commonly used product) is effective for removing oil from the body. Vegetable oil can be used to remove oil from the eyes and mouth. Mayonnaise also can be used to clean the mouth. Soft scrub brushes, toothbrushes, cotton swabs, and gauze are all helpful tools for removing oil. Oil is removed from the mouth and upper esophagus using gauze and forceps. Thorough cleaning of the mouth may be difficult or impossible for energetic, refractory sea turtles. Consult the attending veterinarian before stressing animals with repeated cleaning efforts.

Medical treatment - Following physical oil removal, medical treatment of oiled turtles is at the discretion of the attending veterinarian and may include fluid support, oral administration of emulsifying agents (e.g., mayonnaise and fish oil) to remove oil from the digestive tract (see Appendix 11), and antibiotic therapy. Activated charcoal is not recommended because it poorly absorbs most hydrocarbons and administration creates additional stress and risk of aspiration.

Monitoring and rehabilitation - Animals should be regularly monitored during the rehabilitation process. All clinical, feeding (food consumption and/or preferences), and behavioral observations should be described in the medical records. Body weight should also be monitored repeatedly during rehabilitation and recorded, at a minimum, upon admission, at some point during rehabilitation, and prior to release. It is recommended that plasma electrolytes and hydration be closely followed during the initial week of rehabilitation. Furthermore, electrolytes should be closely monitored (every two days at minimum) if animals are temporarily placed into lower salinity (e.g., 16 ppm) or freshwater conditions for any reason.

Oil may damage the skin of sea turtles and may cause injury to other areas of direct contact, such as the eyes. Organ injury, including damage to the lungs and liver, has been inconsistently observed, but also is a concern and may depend on the characteristics of the spilled material and route of exposure. Repeated radiographs and blood work, at least within the initial two weeks of care, is recommended to detect any delayed effects. Other health problems of concern that may require treatment include opportunistic infections and other commonly encountered secondary problems in sea turtles, especially pneumonia.

Release - The decision regarding when and where to release a rehabilitated, previously oiled sea turtle or group of turtles is based on a number of factors, including species, life stage, time of year, and circumstances of the spill. In most instances, it is desirable to return an animal as close to its location of origin as possible; however, other biologically appropriate alternatives may be selected if a location remains under threat from a spill or if the turtle(s) is of a transitional life stage that has been interrupted by captivity. Once a sea turtle is medically cleared, it is released as soon as logistics allow. Release locations and release timing for a rehabilitated sea turtle(s) are coordinated with NOAA-NMFS and the USFWS, and/or other appropriate government entity. A Release Plan should be drafted, reviewed, and signed by agencies and the UC if needed.

See Appendix 13, **pg. 177**

3.4.8. Postmortem examination (necropsy)

Postmortem examinations (necropsies) are performed on sea turtles that are found dead, or that are recovered alive from within the spill response area and subsequently die. These examinations facilitate understanding of the effects of the spill on sea turtles, which benefits the clinical care of live affected turtles and yields important information for NRDA. Moreover, much of the information and samples obtained by necropsy cannot be collected from live animals. Necropsy procedures and findings from an oil spill are subject to considerable legal scrutiny, thus examination of oiled sea turtles (or those suspected to be oiled) is to be performed by a veterinary pathologist identified by NOAA-NMFS. Depending on the circumstances of the spill, similar considerations may also apply to necropsy of any non-visibly oiled sea turtles found within the response zone. A gross necropsy data form and sample checklist are provided in Appendix 12. Postmortem condition influences the extent of examination and sampling. In general, if specific organs or tissues are recognizable, then they should be sampled according to the protocol. For all examined animals, a final report is generated that includes gross findings, histological findings (if postmortem condition permits), results of any diagnostic testing, final diagnoses, cause of death determination, and any comments related to interpretation of findings and conclusions.

See Appendix 12, **pg. 169**

Each examination is carefully photodocumented using the protocol provided in Appendix 12. A photo placard is made for each case (e.g., using a dry erase board or similar) that includes the turtle's alphanumeric identification, species, date, name of the examiner, and time that the examination begins. This placard is photographed at the beginning and end of each examination in order to clearly demarcate the photographic series for each case. All parts of the body are photographed, including complete images of the dorsum, ventrum, an oblique photo showing the neck and shoulder region, and a ventral photo with the plastron removed to demonstrate nutritional condition. Any oil or suspicious substance found externally or

Figure 3-6. Ingested oil covering the esophagus with its conical papillae (Kemp's ridley turtle).

internally is photographed prior to sampling. Oil tends to adhere to any keratinized epithelium, thus it frequently will coat the mouth or esophagus if ingested (Figure 3-6). Photographs are taken of any injuries or other abnormalities, beginning with a wide angle perspective to show anatomical orientation and progressing to close-up images.

Postmortem samples collected for petrochemical analyses require care to prevent cross-contamination or interference with chemical analyses. It is best to have a clean pair of forceps and a clean scalpel handle (or syringe, as appropriate) for each tissue or fluid that is collected for petrochemical analysis. Instruments should be cleaned with detergent followed by an alcohol rinse between animals (and between samples if reused for the same case) as described in Appendix 12. Contact between nitrile gloves and samples, instruments, or the insides of lids and containers must be avoided because it may interfere with chemical analysis. Fluids (e.g., bile, blood, urine) are collected using glass syringes (also cleaned as described between cases) and disposable needles.

Two general types of sampling containers are used, certified glass jars (preferred) meeting the U.S. Environmental Protection Agency's Specifications and Guidance for Contaminant-Free Containers (EPA Publication 9240.0-05A; EPA540/R-93/051) or aluminum foil pouches (solid samples only) placed into plastic bags. Conventional aluminum foil available from home supply stores can be used. The dull side of the foil should be in contact with the sample and the foil is folded to completely cover the tissue and prevent any contact with the plastic sample bag. Samples are stored at the lowest temperature available. Ultralow (≤-40˚C) storage is preferred, but samples can also be preserved in conventional freezers (-20˚C). The samples listed in Appendix 12, the container types, and the method of preservation allow a variety of analyses to be conducted related to exposure to oil, dispersants, and other potential mortality sources of interest (e.g., biotoxin analyses). Any additional sampling that is required for diagnostic purposes is permitted as long as samples are documented and preserved as previously described (and coordinated with UC). Additional types of samples or means of preservation may be requested as part of the injury assessment based on specific conditions of a spill.

3.4.9. Nesting beach activities

Much of the following information is most pertinent to areas were sea turtles primarily nest at night and eggs are left in place to develop and hatch, which is the case in most areas of the U.S. and its territories. A notable exception is Kemp's ridley nesting in Texas, which occurs in the daytime and requires additional considerations with regard to oiling of beaches and shoreline clean-up operations.

See Appendix 14, **pg. 179**

Nesting monitoring and data collection

Monitoring programs exist in many areas where sea turtles nest within the U.S. and its territories (See Appendix 2). These areas include most beaches where regular nesting occurs; however, daily surveys are generally not conducted in remote locations or beaches where sea turtles rarely nest.[3] These areas are generally on the periphery of the nesting range of the species. For locations where established

[3]Including parts of the northern Gulf of Mexico, Hawaii, Guam, Mariana Islands, U.S. Virgin Islands, Virginia.

programs do not exist, the Sea Turtle Group may be required to devise nesting monitoring capability if such monitoring is required in the event of an oil spill.

There is no universal standardized data form in regular use, but most programs collect similar information, including where and when turtle nesting activities occur (e.g., daily number of nests and number of non-nesting emergences [by zone or by specific location]) and fate of nests, including an estimate of the number of hatchlings that successfully emerge from the nest and reach the sea. A draft nest monitoring form for use during oil spill response and for NRDA purposes in provided in Appendix 13. After hatchlings emerge from the nests, the overall success of the nest, or more commonly, a subsample of nests, is determined by examining the nest contents and estimating hatching and emergence success. This evaluation may also include determination of the timing of embryonic death and documentation of any deformities or dead embryos by qualified individuals. These types of information, as well as any observations of nesting turtles, their eggs, or hatchlings being negatively affected by oil exposure or response activities, should be documented. (See Section 3.4.1 for general considerations).

Protection of eggs and hatchlings in situ

If a spill occurs during the nesting season and near a nesting beach, responders should, if possible, identify locations of nests already laid and begin a dedicated daily marking program to mark all subsequent nests. These practices are employed to prevent beach clean-up activities from harming nests (e.g., sand compaction by vehicles or increased human presence, sand sifting, removal of beach sand/oil) and to detect any nests that are later oiled. Sub-meter GPS readings should be taken at the approximate clutch location. Nest locations should be marked prominently and fenced or roped off to alert personnel and to avoid physical damage. Additional marking procedures such as triangulation should be implemented so nest markers can be re-established if necessary. If there are stretches of beach where unmarked incubating nests are present, the use of heavy equipment for clean-up operations should be avoided and manual clean-up operations should be employed to the maximum extent possible.

Protection efforts also should minimize risks to nesting females and hatchlings posed by beach obstructions and artificial lighting. Very large ruts or holes (~ 8 cm or deeper) should be filled prior to sunset to avoid entrapment of sea turtles. In addition, daily rut removal (following completion of response activities and immediately prior to sunset) should be implemented on the beach seaward of nests that are due to hatch to ensure that hatchlings do not become trapped. The use of artificial lights on sea turtle nesting beaches during sea turtle nesting and hatching season should be minimized to the maximum extent practicable, and clean-up activities should be limited to daytime hours whenever possible. If lights are necessary, they should be used in accordance with well-established guidance for lighting practices that avoid disorienting hatchlings and deterring nesting females (Witherington et al. 2014). Lights should be full cut-off and shielded to direct light onto the work area and minimize visibility along the beach.

When the duration of the egg incubation period for nests has reached its expected end – i.e., typically 40-60 days, depending on species and incubation temperatures (Ackerman 1997) – experienced

ESA-permitted personnel may be required to monitor the nest throughout the duration of the clean-up operations on that beach, especially at night, to protect emerging hatchlings. If hatchlings must be intercepted (e.g., to avoid immediate threats), cages can be placed around the expected site of hatchling emergence by experienced, permitted personnel. Cages must be monitored regularly throughout the night and day in accordance with permit requirements.

These measures are captured within BMPs related to nesting beaches (see Appendix 15) that should be incorporated into the Incident Action Plan (IAP) for response activities when feasible. Resource advisors from the Environmental Unit should be made available to ensure clean-up crews follow the BMPs.

Protection of eggs and hatchlings ex situ

Translocation of eggs from *in situ* nest sites to unoiled locations may be necessary under some extreme circumstances, namely when oiling of nesting beaches is inevitable or if hatchlings will likely enter an oiled environment after leaving their natal beaches. In these cases, several important logistical factors must be addressed to ensure that eggs will complete incubation as successfully as possible, including safe and careful handling of eggs, means of transport of eggs, and environmental conditions at the translocation site. The logistical support required for such efforts can be substantial. If translocation is deemed necessary, eggs should either be exhumed within 12 hours of deposition (or by 9:00 am the morning following deposition) or left to incubate in the natal beach until very near hatching to allow embryos to develop naturally. These timing considerations are important because developing embryos are most sensitive to movement, which can result in mortality after around 4-8 hours following laying through late development (Miller 1997). To mimic the natural genetic differentiation related to nesting locations, hatchlings should be released as close to their natal beaches as conditions allow, provided these areas are suitably free of oil.

Nesting female considerations

Nesting females may become oiled either as a consequence of encountering oil at sea or while crawling through contaminated areas on the nesting beach. Most sea turtles nest at night when very few monitoring programs operate, thus few encounters with nesting females are expected in most situations. Depending on the size, location, and season of the spill, response may consider increasing nighttime nest monitoring, and, when possible, coordinate with active nighttime female tagging operations. Kemp's ridley turtles are an exception to night nesting. They primarily nest during the day on beaches in the western Gulf of Mexico and must be considered as part of the oversight of beach clean-up operations in Texas.

Oil may be sampled from oiled nesting females to inform the UC's assessment of wildlife effects and NRDA. Such sampling is done following nesting (so as not to disrupt the process) using oil-absorbent materials and appropriate PPE. Additional oil may be opportunistically removed from more heavily oiled females to reduce their exposure. Due to the large size of nesting females and the potential for unintended consequences resulting from disruption of their reproductive cycle, further intervention (e.g., capture and transport to a rehabilitation facility) is generally reserved only for oiled females that are unable return to the water on their own and are thus considered stranded.

3.4.10. Directed capture

Operational procedures, process for establishing search areas

See Appendix 9, **pg. 150**

Initial surveys of oil within offshore areas require a vessel with a raised helm in order to provide adequate opportunity for sighting sea turtles. If operations escalate to deployment of directed capture crews, additional vessel specifications must be considered. For directed capture of oceanic juveniles, 30-58' vessels with a raised helm (tower), an enclosed cabin or ample shade, and a cruising speed of greater than 20 knots provide a good working platform. A pulpit is useful for netting. Sportfishing vessels typically have the ideal attributes and maneuverability required to sight and capture turtles, are safe, and transport rescued animals with the necessary expediency. For operating in inshore areas, smaller vessels of appropriate draft may be used, but should also have a raised helm or sighting tower, ample shade or cabin space, and the ability to cruise at speeds necessary to efficiently reach and work in target areas (typically greater than 20 knots).

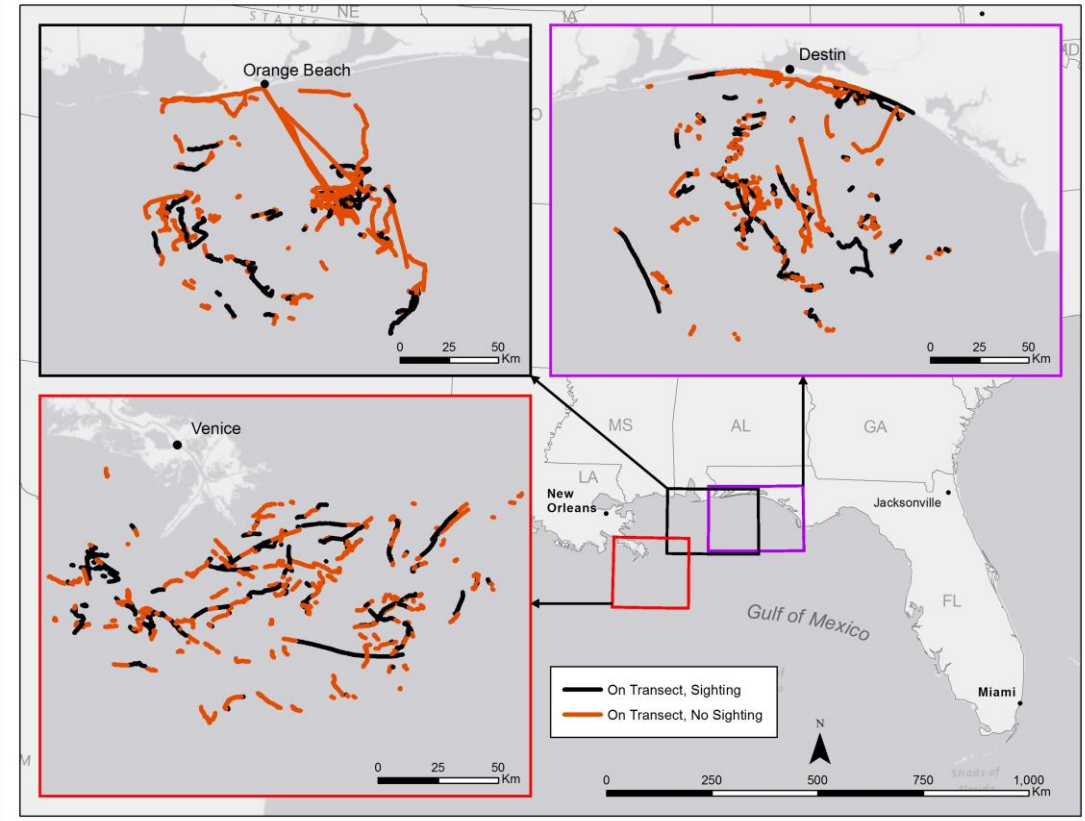
Direct capture crews should include at least two individuals with experience capturing and handling turtles in addition to the captain and a mate (if required). A veterinarian also may be included if spill conditions dictate the need for medical evaluation and treatment in the field. A list of specific equipment necessary for deployment is provided in Appendix 9. All vessels should be equipped with a GPS, as vessel tracks must be recorded and search effort documented (Box 3-2). As discussed under Subsection 4.2.2, directed capture efforts should follow standard transect sampling methodology, which allows later analysis to estimate the total number of turtles exposed or injured by the oil spill. All crew should clearly understand operation rules and objectives, including animals/habitat to be targeted and any constraints related to capture (e.g., limitations on pursuit of turtles that actively evade capture). Data sheets for sea turtle sightings and captures are provided in Appendix 9. In addition, the crew leader for each vessel should keep a daily written log that includes the time of deployment and return, general conditions at-sea (especially as related to observations of the spill), and any additional wildlife observations of note (including time and location).

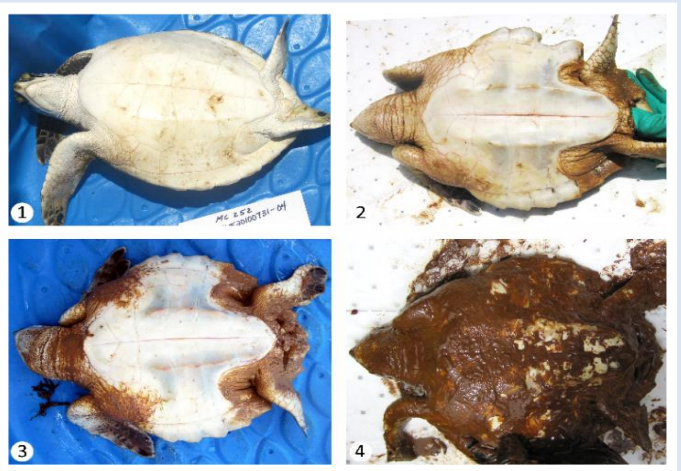
The size of the spill will dictate the number of vessels required. Search efforts should focus on the most heavily oiled areas, but survey of the spill area should be conducted as completely and as frequently as possible. The longer transit times required to reach offshore areas should also be considered when planning and scaling effort. The strategy for deployment of vessels often relies on information from websites that report oceanographic conditions (e.g., probable location of convergence fronts), field reports of oil location, and aerial reconnaissance. Locating suitable search areas can be difficult, especially if far from shore.

Flights for aerial surveys typically are provided by or must be coordinated with the Air Ops Branch in Operations. Communication between aerial surveillance and vessels searching for oiled turtles is essential. There are a number of potential challenges associated with this coordination. Information from aerial operations is needed early in the day to identify appropriate search areas or it is not actionable. Search crews must also communicate closely with shore-based operations to ensure that ground transportation of animals is coordinated and rehabilitation facilities are prepared to receive

oiled turtles. Lastly, crews must be kept informed of other response activities (e.g., skimming, *in situ* burns, and dispersant application) in order to avoid conflict.

Box 3-2. Important data and observations obtained by directed captures. Directed capture operations serve a dual role of saving individual sea turtles and documenting the effects of a spill in a manner that allows estimating injury to turtles within the entire area of a spill. Photos: (top) Search transects and sighting data used to estimate numbers of turtles within a large spill area during the DWH spill (McDonald et al. 2017). Various degrees (minimal, light, moderate, and heavy) of oil exposure (lower left) documented in rescued turtles. Photodocumenting ingestion of oil (lower right), an important route of exposure for sea turtles.

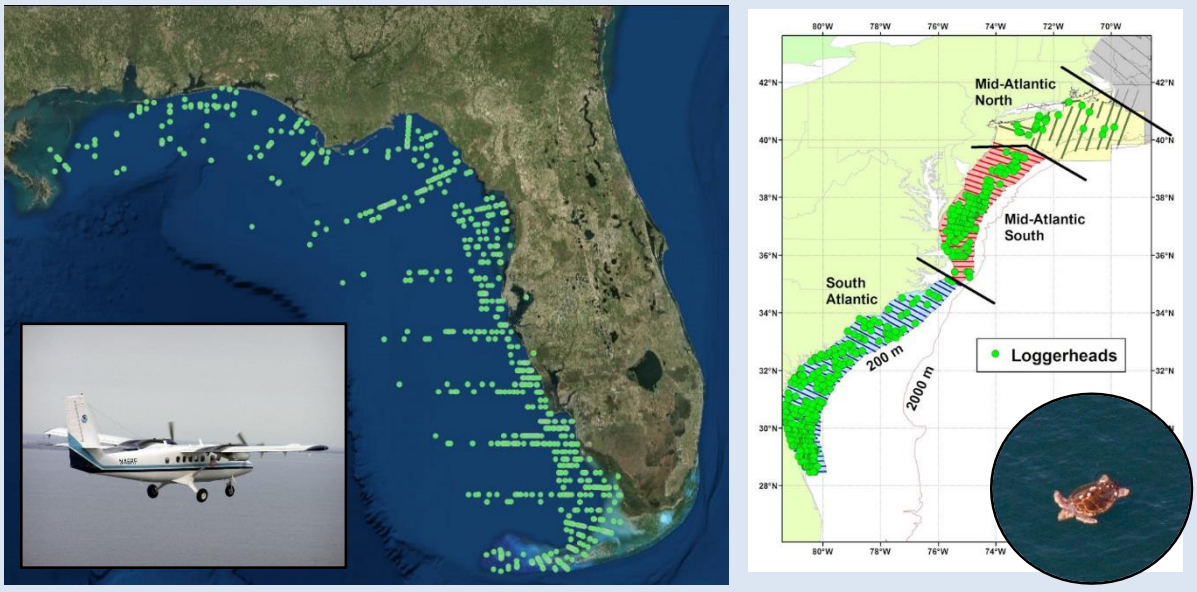




3.4.11. Aerial surveys

Large, neritic juvenile and adult sea turtles dispersed over large geographic areas are most effectively observed by aerial surveys. Although aerial surveys do not allow for the rescue and rehabilitation of turtles, they are vital for directing capture or response assets on the water, to characterize the presence, distribution, and abundance of turtles relative to oil and response activities (Box 3-3) (Garrison 2015). Aerial surveys can also be deployed to map the presence and distribution of habitat features relevant to sea turtles, such as *Sargassum*.

NOAA's standard aerial surveys for sea turtles and marine mammals are typically conducted using DeHavilland Twin Otter (DH-6) planes that fly at approximately 600 ft altitude at an airspeed of 100 knots (185 km hr^{-1}). Surveys are usually flown only in favorable viewing conditions and are not conducted when sea states exceed 4 on the Beaufort scale (typically surface winds > 15 knots) or during fog, rain, or other conditions that limit visibility. In manned aircraft, in addition to a pilot, the crew should include at least two experienced aerial observers (depending on the number of viewing bubbles in the plane), and an additional scientist to record sightings, weather, and visibility data on a laptop computer connected to a GPS and running data-acquisition software. Sighted animals are photographed to assist in species identification, group size (if applicable, primarily for mammals), and association with oil or other habitat features. Visibility data (e.g., sea state, weather, cloud cover, water color, water turbidity, glare for each side of the trackline, and sun penetration into the water) are recorded every 15 min or when conditions change. Observers rotate viewing positions at regular intervals (typically every 20 min) to reduce fatigue.



Box 3-3. Aerial surveys provide observations of sea turtles while at or near the surface and are the basis of density and abundance data across wide areas of the U.S. continental shelf.

Surveys should be designed in accordance with recommendations for line-transect "Distance" sampling as described in Buckland et al. (2001). Regular survey tracks for NOAA aerial surveys are included in the Environmental Response Management Application (ERMA). The number of animals is estimated and identified to the lowest taxonomic group possible. Observers should also record observations of surface oil including details about its appearance (e.g., sheen, mousse, dark oil, patchiness) and spatial extent. If weather conditions permit, surveys should be designed to cover the entire spill area within three to four flight days, and surveys of the entire area should be spaced approximately seven to ten days apart, depending on the circumstances of the spill.

Other types of aircraft, such as helicopters and smaller planes, might be used for nearshore areas and barrier islands. These smaller-scale aerial surveys use alternative protocols to those used by standard NOAA aerial surveys. All survey flights must be coordinated with other response aerial assets, and usually under the operational direction of the Air Ops Branch in the Operations Section.

In addition to surveys using aircraft with trained observers, which are the typical aerial survey method, other tools are available for obtaining visual imagery data at different scales (Box 3-4). Unmanned aerial vehicles (UAVs), including powered craft, kites, and balloons equipped with cameras are an emerging technology with regard to study of sea turtles, and potentially can be used to detect and observe turtles within a spill area or to assess potential effects on habitat (Seymour et al. 2017; Hodgson et al. 2018). The various options available can be flown as different altitudes, depending on specific needs. Digital aerial imagery can produce high-resolution, archival data, which may be used for species identification, size estimation, and location relative to features of interest, such as surface oil. Additional advantages include the ability to observe smaller sea turtles that cannot be reliably seen from manned aircraft and the opportunity to detect greater numbers of animals that may be visible to vessel-based observers.

Box 3-4. Alternative methods for obtaining aerial imagery of animals and oil. Digital aerial imagery can provide valuable high-resolution visual data during an oil spill, such as characterization of presence and size of sighted animals relative to features of interest, particularly surface oil, as well as description and measurement of habitat (e.g., *Sargassum*). Unmanned aerial vehicles (UAVs, or drones) are an alternative to manned aircraft; various options exist that can be flown at different altitudes, depending on the subject of interest. For example, non-NRDA researchers used balloons and kites with commercially available camera systems to document DWH oil in nearshore coastal habitats in Louisiana. The image on the right, obtained by a camera attached to a helium balloon, shows strands of surface oil off the coast of the Chandeleur Islands, Louisiana, during DWH spill. https://publiclab.org/wiki/gulf-coast

3.4.12. Vessel-based surveys

Vessel-based surveys may be conducted as a means of assessing sea turtle presence and density within spill areas, to opportunistically capture oiled turtles, recover dead turtles, and as a complement to aerial surveys (i.e., provide finer scale spatiotemporal exposure data and observations of life stages not seen by aircraft). These operations are distinct from directed capture operations reviewed in subsection 3.4.10, which have been used thus far primarily to recover small oceanic juveniles. Vessel surveys are intended to detect neritic juveniles and adults, especially within continental and insular shelf and inshore waters. These larger life stages spend less time at the surface and tend to be dispersed, thus efforts are likely to be more observational than interventional. Similar to aerial surveys, environmental conditions, such as sea state and water clarity, strongly influence sightability. For example, more sightings are expected in calm conditions and shallower areas with good water clarity, and less with a higher sea state and deeper and/or turbid water. In addition, many of the capture methods typically used on larger sea turtles may not be feasible if associated with danger to field personnel – this effectively prevents any human entry into oiled water (hand-capture) or contamination of large equipment (trawl or tangle nets) with oil. Dip nets may be used, but are only effective in some situations. Recovery may be limited to debilitated or deceased turtles. Nonetheless, vessel-based surveys provide valuable information related to effects of a spill and response actions on sea turtles and their habitats.

Basic methods, materials, and protocols provided in Appendix 9 are also used for vessel surveys. It is important that survey plans ensure that affected areas are comprehensively examined with due attention to heavily impacted or ecologically sensitive locations. Sightings and effort (including recording and preservation of GPS tracks) should be clearly documented. Vessels suitable for a given area (e.g., size and draft) must be selected. A raised helm or sighting tower is essential to allow effective sighting of sea turtles, thus existing sea turtle research vessels are an ideal option, although these are few in number. Vessel crews should include at least two people with experience sighting and handling sea turtles so that they are able to conduct surveys in a confident and reliable manner, and safely render assistance to oiled turtles and other wildlife if necessary. Personnel with experience sighting and identifying sea turtles may be deployed on vessels intended to survey spill areas for multiple types of wildlife, especially during the initial period of a spill. However, such multi-species efforts are not necessarily a suitable surrogate for designated sea turtle surveys.

3.4.13 Basking turtles (Hawaii)

Green turtles come ashore to bask on all of the main Hawaiian Islands (e.g., Hawai'i, Maui, Lana'i, Moloka'i, O'ahu, Kaua'i) and in the Northwestern Hawaiian Islands Marine National Monument (including Nihoa, Necker, French Frigate Shoals, Gardner Pinnacles, Maro Reef, Laysan, Lisianski, Pearl and Hermes, Midway, Kure). In the main Hawaiian Islands, basking is more prevalent than nesting and poses a greater exposure to shoreline oil or other contaminant events as turtles may bask for hours to days. Maps of known basking locations are provided in Appendix 2. Larger turtles typically emerge in the midmorning through the afternoon hours and may remain on shore for up to 48 hours, whereas juveniles may emerge from the water during sunset and remain on the beach throughout the night. These sites are not regularly attended by resource agency staff, with few exceptions such as Laniakea

Beach (north shore O'ahu) and Hookipa (north shore Maui). Some locations are within populated areas; many are remote. Some basking areas also are used by the endangered Hawaiian monk seal (*Neomonachus schauinslandi*), which is another protected species that may be affected by an oil spill in this region. An oil spill impacting locations where turtle basking is known to occur can result in oiling of turtles in the water or as they come ashore, as well as injury from shoreline boom and cleaning equipment. It should not be assumed that sea turtles attempting to bask will avoid oil, thus intensive monitoring is recommended as these turtles typically show high site fidelity for basking areas.

In the event of a spill involving a basking area, knowledgeable observers should continuously monitor these areas (24 hours) to prevent interactions with equipment and clean-up personnel. If necessary, multiple observers should be deployed to provide adequate attendance of clean-up operations and regular survey of the spill area. If determined necessary, basking turtles could be discouraged from emerging onto oiled shorelines or transported by permitted personnel to un-oiled locations for release. However, it is important to note that such displacement likely will only be temporary because individual turtles return to specific basking sites. Any oiled basking turtles may be cleaned, temporarily housed, rehabilitated, and released at designated locations as described in Section 3.4.7.

4. Natural Resource Damage Assessment (NRDA) and sea turtles: conceptual model, integrating response data, and tools for assessment

As discussed in Section 2.1.1, NRDA under the Oil Pollution Act (OPA) of 1990 is a restoration-focused, statutorily-based process for the identification, evaluation, and quantification of injuries to natural resources and services as a result of exposure to oil and/or response actions, and development and selection of restoration actions for injured resources and their services. In the event of an oil spill, the natural resource Trustee(s) will follow the process set forth in the OPA NRDA regulations to determine whether a NRDA should be pursued. Should a NRDA be undertaken, technical working groups (TWGs) comprised of trustee agency representatives and associated experts may be formed to focus on specific animal or plant groups or ecological areas. Experts representing the RP's may also participate, depending on the nature and extent of the RP's agreement to work cooperatively. A comprehensive review of all NRDA elements is beyond the scope of this document, rather the focus herein is technical considerations that may help inform a damage assessment for sea turtles. Additional general information regarding NRDA can be found in documents available from the Departments of the Interior (DOI) (e.g., BLM-NRDA 2008; NPS 2003) and Commerce (e.g., NOAA-DARP 1996).

Information and samples collected under the NRDA may be used as evidence in any potential related litigation, as with that collected during response activities, thus the chain of custody procedures are equally applicable (see Subsections 3.4.1 and 3.4.3). Those involved with NRDA will also need to retain all documents, samples, photographs, data, and other materials as directed by the NOAA General Counsel Office, the DOI Office of the Solicitor, and/or the US Department of Justice. Additional guidance related to handling of data, samples, and other evidentiary materials, such as for researchers conducting NRDA studies, may be provided by legal counsel or NRDA case managers.

4.1. Assessing exposure and injury to sea turtles: conceptual model

An example of a conceptual model for exposure of sea turtles to oil and injury resulting from this exposure, as well as response activities, is shown in Figure 4-1. A conceptual model should be tailored to depict the facts and considerations specific to each spill. Notably, many of the key elements of this example conceptual model rely on data collected during the response phase of an oil spill (e.g., establishing exposure and pathway), thus close alignment of response operations and NRDA activities, to the degree possible, can support a strategically sound and efficient assessment. However, NRDA is distinct from response and NRDA practitioners must coordinate within the response structure. Examples of information that are important to NRDA and may be collected under response operations include: direct observations of exposure of animals to oil, determination of resulting health effects and mortality due to exposure to oil or as a result of response actions, documentation of disruption of reproduction and other biological functions, and demonstration of loss of important habitat or prey. Such information can be ephemeral and requires targeted, proactive collection.

The overview of NRDA as related to sea turtles provided in this section follows the convention of other aspects of these guidelines in terms of threats posed by an oil spill to different life stages and habitats. Specific considerations are organized under three broad ecological zones: terrestrial, oceanic, and neritic environments. Subsection 4.2 reviews opportunities for data collection during the response phase of an oil spill and important considerations with regard to NRDA applications. Subsection 4.3 considers different types of data, analyses, and studies that may be used for NRDA and includes rationale for prioritization and a heuristic rubric of important factors to evaluate when developing and executing a NRDA for sea turtles. Subsection 4.4 discusses how restoration planning factors into selection of injury assessment approaches. Subsection 4.5 reviews important aspects of data management under NRDA and tools available to NRDA practitioners.

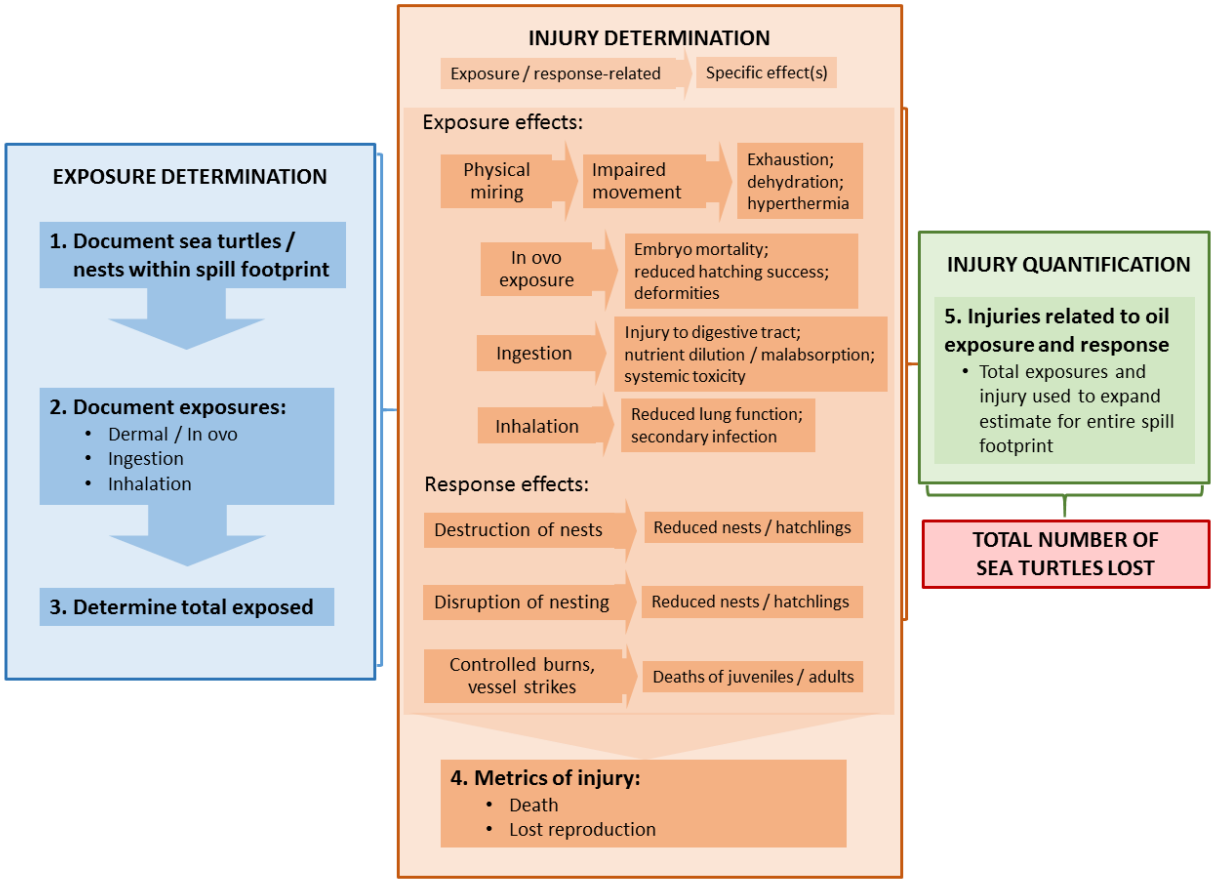


Figure 4-1. Conceptual model of the approach to sea turtle injury assessment. For the purposes of NRDA, injury is often quantified as the number of animals that died or were lost due to diminished reproduction. Quantification may be further provided by species or life stage.

4.2. Oil spill response and NRDA

This subsection highlights information applicable to NRDA for sea turtles that tends to be collected by response operations or that generally is most available during the period of an oil spill response. In addition to these considerations, assessment of exposure to an oil spill and resulting injury greatly benefits from the availability of *baseline* data for comparison with data and observations collected during and following a spill, which can be pertinent to both acute and long-term effects. Ideally, baseline data are collected either routinely, or in the recent past, prior to the spill. However, NRDA can collect this type of ephemeral data after an oil spill occurs if the Trustees determine that the oil and/or response actions have not yet impacted the baseline. Examples of baseline data that may be useful for sea turtles include in-water studies aimed at collecting vital population and health-related data (e.g., metrics of abundance, growth rates, habitat use, movements, nutritional indices) and nesting studies (e.g., nest numbers, hatching success, deformity rates). As long-lived species, such studies are often lengthy endeavors that exceed the timeline of most NRDAs. Nonetheless, if important baseline data are unavailable, initiation of these efforts, provided the animals have not yet been impacted by the oil spill, eventually may yield information on spill effects that benefit sea turtles and future NRDAs.

> ***Baseline*** *- the condition of the natural resources and services that would have existed had the incident not occurred. Baseline data may be estimated using historical data, reference data, control data, or data on incremental changes (e.g., number of dead animals), alone or in combination, as appropriate (15 CFR § 990.10).*

Effects of oil spills on habitat, prey, and forage is another concern as both a route of exposure and effect through loss of nutritional resources and other disruption of the ecosystem as a result of an oil spill. Within the NRDA framework, representatives of the sea turtle TWG should coordinate with other TWGs and response personnel that hold or may collect pertinent information related to prey, habitat, or other linkages to sea turtles.

4.2.1. NRDA considerations for the terrestrial zone

There are a number of metrics that can be incorporated into an injury assessment involving sea turtles in the terrestrial zone, which is mainly the nesting beaches. Some key measures of injury that might be documented by appropriately trained response personnel include direct observations of oiled nesting turtles and their nests, mortality of oiled adults and embryos/hatchlings, destruction of nests, deterrence of nesting females, and disorientation of nesting turtles and hatchlings. These data may be used by the Trustees to determine if there were any negative impacts to reproduction as a result of a spill. Depending on the spill, the NRDA may want to undertake additional sea turtle nesting monitoring effort to supplement areas where response may not be able to visit and/or to provide more frequent and/or systematic search information. Many well-monitored nesting beaches within the U.S. have historical datasets that can be used to detect potential spill-related effects, such as changes in the number of nests, increased disorientation events, or other biological parameters (e.g., hatching success). For example, following the DWH oil spill, sea turtle nest densities within the spill area were compared with similar sites to demonstrate a reduction in nesting that was attributed to deterrence of females caused by shoreline response operations (DWH NRDA Trustees 2016; Lauritsen et al. 2017).

Beyond relatively straightforward injuries that may result from an oil spill, there are other types of injury that merit consideration for NRDA. One area of concern is effects of oil on the nesting environment and developing embryos. As with other taxa, turtles are thought to be especially sensitive to harmful effects of oil contamination during development. Field and laboratory studies of the effects of oil on turtle eggs have yielded mixed results, ranging from no biological effect to increased deformity rates and mortality (Fritts and McGehee 1982; Van Meter et al. 2006; Rowe and Mitchelmore 2009). These studies suggest that the outcome is influenced by the timing of exposure and composition of the oil (i.e., type of oil, degree of weathering). The magnitude of contamination likely is a factor as well. Physical effects of oil on fluid and gas exchange by egg shells and characteristics of the nesting substrate and incubation chamber are also considerations. These potential effects on sea turtle embryos should be considered for any spill that results in oiling of active sea turtle nesting beaches. Data on hatching success, embryo mortality, and deformities are commonly collected by nest monitoring programs (as well as those conducted under response actions), but additional measures may be necessary for NRDA applications, such as increased sampling effort, enhanced characterization of embryo mortality, studies of hatchling health and fitness, and collection of biological samples necessary for demonstrating exposure *in ovo*.

Another pathway of embryonic exposure that could be relevant to NRDA, but is poorly understood, is the transfer of chemical constituents of oil, especially polycyclic aromatic hydrocarbons (PAHs), from adult females to their offspring. Lipophilic (fat-associated) compounds, such as PAHs, may pass from a female turtle to her eggs during the yolk formation phase (vitellogenesis) of egg production and is mentioned in the literature as a possible route of PAH exposure for turtles (Bell et al. 2006). Although PAHs have been measured in nesting female sea turtles (Camacho et al. 2012) and eggs (Alam et al. 2000), there have been very few studies of maternal transfer in any animals (e.g., Tilghman and Oris et al. 1991; Fournier et al. 2010). Understanding potential maternal transfer of PAHs in sea turtles is complicated by their reproductive biology. Vitellogenesis begins approximately 8-12 months prior to breeding and is completed by the time female turtles arrive at nesting areas (Miller and Limpus 2003). Thus, exposure of females on foraging grounds or during reproductive migration could potentially lead to transfer of PAHs to developing eggs, but this route of exposure may be less significant if exposure occurs after completion of vitellogenesis. Furthermore, assemblages of females at a given nesting beach may include turtles originating from multiple foraging areas, which could have different levels of PAH exposure. Additionally, transfer of PAHs during actual egg formation (i.e., deposition of the albumen and the shell) has not been studied. Relevant to NRDA, demonstration of maternal exposure would need to carefully consider the timing of the spill relative to reproduction, potential for variation in background exposure, and the importance of baseline PAH data, which are lacking for most major nesting areas. Translation of such exposure to injury should consider demonstration of adverse effects on embryos or hatchlings, as previously discussed.

The effects of oil on maternal health and reproduction through direct sublethal effects on female turtles or indirect effects associated with loss or alteration of prey and habitat is another consideration, but has not been closely examined in any turtle species. The ocean-going nature of sea turtles, their reproductive migrations, and natural variation and complexity in their reproductive biology are

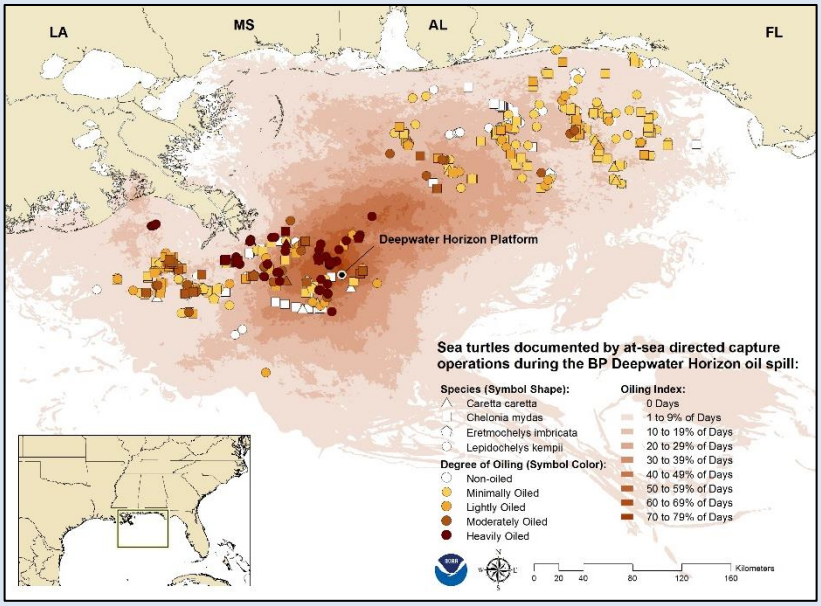
significant challenges to investigation of such linkages. Nonetheless, these potential effects warrant consideration during NRDA.

4.2.2. NRDA considerations for turtles in the oceanic zone

As described in Section 3, observations and data collected on sea turtles within the oceanic zone during response operations can yield valuable information relevant to exposure and injury, including documentation of exposed sea turtles, harmful effects, and environmental conditions (Box 4-1). As a notable case example, data collected by directed capture operations during the DWH spill as part of response efforts supported the Trustees' determination of injury to sea turtles (DWH NRDA Trustees 2016). Oceanic (surface-pelagic) juvenile turtles are especially at risk during an oil spill within the oceanic zone; therefore, much of this subsection pertains specifically to this life stage. Considerations for large juvenile and adult turtles that also are found in the oceanic zone are included in the next subsection (Subsection 4.2.3).

Field observations of oiled turtles and oil ingestion can be used to document and characterize exposure. Observational data on the condition and behavior of animals, necropsy findings, and results of clinical evaluation at care facilities – including physical examination findings, blood analyses, and diagnostic imaging results – can aid injury assessment. Thus, directed capture efforts should be well-designed and executed to maximize information collected in addition to fulfilling the primary objectives of rescuing and rehabilitating oiled animals. Example field data forms provided in Appendix 9 are intended to record data that are essential for these purposes. In addition, comprehensive review and compilation of all medical-related data collected from sea turtles in the field and at rehabilitation facilities may be used to evaluate the effects of exposure. These health assessments generally are done by veterinarians and other experts with specific knowledge of sea turtles and expertise in fields such as clinical medicine, pathology, and toxicology.

Many types of information require additional effort and planning to collect, highlighting the importance of coordinating response efforts with NRDA studies and intra-NRDA studies, to the extent feasible, to be efficient and cost-effective. For example, classifications of various degrees of internal and external oil exposure, coupled with veterinary evaluations of physical and physiological conditions of rescued sea turtles, provided the technical framework for the overall DWH sea turtle injury assessment across multiple life stages. The severity of oiling (i.e., minimal, light, moderate, heavy; see Box 3-2) was categorized using field observations and photographs, and oil ingestion was subjectively assessed based on the quantity of oil observed within the mouths and throats of rescued turtles. Other types of data are time sensitive, highly situation-dependent, and may require additional resources or specific effort to collect beyond response operations. For example, hyperthermia or hypothermia can affect turtles after they become oiled, or after stranding due to having been oiled; these conditions are most accurately documented at the time of discovery (in the field) rather than at rehabilitation centers. Similarly, some blood parameters that are affected by oiling, such as stress hormones, blood gases, and pH, also are affected by capture, handling, and transport, and therefore must be sampled or measured in the field in order to more confidently attribute cause.

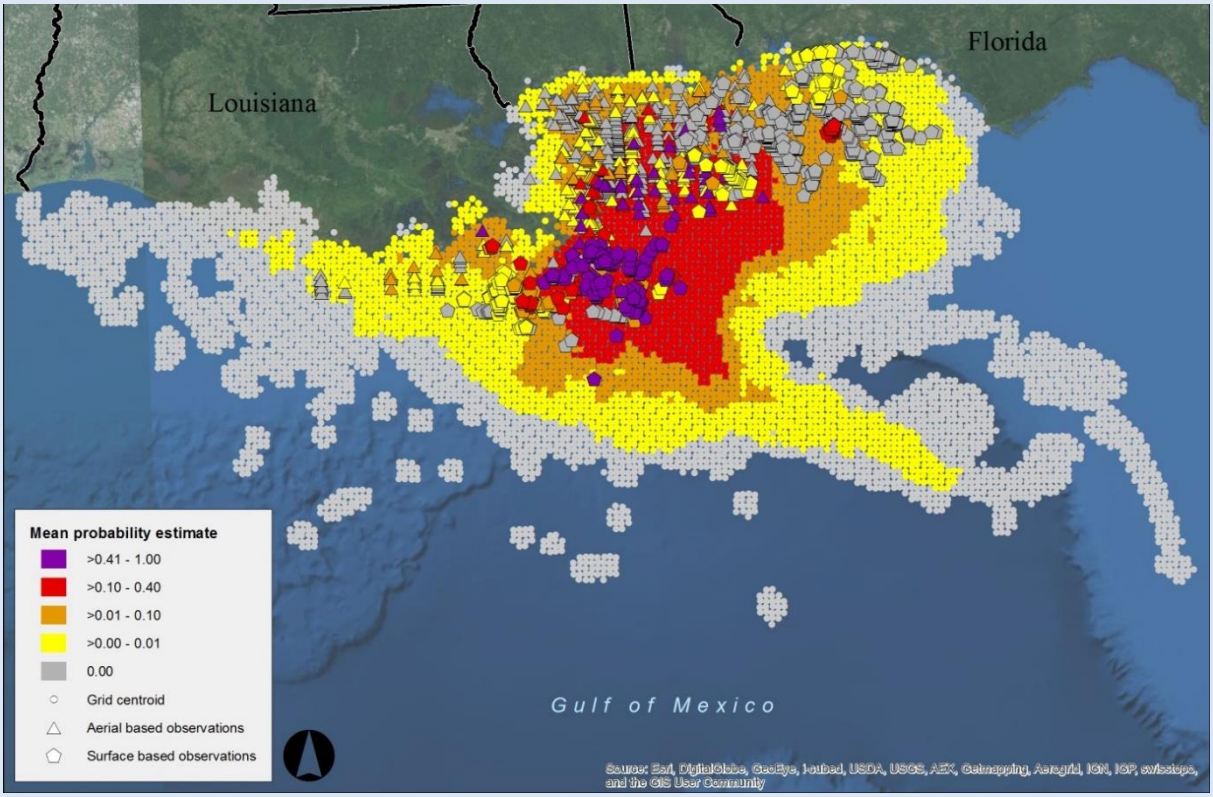


Box 4-1. Boat-based rescue efforts documented more than 900 sea turtles in the DWH spill zone. Photos: (upper left) locations of turtles captured and assessed during rescue operations, shown by species and degree of oiling, overlaid upon cumulative oil-days within the overall oiling footprint (note: nearly all heavily oiled turtles were found within 90 kilometers of the wellhead, and prior to August 1, 2010); (upper right) boat-based rescue efforts on search transects within offshore convergence areas that are known habitats for small juvenile sea turtles; and (lower right) a NOAA veterinarian assessing the condition of a heavily oiled sea turtle rescued from oiled surface habitat.

As subsequently discussed in Subsection 4.3.1, data collected during response related to exposure and injury may include only a partial sampling of the spill area, especially for large and protracted events, or those that occur in remote locations. Under NRDA, these response data may need to be expanded to account for injuries that are representative of the entire footprint and duration of the spill (Box 4-2). Protocols for vessel surveys should be carefully reviewed and use established methodology that is adequate for later quantification analyses. As demonstrated during the DWH spill, vessel-based search and rescue transects provided a survey framework from which empirical observations of oiled turtles could be expanded to overall densities and abundances of each species encountered (McDonald et al. 2017). Especially for larger spills, a statistician should work with data managers to monitor the incoming data to ensure that the information is adequate for calculation of these extrapolations in case they are needed.

In the Atlantic and Gulf of Mexico, another important consideration for juvenile oceanic turtles is loss of habitat comprised of a floating macroalgae (*Sargassum* sp.), which can be destroyed by oiling or clean-up operations. *Sargassum* is very dynamic in terms of density and distribution because it constantly breaks apart, coalesces, undergoes senescence, and regenerates as it is transported in surface currents. *Sargassum* and the floating ecosystem that it creates, including juvenile sea turtles, is vulnerable to surface oil, which also tends to accumulate within convergence fronts in offshore areas.

Quantification of *Sargassum* habitat loss, along with information about how sea turtle densities vary with *Sargassum* patches of different sizes, are an important consideration for NRDA injury assessment studies focused on oceanic sea turtles. Accurate assessment of oiling and losses of *Sargassum* over large areas likely requires aerial surveys (e.g., fixed wings, unmanned aerial vehicles (UAVs)) during the time period where oil is still being discharged, calibrated with fine-scale assessments. Satellite imagery can provide a platform for broad-scale *Sargassum* studies, but may underestimate *Sargassum* coverage by missing smaller dispersed patches, which can still serve as habitat for turtles. Therefore, validation using high-resolution imagery or direct measurements in the field are needed, which may include data or observations collected during response operations (Hu et al. 2016).



Box 4-2. Use of direct observations of turtles in oil to estimate total injuries across the entire footprint and spill period. Careful documentation of search area and effort can be used to estimate the numbers of sea turtles within the spill area (McDonald et al. 2017), and these estimates and field observations can be combined to investigate the degree of exposure and injury over large spatial and temporal scales (Wallace et al. 2017).

4.2.3. NRDA considerations for turtles in the neritic zone

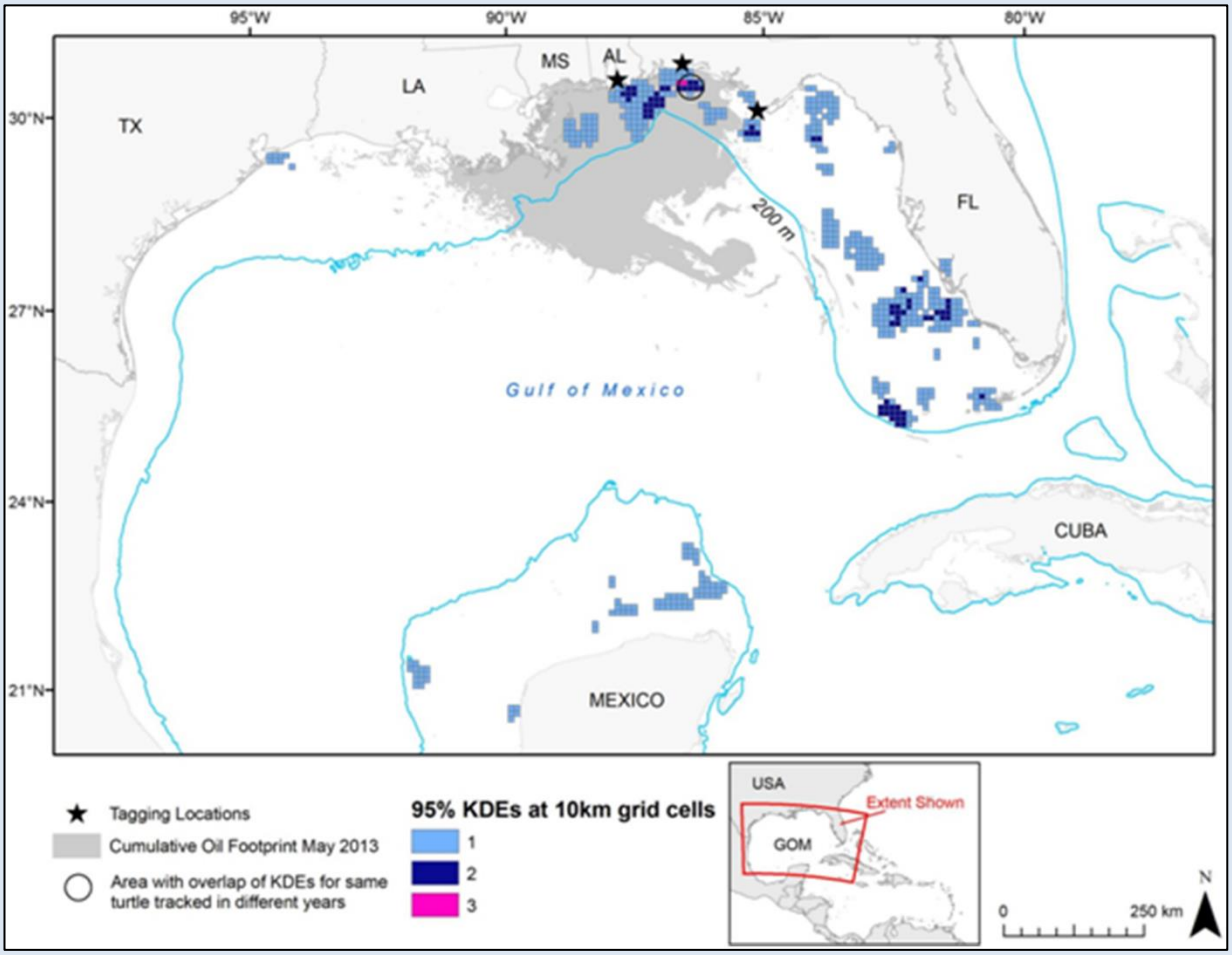
Information on exposure of sea turtles within neritic areas to an oil spill and assessing the effects of oil and response activities may rely on a combination of direct and remote methods. Aerial surveys (manned by observers or camera-equipped UAVs) are the most practical means of documenting and estimating the number of large juvenile and adult sea turtles within a spill area. Due to seasonal and inter-annual differences in the presence of turtles, it is recommended to collect these data for each spill. Whenever possible, established tracklines and methodology (Buckland et al. 2001) should be the basis of any NRDA study attempting to document turtles within a spill area for eventual statistical estimation of density, total abundance, potential degree of interaction with surface oil, or other factors relevant to exposure and injury assessments. NOAA has conducted aperiodic fixed-wing and shipboard surveys to document presence and estimate abundance of sea turtles throughout U.S. Exclusive Economic Zones in the Atlantic Ocean, Gulf of Mexico, and Pacific Ocean (Appendix 1). Aerial and shipboard surveys undertaken for response or NRDA purposes should consider collecting survey data in a similar manner, if appropriate, to maximize comparability with historical/baseline data. In addition to these uses, photographs from the air of sea turtles in and around oil are valuable for demonstrating exposure and, potentially, injury.

Although aerial surveys provide information about the presence and distribution of sea turtles in relation to a spill, complementary vessel-based surveys within the spill area may also be needed in order to: 1) characterize environmental conditions from the perspective of sea turtle exposures; 2) provide additional direct documentation of exposure; and 3) detect smaller turtles (<45 cm SCL) that are not reliably visible from aircraft if alternative methods (e.g., survey by UAV) are not feasible. As with directed capture of oceanic juveniles, vessels participating in these surveys should carefully document search tracklines and effort so that results can be quantified, expanded, and used to corroborate other data.

Large juvenile and adult turtles can be evaluated for response and NRDA purposes if they strand ashore or if they are captured during the course of spill response operations (e.g., directed or incidental captures). Veterinary assessment of live oiled turtles and necropsy of recovered dead turtles may yield information about exposure and adverse effects. However, due to their large size, active and prolonged diving, and dispersed distribution - directed capture, as conducted for oceanic juveniles, is likely to be more difficult and resource-intensive for these larger turtles in many circumstances. Moreover, human safety concerns within active spill areas prevent the use of common capture techniques, such as deployment of nets and in-water hand capture. These challenges also are relevant for large juvenile and adult turtles within oceanic areas, thus similar approaches apply to large turtles in both zones.

Other methods may be used to assess exposure and injuries to neritic stage turtles when direct evaluation is difficult or impossible. For example, during the DWH NRDA, comprehensive satellite-derived data corroborated by field observations of sea turtles in oil was used to characterize the entire surface oil footprint (e.g., extent, thickness) and estimate the distribution and degree of oil exposure experienced by neritic stage turtles documented by aerial surveys (Box 4-2) (Wallace et al. 2017). These analyses were used to estimate both exposure and injury (DWH NRDA Trustees 2016). Because remotely sensed surface oil data are likely to be collected in future spills, this type of analytical approach could be

adapted to other situations where empirical data reflect a partial sampling, as is probable during a larger oil spill. Other sources of data on sea turtle presence, movements, and habitat use from in-water and satellite telemetry studies (e.g., Foley et al. 2014; Hart et al. 2012; Hart et al. 2017; Mansfield et al. 2014; Shaver et al. 2013) can be similarly used to demonstrate exposure to an oil spill (Hart et al. 2014; Vander Zanden et al. 2016)(Box 4-3). Applications of remotely collected data for NRDA purposes are enhanced when corroborated by direct observations in the field. Thus, potential future needs of data and observations that can only be acquired during the response phase of a spill, such as empirical information on oil thickness and documentation of sea turtles in oil, must be carefully considered from the outset.



Box 4-3. Use of satellite telemetry to demonstrate foraging home ranges of loggerhead turtles within the area of the *Deepwater Horizon* oil spill. Such approaches can be valuable for investigating oil exposure at-sea and demonstrating threats to important habitat (Hart et al. 2014).

4.3. Prioritizing exposure and injury assessment tools for NRDA for sea turtles

This section reviews factors for NRDA practitioners to evaluate when considering how to prioritize among potential exposure and injury assessment approaches and studies for NRDA. First, special considerations are described that apply generally to assessing oil exposure and injuries involving sea turtles. Next, various metrics and study approaches are presented and discussed in the context of assessment of specific life stages and habitat types. This information should be considered on a case-by-case basis according to the specific circumstances and characteristics of each oil spill and the associated conceptual model.

4.3.1. Special considerations for approaches to determining exposure and injury under NRDA

There are several general issues that may be encountered when constructing a NRDA that warrant careful consideration when selecting and planning studies of any sea turtle life stage. These issues include methods for detecting exposure as related to the specific petroleum product of interest; toxicological testing to identify effects, particularly sublethal effects of oil exposure; expanding quantification from partial sampling effort to the full extent of the spill; and incorporating uncertainty in quantification of both exposure and injury.

Characteristics of oil and relevance to assessing exposure and injury in sea turtles

Many different types of petroleum and its derivatives are included under the term "oil spill," from crude oil to highly refined products. All are complex mixtures of chemicals in different proportions, including classes of organic and inorganic compounds with different properties and toxicological effects. Composition and other characteristics of these products are determined by factors such as location and depth of origin, extraction methods, refining, and weathering. The most injurious compounds in oil are believed to be the aromatics, i.e., those comprised of one or more six carbon rings joined by alternating double bonds (Neff 1979; Krahn and Stein 1998). The small single ring compounds, such as benzene, are especially hazardous and are known to be both carcinogenic and damaging to organs of vertebrates. These smaller aromatics also are more water soluble and volatile, thus they are readily bioavailable but also are rapidly dispersed. The large multi-ring aromatics (PAHs) are more persistent and also are associated with a variety of toxicological effects in animals. Notably, PAHs in petroleum products are highly alkylated whereas most toxicological studies have been done with non-alkylated forms due to the limited availability of alkylated PAH standards. All of these considerations are important when planning studies of specific toxicity endpoints or evaluating anticipated effects based on prior studies.

With regard to detection of exposure, dermal contact and ingestion of crude oil and similar products generally manifests as grossly visible oiling – material that can be photodocumented, readily sampled, and chemically analyzed. In some situations, other materials, such as brown algae, can have a similar appearance and may need to be distinguished from oil by microscopy or chemical analysis. Exposure to lighter, refined products may not be as evident by simple visual examination. Similarly, detection of exposure by inhalation, ingestion that does not cause frank oiling (e.g., ingestion of contaminated prey or sediment), or exposure *in ovo* also require chemical analysis.

Chemical detection of exposure to petroleum products beyond that apparent by visual inspection generally relies on detection of PAHs, either parent compounds or their metabolites. An important characteristic of PAHs is that these compounds are rapidly metabolized by vertebrates and are excreted primarily in bile, urine, and feces. Therefore, timing of exposure must be considered when selecting appropriate biological samples for PAH analysis and interpreting results. Analysis of tissues (parent compounds), bile (metabolites), urine (metabolites), and gastrointestinal contents (parent compounds and metabolites) can be useful for detecting recent or ongoing exposure, but also can be very insensitive due to high rates of metabolism. Bile was observed to be much more sensitive for detection of PAH exposure in sea turtles exposed to crude oil in comparison to other sample matrices (Ylitalo et al. 2017). However, bile rapidly degrades postmortem and cannot be collected from live turtles. Selection of chemical analyses to be used to assess exposure in sea turtles for NRDA requires attention to timing and degree of exposure, anticipated sensitivity of analytical assays and available sample types, and risk of false negative results.

Assessing potential toxicological effects of oil exposure on sea turtles

Various measures of oil toxicity, specifically those related to chemical effects, may be used for injury assessment under NRDA, either as means of confirming or corroborating observations in animals oiled during a spill or to assert effects that cannot be easily measured or observed in wild sea turtles. These approaches may be in the form of analysis of sublethal toxicity endpoints (such as biomarker assays, metagenomic analyses, immune function testing, and measures of genotoxicity) in animals exposed to oil; laboratory studies; or risk assessments based on modeled exposure regimes, chemical analyses, literature reviews, and other data. It is important to note that some samples, analytical results, and other information needed for some of these applications must be collected during the spill response phase and may be beyond the scope of standard clinically-based evaluations. Coordination and cooperation between response and NRDA is needed to determine the best path forward to collect data needed by NRDA while not impeding response activities with sample collection and processing that is not needed to treat the animals.

As with all assessment studies, for any toxicology-related analyses considered for NRDA purposes, the potential efficacy, logistical requirements of a robust experimental design, and clarity of expected results should be carefully deliberated prior to implementation. Life stage, exposure route, dose, and duration of exposure are some key parameters that must be considered. For example, although sea turtles exposed to oil in the field can provide essential information on effects of oil, dose and duration of exposure typically are unknown, which complicates interpretation of some toxicity endpoints. Laboratory exposure studies under controlled conditions may provide a more straightforward means of assessment, but should be relatable to exposures under spill conditions. Also, studies or analyses aimed at measuring sublethal endpoints should provide a clear contribution to the exposure or injury aspects of a conceptual model.

Expanding observations to spill-wide effects

Once exposure to oil and effects of that exposure or response activities have been documented, some expansion from direct observations to the complete spill area (and beyond for migratory species

such as sea turtles) and time period is often necessary for NRDA. This is because any response and assessment activities related to a marine oil spill are unlikely to cover the complete extent and duration of a spill, except in geographically confined situations and relatively small incidents. One tool for this purpose is satellite telemetry, which can provide information about sea turtle movements and potential exposure to oil over large geographical areas (e.g., Hart et al. 2012; Hart et al. 2014). For other purposes, such as injury quantification, the case team may need to rely on statistical techniques to extrapolate conclusions from partial information. An example of such an approach is the model-based estimation of sea turtles harmed by the DWH spill, which applied field observations of exposure and veterinary and toxicological-based assessments to investigate exposure and injury over the full extent and duration of the spill (DWH NRDA Trustees 2016; Wallace et al. 2017). These methods require data that support extrapolation through proper study design and collection methods. NRDA study protocols, e.g., those used for vessel, aerial, and shoreline surveys, should be reviewed to ensure that methods and assumptions are as robust as possible with forethought that data may be used for statistical expansions.

Incorporating uncertainty in exposure and injury quantification

Determination of adverse sublethal effects, application of these effects to injuries, and expansion of directly observed oil-turtle interactions to the full extent of the spill are approaches that inherently contain uncertainty in empirical and statistical terms. In the context of NRDA, accurate (reflecting actual) and precise (little uncertainty) values for exposure and injury quantification facilitate the determination of the amount of restoration needed to make the environment and public whole. Exposure and injury quantification should be conveyed with appropriate descriptions of uncertainty (e.g., standard deviation, range, appropriate confidence intervals), as in any scientific presentation of such values. Technical personnel performing quantifications of exposure and injury should seek guidance from case management (legal and technical) about presentation of uncertainty associated with quantification.

4.3.2. Evaluation of tools and metrics for determining sea turtle exposures and injuries under NRDA

This section discusses prioritization of various tools and studies currently available for sea turtle NRDA and consists of three tables - one for each of the main ecological zones and associated life stages. Various metrics and approaches are considered with regard to exposure and injury and are described in terms of feasibility (including existence of established methods and availability of necessary data), considerations under NRDA (study design, expected challenges, useful resources), and rationale for the given level of prioritization. The content of these tables is based on deliberations and experiences of trustee agency personnel and other experts participating in prior NRDAs involving sea turtles. Priority levels are intended as a general ranking of value and importance and will vary according to the characteristics of a specific spill.

Table 4-1. Terrestrial areas (i.e., nesting beaches): tools and metrics for sea turtle NRDA assessments. Priority level synthesizes details of all factors to help weigh the relative utility of each tool / metric and associated assessment approaches for constructing sea turtle injury assessments under NRDA. Priority levels are indicated as "high"=★★★, "medium"=★★, and "low"=★. This table is not intended to be an exhaustive list. Depending on the circumstances of the spill and the evolution of scientific understanding, other assessment activities could provide useful data for NRDA.

Pathway and exposure to oil and/or to shoreline response activities			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Quantification of nest locations and densities ★★★	Methods for locating and documenting nests are well-established.	Requires engagement with regional nest monitoring programs, implementation of necessary documentation procedures, and potentially increased beach surveillance effort. Spatial analysis can be used to study overlap between oil, response activities, and sea turtle nesting. Data sets exist for comparing nesting activity within spill areas with historical records and/or comparable unoiled beaches. Metrics can be translated to injury quantification and restoration.	This information informs a number of potential sources of injury, including direct destruction of nests, oiling of nests, and deterrence of nesting resulting from spill-related human activity and other disturbances (e.g., deployment of shoreline boom). Moreover, knowledge of the locations of nests is necessary for protective measures.
Spatial and temporal data on shoreline oil and response activities ★★★	Data on shoreline activities and distribution of oil are routinely tracked by response.	Ensure that data are sufficiently detailed to allow for analysis of effects on turtles. Comprehensive compilation will require data from many different sources. Metrics can be translated to injury quantification and restoration.	Helpful for basic analyses of spill effects on turtles, nesting, and nests.
Oiling of turtles, hatchlings, or eggs ★★★	As above, the necessary methods are well-established.	As above	Direct evidence of exposure helps link a spill with any observed effects on turtles, hatching or development.
Satellite telemetry tracking of nesting females ★★	Technology is readily available for tracking animal movements, including within an oil spill area.	Study design should consider likelihood of detecting exposure, such as proximity of a spill to nesting beaches, migration corridors, and foraging grounds. Study design should consider that nesting assemblages include females originating from multiple, potentially distant foraging areas.	Bolsters documentation of exposure and potentially allows for correlation with any effects.

Pathway and exposure to oil and/or to shoreline response activities *(continued)*			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
PAH analysis of nesting substrate and eggs *in oiled areas*[a] ★★	Methods exist for detection of oil and dispersant-related compounds. Baseline data generally are lacking for pre-spill comparisons.	Study design should consider availability of or collection of baseline data, or identify suitable control site(s).	Bolsters documentation of exposure and potentially allows for correlation with any effects.
PAH analysis of samples from *oiled* nesting females (or turtles suspected be exposed to oil)[a] ★	Methods exist for detection of PAHs and dispersant-related compounds in tissues collected from dead turtles. Detection of PAHs in blood (from live turtles) and other matrices is challenging using current methods. Location-specific baseline data are often not available for pre-spill comparisons.	Females of most species nest at night and thus are often not encountered. Study design should consider availability of or collection of baseline data or identify a suitable control group(s). Unknown timing, duration, and dosage may complicate interpretation.	It is anticipated that most samples would be blood collected from live turtles, which to date has not been very informative for demonstrating exposure, but could be improved by more sensitive analytical methods. Detection of PAHs is insensitive for detecting exposure in some contexts due to rapid metabolism. Analysis of samples from any recovered dead oiled nesting females may be more useful and merit higher priority.
Effects of oil or response-related activities on nesting, embryos, hatchlings, and adult females			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Destruction of nests or injury to females ★★★	Documented during the course of response.	Any injury involving sea turtle nests or turtles should be captured under the response reporting structure and accounted for under NRDA.	Basic injury metric.
Analysis of the effects of shoreline disturbance and other response activities ★★★	Methods and historical data exist for a number of relevant metrics, including nesting activity, false attempts at nesting, and disorientation rates.	The data necessary to undertake these analyses is available through USFWS and the relevant state/regional nesting authority. The necessary response-related data are documented and also available. Nesting activity is variable; requires consideration of long-term trends and data from index locations.	Provides evidence of injury with demonstrated value in prior NRDAs.

[a]Prioritization is **low for non-visibly oiled animals/areas** unless serving as controls due to lower likelihood of yielding data useful to NRDA. In addition, PAH analysis may be a greater priority for petroleum types that do not necessarily result in readily visible external exposure.

Effects of oil or response-related activities on nesting, embryos, hatchlings, and adult females *(continued)*

Tool / metric	Feasibility / methods	Considerations / applications	Prioritization rationale
Assessment of beach-cast strandings, including clinical and necropsy evaluations ★★★	Established methods and trained personnel are available. Significant effort necessary to encounter turtles, document required information, and transport turtles to appropriate facilities.	Stranding networks operate at all times, including in response to oil spills, so baseline data are available. Strandings are influenced by multiple factors and typically represent a biased fraction of overall mortality. Probability of discovery is dependent on origin (e.g., distance from shore) and environmental conditions, and should be considered.	Basic approach to documenting oil exposure and effects. Common aspect of spill response activities. Relatively high probability of detecting mortality of nesting females and newly emerged hatchlings via stranding response if occurs on or near shore.
Evaluation of embryos and hatchlings in oiled areas[a] ★★★	Established methods are available for evaluating the development and health of embryos and hatchlings, including embryo mortality, hatching success, and deformity rates. Clinical and behavioral observations also may be performed.	Studies examining embryonic effects of oil on chelonians have yielded mixed results. Demonstration of exposure using analyses of nest substrate, egg tissues, or other means should be concurrent with these evaluations. Some metrics are highly variable – controls must be carefully considered.	These metrics are of greatest interest when there is clear evidence of exposure or if nests have been manipulated as part of any necessary mitigation or protection.
Health parameters – nesting females in oiled areas[a] ★-★★	Reference data exist for many basic means of clinical evaluation, including hematology and blood chemistry.	Blood parameters are the most accessible means of evaluating the health of live turtles, but may be relatively insensitive for detecting potential effects of oiling.	Logistically difficult because most species nest at night and interference with nesting females should be as minimal as possible. Translation to injury may be challenging depending on the availability of corroborative data. May be done if opportunity for safe field evaluation and sampling are available.
Laboratory toxicity studies (eggs) ★	Published methods exist. Protected status requires permits or use of surrogate species.	Results of previous studies have been mixed. Methods require consideration of both oil and exposure characteristics (e.g., effects of portioning within sediments), as well as chemical and physical effects.	May be most useful (and higher priority) if necessary to corroborate observed effects in spill-exposed nests.

[a]Prioritization is **lower for non-visibly oiled animals and unoiled areas** unless serving as controls due to lower likelihood of yielding data useful to NRDA.

Effects of oil or response-related activities on nesting, embryos, hatchlings, and adult females *(continued)*			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Analyses of oiling effects on nesting habitat ★★	Methods and trained personnel are available.	Oil can have persistent effects on substrate characteristics, including microbial communities	May be most useful (and higher priority) if necessary to corroborate observed effects in spill-exposed nests, if easily added to other beach studies, or if pursued in conjunction with long-term monitoring.
Biomarkers and other sublethal measures in turtles / eggs ★	Assays exist for detecting biomarkers (e.g., CYP1A) and various other sublethal alterations associated with exposure to oil-related compounds.	There has been limited study in sea turtles relative to other species. Study design should strongly consider likelihood of Type I and II error, availability of data to facilitate interpretation of results, and a specific plan for how results will be used for assessment of exposure or injury.	Demonstration of exposure and injury attributable to an oil spill may be challenging based on current knowledge. May be most useful for corroborative purposes.

Table 4-2. Oceanic / offshore areas: tools and metrics for sea turtle NRDA assessments. Priority level synthesizes details of all factors to help weigh the relative utility of each tool / metric and associated assessment approaches for constructing sea turtle injury assessments under NRDA. Priority levels are indicated as "high"=★★★, "medium"=★★, and "low"=★. This table is not intended to be an exhaustive list. Depending on the circumstances of the spill and the evolution of scientific understanding, other assessment activities could provide useful data for NRDA.

Pathway and exposure to oil and/or response activities – oceanic/offshore			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Vessel surveys for oceanic juveniles ★★★	Potential for dense concentrations of turtles in oiled areas, depending on time of year. Readily observed from vessels; may be targeted for rescue.	Requires early deployment; can be limited by sea state, weather, and human safety concerns. Aerial support can be extremely helpful, but challenging to coordinate. Identifying and contracting aircraft and vessels takes time to coordinate. Metrics can be translated to injury quantification. Use of line-transect methods also may be used for statistical analysis to estimate abundance within the affected area.	Provides documentation of both exposure and injury, including that resulting from response operations (e.g., controlled burns).
Aerial surveys for turtles >45 cm ★★★	Established methods and trained personnel are available.	Only turtles >45 cm are reliably visible from aircraft used in most manned aerial surveys; use of alternative methods (e.g., unmanned aerial vehicles (UAVs)) or extrapolation required for smaller animals; improved by species/region-specific sightability parameters (e.g., time at surface). Used for statistical analysis to estimate abundance within the affected area.	Provides basic documentation of exposure for turtles that cannot be efficiently sighted (or captured) by vessels within spill areas. Important for larger spills where aerial surveys are the most practical means of surveying large areas.
Remote sensing products for oil detection (e.g., synthetic aperture radar) ★★★	Established methods exist for using satellite imagery to granularly represent the temporospatial distribution of oil.	Can be combined with field data to understand the scale of oil exposure and potential effects. The resolution of data products and comparability with field observations (e.g., oil thickness) must be carefully considered.	Important for large spills where direct sampling and observations are likely incomplete.
Spatial analysis of overlap between oiling and response activities and turtle abundance ★★★	Published methods available.	Field observations can be used to inform and ground-truth analysis.	Relevant to both exposure and injury (see below).

Pathway and exposure to oil and/or response activities – oceanic/offshore *(continued)*			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
PAH analysis of samples from *oiled* turtles (or turtles suspected be exposed to oil)[a] ★★	Methods exist for detection of PAHs and dispersant-related compounds in tissues collected from dead turtles. Detection of PAHs in blood (from live turtles) and other matrices is challenging using current methods. Location-specific baseline data are often not available for pre-spill comparisons.	Study design should consider availability or collection of baseline data, or identify suitable control site(s). Unknown timing, duration, and dosage may complicate interpretation.	Could yield exposure data to be correlated with effects or useful for comparative toxicology and other purposes. Detection of PAHs is insensitive for detecting exposure in some contexts due to rapid metabolism and current methods. Analysis of samples from any recovered dead turtles may be most useful and merit higher priority due to difficulty associated with detecting PAHs in blood from live turtles.
Effects of oil or response-related activities – oceanic/offshore			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Spatial analysis of overlap between oiling and response activities and turtle abundance ★★★	Published methods available.	Field observations can be used to inform and ground-truth analysis. Evidence of injury is often most robust for heavily oiled turtles; lesser exposure scenarios may rely on risk assessment approach and comparative toxicity data. Can bridge documentation to injury quantification.	Applies field-based observations and established methods to yield estimates of injury.
Health parameters – oceanic juveniles (including clinical evaluations and necropsies)[a] ★★★	Applies standard means of veterinary evaluation; reference data exist for many basic means of clinical evaluation, including hematology and blood chemistry.	Many anticipated immediate effects are physiological and may be affected by capture and transport - field evaluations immediately upon capture should be considered, if feasible. Dose and duration of exposure are unknown, which may complicate interpretation of some parameters. There are a number of parameters that can be measured using current technology, but interpretability in the context of injury assessment should be carefully considered.	Useful for characterizing effects of oil exposure; includes information that is routinely collected during the care and treatment of oiled turtles.

[a]Prioritization is **lower for non-visibly oiled animals and unoiled areas** unless serving as controls due to lower likelihood of yielding data useful to NRDA. In addition, PAH analysis may be a greater priority for petroleum types that do not necessarily result in readily visible external oiling.

Effects of oil or response-related activities – oceanic/offshore *(continued)*

Tool / metric	Feasibility / methods	Considerations / applications	Prioritization rationale
Assessment of beach-cast strandings, including clinical and necropsy evaluations ★★-★★★	Established methods and trained personnel are available. Significant effort necessary to encounter turtles, document required information, and transport turtles to appropriate facilities.	Stranding networks operate at all times, including in response to oil spills, so baseline data are available. Strandings are influenced by multiple factors and typically represent a biased fraction of overall mortality. Probability of discovery is dependent on location of origin and environmental conditions, and should be considered.	Basic approach to documenting oil exposure and effects. Common aspect of spill response activities. The priority level reflects a relatively low probability of detecting animals that become debilitated or die in offshore areas, but some detection may be possible.
Analyses of oiling effects on turtle prey and habitats (e.g., *Sargassum*) ★★	Methods and trained personnel are available, but analytical approaches need additional development.	May combine remotely obtained (by satellite, digital imagery) measurements and direct observations for ground-truthing, as well as information about turtle densities and movements. Other case teams may have access to samples or information pertinent to prey species.	Provides information about continued exposure of sea turtles to oil, and potential injury through loss of food sources and habitat. The designated priority reflects limited precedence for use in prior NRDAs.
Laboratory toxicity studies ★ - ★★	Protected status (often requiring use of surrogate species); feasible duration of exposure often limited by logistics / expense.	Study design should include clear consideration of life phase / species comparability. Inclusion of sublethal effects should include a specific plan for how these data will be used in a NRDA context. Potential long-term effects (months, years) of exposure on sea turtles are poorly understood at present and logistically difficult to study.	Lower prioritization largely reflects logistical constraints and uncertain outcome based on previous studies. May be more necessary for spills involving compounds that have not been studied or to investigate specific effects of significant interest to a given NRDA (e.g., an effect observed in another taxon).
Health parameters – large juveniles and adults in oceanic zone[a] ★	As for oceanic juveniles, established methods exist.	Evaluation of live turtles, unless debilitated, is likely to be extremely difficult due to the dispersed distribution of these life stages and human safety concerns associated with capture of large turtles in a spill area. Examinations of debilitated turtles and necropsies can be valuable, and should be pursued whenever possible	Priority reflects the difficulties of working with live, larger turtles in the oceanic environment and the small numbers of animals that are likely to be encountered.

[a]Prioritization is **lower for non-visibly oiled animals and unoiled areas** unless serving as controls due to lower likelihood of yielding data useful to NRDA.

Effects of oil or response-related activities – oceanic/offshore *(continued)*			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Biomarkers and other sublethal measures in turtle tissues ★	Assays exist for detecting biomarkers (e.g., CYP1A) and various other sublethal alterations associated with exposure to oil-related compounds.	There has been limited study in sea turtles relative to other species. Study design should strongly consider likelihood of Type I and II error, availability of data to facilitate interpretation of results, and a specific plan for how results will be used for assessment of exposure or injury.	Demonstration of exposure and injury attributable to an oil spill may be challenging based on current knowledge.

Table 4-3. Continental shelf / inshore (neritic) areas: tools and metrics for sea turtle NRDA assessments. Priority level synthesizes details of all factors to help weigh the relative utility of each tool / metric and associated assessment approaches for constructing sea turtle injury assessments under NRDA. Priority levels are indicated as "high"=★★★, "medium"=★★, and "low"=★. This table is not intended to be an exhaustive list. Depending on the circumstances of the spill and the evolution of scientific understanding, other assessment activities could provide useful data for NRDA.

Pathway and exposure to oil and/or response activities - neritic			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Aerial surveys large (>45 cm) neritic life stages ★★★	Established methods and trained personnel are available.	Only turtles >45 cm are reliably visible from aircraft used in most manned aerial surveys; use of alternative methods (e.g., unmanned aerial vehicles (UAVs)) or extrapolation required for smaller animals; improved by species/region-specific sightability parameters (e.g., time at surface). Used for statistical analysis to estimate abundance within the affected area.	Provides basic documentation of exposure for turtles that cannot be efficiently sighted (or captured) by vessels within spill areas. Especially important for larger spills where aerial surveys are the most practical means of surveying large areas.
Spatial analysis of overlap between oiling and response activities and turtle abundance ★★★	Published methods available. Baseline information (e.g., telemetry data) available for some areas.	Field observations can be used to inform and ground-truth analysis.	Relevant to both exposure and injury.
Vessel surveys for neritic life stages ★★ - ★★★	Dependent upon location and conditions; rescue / capture may not be feasible due to human safety concerns.	Requires early deployment and potentially aerial support to locate turtles and oil; can be limited by sea state, weather, clean-up operations restrictions, and human safety concerns. Identifying and contracting vessels (and aircraft if needed) takes time to coordinate. Metrics can be translated to injury quantification and restoration.	Sea turtles sightings can be useful for ground-truthing remote sensing and aerial survey data, specifically documentation of exposure and environmental conditions in fine spatial scales and in greater detail. Regarding potential capture of turtles, logistical challenges are significant, successful rescues and evaluations unlikely to be numerous, but information that could be collected is very valuable (e.g., recovery of dead or debilitated oiled turtles for examination).
Satellite telemetry tracking ★★	Technology is readily available for tracking animal movements, including within an oil spill area.	Study design should consider likelihood of detecting exposure, such as proximity of a spill to nesting beaches, migration corridors, and foraging grounds.	Bolsters documentation of exposure and potentially allows for correlation with any effects. Has been combined with stable isotope analysis to study foraging locations before and after a spill.

Pathway and exposure to oil and/or response activities - neritic *(continued)*			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
PAH analysis of samples from *oiled* turtles (or turtles suspected to be exposed to oil)[a] ★★	Methods exist for detection of PAHs and dispersant-related compounds in tissues collected from dead turtles. Detection of PAHs in blood (from live turtles) and other matrices is challenging using current methods. Location-specific baseline data are often not available for pre-spill comparisons.	Study design should consider availability or collection of baseline data, or identify suitable control site(s). Unknown timing, duration, and dosage may complicate interpretation.	Could yield exposure data to be correlated with effects or useful for comparative toxicology and other purposes. Detection of PAHs is insensitive for detecting exposure in some contexts due to rapid metabolism and current methods. Analysis of samples from any recovered dead turtles may be most useful and merit higher priority due to difficulty associated with detecting PAHs in blood from live turtles.
Effects of oil or response-related activities - neritic			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Assessment of beach-cast strandings, including clinical and necropsy evaluations ★★★	Established methods and trained personnel are available. Significant effort necessary to encounter turtles, document required information, and transport carcasses to appropriate facilities.	Stranding networks operate at all times, including in response to oil spills, so baseline data are available. Strandings are influenced by multiple factors and typically represent a biased fraction of overall mortality. Probability of discovery is dependent on location of origin, shoreline features, and environmental conditions, and should be considered. Metrics can be used for injury quantification.	Basic approach to documenting oil exposure and effects. Common aspect of spill response activities. Probability of detection greatest for sea turtles that die or suffer debilitating effects (or are injured by response activities) if closer to shore.
Health parameters – oiled neritic life stages (includes clinical evaluations of live turtles and necropsy)[a] ★★★	Applies standard means of veterinary evaluation; reference data exist for many basic means of clinical evaluation, including hematology and blood chemistry.	Many anticipated immediate effects are physiological and may be affected by capture and transport - field evaluations immediately upon discovery / capture should be considered if feasible. Dose and duration of exposure are likely unknown, which may complicate interpretation of some parameters. There are a number of parameters that can be measured using current technology, but interpretability in the context of injury assessment should be carefully considered.	Important for characterizing effects of oil exposure; includes information that is routinely collected during the care and treatment of oiled turtles.

[a]Prioritization is **lower for non-visibly oiled animals and unoiled areas** unless serving as controls due to lower likelihood of yielding data useful to NRDA. In addition, PAH analysis may be a greater priority for petroleum types that do not necessarily result in readily visible external oiling.

Effects of oil or response-related activities - neritic *(continued)*			
Tool / metric	**Feasibility / methods**	**Considerations / applications**	**Prioritization rationale**
Analyses of oiling effects on turtle prey and habitats ★★	Methods and trained personnel are available, but analytical approaches need improvement, and requires significant sampling effort.	May use a combination of *in situ* measurements of oiling in habitats and prey tissues. Correlative data on habitat/prey use by sea turtles is helpful. Possible applications for injury quantification.	May provide information about potential injury to neritic sea turtles and other organisms that rely on continental shelf and nearshore area. The designated priority reflects some uncertainty regarding translation to sea turtle injury during previous NRDAs.
Laboratory toxicity studies ★ - ★★	Protected status (requiring use of surrogate species); feasible duration of exposure often limited by logistics / expense.	Study design should include clear consideration of life phase / species comparability. Inclusion of sublethal effects should include a specific plan for how these data will be used in a NRDA context. Potential long-term effects (months, years) of exposure on sea turtles are poorly understood at present and logistically difficult to study.	Lower prioritization largely reflects logistical constraints and uncertain outcome based on previous studies. May be more necessary for spills involving compounds that have not been studied or to investigate specific effects of significant interest to a given NRDA (e.g., an effect observed in another taxon).
Biomarkers and other sublethal measures in turtle tissues ★	Assays exist for detecting biomarkers (e.g., CYP1A) and various other sublethal alterations associated with exposure to oil-related compounds.	There has been limited study in sea turtles relative to other species. Study design should strongly consider likelihood of Type I and II error, availability of data to facilitate interpretation of results, and a specific plan for how results will be used for assessment of exposure or injury.	Demonstration of exposure and injury attributable to an oil spill may be challenging based on current knowledge.

4.3.3. Summary of NRDA tools and approaches for sea turtles

According to evaluation of factors presented in Tables 4-1 to 4-3, the highest priority data to collect for NRDA include documentation of the co-occurrence of turtles and oil (including density and abundance of animals), the degree and nature to which turtles are exposed to oil, and mortality of turtles (and lost reproduction) caused by oil exposure and response activities. These data types are: 1) the most feasible to collect because they rely heavily on visual observations, most of which can take place during response operations; 2) very applicable to a sea turtle NRDA because they provide the foundation for exposure and injury determination (i.e., numbers of turtles exposed to oil to varying degrees and the consequences of those exposures) and for injury quantification (i.e., numbers of lost turtles); and 3) associated with relatively few technical challenges.

Based on the state of the science at the writing of these guidelines, types of data that have been less fruitful for sea turtle NRDA include studies of toxicological and other sublethal effects of oil, particularly for turtles without clear evidence of oil exposure. As discussed briefly above, toxicological effects of oil exposure have not been demonstrated in sea turtles as clearly as physical effects. Previous attempts to measure toxicological effects of oil exposure in turtles have generated inconclusive evidence with regard to acute mortality or compromised survival within study intervals. Also, understanding biomarker assays in sea turtles is still in its early stages, and translating results of these methods and other sublethal endpoints to injury is challenging in a NRDA context. In addition to these considerations, sublethal toxicological and physiological effects of oil exposure in free-ranging turtles are difficult to study and track over potentially long periods following initial exposure. Although long-term effects of oil exposure (e.g., effects on growth rates, reproduction, immune function) are difficult to measure, *they nonetheless could be significant*. Applied research on potential assessment tools related to longer-term effects and toxicity could be especially valuable for future NRDAs.

The importance of the effects of oil spills and response activities on sea turtle habitat and prey is mentioned in these guidelines, but an in-depth review is beyond the scope of this document. Habitat and prey are important for defining exposure and demonstrating injury. Effects from spills can be both extensive and persistent (e.g., alteration of beach substrates, destruction of seagrass beds and other habitat). Researchers and NRDA practitioners focused on impacts and restoration of these specific resources should be engaged in order to inform and improve assessment of sea turtle injury.

4.4. Nexus between injury and restoration

Natural resource Trustees must develop a Restoration Plan for restoring the injured resources and services (NOAA-DARP 1996). Although restoration actions follow the injury assessment in conceptual sequence, it is important that injury assessment includes consideration of restoration techniques in planning injury assessment approaches as there are logical and practical connections to be made early in the NRDA process. The OPA requires that Trustees identify and implement actions that restore, rehabilitate, replace, or acquire natural resources and services equivalent to those injured by oil spills to

the baseline condition of those resources if the incident had not occurred (33 USC § 2706(c) and the OPA NRDA regulations 15 CFR Part 990). Simply put, there are two main goals of restoration activities: 1) return injured natural resources and services to their baseline condition (primary restoration) and 2) compensate for interim losses from the time of the incident until the resources and services recover to baseline conditions (compensatory restoration) (15 CFR § 990.10).

To meet these goals, restoration activities must produce benefits that are related to, or have a nexus (connection) with, sea turtle injuries and service losses resulting from the spill. To meet the NRDA regulations, Trustees must consider a reasonable range of restoration alternatives, evaluate and select the preferred alternative(s), and develop the draft and final Restoration Plan(s) with opportunity for public review and comment (DWH NRDA Trustees 2016). To ensure that restoration actions adequately address the injuries caused by an incident, the benefits of the actions should be scaled in the same metrics as those used in injury quantification. Ideally, restoration actions will directly restore the species, life stages, and geographies that were lost. For example, if adult loggerhead sea turtles were lost, then restoration actions should be developed to specifically restore adult loggerhead sea turtles of the affected management unit(s), not an earlier life stage. However, in some cases restoration actions might be infeasible for some life stages or geographies, thus Trustees must develop restoration options that restore a different life stage(s) or management unit than was injured by a spill. In such instances, it may be necessary to identify a common metric to compare the resources lost with those that will benefit from a restoration action.

Consideration of injury metrics is key for robust injury quantification, as well as for enabling the appropriate calculation of quantifiable benefits to resources from restoration actions. In other words, how the injury quantification is conducted and calculated can influence the development of restoration alternatives in final restoration plans. With that in mind, the remainder of this section presents considerations for coordination of injury assessment and restoration planning, possible sea turtle injury metrics, and types and geographies of potential restoration approaches to restore sea turtle injuries.

4.4.1. Coordination between injury and restoration planning

Conceptually, restoration planning follows injury quantification because Trustees must understand the nature and extent of injuries before developing approaches to restore them. However, in actuality, coordination between restoration planning and injury assessment should be initiated during the Restoration Planning Phase. Once preliminary information about the nature, extent, and magnitude of the injuries becomes available, the NRDA practitioners may begin to explore potential restoration options. For example, if a spill occurs in a relatively small area close to sea turtle nesting beaches, and injuries appear to be limited to breeding turtles, eggs, or hatchlings, restoration planning can focus on investigating existing restoration approaches and feasibility in or near the affected area that could directly address beach-based injuries to sea turtles. In contrast, if a spill occurs far from shore, and would likely affect oceanic juveniles that are difficult to directly restore, restoration planning can explore restoration options to feasibly and effectively restore a different life stage, ideally an older life stage that has already survived beyond the one lost, and how to convert those restored resources to the type actually injured.

The types of injury metrics that are produced by an assessment study are an important consideration because they are pertinent to restoration planning. As injury quantification is refined, coordination among personnel engaged in assessment and restoration planning should become more frequent to ensure effective, calculable restoration of injuries caused by an incident. To the extent possible, personnel involved with injury assessment should regularly participate in restoration planning, and vice versa, to promote efficient communication and translation between the two aspects of a sea turtle NRDA. In particular, restoration planners should understand injury metrics and how to apply them to potential restoration actions. In the following subsections, possible injury metrics that were presented in previous sections are discussed in the context of restoration planning.

4.4.2. Injury and restoration metrics

Mortality and sublethal effects

The most straightforward metric is mortality (dead animals) such that any activity or study that documents injury in terms of number of dead animals requires little to no conversion during injury quantification or restoration scaling, i.e., X number of sea turtles lost requires X number or its equivalent to be restored. The only conversions necessary are for some specific applications (e.g., the proportion of hatchlings estimated to reach maturity). In addition to loss of eggs on impacted beaches and mortality of other life stages, offspring that are not produced due to shoreline disturbance or are otherwise lost to the management unit (e.g., due to required translocation out of the region) are essentially treated as mortality.

Sublethal effects may contribute to injury resulting from an oil spill, but quantification in a manner that is applicable for restoration is more challenging than for mortality. For example, if an animal exposed to oil or a response action suffers some reduction in a physiological parameter, growth rate, energetic cost, or other potentially injurious effect, a means of restoration will be needed for this information to be used under NRDA. The eventual need for such application should be considered during study planning and design.

Production forgone and reproductive values

Production foregone as a result of mortalities of individual female sea turtles is an injury metric that could be used to quantify additional sea turtle losses. This metric is an estimate of the number of offspring lost over some future time period (e.g., one generation) due to the loss of individual female sea turtles. Recognizing that there are unique life history traits for sea turtles, the potential reproductive contribution of an individual female of a given age (or life stage) is calculated using population matrix models (see, e.g., Crouse et al. 1987; Crowder et al. 1994; Heppell 1998). The process factors in 1) the approximate age(s) / life stage(s) of animals determined to have died as a result of the spill (determined under mortalities, discussed above); 2) annual survivorship; 3) age at maturity; 4) fecundity; and 5) reproductive lifespan. Empirical data for this suite of parameters may be unavailable and the use of estimates or expert opinion may be necessary. If empirical or derived, robust values from other sea turtle populations that generally share similar life history characteristics are available, they may be used as proxy values. In general, reproduction increases with age and peaks with onset of maturity. Thus,

large juvenile and adult sea turtles are expected to contribute more hatchlings to the population than small juveniles due to their lower survivorship. Another consideration for using production forgone is the duration of the future period over which these losses should be calculated. For purposes of discrete injury quantification and restoration scaling, Trustees must select a defined temporal window to estimate the magnitude of production forgone.

This approach has been used in NRDA cases since 1999 for a number of species, including birds, fish, mussels, and other turtles. It enables the Trustees to both quantify the production foregone from individual female mortalities and to scale restoration projects across life stages, if needed. Scaling injuries across life stages can be useful in informing development of balanced restoration alternatives by ensuring that the types and relative scale of restoration projects reflect the allocation of quantified injuries across life stages. However, uncertainties in important data inputs, especially stage-specific survival rates, can significantly influence this analysis; therefore, Trustees should exercise caution and explicitly incorporate uncertainty when scaling injury to restoration.

Ecosystem services

In addition to restoring for direct losses of sea turtles, the Trustees may consider restoring services that sea turtles provide to ecosystems. As highly mobile, large-bodied animals that occupy different marine habitats during their decades-long lives, sea turtles play unique and important roles in marine ecosystems. Sea turtles transport nutrients from ocean to land through deposition of eggs, thereby transferring nutrients derived from marine sources into sand beaches (Bouchard and Bjorndal 2000). Sea turtles also serve important roles in food webs as specialized consumers of gelatinous zooplankton (leatherbacks), sponges on coral reefs (hawksbills), and seagrass and other aquatic vegetation (green turtles), and as prey resources for many predators and scavengers (Heithaus 2013). In addition, as a result of an oil spill, there may be lost recreational services from the inability of humans to view sea turtles, whether through formal ecotourism or informal enjoyment of nature. In nearly every country in the world where sea turtles are present, particularly where they nest, people make efforts to observe sea turtles in the wild. Although the services provided by sea turtles are not necessarily easy to quantify, they are important to take into account when developing and scaling restoration alternatives.

4.4.3. Possible types of restoration for sea turtles

Restoration actions to address losses of sea turtles caused by an oil spill are essentially compensatory in nature; restoration projects address sea turtle injuries by increasing survivorship or decreasing mortality due to threats. As discussed in Section 1, threats to sea turtles vary in type and magnitude based on geography, behavior, and density of turtles in a given place at a given time, and life stages affected. A first step in developing possible restoration options for sea turtles should be to gather and analyze existing information about threats to the management unit and species of sea turtles affected by the spill. Much of this information can be found in ESA recovery plans, status reviews, and current biological synopses (Appendix 1). Discussed below are several types of restoration techniques that may be considered by the Trustees in identifying restoration options for sea turtles. This subsection

is intended to provide some examples, but is not intended to be an exhaustive review of all possible restoration actions that could benefit sea turtles.

Bycatch of sea turtles in commercial and recreational fishing gear is widely recognized as a primary threat to sea turtles in marine areas across regions, species, and life stages; therefore, bycatch reduction can be a viable restoration approach for sea turtles. It is important to note that restoration funds cannot be used to pay for things that are already mandated by federal law (e.g., purchase of federally-required turtle excluder devices [TEDs] and federal law enforcement). However, there are a number of possible restoration options to reduce bycatch mortality, including voluntary changes to fishing gear and/or practices; support for bycatch reduction training, monitoring, and state law enforcement. Other anthropogenic threats, such as vessel strikes and habitat loss through pollution, development, and other forms of environmental degradation also may be considered.

Threats to sea turtles on land (i.e., those that affect nesting females, eggs, hatchlings, or basking turtles) include coastal development (e.g., coastal armoring, artificial lighting, and beach nourishment), recreational activities (e.g., beach driving, beach furniture, increased human presence), and predation of eggs and hatchlings. (Bolten et al 2011). Possible restoration options could include protection of nesting beach habitats through acquisition and preservation; implementation of management measures to reduce impact of artificial lighting, recreational activities, and barriers to nesting (e.g., sea walls, beach furniture); enhanced patrolling to minimize threats to nesting turtles, their eggs, and hatchlings; and ecologically sound predation control programs.

In all cases, restoration options must be screened using OPA criteria, which includes identification of nexuses to injury and compliance with other applicable laws. In the case of sea turtles, federal ESA recovery plans should be consulted and used as guiding documents to help identify restoration activities that reduce primary threats and associated mortality. Restoration plans are developed to describe the restoration options considered, accounting for variation in species and life stages injured, geographic areas where injures occurred, and where restoration projects might take place. Restoration plans also evaluate the logistical, technical, legal, and financial feasibility of approaches, techniques, and projects.

4.5. Data management in NRDA

Data management is perhaps one of the most key pieces of any NRDA. As the initial flurry of information is becoming organized during the first few days of an incident, responders can be narrowly focused on their own data collection and reporting needs. The RP may be unfamiliar with current federal data expectations and the process of data sharing may be a challenge. A Data Sharing Plan may be developed during response that outlines the data agreements and goals of RP, federal, and state partners. Data managers typically sit under the Planning Section or NRDA and oversee the myriad data collected, working to ensure that both response and trustee needs are met. It is important that they also work with the Scientific Support Coordinator or NRDA lead(s) to discuss other data management staffing and funding needs to ensure that the appropriate level of oversight can be accomplished.

Data sharing among Trustees, various governmental and non-governmental experts, researchers, and others often is often necessary to develop the NRDA. Each agency has their own approaches and infrastructure related to data management for NRDA. For example, NOAA's Office of Response and Restoration has data management specialists trained in both response and NRDA. These roles have become standard when NOAA participates in spill exercises and incidents to ensure that cooperatively collected data are accounted for, shared among all responders, managed appropriately, and archived according to federal requirements. Some examples of web-based resources available to NRDA practitioners for data management, sharing, and visualization include:

- DIVER (Data Integration Visualization Exploration and Reporting) – a platform for the management, querying, and archiving of NOAA-NRDA data such as contaminant chemistry, field observations, and biological data.

- ERMA (Environmental Response Management Application) - a system that provides data visualization and common operational picture for the NRDA. NOAA-Emergency Response Division, NOAA's Office of Homeland Security, and U.S. Coast Guard also use ERMA for visualizing response data and making operational decisions. There are 8 regional ERMAs across the country and each contains the same base datasets that are important early in an incident, such as environmental sensitivity atlases, critical habitat, weather and ocean observations, environmental chemistry, and satellite imagery.

- DARTS (Damage Assessment and Restoration Tracking System) – DOI interactive website used for tracking NRDA cases that includes an interactive map, and comprehensive catalog of case documents.

Trustee agencies and their data managers should discuss the types of data needed to address the components of the injury conceptual model (Figure 4-1), and what metrics could be used to determine when collected samples are adequate for case needs. These goals should be determined and communicated clearly by case management (legal and technical) in collaboration with the TWGs. For studies conducted by NRDA, data managers may be more directly engaged with field personnel and will provide specific instructions for data reporting and entry. Efficient data intake is essential to making the most out of fieldwork and other studies, thus all procedures should account for this process. Teams returning from the field or performing laboratory studies should plan their efforts accordingly to ensure timely data review and data entry.

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Appendices

Appendix 1: Important web-based resources

The resources below can be found on NOAA's Office of Response and Restoration Field Assessment and Support Techniques (FAST) web site: https://www.diver.orr.noaa.gov/web/guest/field-forms-and-templates

- Notification trees and current contact information in the event of an oil spill
- Rehabilitation facilities by region and state
- Nest monitoring programs by region and state
- Editable, current drafts of spill response protocols and data forms
- Evidence handling protocols and best practices
- NOAA standard aerial survey shape files

Species information, including recovery plans, biological synopses, and species status reviews can be found at the NOAA, NMFS, Office of Protected Resources website at: https://www.fisheries.noaa.gov/sea-turtles

Appendix 2: Maps of species distributions, nesting locations, and basking locations for sea turtle populations found in the U.S. and its territorial waters.

Species distributions

Maps A2-1 through A2-6 are intended to show the distributions occupied by sea turtle populations of each species that occur within U.S. territories and Exclusive Economic Zone (EEZ) (based on Wallace et al. 2010; available via The State of the World's Sea Turtles (SWOT; Kot et al. 2015). Note that some sea turtle populations that nest in other countries regularly occur within the U.S. EEZ.

For more details about presence and relative abundance of different life stages by species within all U.S. regions, see Appendix 3.

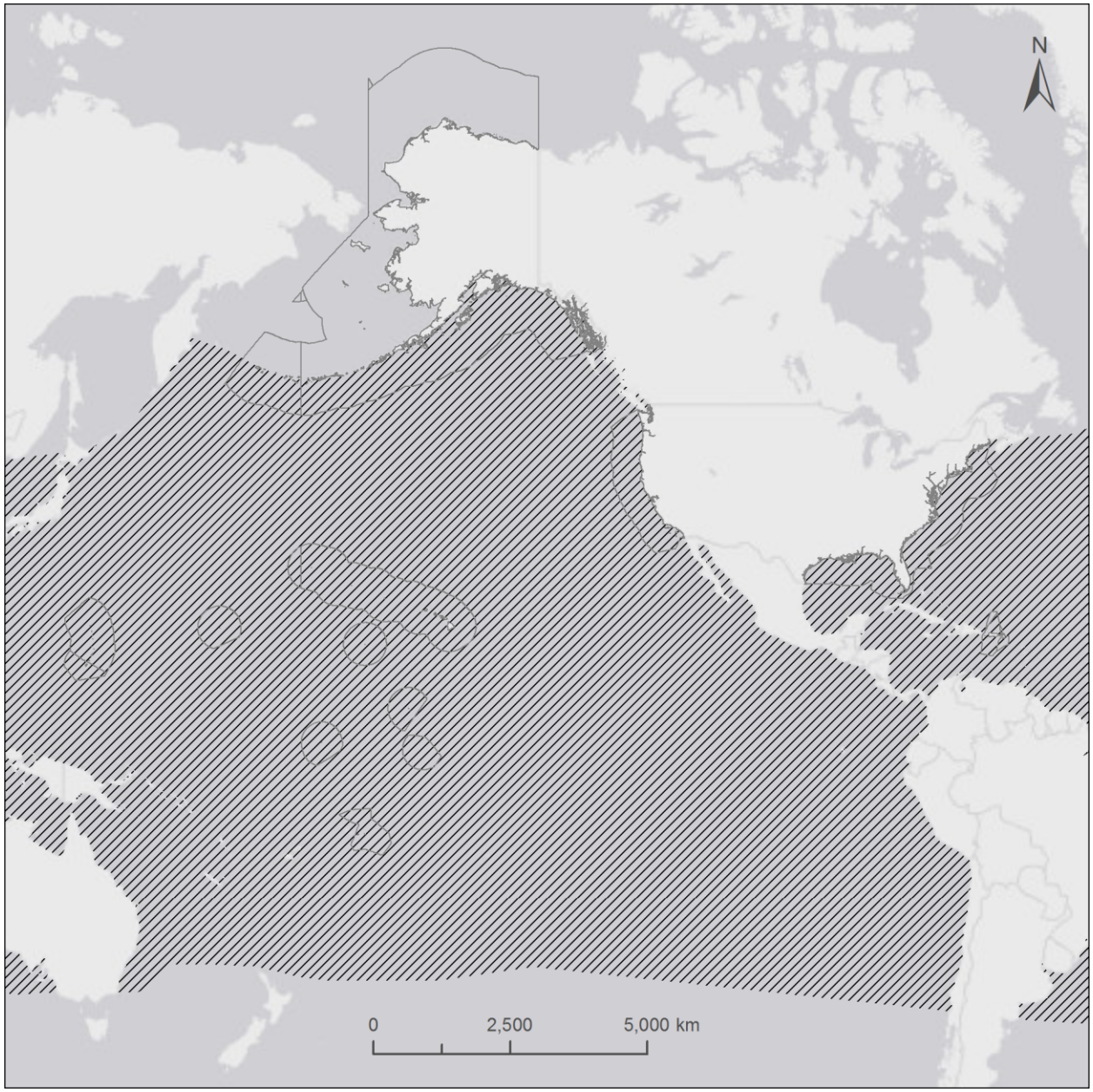


Figure A2-1. Distribution of green turtle (*Chelonia mydas*) populations relative to the U.S., its territories, and EEZ (black lines). Data source: The State of the World's Sea Turtles Online Database (SWOT), hosted on OBIS-SEAMAP (Kot et al. 2015).

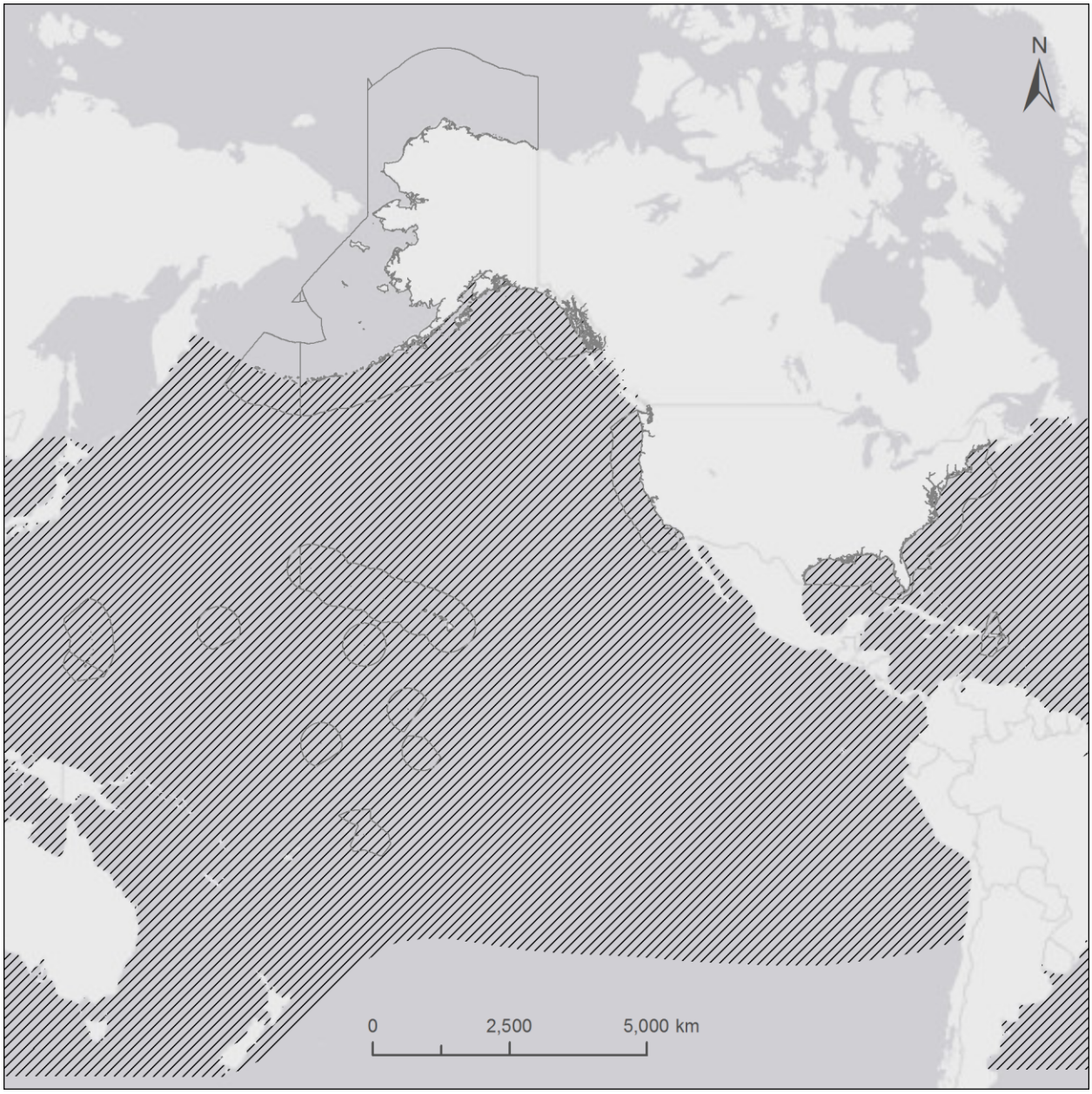


Figure A2-2. Distribution of loggerhead turtle (*Caretta caretta*) populations relative to the U.S., its territories, and EEZ (black lines). Data source: The State of the World's Sea Turtles Online Database (SWOT), hosted on OBIS-SEAMAP (Kot et al. 2015).

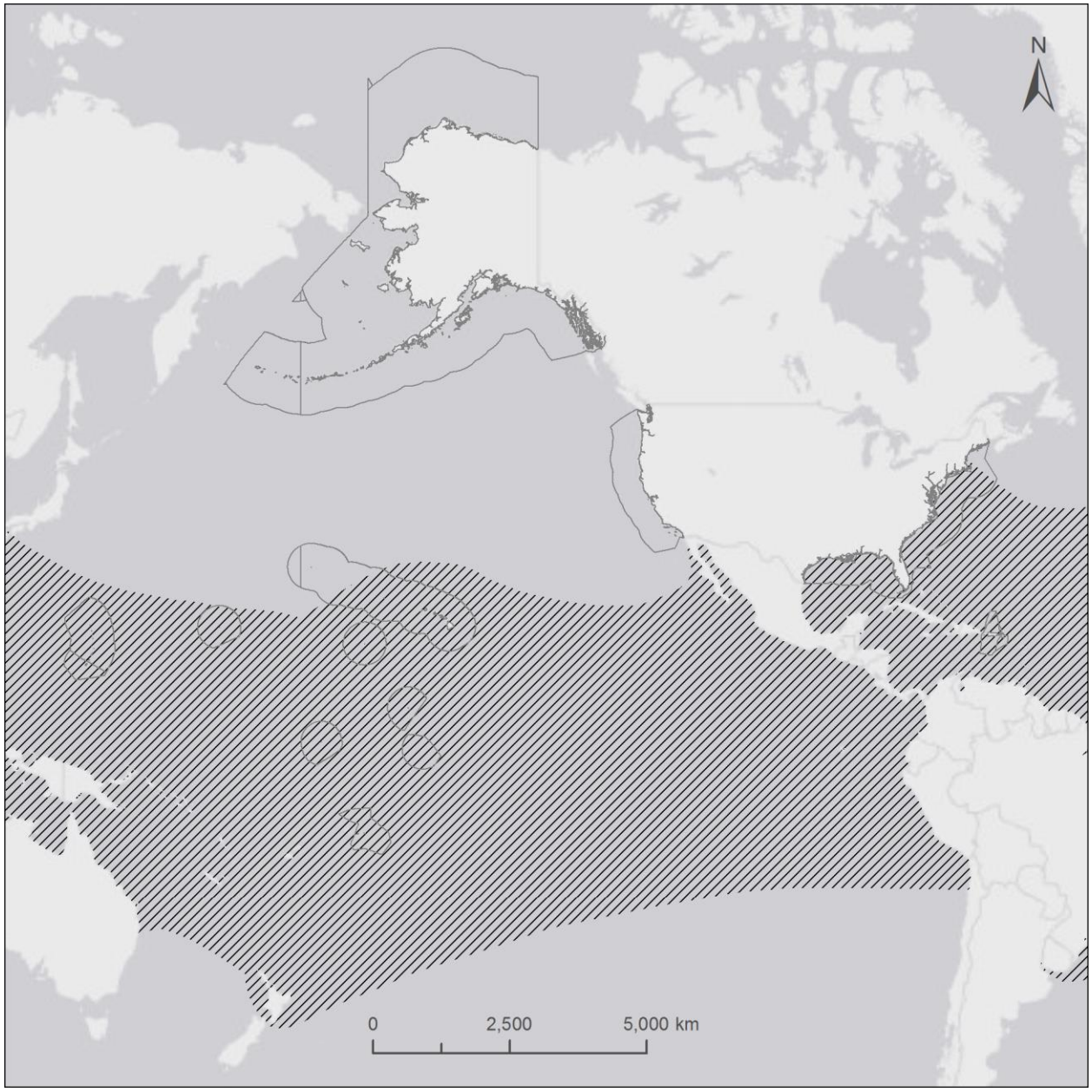


Figure A2-3. Distribution of hawksbill turtle (*Eretmochelys imbricata*) populations relative to the U.S., its territories, and EEZ (black lines). Data source: The State of the World's Sea Turtles Online Database (SWOT), hosted on OBIS-SEAMAP (Kot et al. 2015).

Figure A2-4. Distribution of Kemp's ridley turtle (*Lepidochelys kempii*) populations relative to the U.S., its territories, and EEZ (black lines). Data source: The State of the World's Sea Turtles Online Database (SWOT), hosted on OBIS-SEAMAP (Kot et al. 2015).

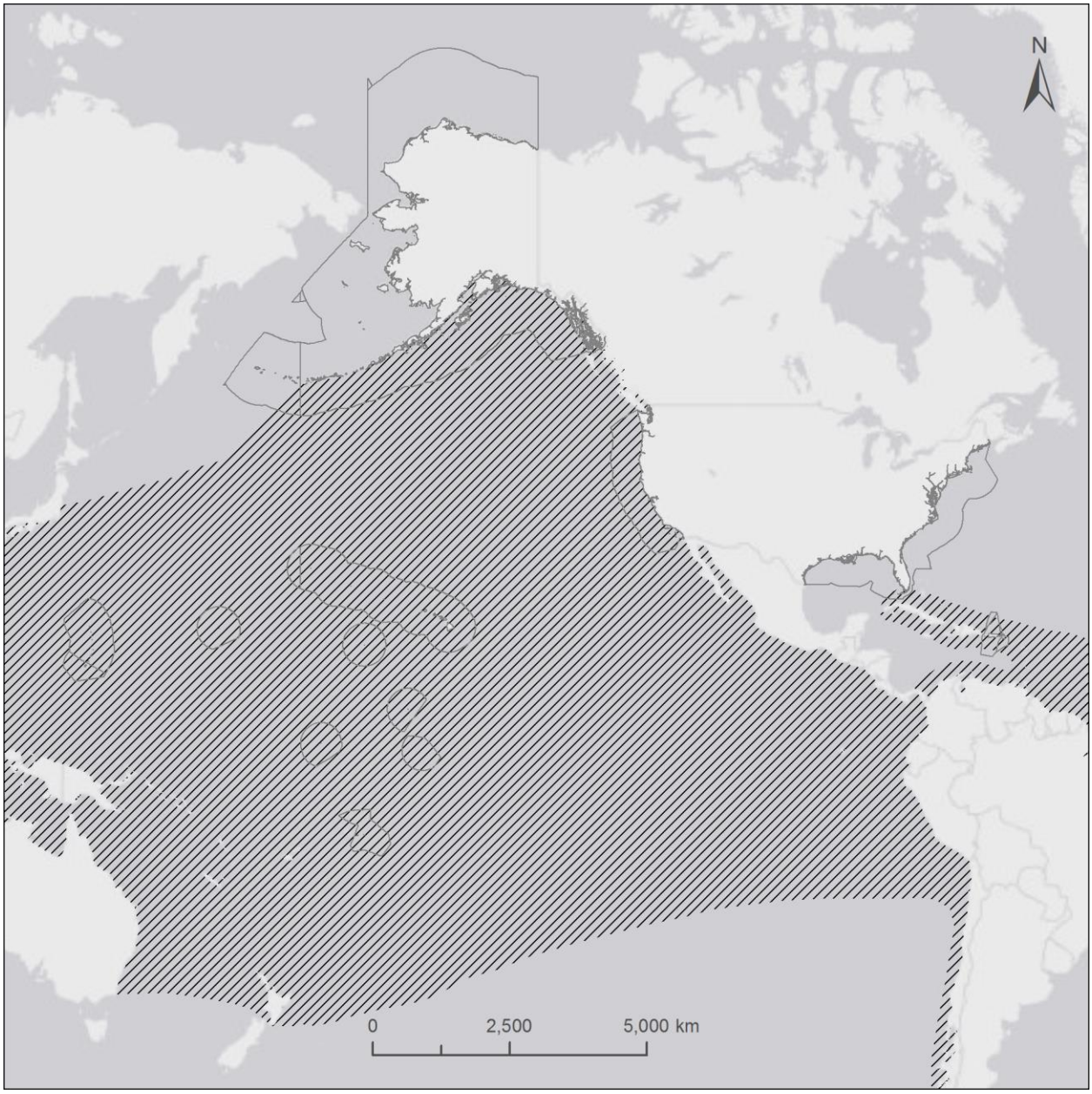


Figure A2-5. Distribution of olive ridley turtle (*Lepidochelys olivacea*) populations relative to the U.S., its territories, and EEZ (black lines). Data source: The State of the World's Sea Turtles Online Database (SWOT), hosted on OBIS-SEAMAP (Kot et al. 2015).

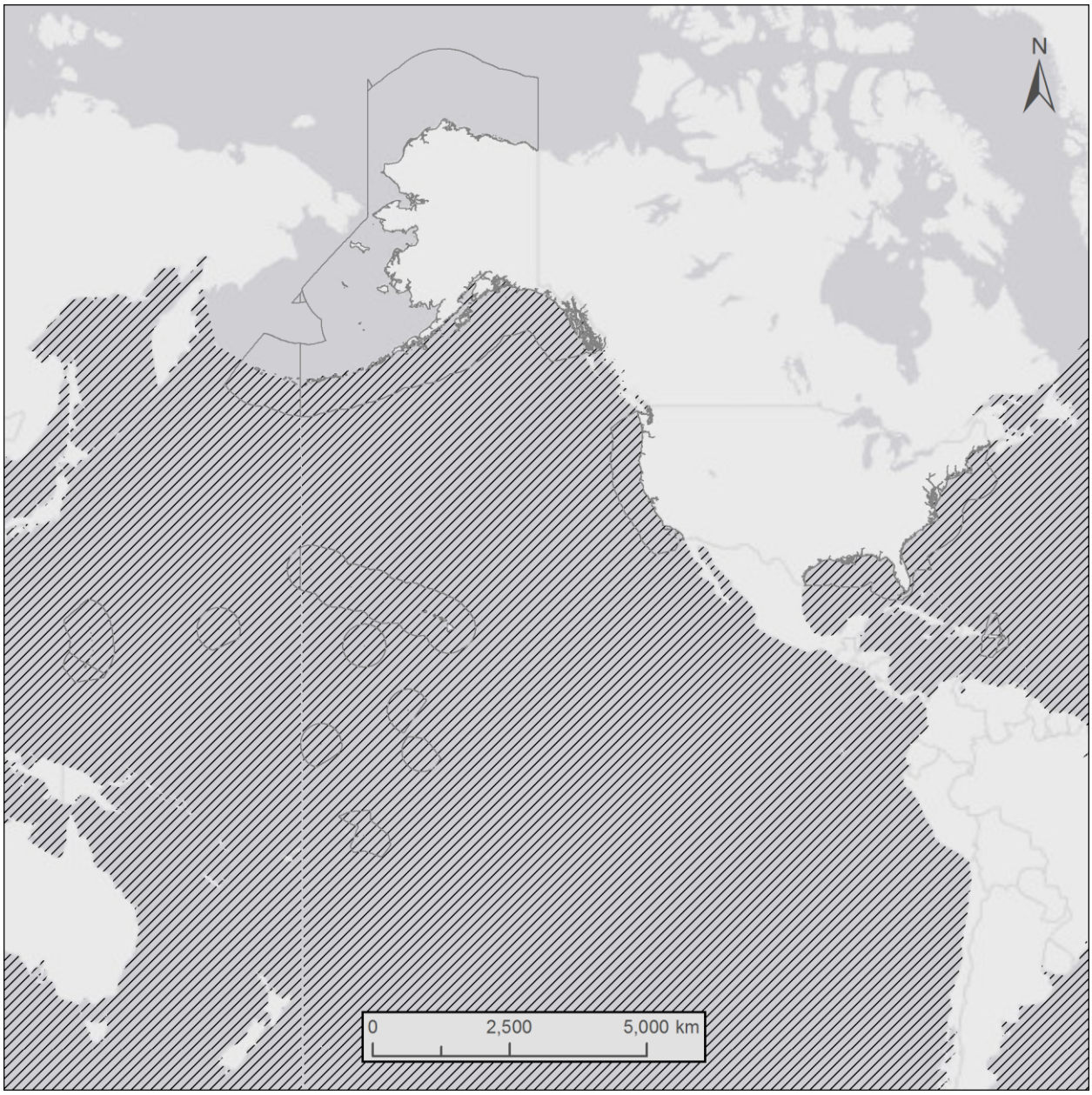


Figure A2-6. Distribution of leatherback turtle (*Dermochelys coriacea*) populations relative to the U.S., its territories, and EEZ (black lines). Data source: The State of the World's Sea Turtles Online Database (SWOT), hosted on OBIS-SEAMAP (Kot et al. 2015).

Nesting locations and densities

Maps A2-7 through A2-13 show the locations and relative numbers of nests in U.S. and its territories. These maps are intended to help spill response and NRDA personnel understand where nesting occurs and the relative magnitude of nests that could be affected by a spill in different areas. These maps do not reflect relative importance as even small numbers of nests can be important with regard to sustainability and recovery of genetic subpopulations. In addition, *many important nesting sites occur outside of the U.S. and its territories.* These locations are not shown on these maps and can be impacted by oil spills originating in U.S. territorial waters. Regional-specific information should be sought during the development of Area Contingency Plans. Information regarding nesting locations within and outside of the U.S. was accessed through The State of the World's Sea Turtles (SWOT) database (Kot et al. [2015]; http://seamap.env.duke.edu/swot) and the Florida Fish and Wildlife Conservation Commission's Statewide Atlas of Sea Turtle Nesting Occurrence and Density; http://myfwc.com/research/wildlife/sea-turtles/nesting/nesting-atlas/.

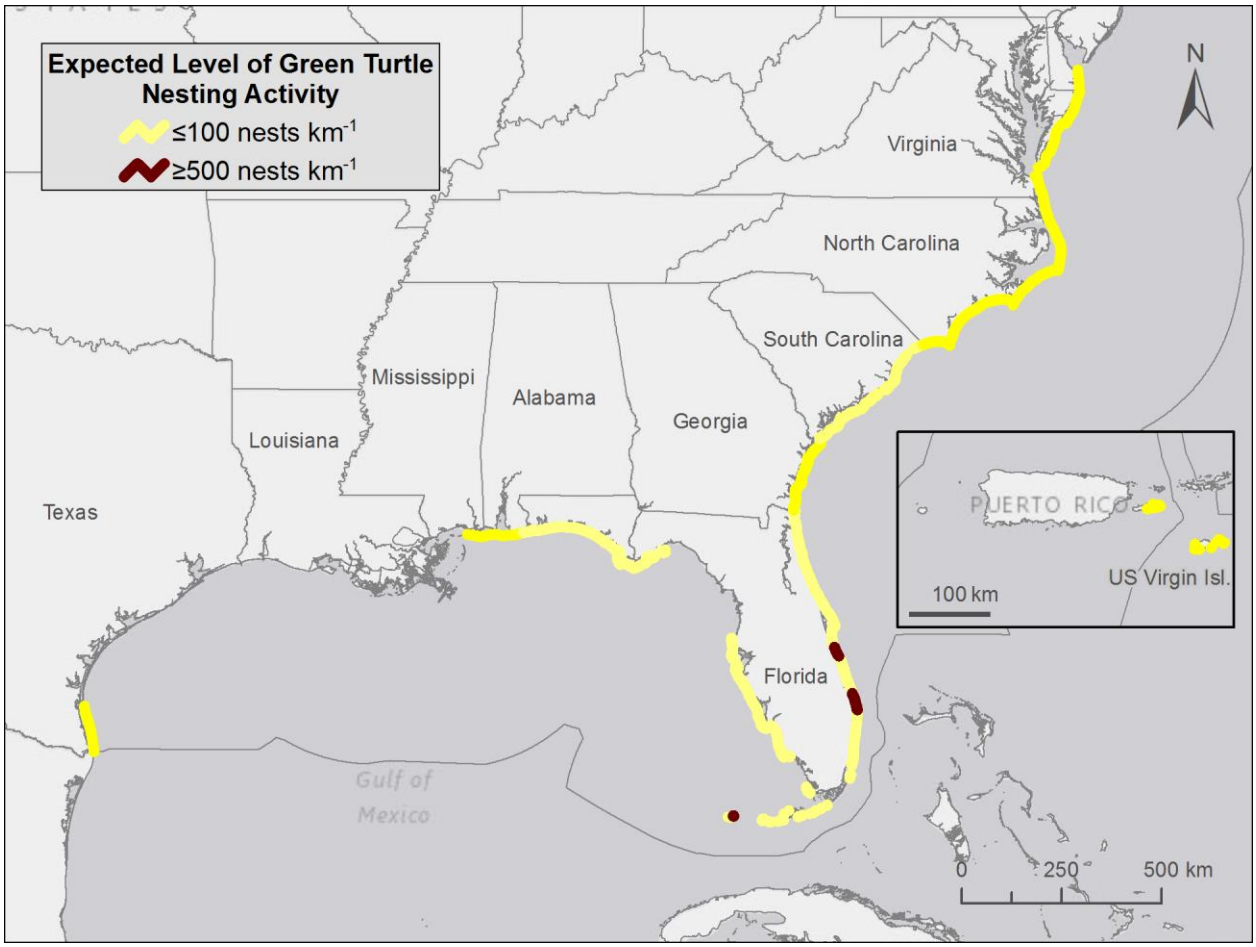


Figure A2-7. Locations and relative density of expected green turtle (*Chelonia mydas*) nesting in the U.S. and territories of the Atlantic, Gulf of Mexico, and Caribbean regions. Within the S.E. U.S., more than 95% of nesting occurs on the Atlantic coast of Florida, exceeding 30,000 nests during recent peak years.

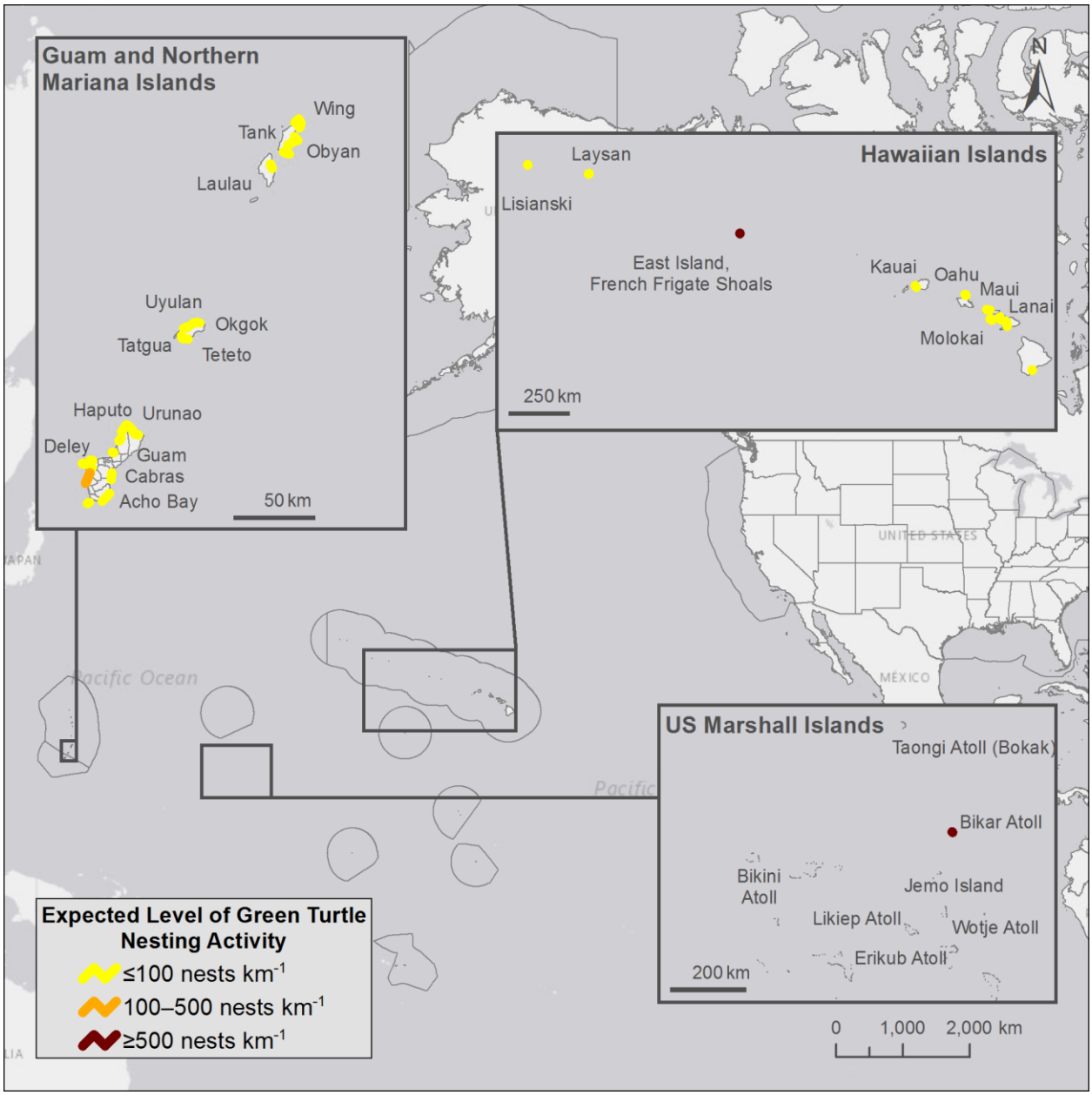


Figure A2-8. Locations and relative density of expected green turtle (*Chelonia mydas*) nesting in the U.S. and territories of the Pacific region. American Samoa also hosts low levels of green turtle nesting, but the sites are covered by the U.S. Marshall Islands inset map. Note that other locations that have sporadic nesting are not shown.

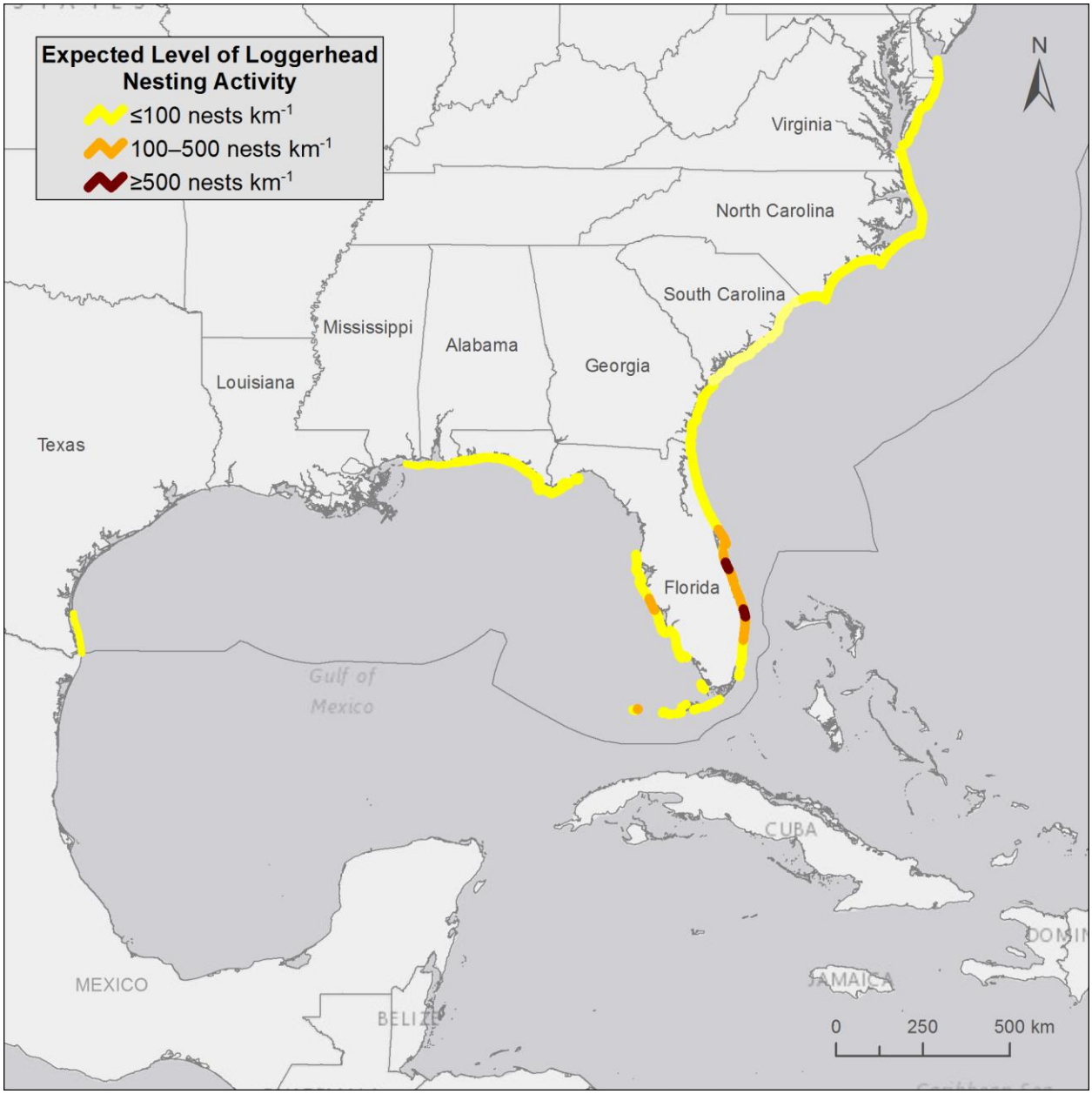


Figure A2-9. Locations and relative density of expected loggerhead turtle (*Caretta caretta*) nesting in the U.S. and territories of the Atlantic and Gulf of Mexico. More than 80% of loggerhead nesting occurs on the Atlantic coast of Florida, exceeding 80,000 nests during recent peak years. Other locations that have sporadic nesting are not shown.

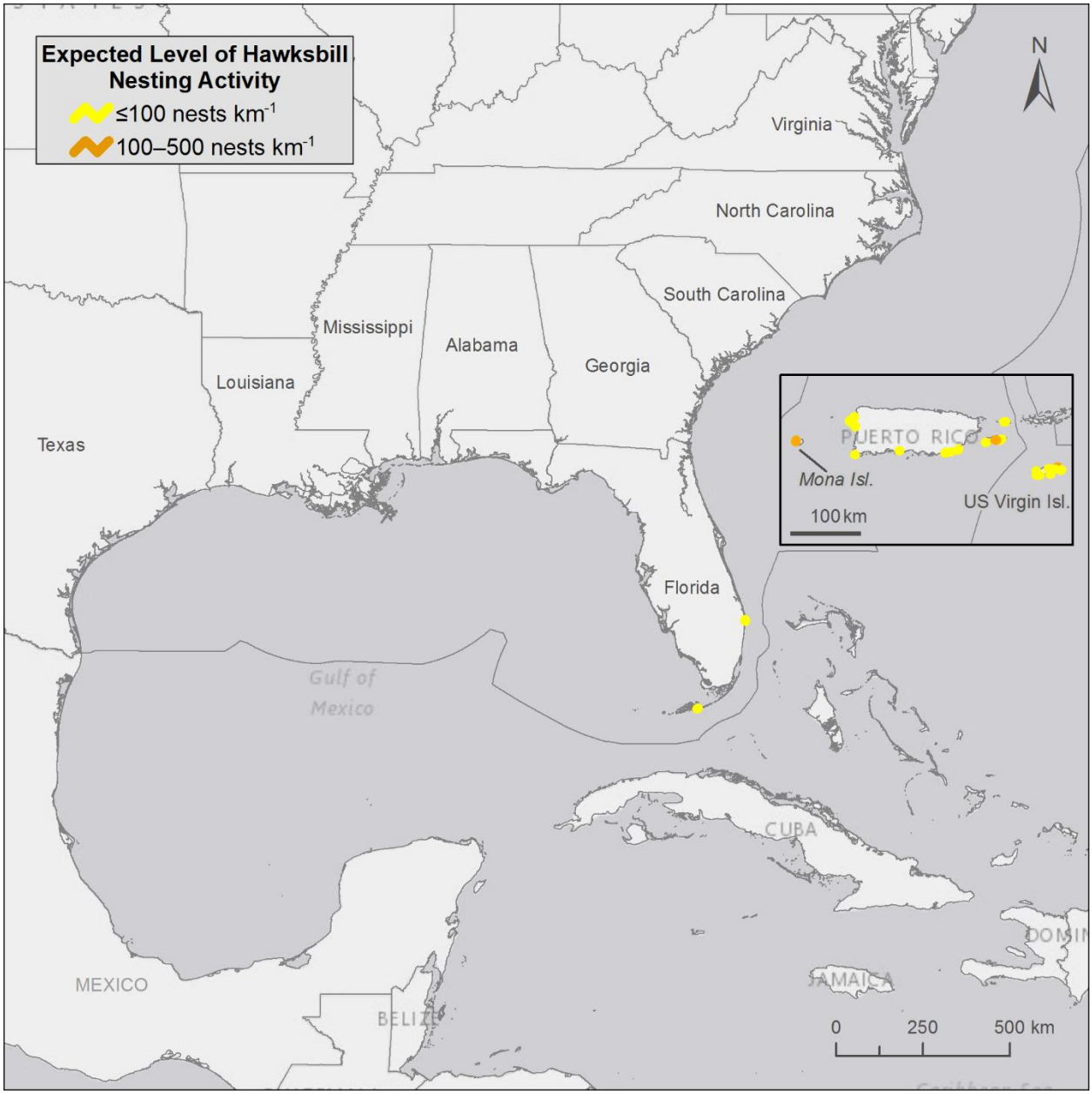


Figure A2-10. Locations and relative density of expected hawksbill turtles (*Eretmochelys imbricata*) nesting in the U.S. and territories of the Gulf of Mexico and Caribbean regions.

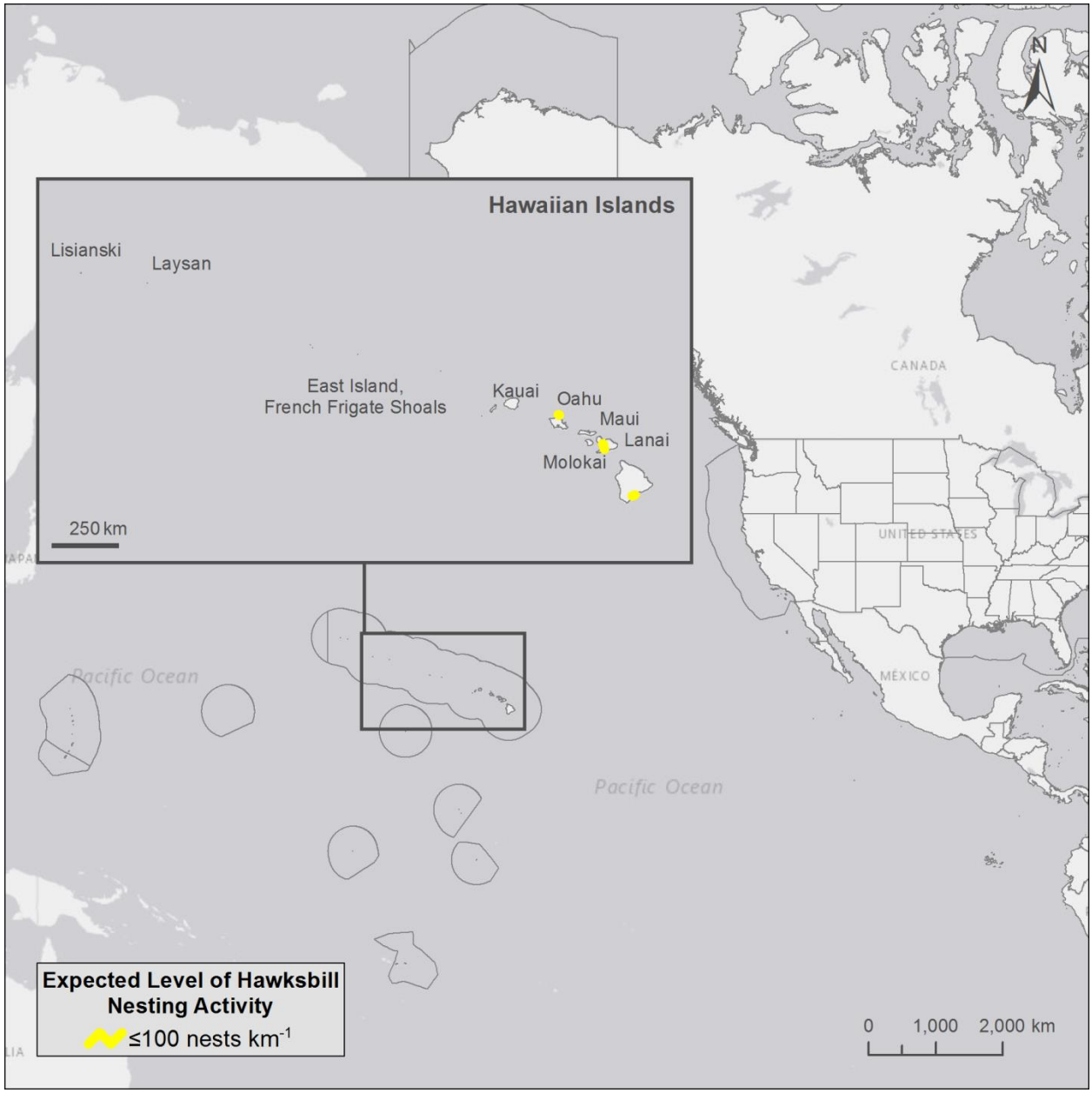


Figure A2-11. Locations and relative density of expected hawksbill turtle (*Eretmochelys imbricata*) nesting in the U.S. and territories of the Pacific region. Note that other locations that have sporadic nesting (e.g., Guam, American Samoa, Commonwealth of Northern Mariana Islands) are not shown.

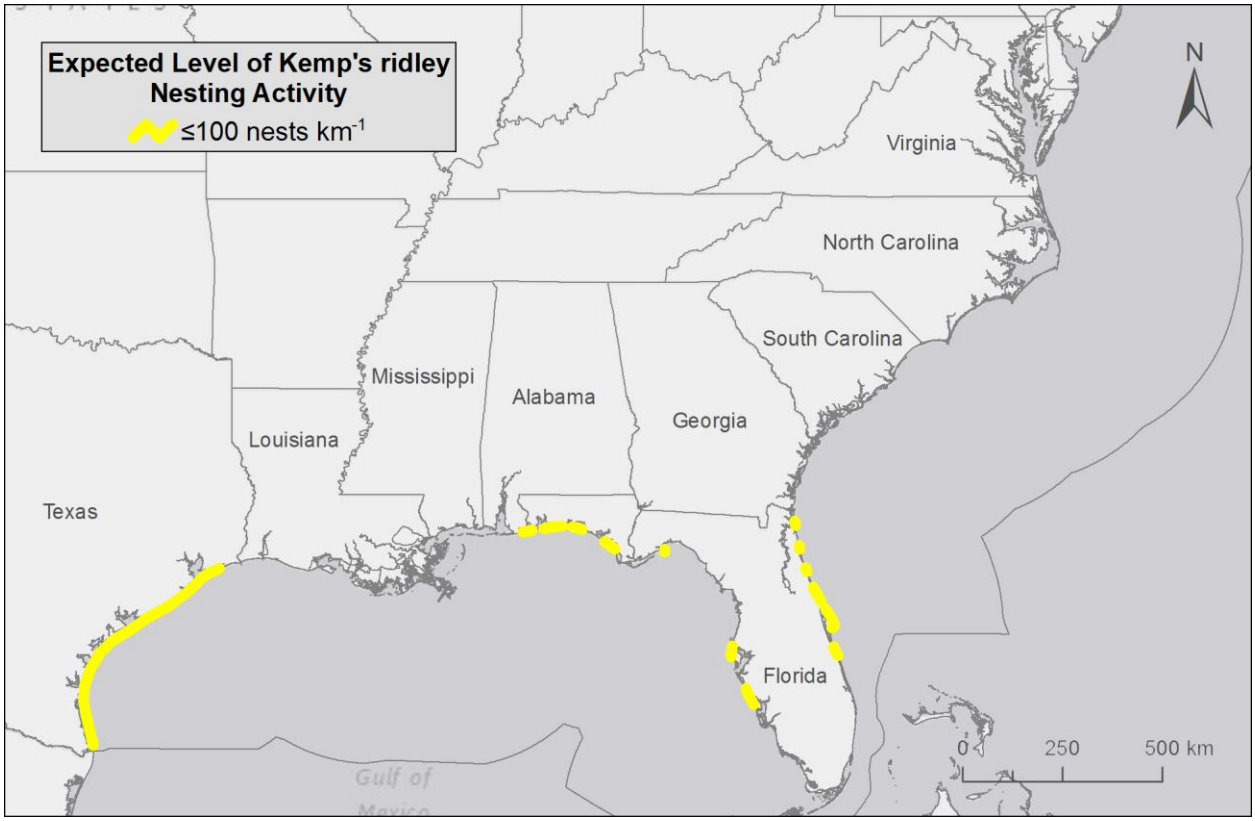


Figure A2-12. Locations and relative density of expected Kemp's ridley turtle (*Lepidochelys kempii*) nesting in the Gulf of Mexico region. Note that other locations that have sporadic nesting are not shown. More than 98% of all Kemp's ridley nesting occurs in neighboring Mexico.

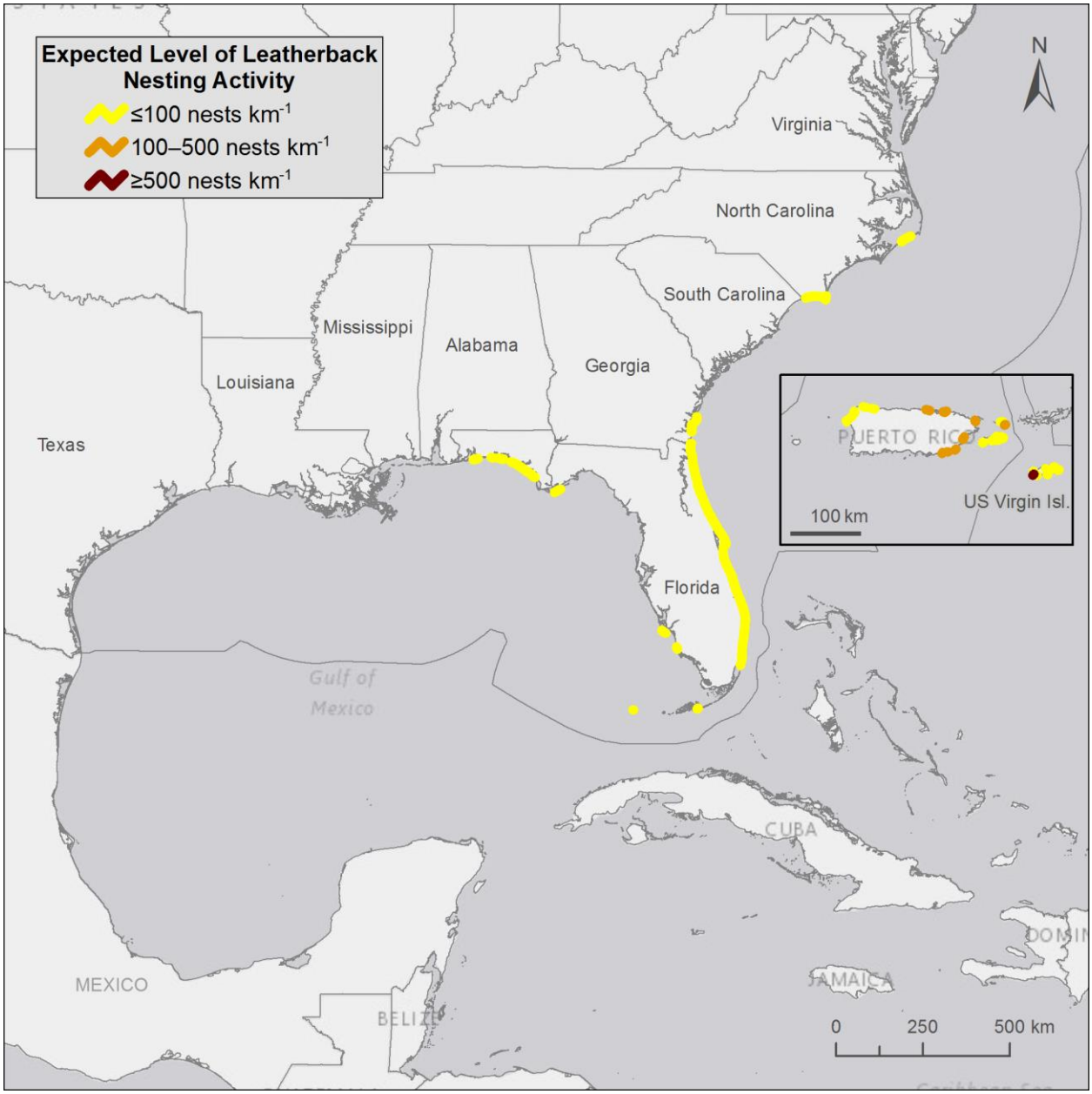


Figure A2-13. Locations and relative density of expected leatherback turtle (*Dermochelys coriacea*) nesting in the U.S. and territories of the Atlantic, Gulf of Mexico, and Caribbean regions. Note that other locations that have sporadic nesting are not shown.

Basking locations

Maps A2-14 through A2-17 show the locations of green turtle basking areas in the Hawaiian Islands and numbers of turtles that may be encountered at these locations. Maps were provided by Todd Jones and Shawn Murakawa.

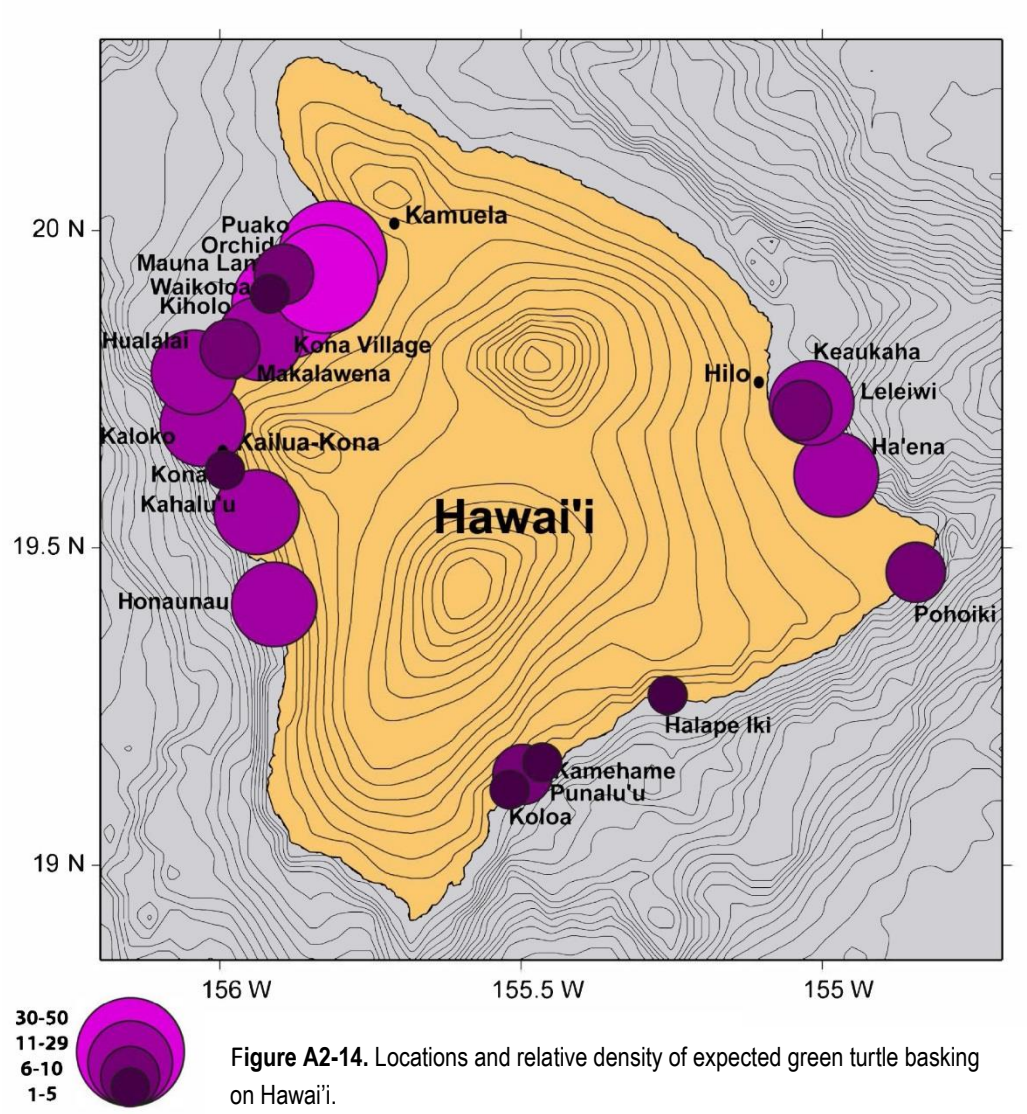


Figure A2-14. Locations and relative density of expected green turtle basking on Hawai'i.

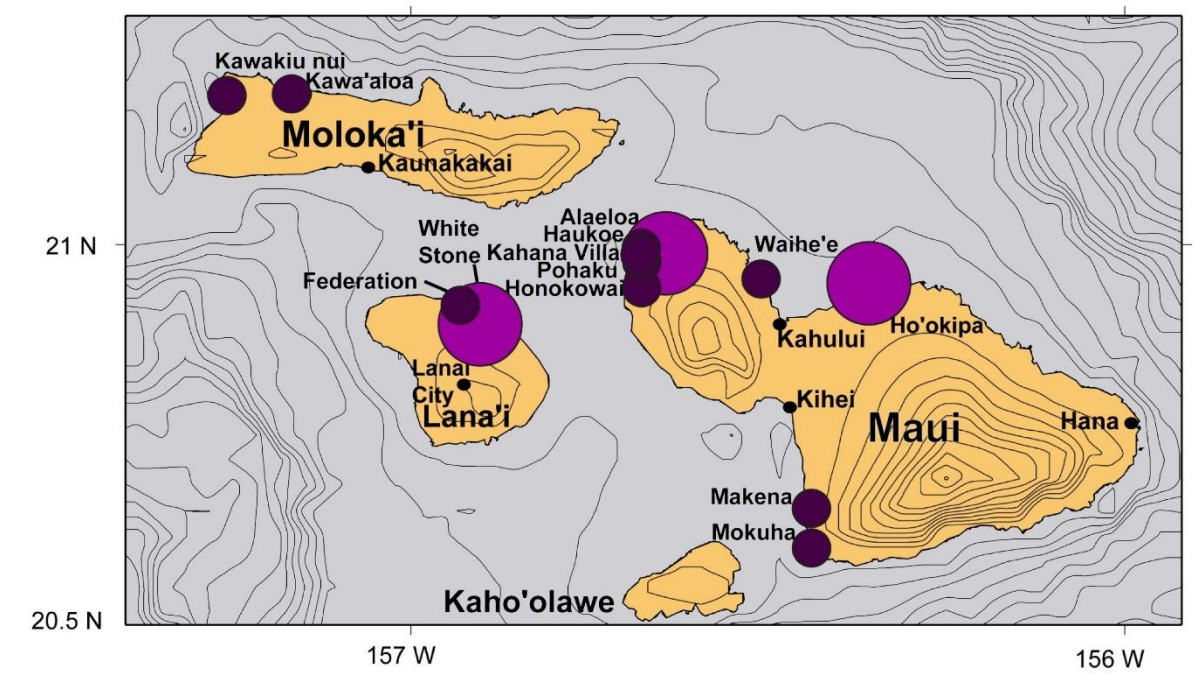


Figure A2-14. Locations and relative density of expected green turtle basking on Maui, Moloka'I, Lana'I, and Kaho'olawe.

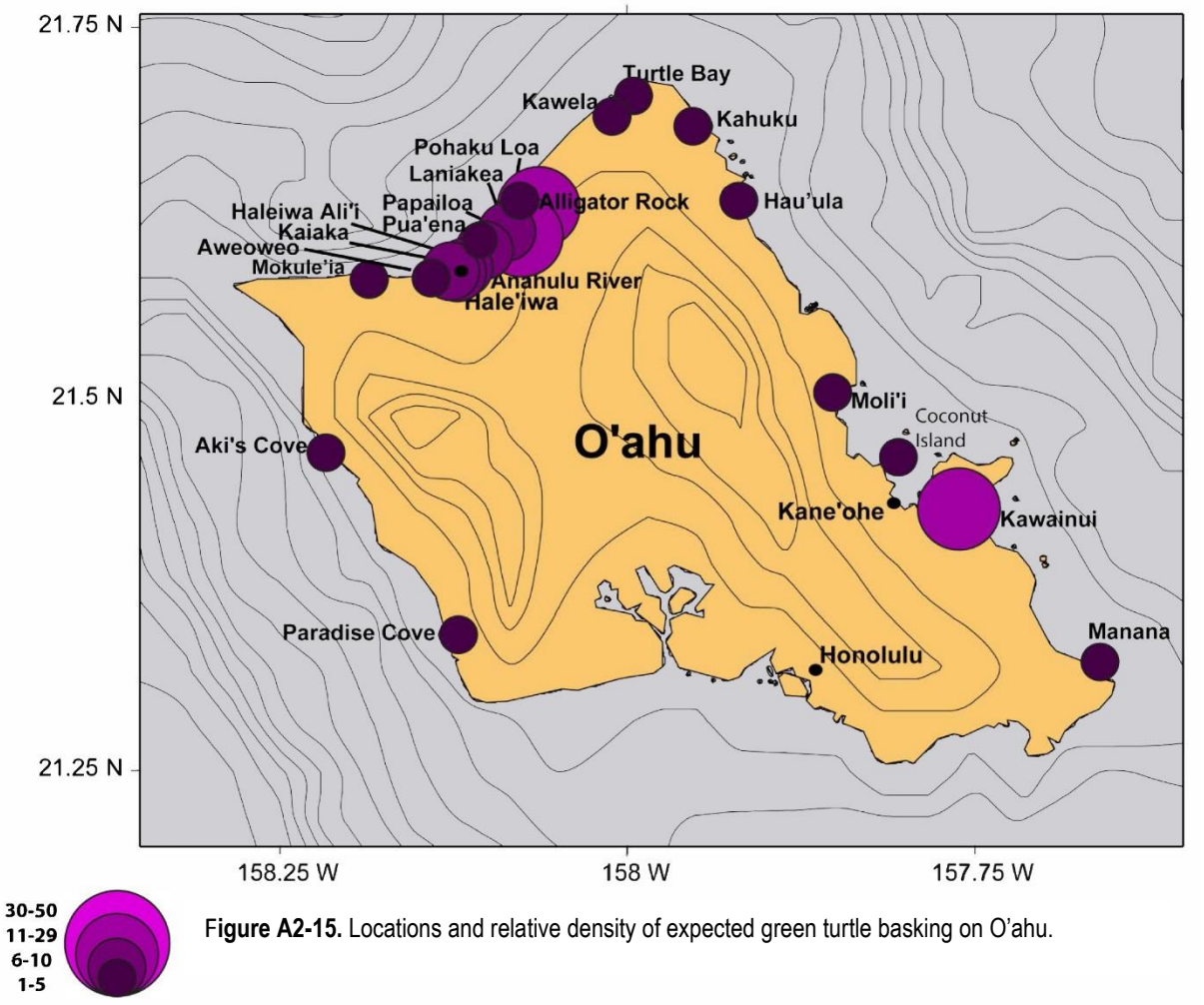


Figure A2-15. Locations and relative density of expected green turtle basking on O'ahu.

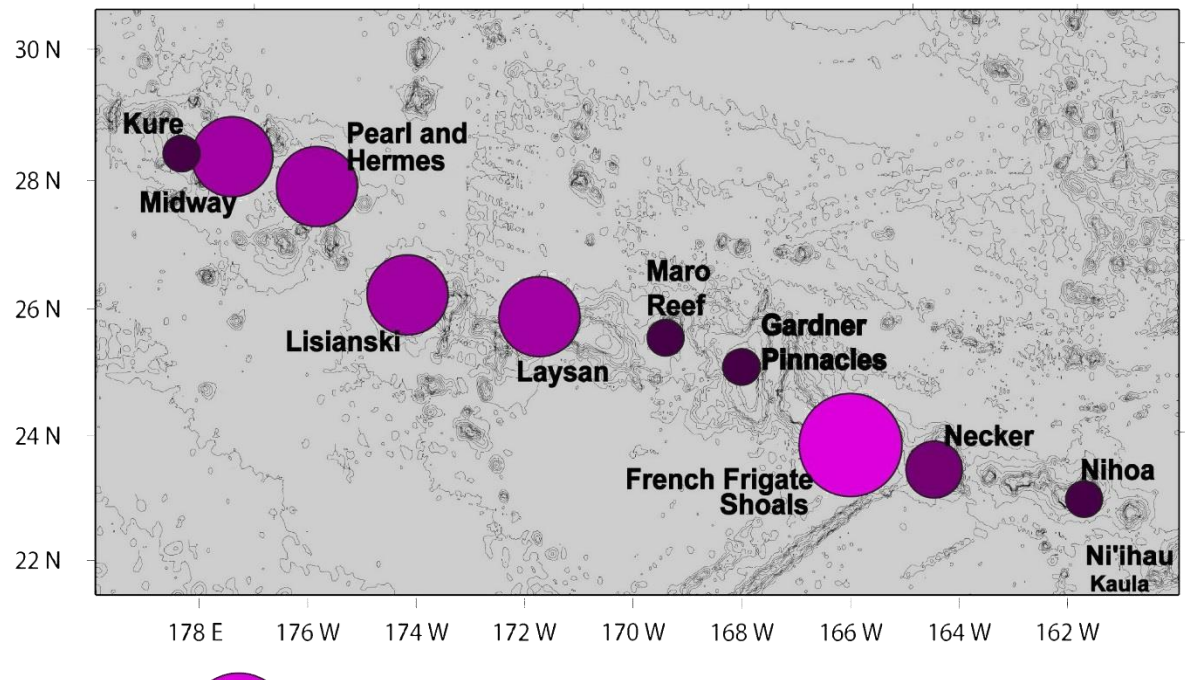


Figure A2-16. Locations and relative density of expected green turtle basking on northwestern Hawaiian islands.

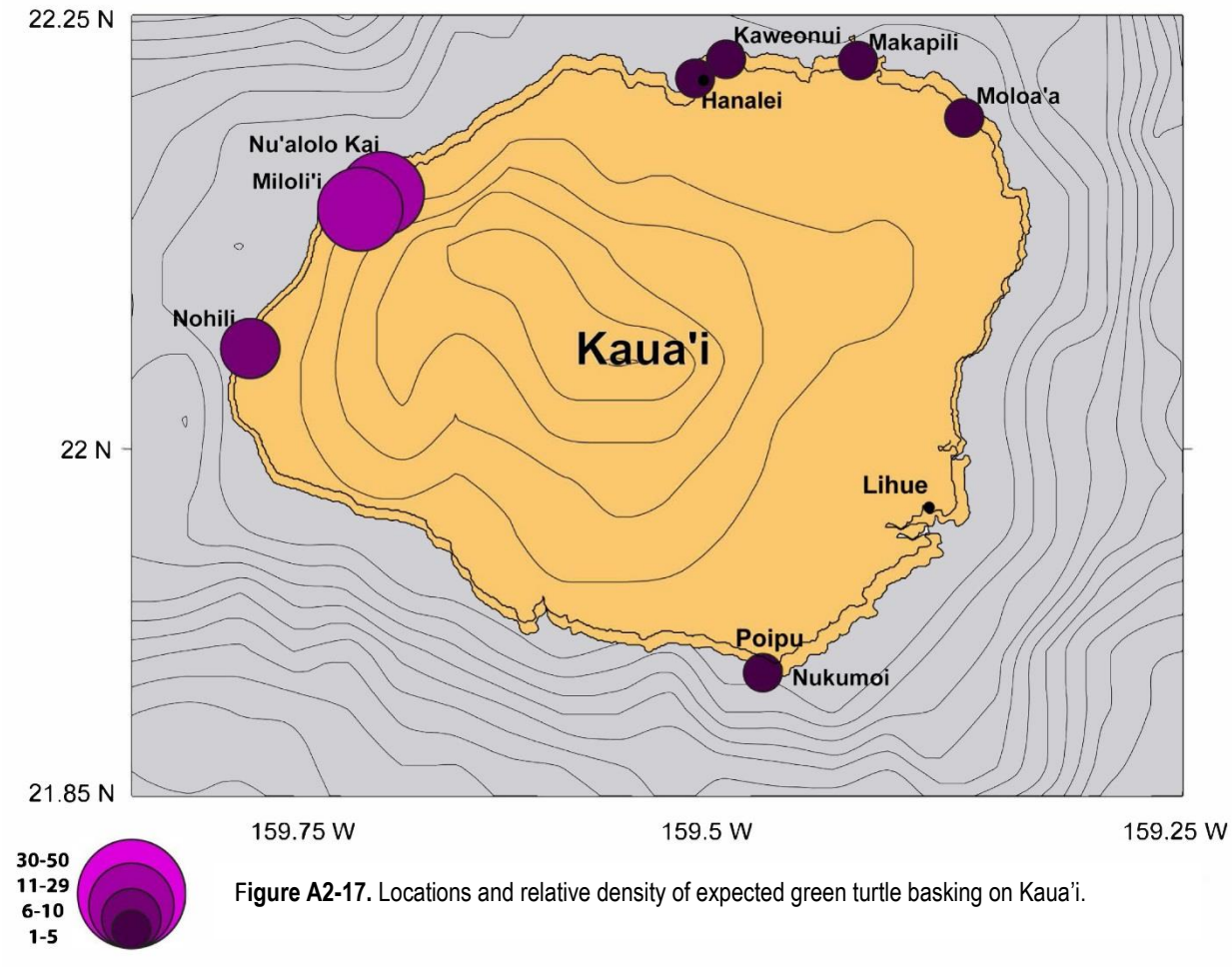


Figure A2-17. Locations and relative density of expected green turtle basking on Kaua'i.

Appendix 3: Temporal presence of different life stages (adults, juveniles, hatchlings) for each species in each U.S. region.

Blue shading indicates in-water presence, pink shading indicates the additional presence of breeding and nesting turtles. Darker colors indicate periods of higher concentrations of turtles, lighter shading reflects anticipated lower concentrations, and "NP" indicates absence. Species that are present in U.S. territorial waters but do not nest in U.S. territories belong to breeding populations whose nesting sites are outside of the U.S. (e.g., hawksbills and leatherbacks in the northern Gulf of Mexico nest in the Wider Caribbean region, leatherbacks present in the East Pacific nest in Indonesia, olive ridleys present in the Pacific nest in Mexico and Central America).

Region	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
NW Atlantic (New York to Maine)	Kemp's ridleys	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles
	Loggerheads	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Green turtles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles
	Leatherbacks	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Hawksbills	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles
	Olive ridleys	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Mid-Atlantic (Delaware to Virginia)	Kemp's ridleys	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles
	Loggerheads	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Green turtles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Leatherbacks	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Hawksbills	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles	Juveniles
	Olive ridleys	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP

Blue shading indicates in-water presence, pink shading indicates the additional presence of breeding and nesting turtles. Darker colors indicate periods of higher concentrations of turtles, lighter shading reflects anticipated lower concentrations, and "NP" indicates absence. Species that are present in U.S. territorial waters but do not nest in U.S. territories belong to breeding populations whose nesting sites are outside of the U.S. (e.g., hawksbills and leatherbacks in the northern Gulf of Mexico nest in the Wider Caribbean region, leatherbacks present in the East Pacific nest in Indonesia, olive ridleys present in the Pacific nest in Mexico and Central America).

Region	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
SW Atlantic (North Carolina to Florida)	Kemp's ridleys	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Loggerheads	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Green turtles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Leatherbacks	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Hawksbills	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Olive ridleys	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
Gulf of Mexico/ Northern Caribbean (U.S. EEZ)	Kemp's ridleys	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Loggerheads	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Green turtles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles
	Leatherbacks	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Hawksbills	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Olive ridleys	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP

Blue shading indicates in-water presence, pink shading indicates the additional presence of breeding and nesting turtles. Darker colors indicate periods of higher concentrations of turtles, lighter shading reflects anticipated lower concentrations, and "NP" indicates absence. Species that are present in U.S. territorial waters but do not nest in U.S. territories belong to breeding populations whose nesting sites are outside of the U.S. (e.g., hawksbills and leatherbacks in the northern Gulf of Mexico nest in the Wider Caribbean region, leatherbacks present in the East Pacific nest in Indonesia, olive ridleys present in the Pacific nest in Mexico and Central America).

Region	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
East Pacific (contiguous U.S. West Coast)	Kemp's ridleys	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
	Loggerheads	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Green turtles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Leatherbacks	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Hawksbills*	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Olive ridleys	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
Central North Pacific (e.g., Hawaii, outlying islands, and connecting high seas areas)	Kemp's ridleys	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP
	Loggerheads	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Green turtles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles	Adults Juveniles
	Leatherbacks	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles
	Hawksbills	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings	Adults Juveniles Hatchlings
	Olive ridleys	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles	Adults Juveniles

Appendix 4. Nesting beach activity by state

State	Region (if different)	Nest Laying Season	Hatching Season Ends
Florida	Nassau through Flagler Counties	15 April – 30 Sep	15 Dec[a]
	Volusia through Miami-Dade Counties	1 Mar - 31 Oct	15 Jan[a]
	Monroe County	15 Apr - 30 Sep	30 Nov[b]
	Collier through Pinellas County	15 Apr – 30 Sep	30 Nov[a]
	Franklin through Escambia County	1 May - 31 Aug	20 Nov[a]
Texas	-	30 Mar – Oct 1	17 Nov
Louisiana, Mississippi, and Alabama	-	1 May - 31 Aug	31 Oct
Georgia	-	15 Apr - 30 Sep	30 Nov
South Carolina	-	29 Apr - 30 Sep	30 Nov
North Carolina	-	1 May - 15 Sep	15 Nov
Puerto Rico	-	1 April – 30 Nov	31 January
U.S. Virgin Islands	-	1 Feb – 31 Oct	30 Dec
Hawaii	-	1 May – 31 Oct	30 Dec

[a] or 80 days after last nest in county was deposited (whichever is earlier).

[b] or 70 days after last nest in county was deposited (whichever is earlier).

Appendix 5: General information for miscellaneous operations

This Appendix includes basic protocols for operations that are not specifically targeting the documentation, rescue or recovery of sea turtles, i.e., activities where personnel may not have any familiarity with sea turtles, such as vessel operators and shoreline workers. The forms provide instructions on what to do if turtles are encountered during land- and sea-based operations, with emphasis on reporting, providing appropriate interim animal care and assistance, and documentation.

General at-sea protocol: retrieval of oiled, dead, or debilitated sea turtles

Information is requested for ALL encounters with oiled, dead, or debilitated sea turtles. If human safety and conditions allow, all dead and apparently debilitated turtles (including oiled turtles) should be retrieved and taken to an onshore facility for cleaning and rehabilitation or postmortem examination. Turtles should be reported and brought to shore or transferred to another vessel for transport to shore as soon as possible. If a sea turtle cannot be retrieved, take photographs to document it as thoroughly as possible.

Sea Turtle Retrieval Kit (1 per vessel):

- Large diameter (≥3 feet) dip net[4]
- Large plastic container (~26”Lx19”Wx15”H)
- Digital camera
- Large cotton towel
- PPE (gloves, Tyvek®suits, boots, goggles)
- Data forms and protocol

1. Protect yourself using appropriate safety equipment and precautions.
2. If a turtle appears dead or does not actively dive or swim away, bring it on board (dip-nets are useful for small turtles less than ~3 ft carapace length). Do not pick up turtles by their flippers, but rather lift them by grasping both sides of the carapace. Do not place hands or other body parts near the mouth, even if the turtle appears weak or listless.
3. If a turtle is not moving or responsive, but does not appear decomposed, place it in a protected area with the rear aspect of the shell elevated at an approximately 30-degree angle with the head downward and neck extended.
4. Keep the turtle out of the sun and on a cushioned surface. Do not put it in water.
   -If the air temperature is >75˚F, keep it moist with towels or wet it frequently.
   -If the temperature is <74˚F do not apply any moisture.
   -If the air temperature is <55˚F place the turtle in area that is as close to around 70˚F as possible.
5. Determine position at sea (latitude/longitude coordinates; DD.DDDD is preferred).
6. Contact [INSERT NAME AND CONTACT INFORMATION] to report the sea turtle as soon as possible.
7. Take multiple photographs of the animal to clearly document any visible oil and the condition of the turtle at the time of recovery (i.e., before any oil is removed).

[4]Recommended net size may vary depending on operational objectives; a larger net may be deployed if capture of larger turtles is anticipated.

8. Complete the **Sea Turtle Observation Form**. Provide your full name and contact information, including a phone number. Record any relevant information about oil conditions at the capture site.
9. Turtles that show obvious signs of decomposition (bloating, loosening of the skin) or that are unresponsive after 24 hours are considered dead and should be kept cool (with ice, refrigerator, freezer, shade) until transferred to a sea turtle responder.
10. If a debilitated or dead turtle cannot be retrieved, complete 4-7 above, taking photographs and complete the entire form. Instructions on how and where to send this information will be provided at the number above.

General shoreline protocol: oiled, dead, or debilitated sea turtles

Information is requested for ALL encounters with oiled, dead, or debilitated sea turtles. All dead and apparently debilitated turtles (including oiled turtles) should be retrieved and taken to a designated facility for cleaning and rehabilitation or postmortem examination. Turtles should be reported as soon as possible.

1. Protect yourself using appropriate safety equipment and precautions.
2. If a live or dead turtle is encountered on the beach, contact [INSERT CONTACT INFORMATION (i.e., Wildlife Branch Lead, Sea Turtle Group Lead, State Coordinator)]. If the turtle is struggling in the surf (appears unable to move onto land or out to sea) or a carcass is at risk of being washed away, move it out of / away from water and above the high tide line. Do not pick up live turtles by their flippers, but rather, lift them by grasping both sides of the carapace. Do not place hands or other body parts near the mouth, even if the turtle appears weak or listless.
3. For live turtles, keep the turtle out of the sun and on a cushioned surface. Do not put the turtle into water. Arrange for immediate transport or retrieval.
   -If the air temperature is >75˚F, keep it moist with towels or wet it frequently.
   -If the temperature is <74˚F do not apply any moisture.
   -If the air temperature is <55˚F place the turtle in area that is as close to around 70˚F as possible.
4. For dead sea turtles, keep cool (with ice, refrigerator, freezer, shade) until transferred to a sea turtle responder.
5. Determine location where the turtle was discovered (latitude/longitude coordinates; DD.DDDD is preferred).
6. If a camera is available, take photographs of the animal to thoroughly document its condition at the time of recovery.
7. If a stranding responder does not document the sea turtle in the field, complete a **Sea Turtle Observation Form** and provide the form to whoever receives the turtle. Provide your full name and contact information, including a phone number. Record any relevant information about oil conditions at the location where the turtle was found.

SEA TURTLE OBSERVATION FORM

OBSERVER'S NAME / ADDRESS / PHONE:

First _____ M.I._____ Last _____

Affiliation / Vessel name _____

Address _____

_____

Area code / Phone number _____

Email _____

TIME/DATE:

Year 20__ __

Month __ __

Day __ __

Time __ __ __ __

LOCATION: ☐ At-sea ☐ On land – State _____ County _____

Descriptive location (be specific)_____

_____

_____

Latitude _____ Longitude _____

PHOTOS TAKEN?

☐ Yes ☐ No

Please take if possible!

TURTLE CAPTURED/ COLLECTED?

☐ Yes ☐ No

WHAT WAS TURTLE DOING? ☐ Swimming ☐ Diving ☐ Floating ☐ Entrapped/entangled ☐ On shore

CONDITION: ☐ Active ☐ Sluggish ☐ Nonresponsive ☐ Bloated/foul odor ☐ Do not know

OIL VISIBLE NEAR TURTLE: ☐None ☐Sheen only ☐Liquid oil ☐Patchy thick oil ☐ Thick oil

OILING STATUS: Oil observed on turtle: ☐ Yes ☐ No ☐ Unknown

If yes, amount of oil: ☐ >50% of body ☐ <50% of body ☐ <10% of body

COMMENTS: (any additional observations on the condition of the animal, environment, or collection)

Definition and qualifications of wildlife observers

Note: The following is a description of Wildlife Observer qualifications and training currently developed for Florida. It has been slightly modified to be more generic, but it is most applicable to areas of the S.E. U.S. For other regions, the information provided below is intended to serve as a template for similar programs.

Description of Wildlife Observers

Wildlife observers are individuals with a background in biology and conservation, either through practical experience in the field such as a volunteer for a resource agency, through academic training such as a degree or coursework in the biological or environmental sciences, or an individual recommended by resource agency staff for their experience with wildlife. Wildlife Observers may be deployed during an oil spill response to observe for, and report sightings of, sea turtles during response activities both on land and on water (i.e. on water during skimming operations, on land during beach clean-up operations).

Wildlife Observer Criteria

In order to qualify as a Wildlife Observer for Protocols approved by Unified Command for the _____ event, each individual must:

A. Meet at least one of the following criteria:

1. Be authorized to work under a resource agency program (For example: volunteer on a Florida Fish and Wildlife Conservation Commission (FWC) Marine Turtle Permit approved under Florida Administrative Code Rule 68E-2, possess documentation of sea turtle work under a permit issued by U.S. Fish and Wildlife Service or other coastal state, or be involved in the FWC volunteer shorebird survey network (the Florida Shorebird Alliance)).[1,2]
2. Have a degree or have completed advanced coursework in the biological or environmental sciences.[3]
3. Be a Certified Field Biologist or Wetland Ecologist.[4]
4. Have documented field biology experience as a researcher, technician, intern, or student.[5]
5. Be recommended by a resource agency responsible for the wildlife to be observed.

Forms of documentation required (referenced in the superscripts above):

[1]Permit # or authorization # issued by federal or state entity
[2]Shorebird survey network contact
[3]Transcript listing college degrees or courses
[4]Certificate number
[5]Resume with references listing appropriate work or intern experience

B. Meet Certification Requirements:

Each individual not already on a sea turtle permit issued by the U.S. Fish and Wildlife Service or state must also complete an on-line training course (available from FWC) and pass the test with at least an 85% correct score. Entities that pass the on-line training course will be provided with a certificate issued

by [insert relevant resource agency]. These certificates shall be good for one year only and shall only allow the applicant to participate as a Wildlife Observer for the given spill event unless otherwise indicated on the certificate.

Description of FWC training for Wildlife Observers

FWC's online training course provides basic information on how to determine if wildlife is present on the beach where nighttime cleaning operations are to take place. Training also would include recommended actions to be taken to minimize risk to the different species of sea turtles, shorebirds, and beach mice that might occur on beaches or adjacent dunes throughout the Gulf of Mexico. The training is followed by a series of questions – a test that must be passed with at least 85% correct answers. Individuals who pass the test are provided with a certificate that makes them eligible to work as a Wildlife Observer for beach clean-up operations undertaken for the spill incident.

Wildlife Observer Responsibilities (Beach example)

Gear

1. Bring a red LED headlamp and/or flashlight, cell phone, camera, and water.
2. You will be provided with survey flags to mark nests and other natural resource items of interest.
3. You will be provided with 2-way radios or cell phone numbers to ensure communication between you and the crew supervisor.

General Duties

1. Come prepared to work from sunset to sunrise.
2. Come prepared to walk the beach ahead of the crew (all- terrain vehicle may be available, but don't expect to be driven).
3. YOU are responsible for informing and advising the crew on how to proceed if there is a wildlife issue.
4. Stay away from ANY oiled areas of the beach, which means you should have no need to bring protective gear. If you locate an oiled turtle crawl or nest, ask for assistance from the crew to place the markers.
5. Provide a written report the morning after your survey with date, time spent, and activities accomplished including wildlife observed and any actions taken or incidents, email to supervisor and State Trustee contact.
6. Be familiar with all protocols for minimizing adverse effects to wildlife.

Wildlife Protection Duties

1. Your main duty is to look for all wildlife and habitat that could be affected by the cleaning crews. You should walk or ride ahead of the crews to determine the presence of nesting sea turtles, shorebirds, or sensitive habitat. Try to stay at least 100 – 300 feet in front of the crews or equipment (closer than further away for equipment) but no more than ½ mile (2600 feet). Sea turtles could come up on the beach within the area in between you and the crew, so you must continually double back and recheck the area.

2. If you see a sea turtle crawl: determine if the turtle is still on the beach; look for a landward and seaward crawl;
    a. if both crawls visible, likely the turtle has completed nesting and returned to the water—use survey flags (3-8 flags) and mark the crawl and nest area, being careful not to disturb the crawl or nest site;
    b. if both crawls are NOT visible, very quietly and slowly walk landward to see if the turtle is on the beach; if you see the turtle, back away and quietly leave the area; tell the crew supervisor to keep the crews at least 200 feet away and stay quiet with lights off (red LED lights are ok if directed away); after the turtle returns to the water, you can flag the area and allow the crew to move forward. [Add any additional contact information].
    c. advise the crews or vehicles to only cross the crawl seaward of the wrack /high tide line.
    d. advise crews and machine operators to stay clear of the 10-foot buffer zone around marked sea turtle nests or posted shorebird nesting sites.
3. In areas where shorebird nesting areas are posted and marked, look out for chicks and birds moving around seaward of the marked area to the wrack line and tide line.
4. Advise crew to stay away from posted and marked bird nesting areas and make sure the birds have moved away from where equipment or crews are before moving forward.
5. Advise crews to stay away from vegetated areas on the beach and the dunes. [Add any site specific information]
6. Report all stranded wildlife on the beach, oiled or not, to the wildlife hotline [Insert number]. This includes birds, sea turtles, and marine mammals. [Add contact information]
7. Take pictures of oiled wildlife, but do not use a flash if a turtle is on the beach.

Appendix 6: Chain of custody and evidence handling

Oil spills have the potential to result in legal proceedings, thus spill responders are typically asked to follow chain of custody (COC) and special sample and data handling procedures. These guidelines are intended to provide instructions for common scenarios. There is no single correct was of maintaining COC. Law enforcement from your federal or state agencies can assist with questions and should be consulted whenever necessary. *As protocols may be updated over time, the latest instructions should be confirmed with NOAA or USFWS (as appropriate) General Counsel.* Although the COC and evidence handling may seem daunting at first, the primary objectives are good record keeping and security, with the goal of preserving the integrity and validity of materials. These principles are good practices regardless of the circumstances. This Appendix includes two related sections: chain of custody and handling of evidence.

Chain of custody (COC)

Chain of custody is a written record of the origin of evidence and provides a list of people that have had possession of that evidence. The COC record is primarily intended to address questions involving the integrity of samples or other evidence collected in support of the natural resource damage assessment or other legal claims. Evidentiary items that responders working with sea turtles may encounter include: carcasses, oil samples collected from turtles, biological/diagnostic samples, data forms, and electronic photographic data. Generally, any material collected from a case should be documented under COC. *If you are unsure if an item is considered to be evidence, be conservative and document it*. The best COC record is clearly written and thoroughly documents the history of an evidence item, starting with the collector or initial recipient, and as it passes from person to person, i.e., there are no "breaks" in the chain. Anyone that takes possession of evidence or alters evidence (such as someone who runs an analysis on a sample or performs a necropsy) should appear as having received that evidence on the COC record. The only exception is couriers used for shipping of sealed packages containing evidence (e.g., delivery personnel). In this instance, means of delivery is entered on the COC, but couriers do not have to sign the COC. In addition, the COC passes from person to person, not facility to facility, e.g., it is not appropriate for one person within a facility to accept custody of an item and another person to release it. *The last recipient must be the person who releases the item(s)*.

A COC record format has been developed for sea turtle spill response, including directed capture and documentation of strandings, and is included in this Appendix. Other COC forms may be formatted for specific purposes (e.g., scientific collections, photographs), but the basic elements and principles described here apply. There are both written and electronic fill-in versions of two generic forms, a **Primary Form** and a **Subsample Form**. The **Primary Form** should be used to document animals (alive or carcass) and any items collected in the field, such as stranding reports or field data sheets, external oil samples, fishing gear, and photographs. The **Subsample Form** is used for anything collected from items listed on the primary form, such as clinical samples (e.g., blood, feces) or necropsy samples (Fig. A6-1). Typically, an animal will have one primary form and one or more subsample forms. You may use the written or electronic form, but try to avoid combinations of written and typed entries for the descriptive

fields (all except for the release/receipt fields). If you make a mistake, line through the error (single line), add the correction, and initial the change. Never scratch out, erase, use white-out, or otherwise obscure entries. This rule applies to COC records as well as any other documents, e.g., stranding forms, and is good scientific practice. Use a black or blue pen for all written entries. *Write clearly and legibly*.

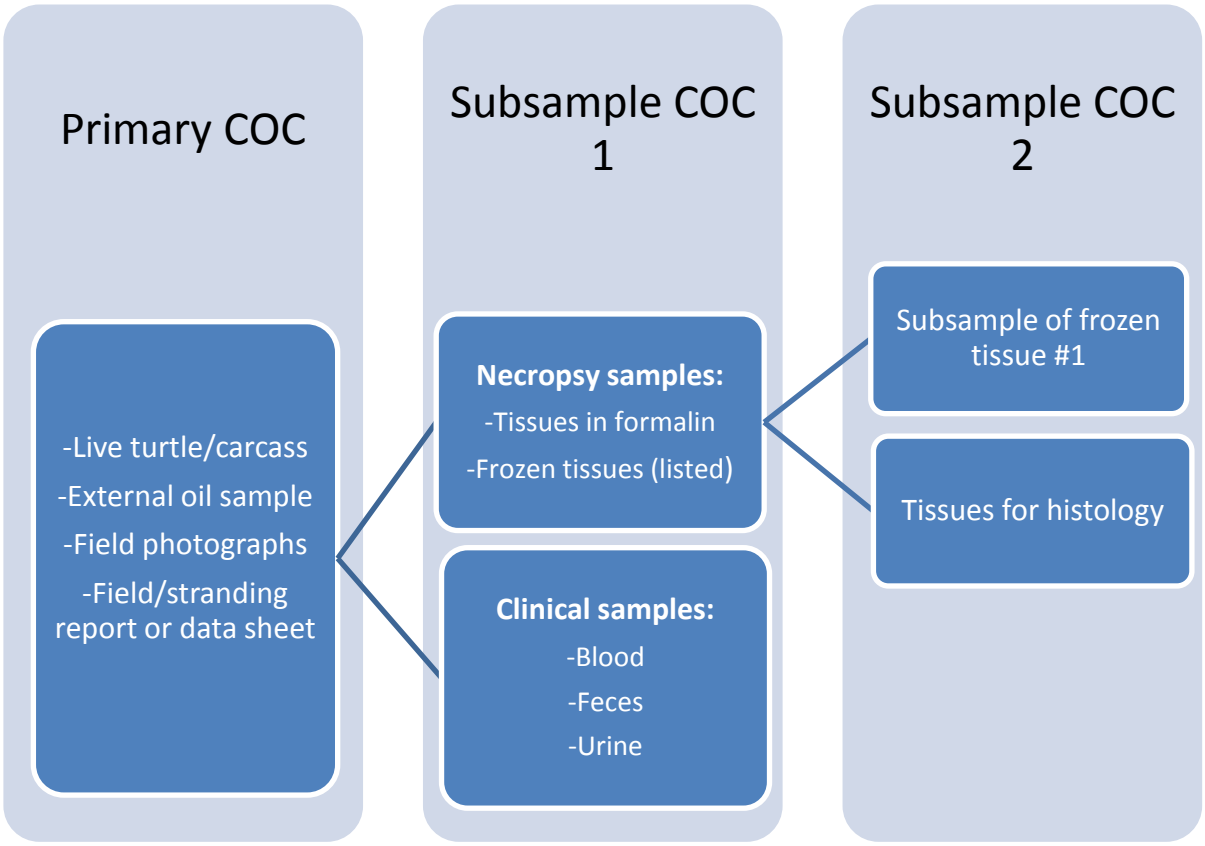


Figure A6-1. General organization of primary and secondary chain of custody (COC) forms. The data collected during initial discovery of the animal or upon receipt are captured in the primary COC. Samples collected from any of those items, e.g., necropsy or clinical samples from the turtle, are documented in one or more subsample forms. Any further subdivision or subsampling of items is entered into a subsequent subsample form.

Who starts a Primary COC record? Ideally, it is a person who is involved with initial collection of the animal. Subsample forms are started by a technician, veterinarian, or person leading necropsy, i.e., the individual primarily responsible for collecting samples/data. If an animal is collected by a member of the public or someone unfamiliar with COC, the person who receives the animal may initiate the COC and enter the relevant information in the "received from" field. **Only one person initiates a given COC record.** The following are example forms to illustrate how to fill out a COC record. The first example shown on the next page is the Primary Form for a dead, stranded loggerhead turtle.

CHAIN OF CUSTODY RECORD

Case Number:

DATE AND TIME OF COLLECTION: 12/12/2010, 1430	AGENCY/FACILITY AFFILIATION: NOAA Fisheries, SE Fisheries Science Center	SEIZED/COLLECTED BY: James Smith

SOURCE OF EVIDENCE/PROPERTY (person and/or location)

TAKEN FROM:

RECEIVED FROM:

FOUND AT: Grand Isle, Louisiana
29 degrees 14.437'N / 89 degrees 58.806'W

DEFENDANT/COMPANY NAME AND REMARKS:
BP Deepwater Horizon (MC252)

ITEM NO:	DESCRIPTION OF EVIDENCE/PROPERTY/SAMPLE (include seizure tag numbers, field/stranding identification numbers, facility identification name/number, and species)
1	JXM2010121201, Loggerhead turtle
2	External swab collected from dorsum of carcass
3	External swab collected from ventrum of carcass
4	Field photographs (DVD) copy 1 of 2
5	Field photographs (DVD) copy 2 of 2
6	STSSN Stranding report (original)

ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA:
1-6	James Smith, NOAA Fisheries	James Smith	12/12/2010	FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
	Allison Doe, Ocean World	Allison Doe	12/12/2010	

ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA:
				FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	

Case number: This number is assigned by law enforcement, it is left blank unless otherwise instructed.

Date and time of collection: Enter the complete date and time (use military format or indicate am/pm)

Agency/affiliation: Affiliation of the person initiating the form.

Seized/Collected by: Person initiating the form. Do NOT enter multiple people.

Source of evidence/property: Includes any information relevant to the source of evidence. "Taken from" generally is left blank as it applies to a law enforcement action. "Received from" is filled out if some else was the primary source of the item, for example if a member of the public brought in an animal or item. "Found at" includes the physical location and coordinates of the stranding.

Defendant/Company name: Assigned name of the spill

Item number: All items are given sequential individual numbers. If possible, avoid assigning the same number; use alphanumeric combinations (e.g., 1A, 1B) if necessary.

Description of evidence: Include the stranding identification number, any other identifier applied, and species.

The shaded fields document any transfer of items and who released or received them. **IMPORTANT: The first person to release any items should be the same person as listed in the "Seized/collected by" field at the top of the form.** The numbers of items transferred are entered in the left column. In this simple example, all items were given from the initial responder, James Smith, to Allison Doe. The parties sign the form and the delivery method (in person) is circled.

The next action that may happen is submission of a sample for analysis. In the example above, the primary stranding responder, James Smith, has transferred everything to Allison Doe at a facility where the carcass is stored. Among the items were two external swabs that were collected to determine the identity of an unknown substance on the carcass. Allison needs to ship these samples to a laboratory. **The original primary COC record should remain with the main evidentiary item, typically the live animal or the carcass.** The COC is copied, and then the items are signed as released on both the original and copied forms. The signed copy is sent with the sample to the laboratory. A notation is then entered on the original COC record. This procedure is done the same for the Subsample Form, as shown in the next section. Here is what the bottom of the forms should look like:

Original (still at the same facility as the animal)

ITEM NO: 1-6	FROM: (PRINT NAME, AFFILIATION) James Smith, NOAA Fisheries	RELEASE SIGNATURE *James Smith*	RELEASE DATE: 12/12/2010	DELIVERED VIA: FEDEX U.S. MAIL ~~IN PERSON~~ OTHER:
	TO:(PRINT NAME, AFFILIATION) Allison Doe, Ocean World	RECEIPT SIGNATURE *Allison Doe*	RECEIPT DATE: 12/12/2010	
ITEM NO: 2,3	FROM: (PRINT NAME, AFFILIATION) Allison Doe, Ocean World	RELEASE SIGNATURE *Allison Doe*	RELEASE DATE: 12/20/2010	DELIVERED VIA: (FEDEX) U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION) Shipped to Environmental labs	RECEIPT SIGNATURE	RECEIPT DATE: on 12/20/2010	

Copy signed for release (sent with sample and signed upon receipt)

ITEM NO: 1-6	FROM: (PRINT NAME, AFFILIATION) James Smith, NOAA Fisheries	RELEASE SIGNATURE *James Smith*	RELEASE DATE: 12/12/2010	DELIVERED VIA: FEDEX U.S. MAIL ~~IN PERSON~~ OTHER:
	TO:(PRINT NAME, AFFILIATION) Allison Doe, Ocean World	RECEIPT SIGNATURE *Allison Doe*	RECEIPT DATE: 12/12/2010	
ITEM NO: 2,3	FROM: (PRINT NAME, AFFILIATION) Allison Doe, Ocean World	RELEASE SIGNATURE *Allison Doe*	RELEASE DATE: 12/20/2010	DELIVERED VIA: (FEDEX) U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION) Jane Johnson, Environmental Labs	RECEIPT SIGNATURE *Jane Johnson*	RECEIPT DATE: 12/21/2010	

The courier, FedEx in this example, does not sign for custody. Sealing of evidence will be covered in the next section. This is how the COC is split to accommodate sending items to various people/locations. The end result should be that the original COC has notations of where all items are or were sent. The copy sent out with sample now serves as the COC record for that specific sample. If the animal is transferred, then the original primary COC record goes with it and a copy is retained at the facility as the record for any samples remaining in-house. If the animal is released into wild, retained as

a long-term captive, or if the carcass disposed of, keep the COC record with the animal's record unless otherwise instructed.

The **Subsample Form** is used whenever material is derived from an item on the Primary Form. Typical examples are clinical samples, e.g., blood collected from a live animal, necropsy samples, or division of a sample into smaller quantities. Simply put, if you collect anything from a live or dead animal, initiate a Subsample COC. Continuing with the example of the loggerhead, here is how the Subsample Form would be filled out if this turtle was alive and samples were collected in rehabilitation. A subsample form is started by the person collecting the samples and all item collected are entered.

CHAIN OF CUSTODY RECORD
SUBSAMPLE FORM

Case Number:

DATE AND TIME OF COLLECTION: 12/12/2010	AGENCY/FACILITY AFFILIATION: Ocean World	SEIZED/COLLECTED BY: Dr. Eric Smith

SOURCE OF EVIDENCE/PROPERTY	DEFENDANT/COMPANY NAME AND REMARKS:
Clinical samples collected from JXM2010121201, Loggerhead turtle; Name: "Turtle"	BP Deepwater Horizon (MC252)

ITEM NO:	DESCRIPTION OF EVIDENCE/PROPERTY/SAMPLE (include seizure tag numbers, field/stranding identification numbers, facility identification name/number, and species)
1	Serum sample
2	Serum sample (cryovial)
3	Blood smear (5x)
4	Blood culture

ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA:
1, 3 (1 of 5)	Dr. Eric Smith, Ocean World	*Eric Smith, DVM*	12/12/2010	(FEDEX) U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
	SHIPPED TO DIAGNOSTIC SERVICES LAB 12/12/2010			

ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA:
4	Dr. Eric Smith, Ocean World	*Eric Smith, DVM*	12/12/2010	(FEDEX) U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
	SHIPPED TO UNIVERSAL MICRO LAB 12/12/2010			

Date and time of collection: Date and time of collection.

Collected by: veterinarian, lead technician or biologist.

Source: Include any specific identifiers for the animal and species.

As in the previous example, specific items are signed as released and their disposition is noted on the original COC record (shown here) and a signed released copy (not shown) is sent with the sample(s). Based on this COC record, Item 2 and four blood smears from Item 3 would still be in Eric Smith's possession.

A subsample form can be used for individual samples, or multiple samples. If all of the samples listed on the form go to a single recipient, then the original subsample form should be sent with the sample(s) as no items on that form would be left in possession of the collector (a copy should be retained in the animal's record). If individual samples are being sent to different recipients or are retained, then keep the original form with the animal's record, and send signed copies as described above. It is standard that some types of samples, such as blood smears or cytology slides, are collected in many replicates. It is acceptable to list the number of replicates and how many are released. In the previous example, serum and one blood smear are sent for clinical pathology, and one serum sample and four blood smear slides are retained at the facility. A live clinical case likely will have many subsample forms for its duration in rehabilitation.

In summary, here are the steps for COC and shipping a subset of items listed on a given form:

1. Copy the original COC record (Primary Form or Subsample Form) that has the item on it.
2. Sign a release of the sample on BOTH the copy AND the original.
3. Note where the item was shipped on the original form and keep the original.
4. Send the signed copy with the shipped sample(s).
5. The person receiving the sample signs the copy and keeps the COC as the record for that sample(s).

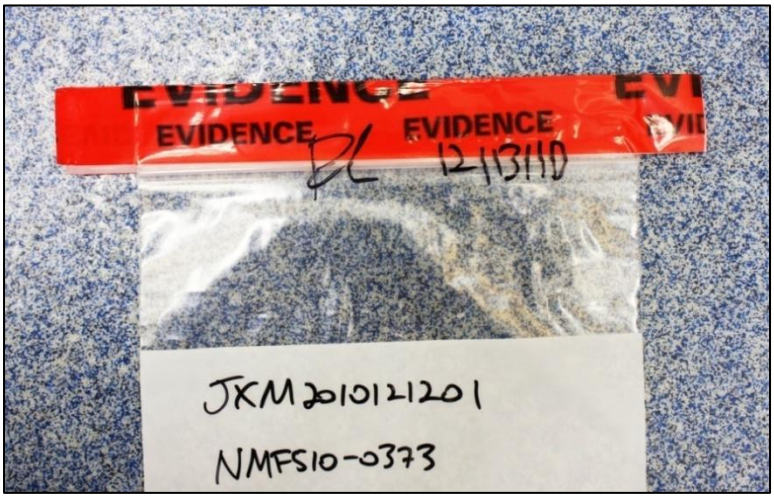
Helpful practices for COC records within facilities/organizations:

1. Have the fewest people possible serve as evidence custodians, and make sure that these individuals are familiar with the guidelines. Evidence can be signed over to one or two designated custodians within an organization, which facilitates transfer of custody.
2. Keep track of anyone who leaves your organization that is listed as a holder of evidence, especially if it will be difficult to reach them. Be sure that they sign over custody to another staff member before they leave. This measure is especially important when temporary personnel are brought in.
3. Do not create gaps in the COC record. **If you are not the last person to have custody of a sample, then you cannot release it.** Chain of custody is from individual to individual, not from organization to organization.
4. Be aware that anyone that assumes custody of evidentiary material is subject to be called upon for legal purposes, such as to verify custody and handling of a sample. This responsibility should not be taken lightly.

Handling of evidence

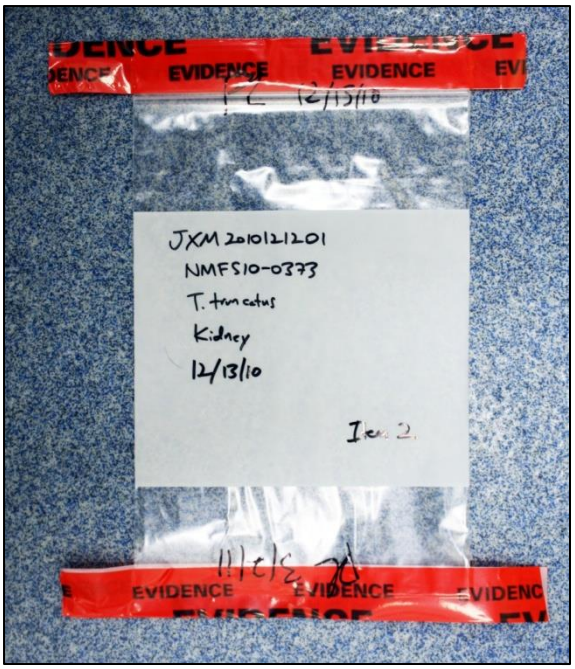
Sealing samples/evidence

When evidence is collected, it should be preserved in a way that ensures integrity during storage and shipment. All items should be clearly labeled/tagged with identifiers, species, contents, date of collection, and evidentiary item number. The collector that is the primary evidence holder, i.e., the person listed in the "seized/collected by" field of the COC should seal the sample using tamperproof tape as soon as possible after collection, and *before it is released to the next person*. Tamperproof tape is initialed and dated in a manner that would be visibly disrupted if the item was opened/accessed. Here are some examples:



Plastic bags of all shapes and sizes are commonly used to hold evidentiary items/biological samples. The opening should be completely sealed as shown here, and initialed and dated along the edge. Any tampering would be clearly visible. Clean and dry the surface before applying tape. Take time to seal containers thoroughly, avoiding wrinkles, to reduce accidental loss of the seal.

Jars are sealed by wrapping tape around the lid or around the entire jar, as shown. The initials and date overlap an area that would be broken if opened.



If a sample is accessed, and the seal broken, it should be resealed and the action noted in laboratory notes. For bags, an unsealed part of the bag should be cut open, and then resealed. In this example, the bag was originally sealed on 12/13/2010 and then accessed and resealed on 3/2/2011. The original seal is left intact. Note that the evidentiary item number is included on the container label.

Helpful practices for sealing evidence

1. Place small items and items that are difficult to seal, such as blood tubes and slides, in a bag and seal the bag.
2. Clean and dry surfaces thoroughly before applying tape. Avoid wrinkles and exposed adhesive surfaces.
3. If sealed items are to be frozen, place them in a second bag before freezing. The second bag will reduce potential damage to the tape and the likelihood of accidental loss of the seal after freezing.
4. Use evidence tape that is known to withstand freezing. Some brands, including the precut individual strips of tamperproof tape, tend to come off during freezing.

Photographic digital evidence

Most photographic evidence is in a digital format. Use designated cameras and memory cards. A placard that includes identifiers, such as stranding number and pathology accession numbers, date, and a scale should appear within the photos and/or be taken at the beginning and end of a sequence of photos. It is a good practice to begin each case with a photo placard labeled "start" and the time, and end the photographic series for a case with a placard labeled "end" and the time. **It is important that photos remain unaltered and sequential.** Do not delete any photos on the camera until a secure, immutable, "original" copy has been made as per Section 3.4.3.

Security

All items collected as evidence should be stored in a secure, locked area. Freezers containing evidence should be locked. Only keyed locks, not combination locks, should be used. It is best if three or fewer people are designated key holders and primary evidence custodians for a given facility. An entry log should be maintained for freezers containing evidence. All access should be documented by date, time, individual, and purpose. Any evidence deposited or removed should be clearly noted.

Primary COC Form

# CHAIN OF CUSTODY RECORD				**Case Number:**
DATE AND TIME OF COLLECTION:	AGENCY/FACILITY AFFILIATION:		SEIZED/COLLECTED BY:	
SOURCE OF EVIDENCE/PROPERTY (person and/or location) TAKEN FROM: RECEIVED FROM: FOUND AT:			DEFENDANT/COMPANY NAME AND REMARKS:	
ITEM NO:	DESCRIPTION OF EVIDENCE/PROPERTY/SAMPLE (include seizure tag numbers, field/stranding identification numbers, facility identification name/number, and species)			
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	

Subsample COC Form

CHAIN OF CUSTODY RECORD ***SUBSAMPLE FORM***				**Case Number:**
DATE AND TIME OF COLLECTION:	AGENCY/FACILITY AFFILIATION:		SEIZED/COLLECTED BY:	
SOURCE OF EVIDENCE/PROPERTY			DEFENDANT/COMPANY NAME AND REMARKS:	
ITEM NO:	DESCRIPTION OF EVIDENCE/PROPERTY/SAMPLE (include seizure tag numbers, field/stranding identification numbers, facility identification name/number, and species)			
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	

COC Page 2 (Primary and subsample)

ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	
ITEM NO:	FROM: (PRINT NAME, AFFILIATION)	RELEASE SIGNATURE	RELEASE DATE:	DELIVERED VIA: FEDEX U.S. MAIL IN PERSON OTHER:
	TO:(PRINT NAME, AFFILIATION)	RECEIPT SIGNATURE	RECEIPT DATE:	

FREEZER ACCESS LOG

Page __ of __

FACILITY: _____ **FREEZER NAME/DESCRIPTION:** _____

Date	Time	Name (initial next to name)	Purpose (identify any items deposited/removed)

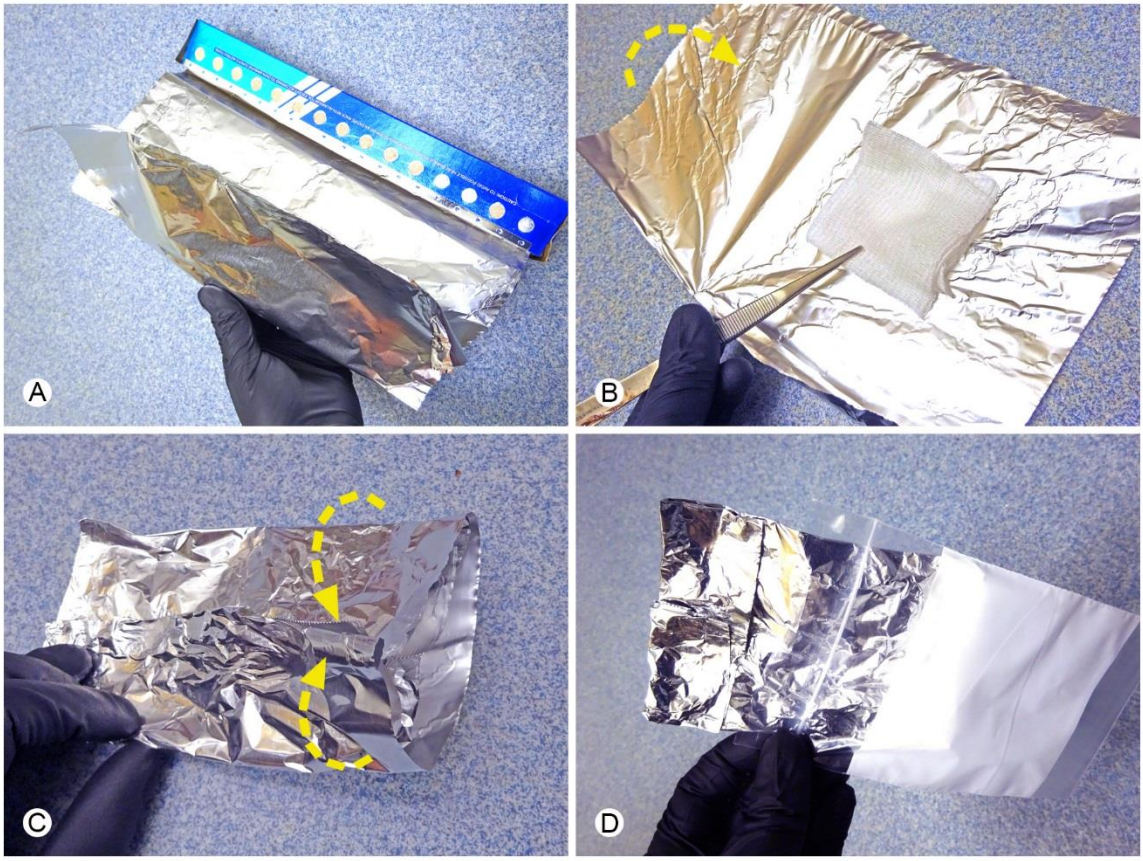
Appendix 7: Collecting external samples of oil or suspicious material

Instructions for making sampling kits using readily available materials

(note: special laboratory-grade materials are preferred if only a small (trace) amount of oil is present)

Materials:

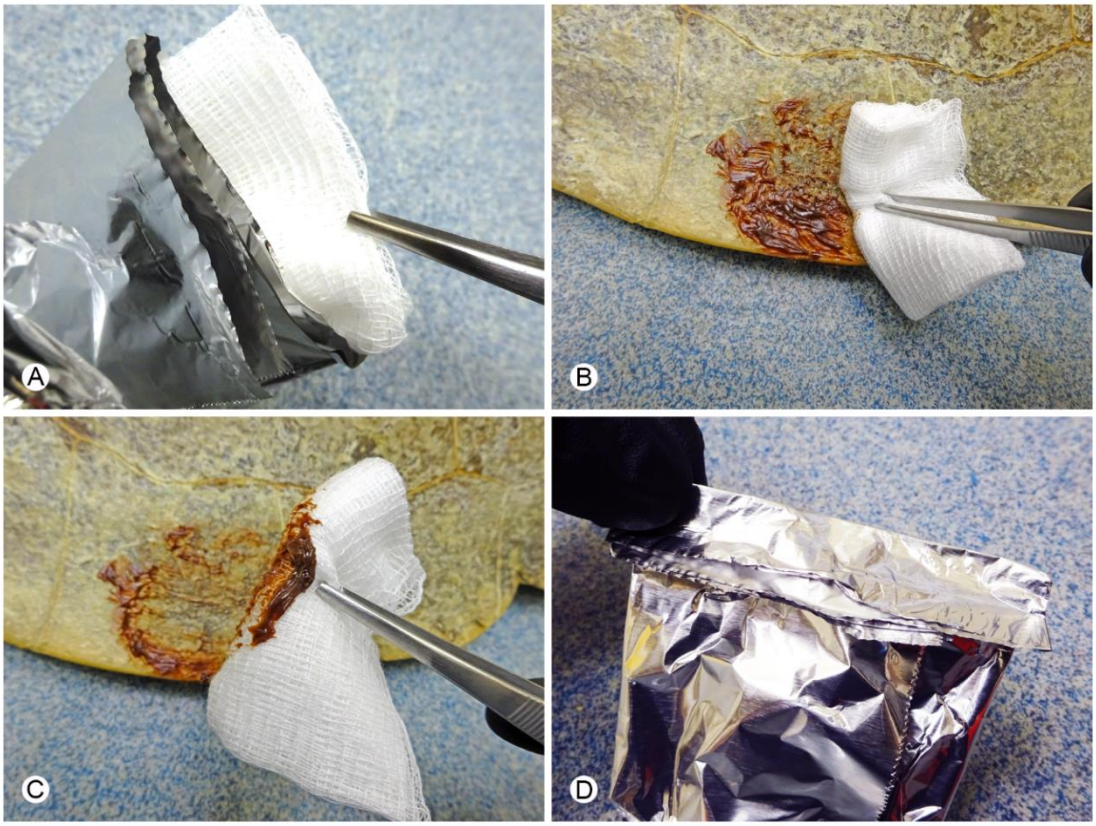
1. 3 or 4 in. square, non-sterile cotton gauze
2. 12 in. roll of aluminum foil
3. Pint size sealable plastic bag or whirlpak with label (do not use completely transparent bags as the label easily smears or is less legible)
4. Clean metal forceps or wooden tongue depressors



Instructions:

A. Put on clean disposable gloves. Remove an approximately 10-12 inch length of aluminum foil, taking care not to touch the dull side.
B. Using metal forceps or two wooden tongue depressors (like chopsticks), remove a square of gauze from the pack and place it onto the dull side of the foil. Fold the foil in half with the dull side, covering the gauze. Be careful not to touch any other surface with the gauze.
C. Fold over the sides of the foil to enclose the gauze on three sides.
D. Fold over the open end of the pouch to completely enclose the gauze. The gauze will be removed from this end for use. Place the pouch into a sealable plastic bag until needed.

Collection of external samples



A. After putting on the necessary personal protective equipment and taking photographs of the oil or suspect material, open the sample bag and foil or jar and carefully grasp the gauze using clean metal forceps or disposable wooden tongue depressors (as with chopsticks).
B. Thoroughly swab the area of interest.
C. Make sure that the material has been clearly transferred onto the gauze. The gauze should be visibly discolored by the substance. Preferably, it should also contain accumulated solid material (as shown).
D. If using aluminum foil, place the gauze square into the premade foil pouch with the dull side inward. Fold the foil so that it completely encloses the gauze. Place the aluminum pouch into a sealable plastic bag. If using a glass jar, carefully place the gauze into the jar and close the lid.
E. Label the bag or jar (using indelible ink) with the animal identifier (stranding or field ID), species, and date.
F. Seal the bag or jar with evidence tape and sign and date the edge of the tape.
G. Keep the sample cool and transfer it to a -20°C (or colder) freezer as soon as possible.

As protocols may be updated over time, the latest instructions should be confirmed with NOAA or USFWS (as appropriate) General Counsel.

Appendix 8: Stranding response

Required equipment for stranding response

- GPS unit
- Designated use digital camera
- Multiple appropriately-sized containers for holding turtles of the expected size classes
- Clipboard with blank stranding and chain of custody forms and writing instruments
- Dry erase board (or notecards) for creating photo placard
- Measuring tape (flexible, nonmetallic)
- PIT tag scanner
- Oil sampling kits
- Trash bags
- Personal Protective Equipment (oil resistant protective outwear [e.g., Tyvek® suit], rubber boots, nitrile or rubber gloves, duct tape, face/eye protection)

Outline protocol for turtle retrieval from oil spill response zones

1. If oil is visible on beach (or suspected based on oil in area) put on Personal Protective Equipment (PPE – Tyvek® suit, rubber boots, nitrile or rubber gloves, eye protection) before going into oiled area, and place two plastic bags at the place of exit from beach. Upon leaving, any oiled disposable PPE goes into one bag for hazardous waste disposal and oiled boots go in the other for later use.
2. Create a photo identification card (paper or dry erase board) with designated Spill Name, Date/Time, GPS coordinates or detailed location description, and Stranding ID #. Photograph the photo card by itself.
3. Take multiple photographs of the turtle including at least one with the photo card, but do not cover up parts of the turtle with the placard. Make sure all areas of the body, including any abnormalities, are represented in the photos.
4. Visually inspect turtle. Take close-up shots of any visible oil. If you see or smell any oil on the turtle or any material you suspect to be oil, take close up photos that clearly show the material and proceed to instructions for Visibly Oiled Turtles (below). For dead turtles, if no oil is observed, turn the carcass over, further inspect it for oil, and take photographs of the underside.
5. Take a final photo of the photo card, completing the photo series for that animal.
6. Complete the basic descriptive portion of the stranding report, including your name, date, and location.
7. For LIVE TURTLES, transport the animal to the nearest designated intake facility or transfer to the individual who has been designated to transport the turtle, if applicable.
8. For DEAD TURTLES, complete remainder of the stranding report, including measurements, place the carcass in plastic bag; include paper label with Stranding ID # inside bag with carcass. Place label on outside of bag with Stranding ID #. Cover the carcass with ice or keep as cool as possible.
9. Complete a primary Chain-of-Custody Form upon transfer of live and dead turtles to the intake facility or individual transporting the turtle, if applicable. Provide all samples taken and forms completed along with turtle to intake facility. Make sure forms are completely filled out and all samples are labeled and sealed according to evidence collection protocols. Do not download photos from memory cards until evidentiary copies have been made.

Visibly oiled or suspect oiled sea turtles:

1. If you see oil or substance suspected to be oil, sample the material using the provided gauze using metal forceps or wooden tongue depressors. **Do not touch the area that might have oil on it, the gauze, or inside the sampling materials with the nitrile gloves.** Thoroughly swab the area of interest making sure that the material has been clearly transferred onto the gauze (visibly discoloring it).
2. Place the gauze square onto a piece of aluminum foil with the dull side to the sample. Fold the foil so that it completely encloses the gauze. If using a premade foil pouch, carefully insert the gauze into the foil pouch and fold the end closed. Place the foil with the gauze into a sealable plastic bag. If using a certified glass jar, place the gauze directly inside and firmly close the lid.
3. Label the bag or jar (using indelible ink) with the information from the photo placard.
4. Seal the bag or jar with evidence tape, if available, and sign and date the edge of the tape.
5. Keep the sample cool and transfer it to a -20°C (or colder) freezer as soon as possible.

Instructions for completing a Sea Turtle Stranding and Salvage Network (STSSN) Report Form (Atlantic, Gulf of Mexico, Caribbean)

Observer's Name / Address / Phone:

The observer is the person who handled and collected data on the turtle in the field. Please include your full name with middle initial if you have one. Please give a complete address and phone number where you can be reached in case we need to contact you for clarification of the report. Include an email address if available.

Stranding Date:

This is the date the turtle was first encountered. If you did not investigate and document the turtle until a later date, please note that on the form. Turtle number by day is used to keep track of the number of turtles any individual STSSN participant documents on a single day – your first turtle of the day is 01, second of the same day is 02, etc. Time is the time you saw the turtle on the beach or in the water.

Species:

Refer to the Sea Turtle Identification Key (ID placard) to determine species based on characteristics detailed on the back of the form. Take multiple photos of the turtle – including straight down views of the carapace, plastron, and head; if the turtle is entangled or has any injuries, take photos to document those anomalies. If you are unsure of species ID, take several photos from different angles and try to salvage the carcass and contact your state coordinator for assistance in species identification.

Stranding Location:

If the turtle was found along a Gulf of Mexico or Atlantic Ocean beach or in the water, check "Offshore"; if the turtle was found landward of an Atlantic or Gulf beach, inside a bay, pass, inlet, lagoon, river, harbor, bayou, etc., check "Inshore". Describe the specific location where the turtle was found using major reference points that can be found on maps or nautical charts. Do not use local landmarks that cannot easily be found on maps. Good reference points include: inlets, lighthouses, county or state lines, roads that intersect the beach, park boundaries. If the location is obscure, or difficult to describe, include a map with the stranding location marked when you submit the stranding report form. If the turtle was found floating, please clearly indicate this on the stranding report form. If you use a GPS unit or other device (e.g., mobile phone) to determine the latitude and longitude of a stranding please indicate this.

Condition of Turtle:

Check the code that best describes the stranded turtle at the time of stranding. For example, if a turtle strands and later dies, it is classified as alive. If the stranding seems intermediate between two codes, pick the one that fits best.

> **Alive (Code 0):** Eye blink response; breathing (breaths may be several minutes apart); may or may not be active / moving around.

Fresh dead (Code 1): Should initially question whether it is alive; may have rigor mortis; eyes should be clear; no smell of decomposition; no evidence of bloating. If the turtle smells at all or is bloated, it is not fresh dead!

Moderately decomposed (Code 2): Mild to moderate smell of decomposition; mild to moderate bloat; bulging eyes, if present; soft tissue may feel spongy; scutes and skin may be beginning to detach.

Severely decomposed (Code 3): Foul smell; severe bloat or already de-gassed (collapsed); scutes and skin detaching or missing; bony structures may be disarticulating.

Dried Carcass (Code 4): Completely desiccated, only dry skin and bones; little to no smell.

Skeleton, bones only (Code 5): Bones only with no soft tissue remaining.

Final Disposition:

ALL TURTLE STRANDINGS WITHIN A DESIGNATED OIL SPILL RESPONSE AREA NEED TO BE SALVAGED FOR FUTURE NECROPSY / ANALYSIS. CONTACT YOUR STATE COORDINATOR FOR INSTRUCTIONS.

During regular operations: check the disposition code that best describes what you did with the stranded turtle. To avoid duplicate reports being received on the same turtle, try to never leave an unpainted carcass on the beach. It is best to paint the turtle and bury it above the high tide line. If nesting occurs in the area, bury the carcass well off the nesting beach behind the dune line to prevent digging into any nests. Codes 1-4 are used for dead turtles only.

Code 2 turtles (buried on or off the beach) - include turtles disposed of at local landfill locations. Codes 6 & 7 are for live animals. If you check code 6 (alive, released), please describe when and where the turtle was released in the box at the bottom of the form. If you check code 7 (alive, taken to a rehab. facility), please write the name of the facility where the turtle was taken in the blank provided. If a turtle was found floating and the carcass (or live turtle) was not recovered, check code 8 (left floating). If none of the codes describes what you did with the turtle, please explain in the box at the bottom of the form.

Sex:

Since immature sea turtles cannot be sexed externally, you should most often check undetermined. Loggerhead and green turtles < 92 cm straight carapace length (SCL), Kemp's ridleys < 60 cm SCL, and hawksbills <80 cm SCL are generally considered immature. Adult male turtles will have a tail that extends well beyond the posterior tip of the carapace. If you document a turtle with a long tail, please measure the length of the tail beyond the carapace and record the measurement in the blank provided. If you necropsy a turtle and determine the sex through visual exam of the gonads, please check the box provided.

Tags:

Check all four flippers of the turtle for flipper tags or evidence of lost tags (tear-outs, holes, or scars). If found, record all tag numbers, where each tag was located on the turtle (example: XXX111-left front flipper, XXX112-right front flipper) AND the return address inscribed on the tag; if evidence of lost tags are present, note the location. Examine the carapace for living tags; if found, record the location in the space provided on the form. If you have a PIT tag scanner, thoroughly scan all flippers (dorsal and

ventral), and the shoulders/neck region and record the tag number and location of any tag found. Always check the scanner first using a test tag to make sure that it is functioning properly. ANY TURTLE THAT HAS ANY TAGS OR EVIDENCE OF LOST TAGS SHOULD BE SALVAGED FOR FURTHER EXAMINATION – CONTACT YOUR STATE COORDINATOR.

Carapace Measurements:

Record all measurements taken in the appropriate blanks and be sure to circle the unit of measurement – centimeters (cm) or inches (in). Straight-line measurements are taken ONLY with calipers. If you do not have calipers, do not fill in the blanks for straight-line measurements. If you do have calipers and take straight-line measurements, please take curved measurements as well. Curved measurements are taken with a flexible measuring tape. The proper locations for obtaining standard carapace measurements are shown on the stranding form. If the measurements taken are estimates (due to carapace damage or decomposition), please indicate this on the form.

Remarks:

Please provide as much information as possible about the stranding. Note any wounds or abnormalities, tag locations, entanglement, etc. (you can also draw on the diagrams). All information provided will be coded as part of the turtle's record. If the turtle is entangled, try to salvage the entangling material(s) and contact your state coordinator. PLEASE DO NOT LEAVE THIS SECTION BLANK – NOTE IF NO WOUNDS OR ABNORMALITIES WERE FOUND.

SEA TURTLE STRANDING AND SALVAGE NETWORK – STRANDING REPORT

OBSERVER'S NAME / ADDRESS / PHONE:
First _____ M.I.____ Last _____
Affiliation _____
Address _____
_____
Area code/Phone number _____

STRANDING DATE:
Year 20☐☐ Month ☐☐ Day☐☐
Turtle number by day ☐☐

Coordinator must be notified within 24 hrs; this was done by ☐*phone* ☐*email* ☐*fax*

SPECIES: (check one)
- ☐ CC = Loggerhead
- ☐ CM = Green
- ☐ DC = Leatherback
- ☐ EI = Hawksbill
- ☐ LK = Kemp's Ridley
- ☐ LO = Olive Ridley
- ☐ UN = Unidentified

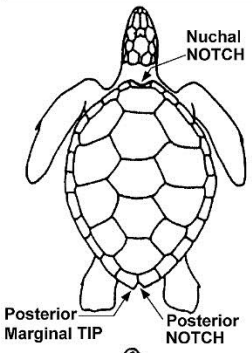
Check Unidentified if not positive. Do Not Guess.

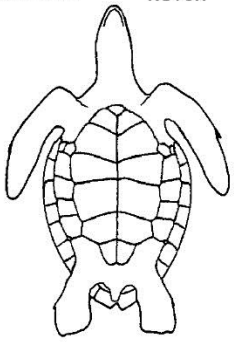
Carcass necropsied? ☐Yes☐No
Photos taken? ☐Yes ☐No
Species verified by coordinator?
☐ Yes ☐ No

SEX:
- ☐ Undetermined
- ☐ Female ☐ Male

Does tail extend beyond carapace?
- ☐ Yes; how far?_____ cm / in
- ☐ No

How was sex determined?
- ☐ Necropsy
- ☐ Tail length (adult only)





STRANDING LOCATION: ☐Offshore (Atlantic or Gulf beach) ☐Inshore (bay, river, sound, inlet, etc)
State _____ County/Parrish_____
Descriptive location (be specific)_____
_____
_____
Latitude _____ Longitude _____

CONDITION: (check one)
- ☐ 0 = Alive
- ☐ 1 = Fresh dead
- ☐ 2 = Moderately decomposed
- ☐ 3 = Severely decomposed
- ☐ 4 = Dried carcass
- ☐ 5 = Skeleton, bones only

TAGS: ***Contact coordinator before disposing of any tagged animal!!***
Checked for flipper tags? ☐ Yes ☐ No
Check all 4 flippers. If found, record tag number(s) / tag location / return address
_____
_____
_____
PIT tag scan? ☐ Yes ☐ No
If found, record number / tag location
_____
_____
Coded wire tag scan? ☐ Yes ☐ No
If positive response, record location (flipper)
_____
Checked for living tag? ☐Yes ☐ No
If found, record location (scute number & side)
_____

FINAL DISPOSITION: (check)
- ☐1 = Left on beach where found; painted? ☐Yes* ☐No(5)
- ☐2 = Buried: ☐ on beach / ☐ off beach; carcass painted before buried? ☐ Yes* ☐ No
- ☐3 = Salvaged: ☐ all / ☐ part(s), what/why? _____
  _____
  _____
- ☐4 = Pulled up on beach/dune; painted? ☐Yes* ☐No
- ☐6 = Alive, released
- ☐7 = Alive, taken to rehab. facility, where? _____
  _____
- ☐8 = Left floating, not recovered; painted? ☐Yes* ☐No
- ☐9 = Disposition unknown, explain _____
  _____

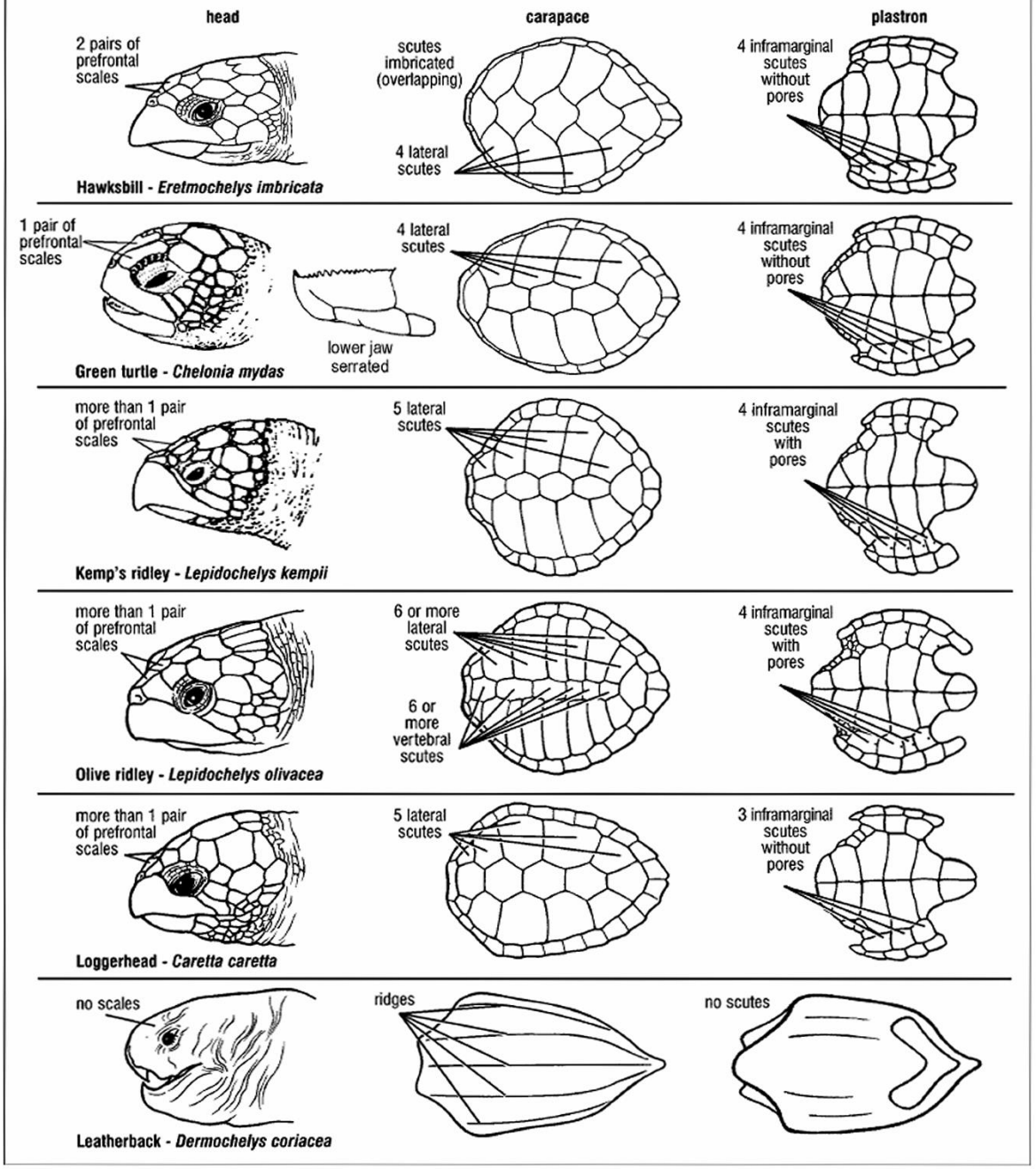
****If painted, what color?*** _____

CARAPACE MEASUREMENTS: (*see drawing*)

Using calipers	**Circle unit**
Straight length (NOTCH-TIP)	_____ cm / in
Minimum length (NOTCH-NOTCH)	_____ cm / in
Straight width (Widest Point)	_____ cm / in
Using non-metal measuring tape	**Circle unit**
Curved length (NOTCH–TIP)	_____ cm / in
Minimum length (NOTCH-NOTCH)	_____ cm / in
Curved width (Widest Point)	_____ cm / in
	Circle unit
Weight ☐ actual / ☐ est.	_____ kg / lb

Mark wounds / abnormalities on diagrams at left and describe below (note tar or oil, gear or debris entanglement, propeller damage, epibiota, papillomas, emaciation, etc.). **Please note if no wounds / abnormalities are found.**
_____
_____
_____
_____
_____
_____

SPECIES IDENTIFICATION



In California, Click to Submit to Justin.Viezbicke@NOAA.gov

In Oregon & Washington, Click to Submit to Kristin.Wilkinson@NOAA.gov

Revised 10/18/2016

U.S. WEST COAST SEA TURTLE STRANDING REPORT

FIELD #_____ NMFS REGIONAL #_____ Other #_____

DATE INITIALLY OBSERVED: __ __ (Month) __ __ (Day) 20__ __ (Year)

DATE EXAMINED: __ __ (Month) __ __ (Day) 20__ __ (Year) RESTRANDER? ☐

INITALLY OBSERVED BY: _____
Phone ( )____ -_____ Email _____
☐ Private citizen ☐ Beach official ☐ Stranding network member

EXAMINED BY: _____
Phone ( )____ -_____ Email _____
Affiliation_____

SPECIES: ☐ Unidentified
_____
Common name
_____ _____
Genus Species
Digital photos taken: ☐ Yes ☐ No
Verified by:_____

LOCATION: *Check one option.* ☐ Beached ☐ Floating in water
City_____ County_____ State_____
Locality details (be specific):_____
_____
_____
Latitude __ __ . __ __ __ __ ° N Longitude __ __ __ . __ __ __ __ ° W *Record in decimal degrees.*
How determined (check one): ☐ GPS ☐ Map ☐ Internet/software_____

AGE: *(NMFS Use Only)*
☐ Hatchling ☐ Immature
☐ Adult ☐ Unknown

SEX: ☐ Male ☐ Female ☐ Unknown
Does tail extend beyond carapace?
☐ Yes ☐ No
How was sex determined?
☐ Tail length ☐ Penis ☐ Necropsy

MEASUREMENTS: ☐ Whole carcass ☐ Partial/ scavenged
Body weight ☐ Actual ☐ Estimate _____ kg
CARAPACE:
Curved Carapace Length (nuchal notch to tip) _____cm
Curved Carapace Width (at widest point) _____cm
Straight Carapace Length ☐ Calipers ☐ Tape _____cm
Straight Carapace Width ☐ Calipers ☐ Tape _____cm
TAIL:
End of plastron to tail tip (ventral side) _____cm
Cloaca to tail tip (ventral side) _____cm

CONDITION:
☐ 1 = Alive
☐ 2 = Fresh dead
☐ 3 = Moderate decomposition
☐ 4 = Advanced decomposition
☐ 5 = Dried mummified/ skeleton
☐ 6 = Unknown condition

BODY CONDITION:
☐ 1 = Poor ☐ 4 = Good
☐ 2 = Fair ☐ 5 = Excellent
☐ 3 = Average ☐ 6 = Unknown

TAGS: *Contact NMFS before disposing of any tagged animal!!*
FLIPPER: Existing metal tags present? ☐ Yes ☐ No
Tag #_____ Left/ Right _____ Front/ Rear
Tag #_____ Left/ Right _____ Front/ Rear
Return address:_____
Evidence of old tag holes/ rips in flippers ☐ Yes ☐ No
If yes, draw on diagram on back of page.
PIT: Existing PIT tags present? ☐ Yes ☐ No
Scanner type: ☐ AVID ☐ Universal tag reader
PIT tag #_____
Location: ___Left/ Right _____Front/ Rear
PIT tag #_____
Location: ___Left/ Right _____Front/ Rear
APPLIED NEW TAGS (live turtle): ☐ Yes ☐ No
Tag #_____ Left/ Right _____ Front/ Rear
Tag #_____ Left/ Right _____ Front/ Rear
PIT tag #_____
Location: ___Left/ Right _____Front/ Rear
PIT tag #_____
Location: ___Left/ Right _____Front/ Rear

HUMAN INTERACTION: ☐ Yes ☐ No ☐ Cannot Be Determined
If yes, choose one or more. Describe and draw on diagram on back of page.
☐ 1 = Boat collision_____
☐ 2 = Shot _____
☐ 3 = Fishery interaction ☐ Hook ☐ Monofilament ☐ Braided line ☐ Netting
☐ 4 = Oiled _____
☐ 5 = Power plant entrainment_____
☐ 6 = Other _____
How determined? ☐ External exam ☐ Internal exam ☐ Necropsy
Evidence collected? ☐ Yes ☐ No Describe_____
Storage location_____
Digital photos sent to NMFS coordinator? ☐ Yes ☐ No

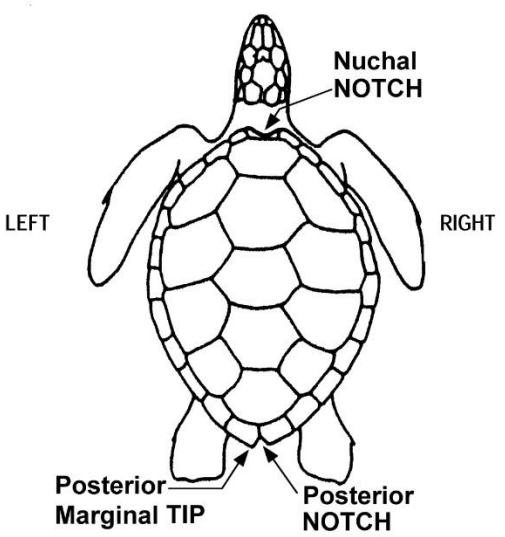
OTHER FINDINGS: ☐ Yes ☐ No ☐ Cannot Be Determined
If yes, choose one or more. Describe and draw on diagram on back of page.
☐ 1 = Disease_____
☐ 2 = Trauma_____
☐ 3 = Cold stunning_____
☐ 4 = Other_____
How determined? ☐ External exam ☐ Internal exam ☐ Necropsy

FINAL DISPOSITION: *Check all that apply.*
☐ 1 = Alive, released ☐ At site ☐ Relocated_____ If fishery interaction, disentangled prior to release? ☐ Yes ☐ No
☐ 2 = Alive, transferred to rehabilitation Date_____ Facility_____
☐ 3 = Euthanized at site By _____ Carcass disposition_____
☐ 4 = Dead, left at site Marked? ☐ Yes ☐ No How?_____
☐ 5 = Dead, buried: ☐ On beach ☐ Off beach Where?_____
☐ 6 = Dead, salvaged: ☐ Whole carcass ☐ Part(s) ☐ Frozen for later exam *Please note all specimens collected and disposition on back.*
☐ 7 = Necropsied: ☐ Field ☐ Laboratory_____ Date_____ By_____
☐ 8 = Left floating, not recovered Why?_____
☐ 9 = Disposition unknown Explain: _____

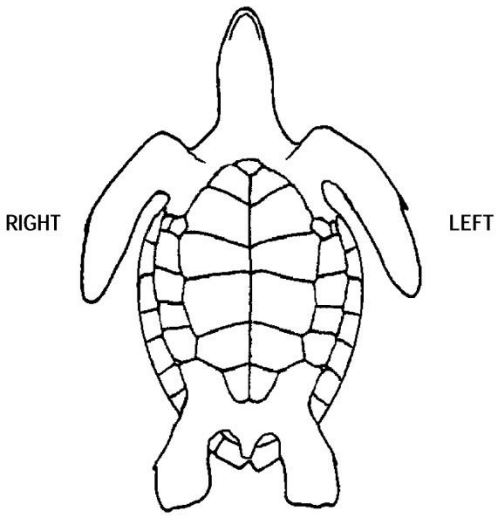
ADDITIONAL COMMENTS

Revised 10/18/2016

CARAPACE (DORSAL VIEW)



ASTRON (VENTRAL VIEW)



Please mark wounds/ abnormalities on diagrams above and describe them below. Be sure to measure all wounds/ lesions and document with digital photos. Note tar or oil, gear or debris entanglements, epibiota, masses, papillomas, emaciation, etc.

Please note if no wounds or abnormalities are found. Digital photos taken? ☐ Yes ☐ No

_____

_____

_____

_____

_____

_____

_____

_____

_____

Additional Attachments (e.g. Level A, Pathology): _____

_____

SPECIMEN DISPOSITION: ***Check all that apply.*** ☐ Scientific collection ☐ Education ☐ Other_____

List all samples/ parts collected (note tissue and storage medium): Storage location_____

_____

_____

_____

_____

NMFS Sample Requests:

Skin (All species): ☐ DMSO ☐ Saturated salt

Scleral ossicles (Leatherbacks only): ☐ Left eye ☐ Right eye

Humerus bone (CM, CC and EI only): ☐ Left ☐ Right

SHIP TO: Erin LaCasella
SWFSC-NMFS-NOAA
8901 La Jolla Shores Drive
La Jolla, CA 92037
858-546-5696
Erin.LaCasella@noaa.gov

Please include copy of this report with submission

Other Samples: _____

SWFSC Animal ID: _____ **Other ID:** _____

PLEASE MAIL ORIGINAL FORMS TO REGIONAL STRANDING COORDINATOR:

In CA: Justin Viezbicke, NOAA – West Coast Region, Long Beach Office; 501 W. Ocean Blvd., Suite 4200, Long Beach, CA 90802
Office: (562) 980-3230, Hotline Cell: (562) 506-4315, Fax: (562) 980-4027, Justin.Viezbicke@noaa.gov

In OR/WA: Kristin Wilkinson, NOAA – West Coast Region, Seattle Office; 7600 Sand Point Way Northeast, Seattle, WA 98115
Office: (206) 526-4747, Cell: (206) 550-6208, Kristin.Wilkinson@noaa.gov

Pacific Islands Stranding Form

MARINE TURTLE BIOLOGY AND ASSESSMENT PROGRAM
NOAA NATIONAL MARINE FISHERIES SERVICE
INTERNAL USE ONLY

TDPS:
RRR: EU:

SEA TURTLE STRANDING QUESTIONNAIRE:

"Stranding" is any injured, sick, dead, or abnormally behaving sea turtle ashore. Due to personnel safety concerns, we do not normally go into water over knee-deep to salvage a turtle, however we do record such reports.
A physical response will be made to stranded (live or dead) turtles when appropriate and possible. Personnel and other resource limitations, including other cases in progress, may cause delays.

Date/time of call: _____

Name: _____ ****Phone:** _____

Mailing address:

_____ **Email:** _____

_____ **Lat/Long (Dec/Deg):** _____

LOCATION

Where is the turtle located? (name and specific area of beach, driving directions, etc.) _____

_____

_____

_____

Is the turtle on shore? If not, what is the distance from shore/ depth of water? _____

Are there any obvious signs as to the cause of death/injury? Description? (tumors, fish hook/ line, etc.) **OVER** →

_____

_____

_____

TURTLE

Is the turtle alive or dead? A D Unknown

Is it possible for one person to lift and carry the turtle? Y N

"Best guess" of the weight of the turtle? _____ lbs.

About how large is the turtle (shell length)? _____

Alive- What is the behavior of the turtle? (observed swimming, lethargic, buoyant, responsive, etc.)

_____

_____

How long have you observed the turtle? _____

Dead- What is the condition of the turtle? (rotten, fresh, intact, etc.) _____

Is it above the high tide mark so it will not float away? _____

How much longer will you (the contact) be home/ on site? _____

Any evidence of law enforcement violation? If yes, please describe briefly: _____

_____

MTRP USE ONLY: Notes:

Name:

Literature sent?

SSG Cell 286-4377	**NMFS-LE**	**BIG ISLAND**	**Maui**
	800-853-1964	Hilo	Kihei area
DOCARE **643-3567- statewide**		286-4359	286-2549
587-0077 Oahu			all other Maui areas
873-3990 Maui			286-2899
974-6208 Hilo/ 323-3141 Kona/ 887-6196 Waimea		Kohala - Kona	
274-3344/ 274-3521 Kauai		881-4200 Office or 987-6903 Cell phone	
553-5190 Molokai		Kona	
565-7916 Lanai		327-6226 Office	

1/7/2016 STRANDING.LINE.QUESTIONNAIRE_CURRENT

Hooked/ entangled questions:

If a hook is present, where is it embedded in the turtle? (FF, neck, mouth…?)

How deep does the hook appear to go into the turtle?

What is the estimated size of the hook? (length of your thumb? smaller? larger?)

Is there line attached to the hook? If yes, about how long is the line- a few inches, a foot or more?

If line is present, is it wrapped around the neck and/or flippers? Does it extend into the mouth?

Have you seen this turtle previously in the same area? If so, when?

What was the turtle doing when seen? Swimming, feeding, resting, etc?

Tumor location/ description:
Head:

Eyes:

Mouth:

Neck:

LFF:

RFF:

HF's:

Other:

Appendix 9: Directed capture

Required equipment for directed capture operations

- GPS unit
- Designated use digital camera
- Satellite phone
- Long-handled dip-net (2-4’ in diameter, netting with stretched mesh ~3-5”, 12-15’ handle)
- Multiple appropriately-sized containers for holding turtles of the expected size class
- Plastic kiddie pool (4-5’ diameter) for holding turtles during sampling and cleaning
- Disposable oil absorbent pads
- Cloth towels
- Field data forms, index cards, and chain of custody forms
- Personal protection equipment (Tyvek® suits, disposable gloves, close-toed shoes, eye/face protection, duct tape)
- Secure hard drive
- Water resistant field notebook
- Digital inclinometer
- Infrared thermometer (laser directed)

Sea turtle directed capture protocol

1. Only target search area conditions specified by operations (oil and oiled habitat).
2. When a turtle is observed, mark and record the waypoint. Using a long-handled dip-net, capture the turtle if it is seen to be oiled. Do not chase or capture vigorously swimming turtles or turtles that are not visibly oiled.
3. If the turtle is captured, bring it aboard in the net and set it within a kiddie pool. Carefully remove the turtle from the net and place it on a clean, unused absorbent pad within the pool. Always use PPE when handling oiled sea turtles.
4. Create a photo identification card (3" x 5" index card) that includes the vessel name, turtle ID, capture position (lat/long), and the name of the spill. The turtle ID consists of the three letter initials of a designated member of the capture crew, four digit year, two digit month, two digit day, followed by the sequential number for turtles captured that day (e.g., Jane A Doe captures a turtle on 5/12/2017 and it is the second turtle captured that day; the ID will be JAD20170512-02; if 6 turtles are caught, the last will end in -06).
5. Using a designated camera (for oil spill turtles only), take a photograph of the photo card as the first image for that animal. Next, place the photo card near the turtle and take dorsal and ventral photos. Take a few close images of oil or suspicious material anywhere on the body or within the mouth (if possible) – clearly documenting external oil. It is not necessary to include the photo card in these closer images. Take a photograph of the photo card as the last image for the animal.
6. Take a temperature reading by aiming the thermometer at the shoulder area or the prefemoral area between the base of a rear flippers and plastron (Fig. A9-1).
7. Using oil absorbent pads, wipe the oil from the shell, skin, and head. Do not attempt to remove every bit of oil - the goal is to wipe the majority of the loose oil from the turtle.
8. Place the turtle on a wet towel in a clean (non-oiled), numbered plastic bin and tape the photo label to the outside. Cover the bin with a clean (non-oiled) towel. The bin must be sufficiently ventilated. Place the bin in the shade or in a climate controlled area such that ambient temperature is no warmer than the low 80's (F). If a climate controlled cabin is used, maintain temperatures no colder than the high 70's (F). Pay close attention to animals throughout the day. Do not allow containers to be inadvertently left in the sun during operations. The towels can be dampened with water to control temperature.
9. A member of the capture crew initiates the chain of custody form and completes the AT-SEA TURTLE DATA SHEET.
10. A data sheet is also completed for turtles that are observed but not captured and for captured turtles that are unoiled. Any unoiled turtles that are active and do not have any apparent abnormalities should be immediately released.
11. As soon as possible after a turtle is captured, notify shore-based operations to inform them that a turtle will be brought in for care.
12. When search effort is concluded, call shore-based operations and report the total number of turtles being brought in and estimated time of arrival so that ground transportation and rehabilitation facilities can be prepared.
13. Closely follow the agreed upon return time to facilitate timely care and treatment of oiled turtles.

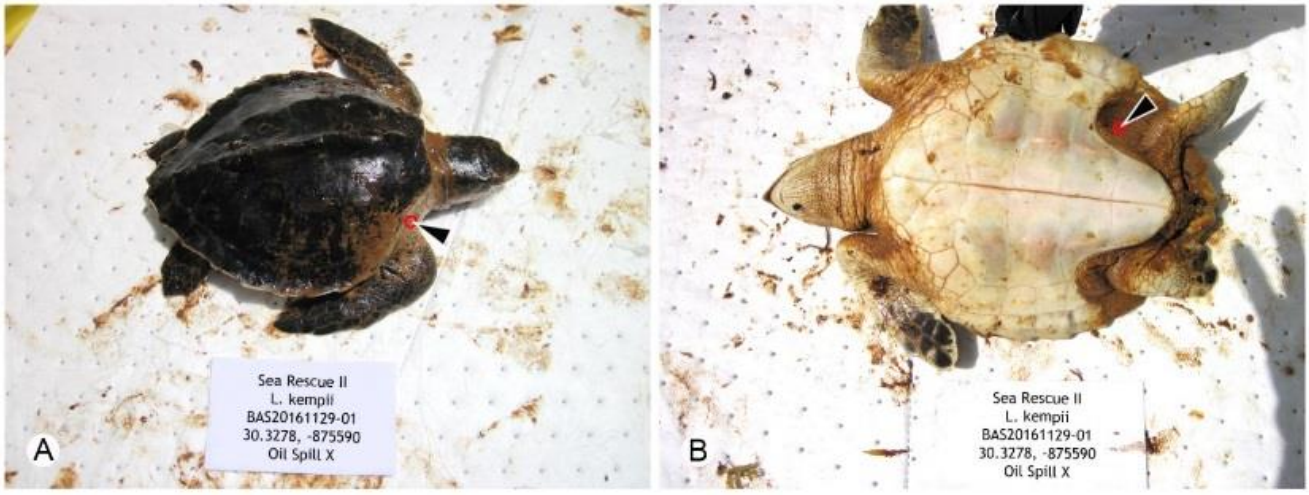


Figure A9-1. Examples of standard dorsal and ventral photographs used to document external oiling. The arrowheads and red dots indicate two areas where body temperature can be measured using infrared thermometers.

Directed capture ancillary procedures

Handling of GPS units and data

GPS data, including all vessel tracks and waypoints should be downloaded daily onto a designated secure hard drive or server. Transfer all data into a folder labeled according to the following convention: vessel name_two digit month.two digit day.four digit year (e.g., Sea Spray_05.12.2017).

Handling of turtle photos

Only use designated cameras and memory cards. **It is crucial that photos remain unaltered and sequential.** Do not delete *any* photos on the camera, even those taken inadvertently. Follow response protocols for uploading or copying images. After these official copies have been made and confirmed, it is permissible to makes additional copies of the images for other response uses and to reuse the camera / memory card.

Crew leader daily log

Each directed capture team leader keeps a daily log recording the vessel used, height of the vantage points used to sight turtles, eye level of the observers, time of departure and return, sea state, weather, sighting conditions, characteristics of encountered oil (e.g., sheen, slicks, mousse), and any observations of other wildlife within or near oil, especially any oiled animals (taxa – as specific as possible, sighting coordinates).

AT-SEA TURTLE DATA SHEET

TURTLE ID#: _____

Date: ____ - _____ - _____
DD MM YYYY

Port: _____

Vessel: _____

Observers: (First data sheet only, unless crew changes)

Name: _____

_____

_____

_____

_____

Waypoint number: _____

Latitude: _____ (decimal degrees)

Longitude: _____ (decimal degrees)

Captured: ☐Yes ☐No

Species: Cc Cm Dc Ei Lk Lo

Distance from transect: _____m

Angle (eye level to turtle): _____˚

Observer initial: ____

Eye level height: _____m (first entry only)

Side of vessel: Port Starboard

Location: Bow Gunnel Stern
Bridge Tower

Surface oil visible: ☐None ☐Sheen only
☐Liquid oil ☐Patchy mousse ☐Heavy mousse

Nearest object: _____

Distance to object: _____ m (0, 0-1, >1)

Behavior when sighted: _____

_____

_____

Photos: ☐Dorsal ☐Ventral

Tags: _____ _____
LF RF

PIT tag: _____

Curved carap length (ntch-ntch): _____cm

Curved carapace width: _____cm

Weight: _____kg

Visible oil: ☐Yes ☐No ☐Unk

Estimated % oiled: 0% <2% 2-25%
26-50% 51-75% 76-100%

Oil sample collected: ☐Yes ☐No

Mouth check: ☐Yes ☐No

Oil in mouth: ☐Yes ☐No ☐Unk

Behavior: Active/alert Quiet/alert
Lethargic/depressed Nonresponsive

Body temperature: _____˚ C or F (circle)

Injuries: ☐Yes ☐No

List any samples: _____

Notes: _____

_____

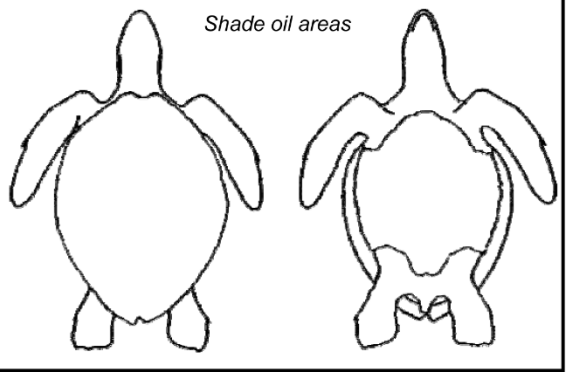
_____

_____

_____

_____

Shade oil areas



AT-SEA SEARCH EFFORT / TURTLE LOG

DATE: ___________ (MM/DD/YYYY) **VESSEL:** _________________ **OBSERVER:** ________________

OVERALL SIGHTING CONDITION ASSESSMENT (CIRCLE ONE FOR AM AND PM)**:**

AM: GOOD FAIR POOR **PM:** GOOD FAIR POOR

Search effort END occurs at a turtle sighting (whether lost or captured) or when the search effort is stopped for any other reason.

SEARCH	GPS WAYPOINT	TIME (MILITARY)	ACTION (CIRCLE ONE) or ENTER DATA (enter Cm, Cm, Dc, Ei, Lk, Lo, U after CAPTURE, LOST or SIGHTING)	
START			CAPTURE:	LOST:
END			SIGHTING ONLY:	STOP
Search area description:				
START			CAPTURE:	LOST:
END			SIGHTING ONLY:	STOP
Search area description:				
START			CAPTURE:	LOST:
END			SIGHTING ONLY:	STOP
Search area description:				
START			CAPTURE:	LOST:
END			SIGHTING ONLY:	STOP
Search area description:				
START			CAPTURE:	LOST:
END			SIGHTING ONLY:	STOP
Search area description:				
START			CAPTURE:	LOST:
END			SIGHTING ONLY:	STOP
Search area description:				
START			CAPTURE:	LOST:
END			SIGHTING ONLY:	STOP
Search area description:				

AT-SEA SEARCH EFFORT / TURTLE LOG

Page __ of __

SEARCH	GPS WAYPOINT	TIME (MILITARY)	ACTION (CIRCLE ONE) or ENTER DATA (enter Cm, Cm, Dc, Ei, Lk, Lo, U after CAPTURE, LOST or SIGHTING)
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			
START			CAPTURE: LOST:
END			SIGHTING ONLY: STOP
Search area description:			

Appendix 10: Transport of sea turtles

Live sea turtles

Live turtles must be shaded and otherwise protected from extremes of heat and cold (not above 90°F and not below 50°F). If a turtle is transported in ambient temperatures greater than or equal to 75°F, it should be cooled by keeping a wet towel on the carapace and by periodically pouring water over the turtle. Water and wet towels should not be used when transporting turtles at temperatures less than 75°F or at any time they are exposed to an air-conditioned environment.

A variety of containers may be used to transport sea turtles depending on the size of the animal, including kiddie pools for larger turtles, plastic or cardboard pet crates, or banana boxes. The containers must allow air circulation, the bottoms must be padded, and the container should not include any material that could be accidentally ingested. Hatchlings and post-hatchlings should be transported in a container with a damp or moist towel. Sea turtles are not transported in water.

Only one animal is transported per container for turtles larger than 10 cm carapace (shell) length. Secure all containers during transport such that they do not slide around or tip over. Minimize bouncing and jostling of the containers to the degree possible.

Dead sea turtles

Keep carcasses as cool as possible by placing them in coolers and/or covering them with ice.

Appendix 11: Rehabilitation and release

Rehabilitation facilities may receive live and dead sea turtles from within the response zone. This Appendix includes procedures for documentation, treatment, and sampling. An important aspect of these procedures is confident identification of individual animals. There are two primary identifiers that are assigned to sea turtles during this process: a **field identifier** and a **log number**. The field identifier (stranding or capture ID) consists of the three letter initials of the person that first documents the turtle, 4-digit year, 2-digit month, 2-digit day, followed by the sequential number for turtles captured that day. For example, Jane A Doe documents a turtle on 5/12/2017 and it is the second turtle she documents that day - the ID will be JAD20170512-02; if 6 turtles are documented by Jane A Doe on that day, the last will end in -06. This number typically is recorded on the COC form when the turtle is presented to a rehabilitation facility. This identification format minimizes duplicative identifiers, but is too long for easy reference and labelling of samples. When turtles are received at the rehabilitation center, they are logged into the Live or Dead Sea Turtle Intake Log, as appropriate, and receive a shorter number that will be primarily used for in-house identification and labelling of any samples. All turtles that are found alive should be entered on the Live Log, even if they die during transit. Do not apply additional names to turtles as this will create confusion and risk loss of important information.

Included in this Appendix is a list of essential supplies necessary to receive, evaluate, stabilize, and treat oiled sea turtles. This list should be considered provisional and requires consultation with specific facilities to ensure that it is adequate and complete.

Outline protocol for admitting sea turtles

Live turtles*

General Intake

1. Initiate or receive and sign Chain-of-Custody Form.
2. Enter turtle into Live Turtle Intake Log and assign log number.
3. Perform physical examination and complete Sea Turtle Intake Form.
4. Place temporary identification on turtle.
5. Review stranding report and complete any missing information.
6. Collect oil sample if one did not accompany turtle.
7. Take dorsal and ventral photographs with photo placard (include log number, turtle stranding/capture identifier as appears on COC, date, and facility name). Take additional photographs of any oiled areas (including mouth).
8. Initial blood collection.

Post-examination

9. Washing procedures.
10. Initial treatments (e.g., fluid therapy).

Rehabilitation

11. Assessment and additional treatment.
12. Implantation of flipper tags/PIT tag prior to release.

Dead turtles

General Intake

1. Initiate or receive and sign Chain-of-Custody Form.
2. Enter turtle into Dead Turtle Intake Log and assign log number.
3. Review stranding report and complete any missing information.
4. Collect oil sample if one did not accompany turtle.
5. Make a carcass tag that consists of the field identifier (as it appears on COC) and dead turtle log number.
6. If fresh dead (no odor or bloating), place the turtle in a plastic bag, attach the carcass tag, completely cover in ice, and contact your stranding coordinator for further instruction.
7. If decomposed, place the carcass in a plastic bag, attach the tag, and freeze the carcass if not to be necropsied within 24 hours.

*Note that all sea turtles found alive are entered into the Live Turtle Log, even if they die in transit. Turtles that are dead upon arrival are handled according to instructions for deceased turtles (right column).

Intake and treatment protocol **(developed during DWH spill)**

The following procedures describe intake and treatment in situations where multiple animals are admitted. These instructions should be reviewed in consultation with the attending veterinarian(s) and may be modified as dictated by medical judgment, animal welfare needs, and numbers of animals admitted for care. Additional therapy, such as administration of antibiotics, is at the discretion of attending veterinarian. At no point should paperwork or related procedures delay care and treatment. Any such difficulty should be immediately reported to Wildlife Branch personnel.

Intake Processing: On arrival, turtles are quickly and briefly checked to ensure they are responsive. The most lethargic are processed first. Intake photos are collected, weight obtained, and the animals are assigned an in-house ID number (log #) and a temporary flipper band or shell marking if needed.

1. Examination: Two assistants are assigned to each turtle, depending on size - one holder, one recorder / extra set of clean hands. The turtle is presented to veterinarian that starts physical examination with a general evaluation including heart rate measured by Doppler and respiratory rate.
2. Blood: For rapid evaluation, blood may be collected for a point-of-care analyzer immediately after thoroughly cleaning a small spot over the external jugular vein (alcohol, chlorhexidine or betadine). Remaining blood is processed for regular CBC/plasma chemistry including hematocrit tubes (for in-house PCV/TS and one for laboratory), 4 blood smears (2 for laboratory and 2 back-ups in case samples are lost/broken), and whole blood in a lithium heparin tube for centrifugation and plasma recovery.
3. Initial treatments: After blood collection and recording of heart and respiratory rates, the eyes are stained with fluorescein and the rest of the physical examination is performed. During this time, if there is extensive oil on the corneas, a small amount of mayonnaise or ophthalmic ointment is applied to try and loosen the oil. Mayonnaise seems to work best to loosen without apparent additional irritation to eye. Fluids, supplemented as necessary, may be administered at the discretion of the veterinarian.
4. General cleaning: If the turtle appears stable, it is wiped down with vegetable oil and/or mayonnaise to loosen the oil and then washed with liquid detergent (e.g., Dawn®) and tap water at ambient temperature. A soft scrub brush is used on the larger surfaces and soft toothbrushes work well on skin folds around the cloaca and inguinal area. Turtles are thoroughly rinsed and re-evaluated. The condition of the skin is better visualized after initial de-oiling.
5. Sensitive areas: Eyes and periorbital tissues are gently wiped with cotton swabs with saline or artificial tears or antibiotic ointment. The mouth is opened and the oral cavity and cranial esophagus are cleaned using a cotton gauze tightly clamped in a hemostat with a small coating of vegetable oil or mayonnaise. Depending on the degree of oiling, several or many oil/mayonnaise gauzes may be needed to clean the esophagus.
6. Internal oiling: A mixture of 2 to 3 parts mayonnaise and 1 part cod liver oil may be administered by lavage if oil ingestion is suspected.
7. Perform daily rechecks including notation of appetite, attitude, feces, activity, etc. The CBC/plasma chemistry should be repeated in 10 days to 2 weeks, or earlier as necessary.

Criteria for medical clearance of oiled sea turtles for release

The intent of these guidelines is to provide sound criteria for medical clearance of sea turtles in rehabilitation facilities such that they are expected to survive upon release back into the wild. The locations and manner of reintroductions will be determined by the federal permitting authority in consultation with experts and will consider the best available information on biology, ecology, as well as threat from oil impact. Decisions regarding release strategy are separate from the medical clearance criteria, which pertain only to the health status of the individual animal. Once sea turtles meet the criteria below, they will be considered eligible for release. Individual criterion may be omitted, in addition to those exceptions specifically mentioned below, under emergency situations that require expedited release when determined to be in the best interest of animal welfare.

Normal swimming and diving ability[1]	Animal is bright, alert, active, and does not have any abnormal neurological signs, problems swimming or diving, or buoyancy problems.
Normal feeding behavior	Animal is actively feeding and passing feces (consistency and character within normal limits)
Good nutritional condition	Based on external appearance of muscle condition and adipose status, and positive trend in body weight during rehabilitation.
CBC compatible with good health	No anomalies on blood cell counts or morphology based on best available reference data or blood parameters otherwise deemed suitable for release.[2]
Blood chemistries consistent with stable clinical status	Blood biochemical parameters are within normal limits based on best available data or blood parameters otherwise deemed suitable for release.[2]
Resolution of any specific clinically diagnosed problems	Resolution may be assessed based on, but not limited to: return of blood values to normal limits, healing of any wounds or other anomalies that reasonably may be considered a significant threat to survival, resolution of any radiographic abnormalities (with the exception of scarring or other persistent effects compatible with clinical resolution).
No medication administered for 2 weeks	Especially antimicrobials, antifungals, and anti-parasitic medications. Does not include nutritional supplementation or sedatives.

[1]Ideally, diving ability and buoyancy will be re-assessed at a staging location prior to release if distant transport of >6 hours is required.

[2]Anomalies in blood values (e.g., calcium and phosphorus) that may be associated with captive conditions will not necessarily preclude release. Furthermore, such findings may be used to justify timing of release.

Initial supply procurement list for rehabilitation of oiled sea turtles

Item	Unit	Minimum order per facility	Per no. of turtles[a]
1" wide Tyvek® wristbands - white or light color (to write on)- for turtle ID on flipper	pack of 500	2	None
1" wide Tyvek® wristbands - red (for ID of fibropapilloma turtles around flipper)	pack of 500	1	None
Sharpie® permanent marking stick (MeanStreak), white for turtle ID on carapace	Box of 8	1	per 20
Sharpie® red (for ID of fibropapilloma turtles)	Box of 8	1	per 20
Tyvek® tags	Box of 1000	1	per 20
Dawn® soap (1 gallon bottle)	gallon bottles/case of 4	2 cases	per 20
Soft tooth brushes	Individual	12	per 20
Mayonnaise (in single-use disposable packets)	12 g portion/case of 200	1	per 20
Cod liver oil (17 oz)	Individual	6	per 20
Cotton swabs (Q-tip® or similar)	Box of 500	1	per 20
Oil absorbent pads (PIG® or similar)	Box of 50	1	per 20
Contractor trash bags, 3 mil	box of 20	4	per 20
Contractor trash bags, 1.2 mil	box of 250	1	per 20
Hazardous sharps containers, small (5 quarts or more)	Individual	4	per 20
Nylabone® - Giant size (for turtle mouth opening)	Individual	1	None
Nylabone® - wolf size	Individual	1	None
Nylabon®e - regular size	Individual	1	None
Nylabone® - petite size	Individual	2	None
Oral (beak) speculum for birds, medium	Individual	2	None
Oral (beak) speculum for birds, large	Individual	2	None
Compression bags for fluids	Individual	1	None
Sterile syringes, 1ml, Monoject™ brand	Pack of 100	2	per 20
Sterile syringes, 3ml, Monoject™ brand	Pack of 100	2	per 20
Sterile syringes, 6ml, Monoject™ brand	Pack of 100	1	per 20
Sterile syringes, 12 ml Monoject™ brand	Pack of 40	1	per 20
Sterile syringes, 20 ml Monoject™ brand	Pack of 40	1	per 20
Sterile syringes, 60 ml Monoject™ brand (cath tip)	Pack of 40	1	per 20
Monoject™ hypodermic needles 20G x 1-1/2”	Box of 100	2	per 20
Monoject™ hypodermic needles 22G x 1-1/2”	Box of 100	2	per 20
Monoject™ hypodermic needles 23G x 1"	Box of 100	2	per 20
Monoject™ hypodermic needles 25G x 1"	Box of 100	2	per 20
10 drop/ml extension sets	Individual	50	per 20
Chlorhexidine solution (1 gallon)	Individual	5	per 20
Isopropyl alcohol (1 gallon)	Individual	2	per 20
23G winged infusion sets	Individual	50	per 20
Betadine surgical scrub (1 gallon)	Individual	2	per 20
Roccal-D® Solution (1 gallon)	Individual	2	per 20

[a]The number of turtles the order volume will accommodate. The order should be repeated for every incremental increase of this number of animals. “None” indicates a one-time purchase for each facility. This list may be modified / amended for specific spills and for resupply during prolonged events.

Item	Unit	Minimum order per facility	Per no. of turtles
Green top Vacutainer® tubes 3 ml	pack of 100	1	per 20
Red top Vacutainer® tubes 3 ml	pack of 100	1	per 20
Green top Vacutainer® tubes 6 ml	pack of 100	1	per 20
Red top Vacutainers® tubes 6 ml	pack of 100	1	per 20
Alcohol Prep pads - medium size	box of 200	1	per 20
Tegaderm™ 15 x 20”	Box of 50	2	per 20
4 x 4” Gauze pad	case of 1200	5	per 20
Fluorescein eye stain	Box of 300	1	None
KY jelly® (4 oz tube)	Individual	5	per 20
Vet Wrap®	case of 18 rolls	1	per 20
Elasticon® tape	box of 4	1	per 20
Red rubber catheter tubes (12Fr)	Pack of 100	1	per 20
Red rubber catheter tubes (12Fr)	Pack of 100	1	per 20
Lactated Ringers Solution 1000 ml	Individual	25	per 20
0.9% NaCl 1000 ml	Individual	25	per 20
Sodium Bicarbonate 8.4% (50 ml bottle)	Individual	10	per 20
Calcium gluconate 23% (500 ml bottle)	Individual	1	per 20
Potassium chloride (10 ml bottles)	Tray of 25	1	per 20
Epinephrine (30 ml)	Individual	1	per 20
Atropine sulfate (100 ml)	Individual	1	per 20
Dexamethasone (100 ml)	Individual	1	per 20
50% Dextrose (50 ml)	Individual	5	per 20
Fortaz® (ceftazidime) 2 gm vials	Individual	25	per 20
Metronidazole (oral) 250 mg tablets	Individual	1	per 20
Sporamox® (itraconazole) 10 mg/ml	Individual	5	per 20
Triple antibiotic ointment tubes	Individual	50	per 20
Puralube® ophthalmic ointment	Individual	50	per 20
B-Complex injectable 100 ml	Individual	2	per 20
Sterile Water for Irrigation 1000 ml	Individual	20	per 20
Sterile NaCl for Irrigation 1000 ml	Individual	20	per 20
Powder-free Nitrile gloves, small	case of 1000	1 cases	per 20
Powder-free Nitrile gloves, medium	case of 1000	4 cases	per 20
Powder-free Nitrile gloves, large	case of 1000	1 cases	per 20
Safety goggles	Individual	10	None
Tyvek® suits, medium	case of 25	3	per 20
Tyvek® suits, large	case of 25	2	per 20
Tyvek® suits, extra-large	case of 25	1	per 20
Masks (Duckbill or with respirator)	1 box of 20	2	per 20
Sharpie® marker, fine point	Box of 12	1	per 20
Sharpie® marker, extra fine point	Box of 12	1	per 20
Clipboards, Redi-rite® stainless w/pencil storage	Individual	10	None
Dry Erase board, 24 x 36"	Individual	1	per 20
Dry Erase Markers assorted colors	Multi-pack	1	per 20

Item	Unit	Minimum order per facility	Per no. of turtles
Formalin 10% buffered, 5 gal cube	Individual	1	None
Evidence strips 6 1/2 x 1 1/4", 100 strips	Individual	3	per 20
Evidence box sealing tape, 3" wide	Individual	10	per 20
Write-on bags, 4 x 6”, 2 mil	case of 1000	1	None
Write-on bags, 6 x 9”, 2 mil	case of 1000	1	None
Write-on bags, 9 x 12”, 2 mil	case of 1000	1	None
Cryovials® (2 ml)	case of 250	2	None
Cryovials® (4 ml)	case of 250	2	None
Cryovial boxes	case of 10	1	None
I-chem™ 300 series (20ml, clear)	case of 72	2	None
I-chem™ 300 series (20 ml, amber)	case of 72	1	None
I-chem™ 300 series (125 ml, clear)	Case of 24	10	None
Aluminum foil (1000')	Individual rolls	5	per 20
Wooden tongue depressors 6”	Pack of 100	10	per 20

LIVE OILED SEA TURTLE INTAKE FORM

Spill name:		**Facility:**	
Field ID:		**Intake log #:**	
Sea turtle examined by (name):			
Date:	**Time:**	**Species:** CM CC EI DC LK LO UNK	

VISIBLE OILING

Visible oil: ☐Yes ☐No ☐Unk	**Petroleum odor:** ☐Yes ☐No ☐Unk
Estimated % oiled: 0% <2% 2-25% 26-50% 51-75% 76-100% Cleaned prior to intake	**Distribution:** ☐Head ☐Body ☐Flippers ☐Eyes ☐Entire
Mouth check: ☐Yes ☐No	**Oil in mouth:** ☐Yes ☐No ☐Unk
Oil sample collected: ☐Yes ☐No ☐Already sampled **Location sampled:**	

EXAMINATION

Curved carapace length (notch-notch): _____cm	**Weight:** _____kg
Body condition: ☐Within normal limits ☐Appears underweight ☐ Obviously emaciated	**Sex:** ☐M ☐F ☐Unk
Epibiota: ☐ None ☐Small amount ☐Moderate amount ☐Heavily encrusted	**Behavior:** ☐Active/alert ☐Quiet/alert ☐Lethargic/depressed ☐Nonresponsive
Heart rate: BPM ☐Not taken	**Body temperature:** ˚C or F (circle) ☐Not taken
Resp. rate: BPM ☐Not taken	**Fluorescein stain:** ☐Yes ☐No ☐Not done
Blood for: ☐POC analyzer ☐CBC ☐Hematocrit/TS ☐Plasma chemistry ☐Films ☐None	
Comments (note any abnormalities):	

TX

Immediate treatments:

SPILL RESPONSE *LIVE* TURTLE INTAKE LOG

Oil Spill Name:	Facility:	Facility Abbreviation:

Intake Log Number (L-Facility abbreviation-XXXX)	Stranding/Field ID (As shown on COC)	Date Received	Time Received	Receipt Checklist	Initials
				□COC* □Stranding/field report* □Oil sample*	
				□COC* □Stranding/field report* □Oil sample*	
				□COC* □Stranding/field report* □Oil sample*	
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*Initiate/collect if not received.

Page ___ of _____

Intake Log Number (L-Facility abbreviation-XXXX)	Stranding/Field ID (As shown on COC)	Date Received	Time Received	Receipt Checklist	Initials
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				□COC* □Stranding/field report* □Oil sample*	
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				□COC* □Stranding/field report* □Oil sample*	

*Initiate/collect if not received.

Page ___ of _____

SPILL RESPONSE *DEAD* TURTLE INTAKE LOG

Oil Spill Name:	Facility:	Facility Abbreviation:

Intake Log Number (D-Facility abbreviation-XXXX)	Stranding/Field ID (As shown on COC)	Date Received	Time Received	Receipt Checklist	Initials
				□COC* □Stranding/field report* □Oil sample*	
				□COC* □Stranding/field report* □Oil sample*	
				□COC* □Stranding/field report* □Oil sample*	
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*Initiate/collect if not received.

Intake Log Number (D-Facility abbreviation-XXXX)	Stranding/Field ID (As shown on COC)	Date Received	Time Received	Receipt Checklist	Initials
				□COC* □Stranding/field report* □Oil sample*	
				□COC* □Stranding/field report* □Oil sample*	
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				□COC* □Stranding/field report* □Oil sample*	

*Initiate/collect if not received.

Page ___ of _____

Appendix 12: Necropsy (postmortem examination)

Included in this Appendix are the Sea Turtle Gross Necropsy Report and Sea Turtle Necropsy Sample Checklist. The forms guide a systematic postmortem examination and collection of samples that are routinely analyzed for assessment of compounds of interest during oil spills. These forms may be amended as necessary for specific conditions or considerations related to individual spill events. In addition to these forms, a final necropsy report, in the format of choice used by the veterinarian of record (designated by NOAA/USFWS), will be produced and may include the following: 1) a written description of gross findings, gross/provisional diagnoses; 2) histological findings (depending on postmortem condition); 3) a list of any ancillary diagnostic tests and results, final diagnoses, cause of death determination; and 4) any comments related to assessment, diagnoses, or interpretation of findings.

Also provided in this Appendix is a list of supplies necessary to conduct necropsies and sample fluids and tissues for oil and dispersant-related compounds. Amounts required for an initial order and scale for resupply are indicated, but will depend on life stages, postmortem conditions, and other specific circumstances. Equipment already possessed by most facilities capable of performing necropsies (e.g., knives, saws, scales) is not included.

Decontamination of non-disposable instruments

Instruments used for oil or PAH sampling need to be thoroughly washed and decontaminated after each use. Do not reuse an instrument without decontamination, even for collection of samples from the same animal as cross-contamination can create erroneous results. Note that the washing process requires time for drying. It is best to plan ahead for sampling needs and have several sets of instruments on hand. The decontamination procedures must be done using metal or glass containers; the instruments must not come into contain with any plastics.

1. Thoroughly clean instruments using a high-quality detergent (Alconox® or similar)
2. Rinse and dry thoroughly
3. Thoroughly rinse the instruments using 99.9% pesticide-free isopropanol
4. Allow to dry completely prior to use

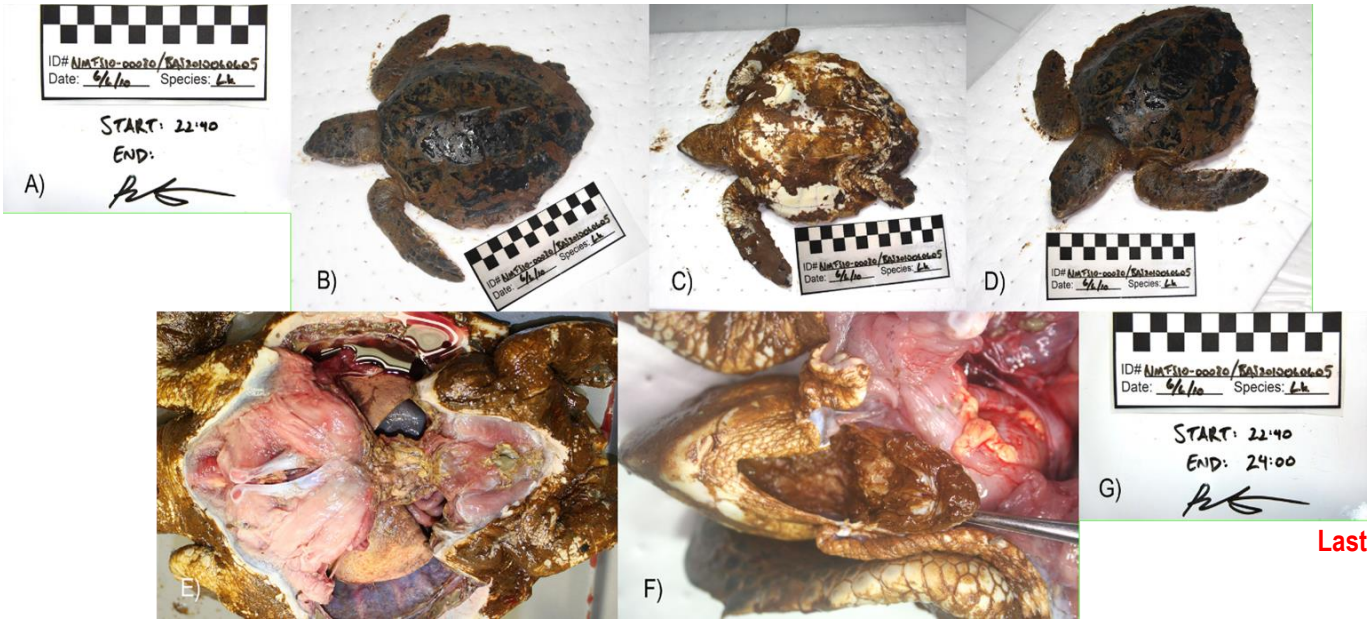
Photodocumentation during necropsy

Each examination is carefully photo-documented using the following instructions (see examples below):

1. Make a photo identification placard (e.g., using a dry erase board or similar) that includes the turtle's identifier, species, date, name of the examiner, and time that the examination begins.
2. Photograph the placard as the first photo for the examination (A). Include a ruler or other scale in photographs, if possible, but do not obscure the subject. If in doubt, take photos with and without an internal scale.
3. Photograph all parts of the body, including complete images of the dorsum (B), ventrum (C), and an oblique photo showing the neck and shoulder region (D).
4. Photograph any external oil or suspicious substance prior to sampling. Take close-up images of any injuries or other external abnormalities.
5. Following removal of the plastron, photograph the pectoral musculature and pericoelomic fat to demonstrate nutritional condition (E).
6. Carefully photograph any oil or suspicious material within the oral cavity or digestive tract (F), as well as any internal abnormalities. Oil tends to adhere to any keratinized epithelium, thus it frequently will coat the mouth or esophagus if oil has been ingested.
7. The final photograph of the necropsy is of the photo placard with the time indicating when the examination ended (G).

   Thus, the complete sequence of photographs of the examination begins and ends with the photo placard, which helps validate the origin and content of the images.

First



Last

Supply procurement list for sea turtle necropsies

Item	Unit	Minimum order per facility	Resupply[a]
Powder-free Nitrile gloves, small	case of 1000	1	per 100
Powder-free Nitrile gloves, medium	case of 1000	1	per 100
Powder-free Nitrile gloves, large	case of 1000	1	per 100
Sharpie® markers (12 per box)	box of 12	1	per 100
Cable ties	case of 1000	1	per 500
Tyvek® tags	case of 1000	1	per 500
Contractor bags, 3 mil	box of 20	4	per 50
Contractor bags, 1.2 mil	box of 250	1	per 100
Write on bags, 4 x 6”, 2 mil	case of 1000	1	per 100
Write on bags, 6 x 9”, 2 mil	case of 1000	1	per 100
Write on bags, 9 x 12”, 2 mil	case of 1000	1	per 100
Cryovials® (2 ml)	case of 250	2	per 100
Cryovials® (4 ml)	case of 250	2	per 100
Cryovial® boxes	case of 10	1	per 100
Glass syringe 5 ml	Individual	5	None
Sterile syringes, 3 ml, Monoject™ brand, luer lock	box of 200	1	per 500
Monoject™ hypodermic needles 20G x 1”	box of 100	1	per 50
I-chem™ 300 series (20 ml, clear)	case of 72	4	per 50
I-chem™ 300 series (20 ml, amber)	case of 72	1	per 50
I-chem™ 300 series (125 ml, clear)	Case of 24	25	per 50
Cotton tipped applicators, sterile	pack of 200	1	per 500
Microscope slides	pack of 144	1	per 100
Red biohazard bags	pack of 100	1	per 100
Aluminum foil (1000')	individual roll	2	per 50
Culture swabs	pack of 50	1	per 100
Scalpel blades	pack of 100	4	per 50
Alcanox® detergent	Case of 9 boxes	1	per 100
Isopropanol (99% pesticide free)	4L bottle	1	per 50
Ethanol, biotech grade	4L bottle	1	per 500
Formalin, 10% neutral phosphate buffered	20L cube	1	per 50
Cal-Ex®	10L cube	1	per 500
Tissue cassettes	case of 1500	1	per 100
Razor blades	pack of 100	10	per 100
Tissue cassette markers	pack of 12	1	per 100
Formalin containers, 1 L	case of 100	1	per 50
Formalin containers, 5 L	case of 10	1	per 50
Bleach (1 gal)	individual bottle	5	per 50
Simple Green® (1 gallon)	individual bottle	5	per 50
Roccal-D® (1 gallon)	individual bottle	1	per 50
Dawn® soap (56 oz)	individual bottle	2	per 50
DVDs	pack of 100	2	per 50
CD/DVD labels	pack of 300	1	per 150
CD sleeves	pack of 50	2	per 50
File folders, 1/3 tab w fasteners	pack of 50	1	per 50

[a]The number of turtles the order volume will accommodate. The order should be repeated for every incremental increase of this number of animals. “None” indicates a one-time purchase for each facility. This list may be modified / amended for specific spills and for resupply during prolonged events.

SEA TURTLE – GROSS NECROPSY REPORT

IDENTIFICATION

1. Identifier #: _____ **2. Other identifier(s)/#:** _____ **3. Rehab:** ☐Yes ☐No

4. Found dead: ☐Yes ☐No **5. If no, date of death** ____/____/_____ leave blank if unknown (Use mm/dd/yyyy for dates)

6. Euthanized: ☐Yes ☐No **7. Frozen/Thawed:** ☐Yes ☐No **8. Condition at necropsy:** ☐1 ☐2 ☐3 ☐4 ☐5

9. Date necropsied: ____/____/_____ **10. Examiner:** _____ **11. Affiliation:** _____

12. Necropsy description: ☐External & internal examination ☐External examination only ☐Incomplete carcass

13. Disposition of carcass: ☐Buried on beach ☐Buried off site ☐Rendered ☐Incinerated ☐Other

14. Species: ☐CC ☐CM ☐DC ☐LK ☐EI ☐LO ☐HYBRID ☐UNK **15. Sex:** ☐Male ☐Female ☐Undetermined

EXTERNAL EXAMINATION

16a. Body weight: _____ ☐kg ☐lb **16b.** ☐actual ☐ est. **17. Eyes sunken:** ☐Yes ☐No **18. Skeletal features prominent:** ☐Yes ☐No

19. Heavily encrusted w/ epibiota: ☐Yes ☐No **20. Leeches:** ☐Yes ☐No **21. Gooseneck barnacles:** ☐Yes ☐No

22. Epibiota coverage: **22a. Head/appendages:** ____% **22b. Carapace:** ____% **22c. Plastron:** ____%

23. External Trauma/evidence of Human Interaction (T/HI): ☐Yes ☐No ☐CBD **(If yes, complete 25)** **Use STSSN scale**

24. Other anomalies: ☐Yes ☐No ☐CBD **(If yes, complete 26)** CBD - Cannot Be Determined/Evaluated ☐ PHOTOGRAPHS TAKEN

ANATOMIC LOCATION CODES: Head (H) Neck(N) Eyes(E) Mouth(M) Carapace(C) Plastron(P) Tail(T) Vent(V)
Use for 25a & 26a Front flipper - Right(R) Left(L) Rear flipper - Right(F) Left(G) All appendages(Y) Pectoral girdle(J) Pelvis(I)

25a. T/HI-Type:(check all that apply and diagram in 25c)
Enter anatomic codes in blanks: (Example: ⊗ Parallel slicing wounds(1) *C*)

☐Parallel slicing wounds(1)_____ ☐Blunt/crushing(2)_____
☐Non-parallel/single linear wounds(3)_____ ☐Dislocations(4) _____
☐Partial/complete amputation(5)_____ ☐Paint transfer(6)_____
☐Fractures/broken bones(7)_____ ☐Puncture(8)_____
☐Bite wound /probable bite (9)_____ ☐Suspect oil/tar(10)_____
☐Ligature/entanglement-type(11)_____[a] ☐Incised/mutilation(12)____
☐Entangling material attached(13)_____[a]
☐Hook and/or line present (14)_____[a] [a]**If yes, complete 25d**
☐Other(15) _____ **describe under 25c**

25b. T/HI- Description:(check all that apply)
Enter 25a. + anatomic codes: (Example: ⊗ Exudate/fibrin *1C*)

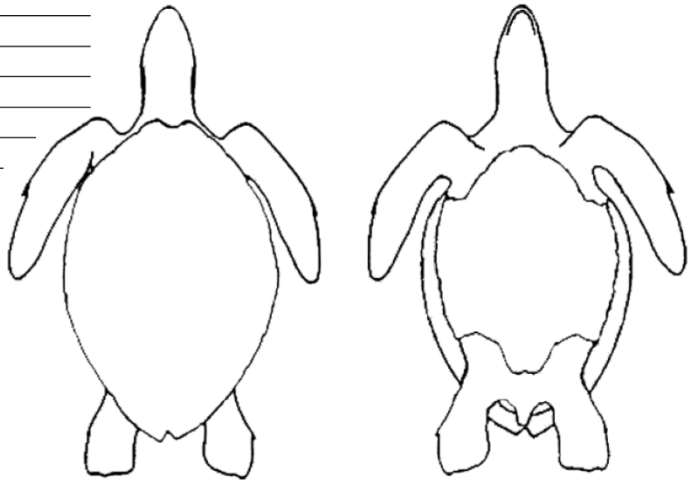
☐Exudate/fibrin_____ ☐Fibrous tissue formation_____
☐Bone formation/remodeling_____ ☐Hemorrhage_____
☐Encapsulated sand/debris_____ ☐Blood clots_____
☐Completely healed_____ ☐Other_____**describe under 25c**

☐ **Diagram wounds/measurements 25c**

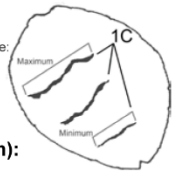
☐ PHOTOGRAPHS TAKEN **Use STSSN scale in photos**

3 Standard photos: with scale
1. Perpendicular to wound(s)
2. Wound margins (close-up)
3. Head, neck, shoulder region

25c. T/HI-Comments & External Diagram (cont. pg 4): _____



Parallel slicing wounds (cm):
Straight (chord) cut length
Maximum: _____ Example:
Minimum: _____



Single linear wounds (cm):
Wound length: _____
Width: _____ Depth: _____

EXTERNAL EXAMINATION (CONT.)

25d. T/HI-Fisheries/Entanglement data: (Fisheries gear, other entangling material)

Gear type:

☐Line & pot ☐Line & buoy ☐Line, buoy & pot ☐Unknown gear/line

☐Netting ☐Hook ☐Monofilament ☐Braided line ☐Other

Number of wraps around body part: _____, **location:** _____[1] **(use anatomic codes)**

Additional areas:___,___[2] ; ___,___[3] ; ___,___[4] ; ___,___[5] (Example: *4 , R*)

☐Material removed prior to necropsy

Ligature injury: (additional comment under 25c)

☐Ligature – mild, non-penetrating

☐Ligature – skin incised/ulcerated

☐Ligature – full thickness (deep tissue/bone exposed)

☐Ligature – partially/completely healed

T/HI-Material collected*: ☐Yes ☐No **Disposition of material:** _____

Gear description (color, shape, size): _____

Gear identification information: _____

26a. External anomalies-Type: (check all that apply and diagram in 25c)

Enter anatomic codes in blanks: (Example: ⊗ Ulcers(16)_*Y*_)

☐Fibropapillomas (16)_____ ☐Masses (non-FP or uncertain)(17)_____

☐Ulceration/dermatitis(18)_____

☐Other(19)_____ **describe under 26c**

☐ PHOTOGRAPHS TAKEN

26b. Other anomalies-Description: (check all that apply)

Extent of observation: *(Refer to Pap Map for FP turtles)*

Enter 26a. + anatomic codes: (Example: ⊗ 10-25% affected_*16Y*_)

☐<5% surface affected_____ ☐5-25% affected_____

☐>25-50% affected_____ ☐>50% affected_____

☐Visual field involved_____ ☐Both eyes_____

☐Mouth obstructed_____ ☐Cloaca obstructed_____

26c. Anomalies-Comments (cont. pg 4): _____

INTERNAL EXAMINATION (comments extended to page 4 – optional)

NUTRITIONAL CONDITION - INTERNAL

27. Muscle status: ☐Well-muscled/No atrophy ☐Mild to moderate atrophy ☐Severe atrophy ☐CBD

28. Fat status: ☐Abundant/No atrophy ☐Mild to moderate atrophy ☐Severe atrophy ☐CBD ☐ PHOTOGRAPHS TAKEN

29a. MUSCULOSKELETAL (internal) – ☐EXAMINED ☐CBD **29b. Joint fluid:** ☐No findings ☐Cloudy/solid material ☐Bloody

29c. Skeletal findings: ☐No findings ☐Fractures ☐Dislocation ☐Avulsions ☐Deformities ☐Other (note location(s) in comments)

29d. Musculature findings: ☐No findings ☐Trauma ☐Hemorrhage ☐Pallor ☐Necrosis ☐Other

29e. MUSCULOSKELETAL-Findings/Comments: _____

30a. COELOMIC CAVITY – ☐EXAMINED ☐CBD **30b. Coelomic fluid Volume**: _____ml **30c.** ☐actual ☐ est.

30d. Coelomic fluid: ☐No findings ☐Cloudy/solid material ☐Blood-tinged ☐Blood clots ☐Fibrin ☐Other

30e. Coelomic lining: ☐No findings ☐Masses (≤2mm) ☐ Masses (>2mm) ☐Hemorrhage ☐Adhesions ☐Other

30f. COELOMIC CAVITY-Findings/Comments: _____

31a. CARDIOVASCULAR SYSTEM (heart/major vessels) – ☐EXAMINED ☐CBD **31b. Blood in heart chambers:** ☐Yes ☐No

31c. Pericardial fluid: ☐ No findings ☐Cloudy/solid material ☐Blood-tinged ☐Blood clots ☐Fibrin ☐Other

31d. CV Findings: ☐No findings ☐Trauma ☐Endocarditis/arteritis ☐Blood clot(s) ☐Vessels thickened ☐Adhesions ☐Other

31e. CV-Findings/Comments: _____

32a. HEPATOBILIARY SYSTEM (liver and gall bladder) – ☐EXAMINED ☐CBD

32b. Liver Findings: ☐No findings ☐Pallor ☐Atrophy (shrunken, black) ☐Trauma ☐Masses (≤2mm) ☐Masses (>2mm) ☐Other

32c. Biliary Findings: ☐No findings ☐Gall bladder thickened ☐Bile ducts thickened ☐Ulcers ☐Exudate ☐Stones ☐Other

32d. HB-Findings/Comments: _____

ANATOMIC LOCATION CODES: Mouth(O) Esophagus(Es) Stomach(St) Small intestine(Si) Colon(Co) Cloaca(Cl)

33a. ALIMENTARY SYSTEM – ☐**EXAMINED** ☐**CBD**

33b. GI-Findings: (check all that apply) **Enter anatomic codes in blanks:** (Example: ⊗ Ulcers(20)_Co_)

☐Ulcers/exudate(20)_____ ☐Trauma (21) _____ ☐Masses(22) _____ ☐Impaction(23) _____

☐Obstruction(24) _____ ☐Intussusception(25) _____ ☐Plication(26) _____ ☐Other(27) _____

33c. GI-percentage of affected area: Enter 33b. + anatomic codes: (Example: ⊗ >25-50 affected_20 Co_)

☐<5%_____ ☐5-25%_____ ☐>25-50%_____ ☐>50%_____ ☐N/A

33d. GI-Foreign material: ☐Yes ☐No **(if yes, complete 33k)**

33e. Injury/lesion associated with foreign material: ☐Yes ☐No **If yes, give entry for 33b:**_____(Example: _21,St_)

GI-Contents(include & note any biotic impacted material)**:**

33f. Esophagus: ☐ Empty ☐ Contents, describe: _____

33g. Stomach: ☐ Empty ☐ Contents, describe: _____

33h. Intestine (first ½)**:** ☐ Empty ☐ Contents, describe: _____

33i. Intestine (second ½)**:** ☐ Empty ☐ Contents, describe: _____

33j. GI-Findings/Comments: _____

_____

_____

_____

33k. GI-Foreign material - type: ☐ PHOTOGRAPHS TAKEN

☐Hook(29) ☐Line(30) ☐Hard plastic(31) ☐Plastic bag(33) ☐Misc soft plastic(33) ☐Balloon(34) ☐Tar(35) ☐Other(36)

Material/lesion location(s): _____ **(use anatomic codes)**

Material collected*: ☐Yes ☐No **Disposition of material:** _____

Foreign material-Description of material & comments: _____

34a. SPLEEN – ☐**EXAMINED** ☐**CBD** **34b. Spleen Findings:** ☐No findings ☐Trauma ☐Enlarged ☐Masses ☐Other

34c. PANCREAS – ☐**EXAMINED** ☐**CBD** **34d. Pancreas Findings:** ☐No findings ☐Trauma ☐Masses ☐Congested ☐Other

34e. SPLEEN/PANCREAS-Findings/Comments: _____

_____

35a. UROGENITAL SYSTEM (kidneys, reproductive, urinary bladder) – ☐**EXAMINED** ☐**CBD**

35b. Kidneys Findings: ☐No findings ☐Trauma ☐Enlarged ☐Asymmetrical ☐Masses ☐Other

35c. Gonads identified as: ☐Testes(complete 35d-f†) ☐Ovaries(complete 35g-i†) ☐Unknown **(Indicate sex on Page 1, Field 15)**

35d. Testes–characterization: ☐Cylindrical ☐Ellipsoidal ☐Flat **35e. Testes-size:** _____length x _____width (cm)

35f. Epididymis–characterization: ☐Not expanded from wall ☐Distinct ridge ☐Pendulous ☐Obvious white coils

35g. Ovaries–characterization: ☐All follicles <4mm ☐Developing follicles (4-24mm) ☐Corpus luteum (>7mm) ☐Corpus albicans

35h. Ovary length: _____ (cm)

35i. Oviduct–characterization: ☐White, straight (<3mm diameter) ☐Partially convoluted (3-15mm diameter)
☐Very convoluted (>15mm diameter) ☐Contains eggs (>24mm) † *Optional fields by state*

35j. UG-Findings/Comments: _____

_____

_____

36a. RESPIRATORY SYSTEM – ☐**EXAMINED** ☐**CBD** **36b. Foam/froth in airway:** ☐Yes ☐No

36c. If froth present: ☐Cranial to bifurcation ☐Caudal to bifurcation **36d. Froth amount:** ☐Small ☐Moderate ☐Copious

36e. Sand/sediment in airway: ☐Yes ☐No **36f. Trachea/bronchi:** ☐No findings ☐Exudate ☐Masses ☐Ulceration ☐Other

36g. Lungs Findings: ☐No findings ☐Wet/frothy ☐Hemorrhage ☐Trauma ☐Exudate
☐Masses (≤2mm) ☐Masses (>2mm) ☐Aspirated debris ☐Other

36h. RESP-Findings/Comments: _____

_____

_____

INTERNAL EXAMINATION (CONT.)

37a. CENTRAL NERVOUS SYSTEM – ☐Brain EXAMINED ☐CBD **37b. ☐Spinal cord EXAMINED ☐CBD**

37c. Brain findings: ☐No findings ☐Trauma ☐Hemorrhage ☐Necrosis ☐Exudate ☐Blood fluke eggs ☐Other

37d. Spinal cord findings: ☐No findings ☐Trauma ☐Hemorrhage ☐Necrosis ☐Exudate ☐Blood fluke eggs ☐Other

37e. CNS-Findings/Comments: _____

_____

38. Other Comments (include any continuation from previous sections & label notes by data field number (e.g. 25c)**:** _____

List Major Findings / Gross Diagnoses: _____

Examiner's signature: _____ **Date:** _____

*All fisheries gear should be submitted to Pascagoula (SE) or North Kingston (NE) NOAA laboratories for ID

SEA TURTLE NECROPSY SAMPLE CHECKLIST

**Label all samples with identifier, date, and sample type; collect in duplicate if possible for turtles >1 kg (see footnotes)*

	Code 1[a]	Codes 1 & 2[b]
Sample / Preservation	10% Formalin	Frozen: For all potentially exposed turtles, collect in aluminum foil or certified glass as indicated
Fluids		
Plasma (preferred) or serum (2-3 mls, or any available)		☐Code1 only (Glass)
Bile (5-10 mls, or any available)		☐Code1 & 2 (Amber glass)
Urine (5-10 mls, or any available)		☐Code1 & 2 (Glass)
Gastrointestinal contents		Collect 100-150 mls, or any available; freeze GI tract wall if empty
Stomach contents		☐Glass
Intestine contents		☐Glass
Feces (distal colon or cloaca)		☐Glass
Any hard parts, bone, shell (representative subsample)		☐Plastic
Tissues		Collect at least 150-250 grams (~ half of fist-sized section)
Skin	☐	
Eye	☐	
Conjunctiva	☐	
Salt gland	☐	
Tongue	☐	
Skeletal muscle (3 sites: neck and two limbs)	☐	
Trachea	☐	
Lungs (two sections each [different areas]: right & left lung)	☐	☐ Glass or foil
Thyroid	☐	
Thymus	☐	
Heart (one section from ventricle and each atria)	☐	☐ Foil
Aorta	☐	
Liver (one section from each lobe minimum)	☐	☐ Glass or foil
Gall bladder	☐	
Spleen	☐	☐ Plastic
Pancreas	☐	
Esophagus	☐	
Stomach	☐	☐ (wall, if empty only) - Glass
Intestine (one section each: proximal, mid, distal)	☐	
Colon	☐	
Kidney (one section each: right and left kidney)	☐	☐ Glass or foil
Gonads & ducts (oviducts / epididymis, vas deferens)	☐	
Adrenal glands	☐	
Urinary Bladder	☐	
Brain (place intact in formalin for Code 1)	☐	☐ (Code 2 only) - Foil
Spinal cord	☐	☐ (Code 1 only) - Foil
Peripheral nerve	☐	
Pituitary gland	☐	
Bone marrow (margin of carapace or long bone/pelvis)	☐	
Fat (near kidney left side)	☐	☐ Glass
Other lesions	☐	☐ Foil
Parasites	☐ 70% Ethanol	☐ 70% Ethanol

[a]**Frozen samples:** All samples should be stored frozen in whatever facility is available. Ultralow storage (-80°C) is preferred, but -20°C (conventional freezer) is also suitable. For collection in aluminum foil, first place the tissue into a folded foil pouch with the dull surface in contact with the sample, fold the foil to completely over the sample, and then place into a sealable plastic bag. Only collect duplicate samples if sufficient quantity exists. Single sets will be collected from turtles under 1 kg.

[b]**Formalin-fixed samples:** Collect all tissues in 10% neutral buffered formalin. Include normal and abnormal-appearing tissues, especially the margins of lesions if possible. All tissue sections should be less than 1.0 cm thick (except eyes and brain, which are fixed intact) and fixed in a formalin:tissue ratio (by volume) of 10:1. Only collect duplicate samples if will not comprise diagnostic value. Single sets will be collected from turtles under 1 kg.

Appendix 13: Release of de-oiled and non-oiled sea turtles

All live sea turtles collected during the spill events are intended for release back into the wild, whether they were oiled or not. Turtles that are cleared for release by the attending veterinarian are candidates for immediate release. The goal is to return turtles to the wild, as soon as possible following medical clearance and once environmental conditions are conducive to their long-term survival. Decisions on the timing and location of release are made by the federal permitting authorities (NOAA/USFWS) and coordinated with the Unified Command (if release is during active spill response operations), particularly if any media will be present.

Release options, discussion, and evaluation

Option A: Release at or near original stranding or capture location(s).

In order to release stranded turtles at or near the original site of collection, the following conditions must be met at the proposed release area:

1. Containment of the spill source.
2. Absence of recoverable surface oil as determined by aerial and/or shipboard observation and as demonstrated by absence of clean-up operations to recover surface oil.
3. Opening of prior fishing closures to harvest of fish and invertebrates for human consumption (as a proxy for food web evaluation).

Option B: Release in habitat(s) away from stranding or capture location(s).

If the aforementioned criteria (for release at or near stranding location) are not met at the time of medical clearance, turtles may be released at an alternative location that is deemed not to be under threat from an oil spill. Sea turtles of the same species (preferably the same recovery unit/genetic subpopulation) and life stage must be known to occur at the proposed release site. Propensity for turtles to return to original areas of capture should be anticipated for neritic phase turtles, thus release should be timed such that risk of exposure at the original area of collection is minimal should the turtle return.

In addition, sea turtles captured during transitional phases of their life history (hatchlings, post-hatchlings, oceanic juveniles) may require alternative release locations that are biologically suitable for their size at the time of release. Selected habitat and locations must be known to contain sea turtles of the same species and size class.

Safe handling and release protocols

Guidelines for safe transportation of sea turtles should be followed at all times. The PIT tag number and other identifier for each turtle are recorded prior to release along with the release location (latitude/longitude). A log should be prepared in advance and each animal checked off as it is released. Once turtles arrive at the designated release location the following measures are implemented:

Shoreline releases:

- Hatchlings: In general, releases should occur at night. At the time of release, hatchlings should be placed on the beach at a distance from the waterline that is roughly equivalent to the original nest site (if free from oil) and allowed to crawl to the water on their own. Flashlights or other artificial lights may not be utilized during hatchling releases. A quick check of the release area with a small flashlight fitted with a red LED light source or red filter that eliminates short wavelength light a short time after release will ensure that all hatchlings have reached the water. Occasionally, individual hatchlings may need assistance in reaching the water. In such cases, they may be moved closer to the water or placed in the shallows and allowed to swim off on their own.
- Juveniles and adults: Place turtle at the water's edge or directly in the water. Do not make animals crawl across land to reach water. Do not allow onlookers to crowd around animals or to position themselves between the turtle and open water.

At-sea releases:

- If turtles are aboard multiple release vessels: release animals from one vessel at a time, so that all vessel operators are aware of where turtles are being released. If multiple release vessels are involved, the lead sea turtle biologist shall direct the order of release and the location of all vessels, including press, during release.
- All vessel engines (both the releasing vessel and observing vessels) shall be in neutral, preferably turned off, during the release.
- For releases of multiple turtles, animals should be spread out along the line, not released all in one location.
- Turtles shall be removed from their respective transport bins and placed immediately by hand into the water. Turtles shall not be handled by media personnel, held out of the water once taken from the holding bin, or dropped into the water from any height.
- Newly released turtles should be observed for a sufficient time period to ensure they are behaving normally.
- Vessels must exercise extreme caution when departing the release location to ensure released turtles are clear of the area.

General:

Any turtle that does not dive or exhibits any indication of a persistent abnormality should be recaptured for additional evaluation and rehabilitation. All release vessels should be equipped with a dip net of suitable size to recapture released turtles.

Appendix 14: Nesting beaches

Sea turtle nesting beach survey and turtle/nest protection protocols

This document addresses loggerhead (*Caretta caretta*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp's ridley (*Lepidochelys kempii*), and leatherback (*Dermochelys coriacea*) sea turtle nesting beach surveys and turtle and nest protection efforts on beaches where regular nesting surveys are conducted. If the protocols in this appendix conflict with the permitted procedures in a particular area, then the permitted actives will take priority under the guidance by USFWS in consultation with the Sea Turtle Group Lead. Pertinent contact information for notification of nests and related activities should be added to the protocols below.

Protocol: Conducting nesting beach surveys

Until such time as beaches are officially identified and designated as "oiled," nesting surveys will proceed as usual in accordance with existing sea turtle permitting guidelines. If oil is present on beach and the beach has been identified for clean-up activities, sea turtle permit holders must comply with any hazardous material training requirements communicated from the Unified Command. Every effort will be made to ensure continued cooperation with the nesting survey network and to ensure continuity of the survey and nest inventory methods.

Protocol: Encountering nesting sea turtles and/or exposed eggs on the beach

If a nesting sea turtle is encountered on the beach while a sea turtle permit holder is conducting normal activities authorized under their existing sea turtle permits, the turtle should be observed to assess its behavior and condition after egg laying while she is covering her nest. Females that appear weak or injured might not complete the nesting process or may drop eggs on the beach. If a turtle has not yet nested or is in the process of nesting, then wait to check her condition. She may still be able to lay a clutch even in a distressed condition. The turtle should not be approached until nesting activities have been completed and she is returning to the water. If the nesting female appears to be oiled or in distress, please contact the regular stranding hotline for the State/Territory in which the turtle is located as indicated below.

Any uncovered eggs in a nest on the beach should be carefully covered with damp sand. Loose eggs on the sand surface may be retrieved and properly buried on the beach in accordance with the nest relocation protocols in the existing sea turtle permitting guidelines. The nest should be marked in accordance with the Nest Marking protocols below.

Protocol: Protecting nests

Nest Cleaning

During daily surveys, if oil and/or tarballs or tar mats are evident on the beach, please call the number identified for the State in which the nest is located; these organizations will in turn contact the local Incident Command System Hazmat clean-up crew to request the oil and/or tarballs and tar mats be

removed. Only designated Hazmat clean-up crew members can remove oil and tar materials from the beach.

Upon arrival at the scene, the designated Hazmat clean-up crew will follow the Sea Turtle Nest Protection Protocols for Clean-up Crews on Beaches (attached) to minimize the likelihood of impacts to incubating nests and turtles on the beach.

Nest Relocation

During an oil spill, determinations regarding relocation of nests to protect them from oil impacts will be made by USFWS in consultation with the Sea Turtle Group Lead. The presence of oil and/or tarballs and tar mats on a beach in and of itself does not justify nest relocation. If a nest meets the standard criteria for relocation, it should be moved to an oil-free location and away from the path of clean-up activities, in accordance with the sea turtle permitting guidelines referenced above.

Nest Marking

Nest marking will proceed in accordance with the existing sea turtle permitting guidelines. The goal of this marking method is to clearly identify the nest area and protect it from response activities. Visually inspect the site to determine whether a nest exists. Nests should not be dug into simply to verify the presence of eggs. The entire disturbed area (where digging has occurred) should be delineated with stakes. Nest site must be marked with a radius of at least three feet or up to ten feet, depending on the width of the beach, centered at the approximate location of the clutch. The stakes should extend about 36" above the sand. To further identify the nest site, surveyor's ribbon can be tied from the top of one stake to another to create a perimeter around the nest site. Additionally, a nest sign can be attached to one of the stakes used to create the perimeter (contact information on signs). A nest-identifying number should be indicated on at least one of the nest perimeter stakes.

Protocol: Marking nests to determine hatching success

Mark nests so that you can locate the clutch even if no hatchling emergences occur. Triangulation requires measuring the exact distance from the approximate clutch location to two separate marking stakes on the dune that are aligned so that a straight line between them orients directly toward the location of the clutch (Figure A14-1). Both stakes should be labeled with an identifying nest number. As added insurance, an aluminum marker can be buried by hand approximately hand-deep and 24" from the approximate clutch location in a standardized direction on either side of the nest. This metal marker can be found later with a metal detector. The measured-distance marking stakes should be used to find the egg chamber location by extending the tape to the previously recorded distance between each stake and the clutch (measured at ground level) and making a large arc in the sand. The clutch will be found where the arcs cross in the sand.

Nest inventory is the evaluation of the contents of a nest. Nest inventories should be conducted in accordance with sea turtle permitting guidelines and entered onto a Nest Inventory Data Sheet. A nest inventory may only be conducted either 72 hours after the first sign of emergence or 70 days after the eggs were deposited (80 days for leatherbacks), whichever occurs first. Inventory of nests may be conducted under NRDA or as part of any pre-existing, permitted monitoring effort.

All marked nests should be checked daily to ensure that marking materials remain in place and are intact and to determine whether oil or tar is present. In the event that nest markers are lost due to high tides or storms, the sea turtle permit holder shall coordinate with the sea turtle permitting agency to re-establish the nest location using the secondary dune or landward markers and existing landmarks, and confirm the location using existing GPS readings.

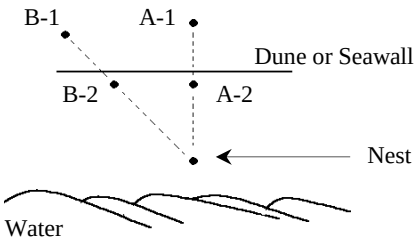


Figure A14-1. Site A stakes are directly landward of the nest in dune vegetation or at the base of a seawall. Site B stakes are in a similar position as Site A but located at an angle from the nest. Stakes A-1 and B-1 should be sunk deeply so that they are not conspicuous to someone not looking for them. Precisely measure the distance from stakes to the clutch location. Then, sink additional stakes (A-2 and B-2) directly between the clutch and the dune stake(s).

Nest Caging

If there are concerns that emerging hatchlings may depart from the nesting beach and encounter oil in the water, nests may need to be screened with restraining cages to enable collection and relocation of hatchlings. If caging is necessary, caged nests must be monitored regularly beginning at 40 days from egg deposition.

Determinations regarding the disposition of hatchlings (i.e., allow to enter the ocean at the nest site or collect and release hatchlings elsewhere) will be made by USFWS in consultation with the Sea Turtle Group Lead.

Sea turtle hatchling encounter protocol for beach clean-up crews

Encountering sea turtle hatchlings on the beach

Unmarked sea turtle nests may exist on some beaches and clean-up crews may encounter hatchlings from these nests. If sea turtle hatchlings are encountered on the beach, please follow the guidelines listed below:

1. All hatchlings must be allowed to crawl to the water undisturbed.
2. If hatchlings will emerge onto an oiled beach or water, place hatchling(s) in a clean, rigid container, more than 10-inches deep, lined with damp (not wet), unoiled sand, and loosely covered with a lid or towel to provide a dark environment while allowing for air flow. Any containers housing turtles should not contain any material that could be accidentally ingested.
3. Do not place the hatchling(s) in water.
4. No more than 15 hatchlings should be placed together in a single container.
5. The descriptive location of the hatchling(s), including the GPS location, should be recorded; avoid obscuring any hatchling tracks so that the nest can be visually relocated if necessary.
6. The container should be shaded and otherwise protected from extremes of heat and cold (not above 90°F and not below 50°F).

Immediately contact the regular stranding hotline for the State in which the hatchlings were located [INSERT CONTACT INFORMATION].

OIL SPILL RESPONSE / NRDA NEST INVENTORY DATA SHEET

Inventory/collection date: _____ **Nest number:** _____

Species: Cc Cm Dc Ei Lk Lo Unk **Date laid:** _____

Sampled by: _____

Latitude: _____ **Longitude:** _____ (decimal degrees)

Beach Name: **State**: _____

Stakes in place?: ☐Yes ☐No **Emerged?:** ☐Yes ☐No

Nest from female that was sampled?: ☐Yes ☐No

Female Tags: _____ _____ **PIT tag:** _____

Photo taken: ☐Yes ☐No

Total clutch size: _____ **Live hatchlings:** _____

Hatched: _____ **Dead hatchlings:** _____

DEVELOPMENT ARRESTED AT (provide counts):

Early stage mortality: _____ **Addled:** _____

Late stage mortality: _____ **Infertile:** _____

Pipped dead: _____ **Pipped live:** _____

Hatchling deformities: _____ **Deformed hatchlings collected?** ☐Yes ☐No

EGGS AFFECTED BY (please describe if nest was affected by predators or inundation): _____

_____

BEACH OILED? ☐Oil on beach ☐Oil on nest ☐No oil visible ☐Unknown

CLEAN-UP OPERATIONS BEACH? ☐No ☐Ongoing ☐Completed ☐Unknown

HATCHLING SUCCESS (# hatched / clutch size): _____

HATCHLINGS EMERGED (# hatchlings in nest subtracted from total # hatched): _____

NOTES: _____

_____

_____

_____

_____

_____

_____

Appendix 15: Best management practices to protect sea turtles during response operations

Best management practices to protect sea turtles during *in-situ* burn operations

Sea turtles can be adversely affected during corralling/booming of oil and oiled floating *Sargassum* seaweed or other converged material. Turtles may also be in the oil whether or not there is *Sargassum* present. The concern with *in-situ* burning is that any live turtles in the boomed oil and/or oiled *Sargassum* or other converged material could potentially be burned when the oil is ignited.

Best management practices to reduce in-situ burns impacts to sea turtles

- Collect all live and dead turtles according to the **Retrieval of Oiled, Dead, or Debilitated Sea Turtles Protocol** whenever possible.
- The best possible mitigation measure is to have turtle rescue vessels (with trained rescue personnel, if available) accompany the burn taskforce into the scheduled burn area and to search all material to rescue turtles prior to burning, while oil is being boomed or otherwise is awaiting burning. If this is not possible then the following should be considered:
    - Send turtle rescue vessels (with trained rescue personnel, if available) into the next day's projected burn area to search for and rescue turtles. Feasibility will depend on the size of the projected area and whether material has already been boomed or otherwise collected.
    - Have a trained observer (if available) or a crew member dedicated to looking for sea turtles (as well as marine mammals and other taxa) during corralling operations and record each sighting event, including GPS location, species (if known), description of encounter on the **Sea Turtle Observation Form**.
    - Have a trained observer on board the ignition or support vessel (or other small vessel carrying the observer) to visually inspect each portion prior to ignition. Note that it may be difficult to see turtles in thick corralled oil, so multiple observers, searching from different angles, would be ideal.
    - Immediately report any wildlife within the burn area to [INSERT CONTACT INFORMATION].
    - If possible, all *Sargassum* that is not-oiled or is only very lightly oiled should be avoided.
    - If possible, a survey should be conducted in the burn area after the burn is complete and all dead sea turtles should be counted and collected, or at least photographed.

Best management practices to protect sea turtles during skimming operations

Use of oil skimmers can adversely affect sea turtles through possible capture and/or entrainment.

Best management practices to reduce skimmer impacts to sea turtles

- Collect all live and dead turtles according to the **Retrieval of Oiled, Dead, or Debilitated Sea Turtles Protocol** whenever possible.
- The best possible mitigation measure is to have turtle rescue vessels (with trained rescue personnel, if available) accompany the skimming taskforce to search all material to rescue turtles prior to skimming. If this is not possible then the following should be considered:
    - Send turtle rescue vessels (with trained rescue personnel, if available) into the next day's projected area to search for and rescue turtles. Feasibility will depend on the size of the projected area and whether material has already been boomed or otherwise collected.
    - Have a trained observer (if available) or a crew member dedicated to looking for sea turtles (as well as marine mammals and other taxa) during skimming operations and record each sighting event, including GPS location, species (if known), description of encounter on the **Sea Turtle Observation Form**.
    - Immediately report any sea turtles to [INSERT CONTACT INFORMATION].
    - If possible, all *Sargassum* that is not-oiled or is only very lightly oiled should be avoided.

Best management practices to protect sea turtle nests from beach clean-up operations

Included are two protocols related to protection of sea turtle nests: 1) instructions for clean-up operations on nesting beaches that are actively monitored by sea turtle programs; and 2) instructions for clean-up operations on beaches that are not regularly monitored for sea turtle nests. In addition, in the event of a spill, these protocols will be accompanied by a list of all nesting beaches within the spill area where daily surveys are performed and relevant contact information. *Note: alternative BMP's are required for the state of Texas during nesting season because Kemp's ridley turtles regularly nest during the day.*

Protocol 1: For beaches where nesting surveys are conducted daily:

1. Clean-up activities are restricted to full daylight time only.
2. Ensure daily sea turtle nesting surveys by sea turtle permit holders have been completed before work begins each morning. The clean-up crew leader must contact the appropriate individual identified on the attached list (or his/her designee) daily to determine if nesting surveys have been completed and clean-up activities can begin.
3. Sea turtles may still be nesting or hatchlings may emerge after sunrise, so it is imperative that clean-up crews watch for nesting and hatchling turtles while they are on the beach and immediately cease activities in the immediate area and report the event to the individual identified on the attached list (or his/her designee). Clean-up vehicles should travel slowly to enable a better opportunity to spot turtle crawls and avoid colliding with nesting and hatchling turtles.
4. Nesting turtles should not be approached, and all vehicles and personnel must remain a minimum of 50 feet away until the turtle has re-entered the water. If hatchlings are encountered, personnel and vehicles should stop all activity until all hatchlings have safely entered the surf.
5. Look for any marked nests before beginning beach cleaning activities in an area. Nests will be marked with at least eight stakes, four around the nest perimeter and four more around a 10-foot buffer zone (Figure A15-1). Do not remove or destroy any stakes or flagging, even if they are up in the dune. These may be back-up stakes that were placed to ensure that a nest can be found at a later date should the nest perimeter stakes be lost.
6. No mechanical equipment or hand tools should be used within the flagged buffer area of a nest.
7. Removal of contaminated sand over a nest should occur only under the direction of the sea turtle permit holder. In such cases, clean-up crews should gently remove contaminated sand within the flagged area of a nest by hand and replace it with clean, sand taken from an area adjacent to the flagged nest area. The surface layer of oiled sand should be removed only to the minimum depth necessary without impacting the top of the nest. If nest flagging was removed to access the nest area, it must be securely replaced after clean-up activities have been completed.
8. All excavations and temporary alteration of beach topography shall be filled, covered, or leveled to the natural beach profile prior to 8:00 p.m. each day.

NOTE: If the clean-up crew observes signs that the turtle dug into the sand, contact the permit holder immediately. Under no circumstances should stakes be driven into the sand within the disturbed area created by the turtle

Figure A15-1. Marked sea turtle nest.

Protocol 2: For beaches where nesting surveys are not conducted or are not conducted daily:

Note: Every effort is made to conduct daily nesting surveys in the area of the spill/clean up area. If the area is not easily accessible to conduct daily nesting surveys, *a sea turtle permit holder will accompany the clean-up crew*.

1. Clean-up activities are restricted to full daylight time only.
2. Sea turtles may still be nesting or hatchlings may emerge after sunrise, so it is imperative that clean-up crews watch for nesting and hatchling turtles while they are on the beach and immediately cease activities in the immediate area and report the event to the individual identified on the attached list (or his/her designee). Nesting turtles should not be approached, and all vehicles and personnel must remain a minimum of 50 feet away until the turtle has re-entered the water. If hatchlings are encountered, personnel and vehicles should stop all activity until all hatchlings have safely entered the surf. Clean-up vehicles should travel slowly to enable a better opportunity to spot turtle crawls and avoid colliding with nesting and hatchling turtles.
3. Ensure a sea turtle nesting survey by sea turtle permit holders have been completed before beginning beach cleaning activities in an area. [In some cases, there may be marked nests on some partially surveyed beaches (steps 1-6 on the preceding page should be followed for existing nests).]
4. Follow any turtle crawls and look for signs that the turtle dug into the sand (Figure A15-2). Using stakes and two layers of flagging, mark the entire disturbed area created by a turtle digging (Figure A15-3). Under no circumstances should stakes be driven into the sand within the disturbed area created by the turtle.
5. Follow Steps 5-6 in Protocol 1.
6. All excavations and temporary alteration of beach topography shall be filled, covered, or leveled to the natural beach profile prior to 8:00 p.m. each day.

Figure A15-2. Examples of sea turtle crawls (tracks).

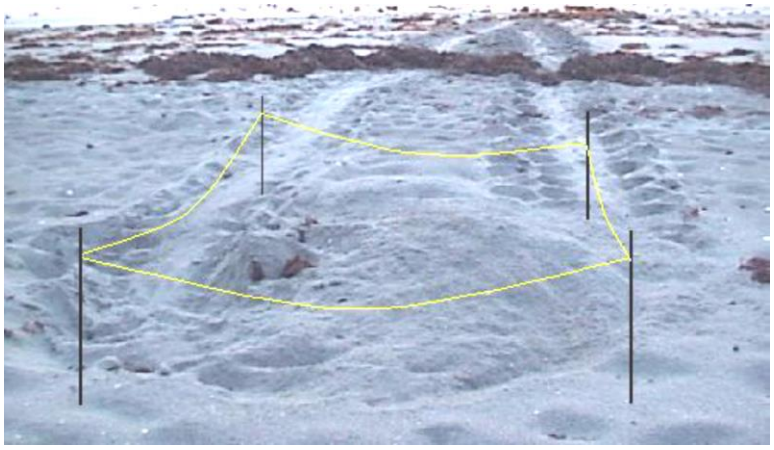


Figure A15-3. Marked sea turtle nest. Note that a second band of flagging should be added to clearly indicate the nesting area.

ATTACHMENT

SURVEYED BEACHES AND SEA TURTLE CONTACTS*

SURVEYED BEACHES	CONTACT NAME	PHONE NUMBER

To be completed for spills within sea turtle nesting areas using current names and contact information.

*****If the beach to be cleaned is not identified on the above list or does not fall within a County where all beaches are surveyed, then clean-up crews should follow **Protocol 2**. If you have any questions about whether a beach is surveyed or not, contact [INSERT CONTACT INFORMATION].

Appendix 16: Memoranda of Understanding/Agreements relevant to sea turtles and oil spill response activities

Fact Sheet
Towards a Common Goal
Coordinating oil spill response actions under the Clean Water Act (FWPCA) & the Endangered Species Act (ESA)

Purpose

To establish a protocol for cooperation and participation among the USCG, EPA, Department of the Interior (DOI) through the Fish and Wildlife Service (FWS), and the Department of Commerce (DOC) – National Oceanic and Atmospheric Administration (NOAA) through National Marine Fisheries Service (NMFS) and the National Ocean Service, in the exercise of oil spill planning and response duties and responsibilities under ESA. These procedures will help fulfill requirements under ESA Section 7(a)(2) as well as those mandated in the National Contingency Plan (NCP). It is a holistic approach to protection and conservation of the ecosystem upon which listed species depend that also facilitates interagency cooperation, reduces paperwork, makes the best use of limited financial and personnel agency resources, and develops a quality response plan.

Background

In February 2000, a workgroup comprised of members from the USCG, EPA, FWS, NMFS, and NOAA was formed to conduct an ESA Section 7(a)(1) review of the NCP and associated oil spill response *activities* (not the results of a spill itself). Under ESA Section 7(a)(2) federal agencies are required to consult on actions that may affect listed species and/or habitat. Similarly, the NCP requires that DOI/DOC be included in the Area Contingency Plan (ACP) planning process, provide technical expertise to Federal On Scene Coordinators (FOSCs) during a response, and facilitate compliance with ESA in both instances. The resulting Memorandum of Agreement (MOA) addresses three areas of oil spill response activities: pre oil spill planning, activities during the oil spill, and post oil spill activities. The guidance clearly states the roles and responsibilities of each agency under these scenarios. In addition, following publication of the guidance as a Memorandum of Agreement, the workgroup will provide technical documents to assist with implementation and agency training.

The MOA was signed in July 2001.

Protocol Highlights

Planning

- Pre-spill planning is accomplished using mainly informal consultation through the Area Contingency Plan planning process.

- Area Committees or RRT's may use any planning process that brings USFWS & NMFS endangered species representatives and USCG or EPA representatives together for joint decision-making.

- Information assembled from the planning process, provided as a Planning Template, can also be used as a biological assessment to aid in strategy pre-approval. It can be formalized by the Services if there is still a potential for adverse effects on listed species/habitat by response actions.

- Pre-spill planning requires ongoing involvement by USCG, EPA, USFWS, NOAA and NMFS to ensure that listed species/habitat are recognized and prioritized, and response strategies are developed.

- USFWS Regional Response Coordinator (RRC) and NOAA Scientific Support Coordinator (SSC) will act as liaisons for their respective Services as needed.

• Up front consultations (planning) will improve the speed of response and offer some legal protection to the FOSC.

Response

• Notification will occur as agreed in the ACP.

• Spill response activities that may result in an adverse effect to listed species/habitat require emergency consultation.

• The ACP, and/or agreed upon references cited in the ACP, will form the basis for immediate guidance on response actions.

• Emergency consultation will be accomplished by including USFWS and/or NMFS in the Incident Command System organization established by the FOSC. These representatives will provide timely recommendations to eliminate/minimize adverse effects to listed species/habitat.

• The emergency will continue until removal operations are complete in accordance with 40 CFR 300.320(b). The FOSC will continue emergency consultation until the case is closed.

Post Response

•If listed species/habitat have been adversely affected by spill response activities, the FOSC will initiate formal consultation after the case is closed.

• Requirements to initiate formal consultation following an emergency have been developed based on the Services' Consultation Handbook. The FOSC, or the SSC on behalf of the FOSC, will work with USFWS and NMFS to ensure that this package is complete.

• Pertinent information from the biological opinion developed by USFWS or NMFS can be included in a lessons learned system at the discretion of the FOSC. The lessons learned will be used to make improvements to the Area Contingency Plan and spill response procedures.

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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

IN RECOGNITION of the current status of sea turtles and the mandate of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*, ESA) to conserve and recover threatened and endangered species;

ACKNOWLEDGING that on July 18, 1977, the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) (collectively referred to as the Services) entered into a Memorandum of Understanding titled *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 Marine Turtles*;

IN ORDER TO facilitate orderly, effective administration of the ESA by the Services (as contemplated in paragraph 4 of the August 28, 1974, Memorandum of Understanding between FWS and NMFS regarding jurisdictional responsibilities and listing procedures under the ESA); and

RECOGNIZING that additional sea turtle species have been listed under the ESA and the Services' respective sea turtle program roles and responsibilities have expanded significantly since the July 18, 1977, Memorandum of Understanding;

THE SERVICES AGREE to the following division of roles and responsibilities for joint coordination and collaboration with respect to the conservation and recovery of sea turtles:

1. NMFS shall have jurisdiction for sea turtles, including parts and products, when in the marine environment ("marine environment" means oceans and seas, bays, estuaries, brackish or riparian water areas, and any other marine waters adjacent to the terrestrial environment) and for activities affecting sea turtles and their habitats in the marine environment, unless explicitly provided for otherwise within this Memorandum of Understanding (MOU).

2. FWS shall have jurisdiction for sea turtles, including parts and products, when in the terrestrial environment and for activities affecting sea turtles and their habitats in the terrestrial environment, unless explicitly provided for otherwise within this MOU. FWS shall also have jurisdiction for all imports and exports of sea turtles, including parts and products.

3. NMFS shall serve as the lead for and coordinator of the Sea Turtle Stranding and Salvage Network (STSSN) to attend to dead or distressed turtles in the marine environment or when washed ashore from the marine environment. Coordination by NMFS of the STSSN may include coordinating placement of stranded turtles at permitted rehabilitation facilities. Within its capacity, FWS shall provide assistance to the STSSN, including within the National Wildlife Refuge system. NMFS shall share STSSN information with FWS to promote the recovery and conservation of sea turtles.

4. FWS shall serve as the lead for and coordinator of permitted facilities holding sea turtles for rehabilitation or captive display. FWS shall share information with NMFS on captive sea turtles and coordinate with NMFS on guidelines and standards for such facilities.

5. All sea turtle petition findings, status reviews, species listings, recovery planning, and post- delisting monitoring activities under section 4 of the ESA shall be the joint responsibility of the Services. Critical habitat designations under section 4 of the ESA solely in the marine environment shall be the responsibility of NMFS, and critical habitat designations solely in the terrestrial environment shall be the responsibility of FWS. Critical habitat designations under section 4 of the ESA that include areas of both the marine and terrestrial environment may be

jointly designated by the Services. The Services shall coordinate with each other when either Service is considering designation of critical habitat for sea turtles.

6. The Services shall use their authorities under section 6 of the ESA to advance the conservation and recovery of sea turtles, as appropriate and as available funds allow. When either Service is developing, renewing, amending, or implementing a section 6 cooperative agreement that includes sea turtles, that Service shall coordinate with the other Service to ensure that such agreements promote the goal of conservation and recovery of sea turtles.

7. All consultations under section 7(a)(2) of the ESA for activities affecting sea turtles and their habitat in the terrestrial environment shall be the responsibility of FWS. All consultations under section 7(a)(2) of the ESA for activities affecting sea turtles and their habitat in the marine environment shall be the responsibility of NMFS. Joint biological opinions are often the most efficient way to implement the Services' authorities and provide clarity to action agencies and applicants. The Services shall coordinate with each other at the earliest opportunity on section 7 consultations for activities that may affect sea turtles in both the terrestrial and marine environments and shall decide whether a joint consultation is warranted. The Services shall exchange information annually with regard to incidental take of sea turtles authorized under section 7(a)(2) of the ESA. As envisioned in section 7(a)(1), the Services shall use other programs under their authorities, as appropriate, to support sea turtle recovery and conservation. As appropriate, to support sea turtle recovery, the Services shall coordinate on section 7(a)(1) conservation plans that have both marine and terrestrial components.

8. All rules or permits issued under sections 4(d) or 10 of the ESA for otherwise prohibited activities involving sea turtles and their habitat in the terrestrial environment shall be the responsibility of FWS. All rules or permits issued under sections 4(d) or 10 of the ESA for otherwise prohibited activities involving sea turtles and their habitat in the marine environment shall be the responsibility of NMFS. The Services shall provide each other an opportunity to review and comment on all rules or permits under consideration for issuance under section 4(d) or 10 of the ESA. The Services shall coordinate when a section 10(a)(1) conservation plan has

both marine and terrestrial components. The Services shall exchange information annually with regard to take and other activities involving sea turtles authorized under sections 4(d) and 10.

9. FWS shall coordinate with NMFS prior to issuing or denying any Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) permit or certificate involving the import, export, re-export, or introduction from the sea of sea turtles or their parts.

10. The Services shall coordinate with each other on international efforts to promote the global conservation and recovery of sea turtles and their habitats.

Law Enforcement

11. Both NMFS and FWS have authority to enforce the ESA's prohibitions with respect to sea turtles. The Services will collaborate on law enforcement activities, where joint enforcement efforts would be beneficial, to advance the conservation and recovery of sea turtles. The following paragraphs clarify primary areas of enforcement jurisdiction for NMFS and FWS. However, nothing shall preclude either Service from taking enforcement action outside their primary jurisdiction when such action is coordinated with the other Service.

11.1 NMFS shall have primary enforcement jurisdiction for violations in the marine environment, and for activities affecting sea turtles and their habitats in the marine environment, except as provided for in paragraphs 11.3 and 11.4.

11.2 FWS shall have primary enforcement jurisdiction for violations in the terrestrial environment, and for activities affecting sea turtles and their habitats in the terrestrial environment, except as provided for in paragraph 11.3 of this section.

11.3 NMFS and FWS will each have primary enforcement jurisdiction for violations occurring on lands and in waters administered by their respective agencies (i.e., National Wildlife Refuges, National Marine Sanctuaries).

11.4 FWS shall have primary enforcement jurisdiction for all imports and exports of sea turtles, including their parts and products, regardless of the means of conveyance.

General Provisions

12. Nothing in this MOU is intended to obligate any appropriated funds from any agency in conflict with any Federal law or regulation.

13. Should disagreement arise on the interpretation of the provisions of this MOU, or amendments or revisions thereto, that cannot be resolved at the operating level, the areas of disagreement shall be stated in writing by each Service and presented to the other Service for consideration. If agreement on interpretation is not reached within 30 days, the Services shall forward the written presentation of the disagreement to respective higher officials within their Department for appropriate resolution.

14. This MOU between FWS and NMFS will become effective by the signatures of the representing officials on the date of signature by the last Director/Assistant Administrator. The MOU will remain in effect until amended in writing or superseded by a new agreement.

15. Upon becoming effective, this MOU supersedes the July 18, 1977, Memorandum o 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 Marine Turtles.

16. Nothing in this MOU is intended to conflict with the current authorities of the Services. If any terms of this MOU are inconsistent with existing directives of the Services, then those portions of the agreement that are determined to be inconsistent may be considered to be invalid,

but the remaining terms of this agreement not affected by inconsistency will remain in full force and effect. Nothing in this MOU provides a private right of action to other parties.

17. The terms of this MOU may be amended upon written agreement of both Services, either by amendment of this MOU in writing or by entering into a new agreement, whichever is deemed expedient by both Services.

18. Either of the Services may cancel this MOU upon 30 days written notice to the other Service.

9/9/2015

Eileen Sobeck
Assistant Administrator
National Marine Fisheries Service

Date

9.18.2015

Dan Ashe
Director
U.S. Fish and Wildlife Service

Date