doi:10.7289/V5/TM-NOS-NCCOS-199

Defining and Documenting Marine Debris Interactions with Wildlife

NOAA Technical Memorandum NOS NCCOS 199

Defining and Documenting Marine Debris Interactions with Wildlife

Jessica Conway and Wayne McFee

NOAA, National Ocean Service
National Centers for Coastal Ocean Science
Center for Coastal Environmental Health and Biomolecular Research
219 Fort Johnson Road
Charleston, South Carolina 29412-9110

NOAA Technical Memorandum NOS NCCOS 199

April, 2015

Disclaimer:
This publication does not constitute an endorsement of any commercial product or intend to be an opinion beyond scientific or other results obtained by the National Oceanic and Atmospheric Administration (NOAA). No reference shall be made to NOAA, or this publication furnished by NOAA, to any advertising or sales promotion which would indicate or imply that NOAA recommends or endorses any proprietary product mentioned herein, or which has as its purpose an interest to cause the advertised product to be used or purchased because of this publication.

Cover Image Photo Credit:

Left: Jim Patterson, Top Right: plastikeep.com, Bottom Right: NOAA

Citation for this Report

Conway, J. and McFee, W. 2015. Defining and documenting marine debris interactions with wildlife. U.S. Dep. Commerce, NOAA Technical Memorandum NOS NCCOS 199. 52 pp.

doi:10.7289/V5/TM-NOS-NCCOS-199

This page is intentionally left blank.

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

EXECUTIVE SUMMARY

Over the past several decades, the input of anthropogenic litter into the marine system has been an increasing global concern, with negative ecological and environmental consequences. Plastics, abandoned fishing gear and other debris can have serious effects on marine animals, via entanglement and ingestion. Wildlife stranding and response networks have been established since the 1980s throughout the United States in an effort to identify and gain insight to the dynamics of marine animal populations. Many of these networks placed a high priority on classifying and analyzing the impact that humans have on populations of marine animals.

While Federal agencies oversee the response of stranded or injured marine taxa, protocols for identifying and documenting human interaction cases are not universally standardized. Smaller institutions ultimately handle human interaction incidents independently before submitting to their appropriate agency, which limits the amount of consistently collected data that can be combined and accessed to conduct large-scale research. This study outlines the difficulties and inconsistencies involved in documenting marine debris interactions through a review of current practices, and provides recommendations to increase the amount of obtainable data for widespread studies.

The three most substantial difficulties addressed in this study are:

1. *The challenge to accurately define marine debris in the event of a fishing gear entanglement.* It is often not possible to determine whether fishing gear was active or abandoned at the time the entanglement occurred. Similarly, ingested pieces of mono-

filament, fishing lures or other fishing gear are often not able to be identified as either active or debris, thus these interactions are most commonly misclassified as a fishery interaction instead of marine debris.

2. *The inconsistencies in collecting and documenting marine debris interaction data across individual institutions or networks.*
3. *The lack of obtainable records of non-fatal marine debris incidents.* Live entanglements or rescues are often not published and may not appear in a stranding database, lessening the amount of useable data for marine debris studies.

Recommendations are proposed in this study to address these hindrances, the primary being to alter wildlife data sheets to reflect marine debris as its own entity. Wildlife networks across the United States were contacted for their opinions about the proposed recommendations, as well as their protocol for handling these debris related cases.

BACKGROUND

Marine debris is one of the most recognized pollution problems in the world's waters and its impacts on wildlife are detrimental (Sheavly and Register 2007), yet seemingly understudied and most likely underestimated (McFee 2014). In the United States alone, entanglement in marine debris has been documented for at least 115 marine species, however due to certain gaps in the literature and difficulties recording incidents, the ecological implication of this number remains unclear.

McFee's (2014) report of entanglement of marine species in debris unveiled several gaps and factors that complicate the analysis of marine debris entanglements. One of was the inconsistency between organizations in defining marine debris. Inactive gear such as abandoned, lost or otherwise discarded fishing gear (ALDFG) should be considered marine debris, however many wildlife reports and databases do not distinguish it from an active gear entanglement. One reason for this is because it is difficult to tell the difference between active gear and ALDFG on an entangled stranded animal (Simmonds 2012), thus it is likely that many marine debris interactions become misclassified as a fishery interaction. Differences in sampling procedures and documentation methods across stranding networks may also contribute to the misclassification of marine debris interactions.

Another difficulty in estimating an effect of marine debris on wildlife populations is that many incidents of single individuals go unreported or unpublished, especially non-fatal interactions. McFee (2014) reported that there are numerous articles related to marine debris entanglements that can be found through local media outlets, but they are usually not found in

peer reviewed journals or in an institution's stranding database. Though these unreported records may be sparse, it would be beneficial to have them all stored in a location that allows easy viewing access for future use in research. Furthermore, many institution's databases contain records of human interaction, though these records might not be specifically classified as marine debris or databases lack the option altogether. Such is the case with the US National Marine Mammal Stranding Database, which will be discussed in further detail in the next section.

The purpose of keeping consistent records of human interaction is so data can be combined and used to quantify the impact on wildlife populations. Specifically, it is important to know whether or not current rates of entanglement and/or ingestion of marine debris are sustainable to stocks with known population estimates. Ultimately, these data are what contribute to the design and improvement of conservation management strategies for many species, so there must be a high priority placed on accurately and consistently documenting these incidents. One possible solution for increasing the number of documented marine debris interactions, including ingestion, would be to create a section within each wildlife database specifically for marine debris. In accordance, data sheets should also be revised to reflect options for marine debris as a separate entity. Stranding networks and wildlife agencies can then discuss best practices to ensure evidence of marine debris interactions are investigated and recorded consistently.

This study was conducted to gain insight from several stranding agencies and organizations across the nation on their experiences with these difficulties recording marine debris-animal interactions. Questions were asked regarding their opinions on the proposed ideas of amending data sheets and databases. A brief overview of each taxa and responder's feedback are described below. All contacted organizations are listed in Table 1.

MARINE MAMMALS

One of the Marine Mammal Protection Act's (MMPA) goals is to continuously improve the understanding of how humans are impacting populations of marine mammals, as to better structure conservation management approaches (NMFS 2007). Entanglement and ingestion involving marine debris have become increasingly apparent in the case of cetaceans, with evidence of significant threat for endangered species, such as the North Atlantic right whale (Simmonds 2012). In the United States, entanglement in marine debris has been documented for 20 species of marine mammals (McFee 2014). With the described gaps in literature, difficulties defining marine debris, and increased fishing activity in the last decade, it is likely that the significance of this number is underestimated.

The National Marine Fisheries Service (NMFS) oversees and authorizes a network of responders in all coastal states to respond to marine mammal strandings, through the Marine Mammal Health and Stranding Response Program. NMFS provides Level A data sheets to all stranding networks, and houses all records of marine mammal strandings in the Marine Mammal Health and Stranding Response Program's (MMHSRP) national database. Although stranding response is nationally coordinated and regionally monitored, there are still inconsistencies across individual networks with regards to documenting marine debris-related cases. It may not be possible to develop a systematic approach to determine whether entangled gear is active or ALDFG in all cases, but efforts should be made to make sure that the possibility of marine debris is discussed and recorded as such. There are two hindrances in accurately reporting marine debris interactions with marine mammals: (1) Datasheets/databases do not provide an option for reporting marine debris as its own entity, nor is the national database easy to run queries on; and

(2) Reports of live entanglements (sightings) and rescues have not always been entered in the national database, which leads to data becoming scant, unreliable, and not easily obtainable.

The NMFS Level A data sheet includes a section for recording human interaction (Appendix 1). The options given are: Boat Collision, Shot, Fishery Interaction and Other. If a carcass is recovered with fishing gear attached, given these options it is most likely going to be represented as a fishery interaction. However, it is possible that the entanglement could be an interaction with ALDFG. There is also no option for entanglement in other marine debris such as packing straps or rubber gaskets, though several documented cases have proven it to be a categorical entanglement source for marine mammals (Simmonds 2012). These scenarios would be best suited for the "Other" category, however if simple query searches are unavailable within a database, these records would be difficult to pull for research purposes.

At least 31 species of marine mammal have been reported to have ingested marine debris, and even small quantities have been known to have large effects, including mortality (Simmonds 2012). Plastic bags and sheeting are commonly ingested by odontocetes, causing gastric compaction and obstruction. It has been suggested that these plastic items resemble cephalopods, which are common prey items for odontocetes (Simmonds 2012). Estuarine bottlenose dolphins may be more frequently exposed to debris than those living in a fully marine environment due to their increasingly common interactions with boaters and their proximity to industrial areas, though the impacts on a population level have not been addressed (Simmonds 2012). On the east coast of the United States and along the Gulf of Mexico, estuaries are an important habitat for several resident stocks of bottlenose dolphin (Gubbins 2002). With the increasing amount of coastal development, it is important to know how these human-interactions are affecting species on a population level (Read 2003). There is currently no section for recording ingestion of

marine debris on the NMFS data sheet or within the national database, though ingestion has been known to cause mortality (Laist 1987). Also, stomach content analysis is not always conducted during necropsy, so there may be a significant amount of time that passes between when information is entered into a database and ingestion content is discovered.

Many reports of entanglement to individual animals are observational, and while those records may exist within the affiliated institution, these data are rarely brought forward for publication (McFee 2014). For example, the Coastal Marine Mammal Assessment Program (CMMAP) at NCCOS/CCEHBR in South Carolina holds photographs of a free swimming dolphin with a packing strap wrapped around the torso (Fig. 1), but these records were never published nor do they exist in a database. The same is true for some rescues and other non-fatal incidents from past years, though more recently (past decade), rescued and entangled animals are provided a field number and included in the national database. If every non-fatal report could be officially documented in a database, accessibility of use for research purposes would be facilitated. The CMMAP program lead keeps a record of all incidents and has used these data to describe trends of marine debris interactions with marine mammals in South Carolina. It would be beneficial to be able to expand this dataset and compare trends with other states in the region or among other regions. CMMAP's efforts to describe the effects of marine debris would be facilitated by an updated version of the Level A datasheet to include reports of entanglement sightings.

In May of 2014 the author gave a presentation at the Southeast Regional Marine Mammal Stranding conference in Orlando, Florida about the importance of documenting marine debris cases and the difficulties associated with it. The feedback was positive, though many people had concerns with how to tell the difference between active and inactive gear in the event of an

entanglement. This appears to be a concern among all stranding networks and though there is not a clear protocol for determining which is which, it is necessary to at least discuss the plausibility of ALDFG gear and let the few confirmed cases be recorded independently. There was a discussion about using encrustation of ropes and buoys as in indicator of abandoned gear, though this is not always a reliable method. Steve Burton, the stranding coordinator for Harbor Branch Oceanographic Institute expressed his enthusiasm for a workable solution for this issue. A working group or discussion at the next stranding conference would be useful for obtaining input from state and regional representatives. Responders should be encouraged to seek advice from other institutions if there is a questionable incident. After hearing the positive feedback from members of the conference, several marine mammal stranding networks across the nation were contacted and asked for their protocol when it comes to handling marine debris cases, and if they would support the recommendation of an alteration to current data sheets.

The Volusia County Stranding Network in Florida works as a designee under the Hubbs-SeaWorld Research Institute (Hubbs), and all Level A reports get sent and maintained in the Hubbs database. Georgia Zern, the Marine Mammal Stranding Team Manager, described their Dispatch Reports which are used to document all strandings in Volusia County, and though these reports have a check box for Human Interaction, marine debris is not differentiated from active gear in the event of an entanglement. If possible, they try to provide an explanation in the report's comment section, but it is rare that they are able to discern between the two. The Volusia County Stranding Team also conducts underwater monofilament line cleanups in the Ponce de Leon Inlet, and occasionally finds entangled wildlife. Notes are taken describing the line/debris recovered and species affected, and these records are maintained within the network, though not in an official database. The network is willing to contribute data to the cause and assist in any

way possible; however, they do not currently log their own Level A cetacean reports, as they are sent to Hubbs. Megan Stolen, of Hubbs SeaWorld Research Institute, was contacted and also expressed interest and support of a change to their data sheets. Their Level A records do not discern marine debris from fishery entanglements, though they do send gear out to NOAA Fisheries (Pascagoula, MS) for analysis. Non-gear (i.e. trash ingestion) gets held by the institute and they do the best they can to categorize it properly.

Justin Greenman, the Assistant California Stranding Network Coordinator with NMFS West Coast Region, asserted that marine mammal entanglement in California is a significant concern, for both pinnipeds and cetaceans. Unfortunately it is often difficult to determine whether entangled gear is a result of active or ALDFG fishery interaction. Nonetheless, these options are not given on the NMFS Level A datasheet and are therefore not housed in the MMHSP national stranding database. Mr. Greenman reiterated that like the east coast, stranding network members along the Pacific coast respond to human interaction cases independently, and that trying to pull comparable records of all marine debris-related incidents for analysis would be both challenging and time consuming. Historically, non-fatal interactions with marine debris (i.e. sightings of live animals entangled in gear) have not always been stored in the regional or national stranding databases and the records that do exist are not always easily obtainable. In the event of a live entanglement rescue, NMFS has, and will continue to, received action reports from the responding organization, but in some cases these were the only existing records for that entanglement. Mr. Greenman expressed his concern for this marine debris documentation difficulty and fully supports the idea of adjusting the national Level A datasheet and MMHSP stranding database to reflect an option for marine debris.

The Alaska Marine Mammal Stranding Network often encounters large whale and pinnipeds entangled in fishing gear and marine debris. According to their website, packing bands account for more than 50% of neck entanglements of stellar sea lions in the state. Though marine debris appears to be an issue in Alaska, no mention of it was found in their most recent stranding summaries. In accordance with NMFS human interaction categories, the summary included a pie chart of all stranded animals involved in Collision, Entanglement, Fishery Interaction and Shot. The caption stated "Fishery interactions are separated from entanglements by internal evidence of human interaction." Alaska Stranding Network Coordinator, Aleria Jenson, clarified their human interaction efforts by explaining that if fishing gear such as hooks and lures are present during internal examinations, the case is considered a fishery interaction. Entanglements are categorized if no internal evidence is apparent, though it is not usually further investigated as to whether it was an active fishery or marine debris interaction. She also stated that marine debris is not consistently recorded on stranding datasheets, and thus is not housed within their regional database as a searchable entity.

The responses from marine mammal stranding coordinators and technicians demonstrate the need for a workable protocol for identifying marine debris interactions and recording them accurately, in a way that allows the data to be most useful. This could be accomplished most easily by a simple change to the human interaction portion of the NMFS data sheets. A marine debris tier with options for entanglement or ingestion would be beneficial, as well as an option under fishery interaction for ALDFG or debris (Fig. 2). A sample of the proposed change is reflected in Figure 3. In accordance with an updated datasheet, stranding databases should also be changed to allow records to be easily searched. Additionally, an option for non-fatal reports

in the national database would increase the amount of data that can be used for research purposes and be stored in a centralized location.

SEA TURTLES

Sea turtles exposed to marine debris are at risk of mortality from both ingestion and entanglement (Carr 1987; Laist 1997; Schuyler et al. 2013; Ragland 2014). Globally, all seven species have been known to become entangled in or ingest marine debris (McFee 2014; Ragland 2014). Every sea turtle species with the exception of the flat back (*Nator depressus),* which is data deficient, is considered threatened or endangered (IUCN 2014). Little empirical data exist on the direct impacts of debris interactions with sea turtle populations, but findings from stranded animals suggest that consequences are significant and potentially detrimental to some species (Bjorndal et al. 1994; Laist 1997). Schuyler et al. (2013) addressed the difficulties in assessing ingestion in live turtle populations, and since most data come from stranded animals, necropsies are currently the most effective method for identifying debris ingestion.

The Sea Turtle Stranding and Salvage Network (STSSN) was formed in 1980 by NMFS to collect information and document strandings of marine turtles along the US Gulf of Mexico and Atlantic coasts. Like the Marine Mammal Health and Stranding Response Program, STSSN relies on federal, state and private partners to collect and send forth data from a datasheet provided by NMFS. The STSSN datasheet does not include a human interaction category, but there is a section for describing any wounds, abnormalities or entanglement (Appendix 2). There

is also no section to note presence of foreign objects found internally, like ingestion of plastic. Every state within the network has its own coordinator and the partnering agency is responsible for sending data back to NMFS, who houses all records on an online database. Individual networks conduct necropsies and record information on human interaction independently, though the methodologies are not always consistent and the full necropsy reports do not get sent to NMFS. Ragland (2014) pointed out one of the key areas that needs to be focused on is population and community-level effects of debris on wildlife. Without an easy way to pool data from multiple agencies and networks, it is difficult if not impossible to fully evaluate these impacts.

On the Pacific coast of the United States, sea turtles rarely spend much time on shore, so stranding response and data are not mandated by the STSSN (Greenman, personal communication). Instead, the marine mammal stranding network through NMFS is responsible for answering stranding calls involving sea turtles, and then incidents are deferred to local or state agencies and networks when applicable. The Pacific coast uses their own sea turtle datasheet, which Justin Greenman said does not offer an option for recording marine debris entanglements or ingestion. These records are housed within NMFS, though pulling data for a study on marine debris interactions would be very time consuming, as query searches in the database are not easy to be performed for such purposes.

Michelle Pate, the South Carolina state coordinator for STSSN with the SC Department of Natural Resources (SCDNR), coordinates and trains employees and volunteers on species identification and data collection for stranded marine turtles. The South Carolina sea turtle program uses the datasheets provided by NMFS and not only sends their reports to the STSSN, but also to the Sea Turtle Rehabilitation and Necropsy Database (STRAND), which will be

discussed in further detail below. In addition to the datasheet provided by NMFS, their program has its own necropsy data sheet which describes gross findings in greater detail (Appendix 3). For example, the datasheet includes a section for entanglement and provides several checkboxes for different types of fishing gear and a box for 'Other'. If gear is present, the type is recorded but a distinction is not made between active gear and debris. In addition, the necropsy report includes a section for stomach content, including foreign objects. Again, fishing gear found internally is not identified as either active or ALDFG but there are options for recording plastics and other types of marine debris. This necropsy report is for SCDNR's turtle program only and does not get sent to NMFS or any other centralized database. However, if findings indicate that the cause of death is human-induced, best attempts are made to document that on the forms that are sent to STRAND and NFMS. Within STRAND (which NMFS has direct access to), there is a dropdown menu for incidental capture (i.e. if someone fishing on the pier caught an animal on hook and line). Ms. Pate agreed on the importance of documenting human interaction cases and stated that there may be an opportunity to link any potential new applications to their current stranding database, though changes to the protocol from NMFS would be the best option.

Seaturtle.org is a non-profit organization founded in 1996 to support research and conservation efforts in the sea turtle community. The STRAND was added as a centralized database for this organization to help sea turtle groups manage, organize and share their data. STRAND is managed in North Carolina, and so far five states in the southeastern US region are active members. Organizations that participate in STRAND get an account that can be used to access and edit the database online. STRAND also prepares summary reports, stranding maps and displays an updated count of year-to-date turtle strandings, all publically available. Dr. Michael Coyne, the executive director of seaturtle.org, expressed his idea for a centralized

location where the nation's sea turtle stranding data can be housed. STRAND uses an electronic version of the NMFS STSSN data sheet, which authorized members can use to input data online. Although the datasheets do not include a section for documenting marine debris, Dr. Coyne stated that state administrators have the option of entering in the field "probable cause of stranding". There, possible responses can be recorded as: entanglement-incidental, entanglement-passive gear, pollution/debris, etc. There is no formal reporting of details beyond that, and no separate fields for marine debris, but if examiners thoroughly document evidence, it should appear in the "notes" section of the form. Dr. Coyne offered that it may be possible to extend or modify STRAND to collect data that would be more appropriate for the Marine Debris Program's use.

Since occurrences with marine debris are high for sea turtles, the best suggestion for increasing the amount of incidents that get recorded is to amend the STSSN datasheets to reflect human interaction and specifically marine debris. Similar to the proposal for the marine mammal datasheets, there should be a field for entanglements (active, ALDFG, or cannot be determined) and ingestion in addition to other common human induced mortality, such as boat strike. Differences in reporting incidents make it challenging to develop global or even regional analyses on which to base management decisions (Schuyler et al. 2013). Most of the United States' turtle programs use the NFMS datasheet for strandings; therefore it would be easiest to make those changes within the agency and encourage a change in documentation directly from the source. Fortunately, STRAND is also willing to make adjustments to their datasheet, so states that currently send data to both organizations would not have to send two different forms.

SEABIRDS

Fifty-one species of seabirds worldwide have been reported as entangled in marine debris and 111 have been known to ingest debris (Laist 1997). Ingestion of plastics and other debris appears to be a more common problem for birds than entanglement, with over one third of all seabird species having records of ingestion (Laist 1997; Ragland 2014). Impacts of debris are not only seen in the individual ingesting it, but also in their offspring, mainly because of their feeding behavior. Additionally, seabirds have been known to collect plastic items to use in nest building (Hartwig et al. 2007), another mechanism that introduces vulnerable chicks to debris. Cases involving plastic and other debris items appear to be well documented; however, there are large gaps in the literature when it comes to interactions with fishing gear. It is difficult to assess the impact that gear has on birds due to inconsistencies in distinguishing active versus ALDFG gear. It was estimated by McFee (2014) that 8.3% of all seabird entanglements from the Pacific coast were from non-fishery related items (i.e. plastic or other marine debris). Since gear is often not determined active or inactive in the event of an entanglement, it seems likely that 8.3% is an underestimated calculation of marine debris entanglements.

The NOAA Fisheries Seabird Program (NSP) was developed in 2001 as result of the finalization of the National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (NPOA-Seabirds). The two main priorities for the NSP is to address long-term effects of bycatch of seabirds in NMFS managed fishing industries, and to understand the demographics associated with these important ecosystem indicators. A National Seabird Workshop was held in Seattle in 2009 to initiate the development of a national seabird strategic plan to reduce bycatch and augment seabird management and science (Rivera et al. 2014). A few

of the needs that were addressed in order to create a strategy included: creating an inventory of fishery interaction data, identifying gaps in the data, formalizing data collection methods, and collaborating with state, regional and national organizations and agencies. Though seabirds are relatively easy to perform studies on (Rivera et al. 2014), it appears that bird groups also have difficulties similar to those of mammals and turtles. Inconsistent sampling between networks and organizations makes it difficult to compare data for large scale studies. Two of the largest seabird groups in the nation were contacted to get a better understanding of how their surveys collect human interaction data.

On the Atlantic coast of the United States, several states participate in the Seabird Ecological Assessment Network (SEANET) program that is based out of the School of Veterinary Medicine at Tufts University in Massachusetts. SEANET was initiated in 2002, in collaboration with the Lloyd Center for Environmental Studies in Massachusetts, and currently has expanded to beaches from New England down to Florida. Each participating state has a local coordinator that trains volunteers who wish to help conduct year-round beached bird surveys. Data collected about the mortality of seabirds are used to examine spatial patterns of carcass deposition and serve as a baseline for detecting mass mortality events.

SEANET data sheets are available to volunteers online and provide space to record information about observed beached birds. There are options for human interaction in the form of entanglement and presence of oil (Appendix 4). Though there is not a distinction between active gear and ALDFG for the entanglement options, there is a checkbox for plastic entanglement. These reports are manually uploaded to an online database, which allows access for approved volunteers. Because these are surveys and necropsies are not routinely being conducted, evidence of debris ingestion is not often recorded on the data sheets. Dr. Sarah

Courchesne, SEANET Project Director, elaborated that the program tries to record entanglements in the most basic approach possible, though sometimes there is evidence that fishing gear is active or marine debris. For example, if birds show signs of drowning they are considered suspect bycatch. These distinctions are not recorded directly into the database, but notes are made if possible in the comments section. There are also cases where a bird is entangled in non-fishing gear that is not plastic, for example a merganser entangled by a hair tie (Fig. 4). These incidents are recorded as the surveyor sees fit, and then are usually described in the comments section. Though ingestion data is not specifically recorded for SEANET's spatial distribution project, Dr. Courchesne does keep records of plastic ingestion if presented. In special cases, necropsies will be conducted and those data are held separately, but that increasing the amount of necropsies, and thus stomach content data, is a goal of Dr. Courchesne. She was very enthusiastic about this project and would be willing to contribute any data to the cause, including her necropsy data.

On the Pacific coast, the Coastal Observation and Seabird Survey Team (COASST) is a citizen science project of the University of Washington that partners with several regional organizations and agencies to collect observational data on seabirds along the Alaska, Washington, Oregon, California and Hawaiian coasts. Interested volunteers attend a six-hour training session to learn the proper methods for completing beach surveys. Their datasheet, available online, includes a small section for inputting evidence of entanglement or oil (Appendix 5). The options for entanglement include: Net, Line, Hook and 6-Pack/Plastic. These datasheets are electronically entered into an online database by volunteers with user access. Jane Dolliver, the COASST Seabird Program Coordinator provided a form from the COASST Protocol: A guide for COASST Participants (Appendix 6), which describes the data recording

protocol for entanglements. The form indicates that bycaught birds are rarely washed ashore in nets, so entanglements in fishing gear are treated as ALDFG interactions, or marine debris. Volunteers are to record the type of material from the given datasheet choices and then describe the situation in greater detail in the Comments section. The COASST website includes a page specifically for displaying data from entanglement cases and these data are used in annual reports of mortality related to human activities. Ms. Dolliver expressed her willingness to participate in the reporting process of a large scale marine debris study, by sending annual summaries of entanglements similar to the format of their annual mortality reports.

In addition to placing a high priority on recording human interactions with seabirds, COASST offers marine debris pilot training sessions for interested parties to collect marine debris data from beach surveys. Data from this opportunity are sent to COASST via phone or email, and are used to provide baseline data and test methods to improve the program. Through the cooperation of several organizations and standardized protocol and survey practices, COASST is able to combine beached seabird data from an entire region to gain large-scale views of anthropogenic impacts. Stranding data collected by participants are all sent to one centralized location, where coordinators can then easily combine them to produce summaries on regional trends. In a way, this program should be a model for the development of standardized practices across all wildlife survey and stranding networks for Federal programs. If the MDP or NMFS can introduce a centralized database for these taxa which do not currently have a national database, it would be possible to start filling in some of the gaps and gain a broader understanding of how marine debris is impacting several species across the United States. The centralized database would also allow the option to input ingestion data, which is known to be a more serious threat to seabird populations than entanglement (Laist 1997).

FISH AND MARINE INVERTEBRATES

The impacts of marine debris entanglements on fish and invertebrates are not well represented in literature and are most likely underestimated (Chiappone 2004; McFee 2014). Many entanglement reports appear to be caused by derelict gear that is ghost fishing, and with the increasing number of studies on impacts of commercial fishing industries, it is important to document as many incidents as possible. Ingestion of marine debris by fish and sharks also appears to be a growing problem that is understudied (Carson 2013).

Chiappone et al. (2004) studied 63 sites offshore of the Florida Keys to assess the impacts of lost fishing gear to benthic organisms. The implications of his study outline the need for more data and the growing concern over increased fishing practices. Collaboration with agencies and organizations that are already doing studies in these habitats would be a beneficial route for gaining information in an otherwise data deficient area.

Members of the Deep Sea Coral Ecology Team at NOAA/NOS's National Centers for Coastal Ocean Science (NCCOS) Protected Areas and Resources (PAR) Branch in Charleston, South Carolina conducts deep sea video surveys in the Gulf of Mexico and Pacific Ocean, in search of deep sea corals. The team often encounters marine debris in the form of derelict gear that is either ghost fishing, draped over a reef patch or lacerating fragile branches (Fig. 5a, b). ADGLF such as monofilament line and rope has the potential to destroy slow-growing corals that provide habitat for many benthic species. These marine debris sightings are recorded as high-resolution still and video images and annotated in their data collection logs. The coral and

sponge data are incorporated into NOAA's National Database of Deep-Sea Corals and Sponges, but marine debris data is reported anecdotally. Enrique Salgado maintains marine debris data from Southern California surveys in a database and characterizes debris by gear type. Dr. Peter Etnoyer, who leads the program, offers that these data could be made available for a large scale marine debris study. This information would be valuable for understanding marine debris effects in lesser-studied deep water habitats.

The South Carolina Department of Natural Resources (SCDNR) currently has two projects (SEAMAP and MARMAP) that conduct extensive boat-based reef fish surveys from North Carolina to Florida. These surveys occasionally encounter derelict gear that is ghost fishing but incidents are not recorded and gear is often not able to be removed. Associate Scientist Dr. Marcel Reichert expressed his willingness to participate in a marine debris study by sending reports of their encounters, pending a workable protocol. If data sheets were developed for agencies or programs like SEAMAP and MARMAP that indirectly encounter marine debris interactions, it would increase the amount of useable data for future studies.

INTERNATIONAL PROGRAMS/STUDIES

Since marine debris pollution is a global problem, programs and studies outside of the United States were queried to determine if there were any international agencies or organizations that have experience with this issue or that have a different structure for documenting marine debris interactions with wildlife.

The Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) is a treaty that was signed in 1992 with aim to promote close cooperation between countries to achieve and maintain conservation for small cetaceans throughout the agreement area. ASCOBANS is split into several working groups, one of which is for marine debris research. The primary task for this working group is to "establish recommendations for research methodologies to assess debris as seen during cetacean surveys conducted at sea, aiming for a standardized approach to recording types of debris." The suggestions described in their 2013 report for completing this task include two strategies that are similar to what is proposed in this report, one of which being to create "a centralized database for a comprehensive picture of global marine debris impacts on cetaceans". The other suggestion was to standardize datasheets and collection protocols. Marchien de Rutier, the coordinator for the ASCOBANS marine debris working group, explained that there has been no significant progress on the topic since the 2013 workshop report came out, but a general post mortem diagnosis workshop will be proposed at the 2015 European Cetacean Society conference, and he hopes that some of these topics will be addressed. Mr. de Rutier offered updates on their progress, and would be willing to share information regarding this topic.

The British Divers Marine Life Rescue (BDMLR) is an organization formed in 1988 to rescue marine wildlife in the United Kingdom, with a primary focus on improving the response to live cetacean strandings. Every year, BDMLR trains over 400 volunteer marine mammal medics. The organization's website contains a link for their stranding database, with options for viewing the cetacean and pinniped stranding forms. These forms and data are only accessible to members.

BDMLR also sends reports and stranding information to the UK Cetacean Strandings Investigation Programme (CSIP), which was established in 1990 by the UK Department of the Environment as a result of a phocine distemper outbreak. Several organizations throughout the UK collaboratively record information on cetacean strandings and send them to CSIP, as part of their long-term monitoring goal. CSIP then sends summaries of their findings to the government. The last report published online was for the period January 1, 2005 to December 31, 2010 (Deaville and Jepson 2011). The report included a small section on entanglement and marine litter interactions. Entanglements included both fishing gear and marine litter, and it did not appear that a distinction was made between active and inactive gear, as most fishing gear entanglements were diagnosed as bycatch, which is a term most often associated with active fishing takes. The report also states that due to the low prevalence of ingestion and entanglement of marine litter, it does not appear to be a significant issue for cetaceans in the UK. Marine turtles however, have higher recorded incidences, with 100% (n=3) of all stranded leatherback turtles having ingested marine debris (Deaville and Jepson 2011). CSIP will continue to monitor for evidence of marine debris, not only to observe local stranding trends, but also to feed data to any future regional or worldwide analysis or comparison.

Another section of the most recent publically available CSIP report (2005-2010) included a collaborative stranding summary from European stranding networks with coastlines adjacent to those of the UK. This study was funded by the ASCOBANS Secretariat and was described as the first step toward creating a central database on strandings and necropsies encompassing ASCOBANS parties and range states. This large scale cooperation would provide researchers with a broadened view of stranding trends and the ability to share data, given standardized collection protocol. Similarly, regional trends in wildlife interactions with marine debris in the

United States can be better understood if there is a collaborative effort between stranding networks to standardize data entry methods.

Smith and Edgar (2014) outlined the importance of standardized protocols when documenting the interactions between marine debris and marine biota in Australia. This study surveyed 120 sites across the coast of New South Wales in Australia to document the density of subtidal marine debris. Smith and Edgar (2014) argued that while community education and clean-up activities have been implemented in many developed countries, the focus has been primarily within intertidal zones and other easily accessible areas, while larger habitats remained un-surveyed. The first objective in this study was to develop a standardized survey and documentation method for subtidal habitats so that managing authorities would be provided with accurate and comparable data. Likewise, it should be the objective for wildlife networks in the United States. If standardized protocols could be made for documenting marine debris interactions with wildlife, it would be possible to collaborate with organizations and researchers who are already surveying those "hard-to-reach" habitats.

CONCLUSIONS AND RECOMMENDATIONS

It is clear after reviewing literature and speaking with several wildlife networks that there are inconsistencies and gray areas when trying to document marine-debris interaction cases. The three most pressing issues are: (1) the difficulty in defining and characterizing marine debris when dealing with fishing-gear interactions, (2) inconsistencies in collection methods across networks, and (3) the lack of records for non-fatal interactions. The impact of marine debris on a population level is not well understood for nearly all marine species, and in order to look at these

large-scale effects, it is necessary to be able to easily obtain and combine data, preferably from a centralized location.

In an effort to address these issues and increase the amount of useable data, one useful approach would be to implement standardized protocols and collection methods across wildlife networks. Many stranding and survey networks rely on data sheets and protocols provided by NMFS. If those data sheets were slightly modified to include marine debris as a separate entity and allow a distinction to be made between active gear and ALDFG, it would increase the amount of useable data from areas across the nation. Ideally, associated databases would then be changed to reflect these new marine debris options and begin filling existing data gaps. Unfortunately, there may never be a systematic approach to determining whether a stranded animal entangled in fishing gear was interacting actively or inactively in every case, however the few confirmed cases should be able to be recorded as marine debris, and not misclassified as a fishery interaction. Changing data sheets to account for these cases would be a great first step toward increasing the accuracy of marine debris entanglement rates. Wildlife groups should also continue to discuss methods for making the distinction between active gear and ALDFG.

The other issue with documenting marine debris interactions with wildlife is that many reports go unpublished or do not have a means of being officially recorded. Many animals that are involved in non-fatal incidents do not end up in a stranding database, and individual events are often not brought forth for publication. Collectively, all of these pieces of missing data could contribute greatly to our understanding of debris interactions if there were a place for them to be stored. Creating or modifying centralized, accessible databases within each marine taxa (e.g. the national marine mammal stranding database) would be the most useful tool for sharing and

analyzing data to improve our understanding of larger-scale impacts. The feedback received from networks across the nation was universally positive and supportive of this idea.

The last recommendation is to reach out to groups that are currently involved in research in areas considered data deficient in terms of marine debris interactions, i.e. deep sea, offshore, etc. It is encouraged to contact these organizations and develop a workable protocol for documenting marine debris interactions that otherwise would go unrecorded. For example, NOAA's Protected Areas and Resources Branch in Charleston and SCDNR's MARMAP and SEAMAP projects both encounter marine debris interactions but documentation protocols are not standardized. Both parties declared their willingness to start or continue recording these events and send them to a centralized marine debris database. If a centralized database were created, several other groups could be contacted and asked to participate by recording interactions that they encounter during their research. The greater the network of volunteers, the more data can be combined to start improving our understanding of this global problem.

The next goal for this study is to seek funding for a pilot project that will allow for a plan to quantitatively assess the impact of marine debris interactions with wildlife. Several populations of marine taxa across the nation have updated minimum population and potential biological removal (PBR) estimates available for use as a platform for understanding whether or not current rates of marine debris interaction are sustainable. Further, a workshop is suggested to bring together data managers to develop consistent protocols and address needed changes to observation forms so that marine debris entanglements and ingestion are better represented.

ACKNOWLEDGEMENTS

The authors would like to thank the wildlife network members who took the time to respond and provide their opinions, data and enthusiasm for this project including: Steve Burton of Harbor Branch Oceanographic Institute, Georgia Zern of the Volusia County Marine Mammal Stranding Network, Megan Stolen of Hubbs-SeaWorld Research Institute, Justin Greenman and Aleria Jenson of NMFS, Michelle Pate, Sean Miller, Janet Thibault, and Marcel Reichert of SCDNR, Michael Coyne of Seaturtle.org, Sarah Courchesne and Julie Ellis of SEANET, Jane Dolliver of COASST, Peter Etnoyer, Ren Salgado and Leslie Wickes of the NOAA Deep Sea Coral Ecology Team, and Marchien de Rutier of the North Sea Foundation.

This project was funded by the National Oceanic and Atmospheric Administration's Marine Debris Program.

REFERENCES

Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) Treaty. 1992. (As amended in 2003). Available at http://www.ascobans.org/en/documents/agreement-text/

Bjorndal, K.A., Bolten, A.B., and Lagueux, C.J. 1994. Ingestion of marine debris by juvenile sea turtles in coastal Florida habitats. *Marine Pollution Bulletin* 28(3): 154-158

Carr, A. 1987. Impact of nondegradable marine debris on the ecology and survival outlook of sea turtles. *Marine Pollution Bulletin* 18(6B): 352-356

Carson, H.S. 2013. The incidence of plastic ingestion by fishes: From the prey's perspective. *Marine Pollution Bulletin* 74(1):170-174

Chiappone, M., Dienes, H., Swanson, D.W., and Miller, S.L. 2014. Impacts of lost fishing gear on coral reef sessile invertebrates in the Florida Keys National Marine Sanctuary. *Biological Conservation* 121(2005):221-230

Deaville, R. and Jepson, P.D. 2011. Final Report for the period 1st January 2005- 31st December 2010. UK Cetacean Strandings Investigation Programme. <ukstrandings.org/csip-reports>

Gubbins, C. 2002. Use of home ranges by resident bottlenose dolphins (*Tursiops truncatus*) in a South Carolina estuary. *Journal of Mammalogy* 83(1): 178-187

Hartwig, E., Clemens, T., and Heckroth, M. 2007. Plastic debris as nesting material in aKittiwake-(Rissa tridactyla)-colony at the Jammerbugt, Northwest Denmark. *Marine Pollution Bulletin* 54(5): 595-597

IUCN (International Union for Conservation of Nature). 2014. IUCN red list of threatened species. Version 2014.2. IUCN, Gland, Switzerland. Available from http://iucnredlist.org (accessed September 2014)

Laist, D.W. 1987. Overview of the biological effects of lost and discarded plastic debris in the marine environment. *Marine Pollution Bulletin* 18(6B): 319-326

Laist, D.W. 1997. Impacts of marine debris: Entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records. Chap. 10 in *Marine Debris*, J.M. Coe and D.B. Rogers (eds.). Springer Series on Environmental Management, 99-139: Springer New York

Marine Debris Working Group. 2013. Report and Recommendations of the Marine Debris Working Group. 20th ASCOBANS Advisory Committee Meeting, Warsaw, Poland. 27-29 August 2013.

McFee, W. 2014. Report on the Entanglement of Marine Species in Marine Debris with an Emphasis on Species in the United States. National Oceanic and Atmospheric Administration Marine Debris Program Silver Spring, MD. 28 pp

Ragland, J. 2014. Report on the occurrence and health effects of anthropogenic debris ingested by marine organisms. National Oceanic and Atmospheric Administration Marine Debris Program. Silver Spring, MD. 19 pp

Read, A.J., Urian, K.W., Wilson, B. and Waples, D.M. 2003. Abundance of bottlenose dolphins in the bays, sounds and estuaries of North Carolina. *Marine Mammal Science* 19: 59–073

Rivera K.S., Ballance, LT., Benaka, L., Breuer, E.R., Brooke, S.G., Fitzgerald, S.M., Hoffman, P.L., LeBoeuf, N., and Waring, G.T. 2014. Report of the National Marine Fisheries Service's national seabird workshop: Building a national plan to improve the state of knowledge and reduce commercial fisheries impacts on seabirds. September 9–11, 2009, Alaska Fisheries Science Center, Seattle, WA. U.S. Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-F/SPO-139, 78 p.

Schuyler, Q., Hardesty, B.D., Wilcox, C., and Townsend, K. 2013. Global analysis of anthropogenic debris ingestion by sea turtles. *Conservation Biology* 00(00): 1-11

Sheavly, S.B, and Register, K.M. 2007. Marine debris & plastics: Environmental concerns, sources, impacts and solutions. *Journal of Polymers and the Environment* 15:301-305

Simmonds, M.P. 2012. Cetaceans and marine debris: The great unknown. *Journal of Marine Biology* 2012:1-8

Smith, S.D. and Edgar, R.J. 2014. Documenting the density of subtidal marine debris across multiple marine and coastal habitats. *PLOS One* 9(4):e94593

United States National Oceanic and Atmospheric Administration. 1972. National Marine Fisheries Service. The Marine Mammal Protection Act of 1972 (As amended, 2007)

United States National Oceanic and Atmospheric Administration. 2013. National Marine Fisheries Service, Hawaiian Monk Seal 2013 Stock Assessment Report. <http://www.nmfs.noaa.gov/pr/sars/2013/po2013_monkseal-hi.pdf>

Table 1. List of organizations contacted, arranged by taxa

Taxa	Oranization	Region	Contact
Marine Mammals	NMFS	All US waters	
		California	Justin Greenman
		South Carolina	Wayne McFee
		Harbor Branch, Florida	Steve Burton
		Volusia County, Florida	Georgia Zern
		Melbourne Beach, Florida	Megan Stolen
		Alaska	Aleria Jenson
	ASCOBANS	Baltic, North East Atlantic, Irish and North Seas	Marchien de Rutier
Seabirds	SEANET	Eastern US coasts	Sarah Courchesne
		South Carolina	Janet Thibault, SCDNR
	COASST	AK, WA, OR, CA and HI coasts	Jane Dolliver
Sea Turtles	NMFS	Eastern US coast and Gulf of Mexico	
		South Carolina	Michelle Pate, SCDNR
	Seaturtle.org	VA, NC, SC, GA, FL	Michael Coyne
Fish and Corals	NOAA	Gulf of Mexico, Pacific US coast	Leslie Wickes and Peter Etnoyer
	SCDNR	Offshore North Carolina to Florida	Marcel Reichert

Figure 1. Free-swimming bottlenose dolphin with blue plastic packing strap wrapped around the torso. Photo credit: NOS, Charleston, South Carolina.

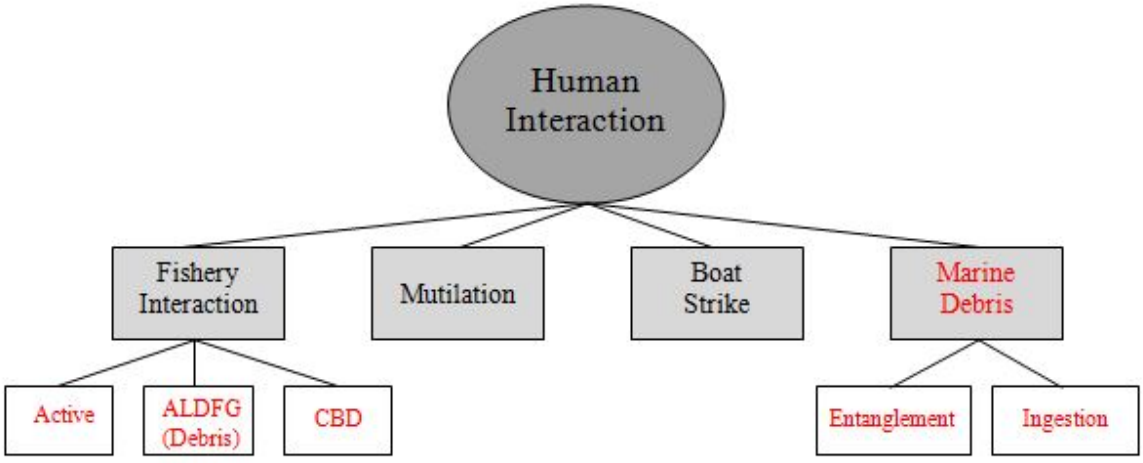


Figure 2. Proposed tier for human interaction options on wildlife datasheets/databases. Red text boxes indicate new entities, not currently available on many datasheets and databases.

Findings of Human Interaction: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Strike ☐ 2. Mutilation/Shot ☐ 3. Fishery Interaction

☐ 4. Marine Debris ☐ 5. Other Human Interaction: _____

If Fishery Interaction, Choose one: ☐ 1. Active Gear ☐ 2. ALDFG (debris) ☐ 3. CBD

Gear Collected? ☐ YES ☐ NO Gear Disposition: _____

If Marine Debris, Choose one: ☐ 1. Entanglement ☐ 2. Ingestion

Description: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Figure 3. Example of modified Marine Mammal Level A datasheet, Human Interaction section to reflect marine debris

Figure 4. A deceased merganser entangled in hair elastic. Photo credit: SEANET program

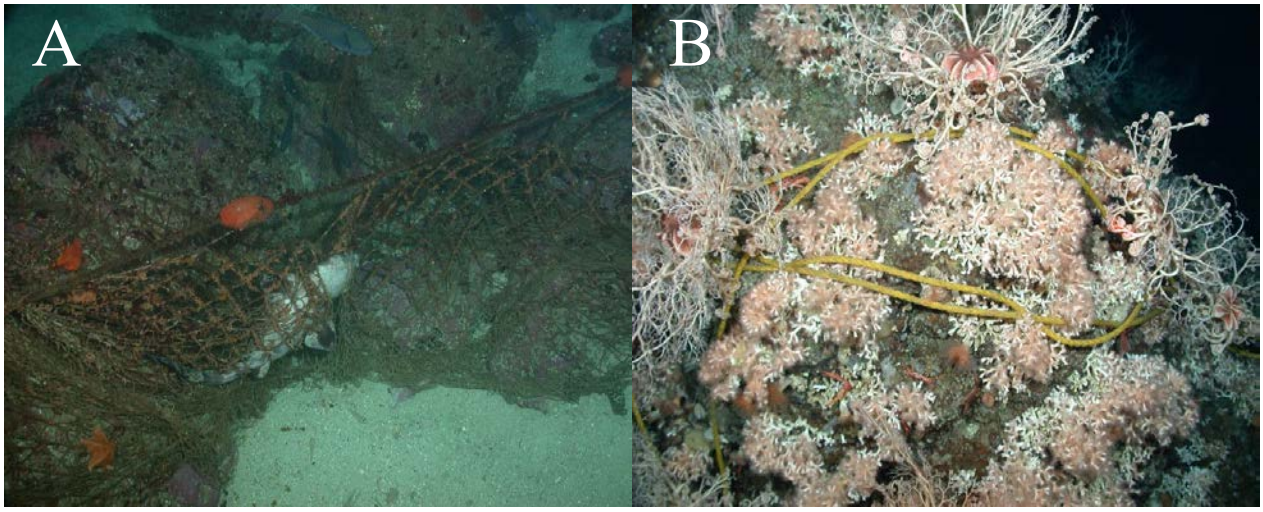


Figure 5. Evidence of ALDFG in the Southern California Bight. Derelict fishing net with entangled shark (A) and yellow rope draped over a coral reef (B). Photo credit: John Butler, NMFS.

APPENDIX

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #: _____ NMFS REGIONAL #: _____ (NMFS USE) NATIONAL DATABASE#: _____ (NMFS USE)

COMMON NAME: _____ GENUS: _____ SPECIES: _____

EXAMINER Name: _____ Affiliation: _____

Address: _____ Phone: _____

Stranding Agreement or Authority: _____

LOCATION OF INITIAL OBSERVATION

State: _____ County: _____

City: _____

Body of Water: _____

Locality Details: _____

_____

Lat (DD): _____ . _____ N

Long (DD): _____ . _____ W

☐ Actual ☐ Estimated

How Determined: (check ONE)

☐ GPS ☐ Map ☐ Internet/Software

OCURRENCE DETAILS ☐ Restrand GE# _____ (NMFS Use)

Group Event: ☐ YES ☐ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding # Animals: _____ ☐ Actual ☐ Estimated

Findings of Human Interaction: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Collision ☐ 2. Shot ☐ 3. Fishery Interaction

☐ 4. Other Human Interaction: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Gear Collected? ☐ YES ☐ NO Gear Disposition: _____

Other Findings Upon Level A: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

INITIAL OBSERVATION

Date: Year: _____ Month: _____ Day: _____

First Observed: ☐ Beach or Land ☐ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

LEVEL A EXAMINATION ☐ Not Able to Examine

Date: Year: _____ Month: _____ Day: _____

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

INITIAL OBSERVATION

Date: Year: _____ Month: _____ Day: _____

First Observed: ☐ Beach or Land ☐ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Condition Unknown

LEVEL A EXAMINATION ☐ Not Able to Examine

Date: Year: _____ Month: _____ Day: _____

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Unknown

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)

☐ 1. Left at Site ☐ 6. Euthanized at Site

☐ 2. Immediate Release at Site ☐ 7. Transferred to Rehabilitation:

☐ 3. Relocated Date: Year:_____ Month:_____Day:___ Facility:_____

☐ 4. Disentangled ☐ 8. Died during Transport

☐ 5. Died at Site ☐ 9. Euthanized during Transport

☐ 10. Other:_____

CONDITION/DETERMINATION (Check one or more)

☐ 1. Sick 7. Location Hazardous

☐ 2. Injured ☐ a. To animal

☐ 3. Out of Habitat ☐ b. To public

☐ 4. Deemed Releasable ☐ 8. Unknown/CBD

☐ 5. Abandoned/Orphaned ☐ 9.Other_____

☐ 6. Inaccessible _____

MORPHOLOGICAL DATA

SEX (Check ONE)

☐ 1. Male

☐ 2. Female

☐ 3. Unknown

AGE CLASS (Check ONE)

☐ 1. Adult ☐ 4. Pup/Calf

☐ 2. Subadult ☐ 5. Unknown

☐ 3. Yearling

☐ Whole Carcass ☐ Partial Carcass

Straight length:_____ ☐ cm ☐ in ☐ actual ☐ estimated

Weight:_____ ☐ kg ☐ lb ☐ actual ☐ estimated

PHOTOS/VIDEOS TAKEN: ☐ YES ☐ NO

Photo/Video Disposition: _____

_____

TAG DATA Tags Were:

Present at Time of Stranding (Pre-existing): ☐ YES ☐ NO

Applied during Stranding Response: ☐ YES ☐ NO

ID#	Color	Type	Placement* (Circle ONE)	Applied	Present
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Lateral Body
LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear

CARCASS STATUS (Check one or more)

☐ 1. Left at Site ☐ 4. Towed: Lat_____Long_____ ☐ 7. Landfill

☐ 2. Buried ☐ 5. Sunk: Lat_____Long_____ ☐ 8. Unknown

☐ 3. Rendered ☐ 6. Frozen for Later Examination ☐ 9. Other_____

SPECIMEN DISPOSITION (Check one or more)

☐ 1. Scientific collection ☐ 2. Educational collection

☐ 3. Other: _____

Comments: _____

_____

NECROPSIED ☐ NO ☐ YES ☐ Limited ☐ Complete

☐ Carcass Fresh ☐ Carcass Frozen/Thawed

NECROPSIED BY: _____

Date: Year: _____ Month: _____ Day: _____

Appendix 1. NMFS marine mammal level A data sheet

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***

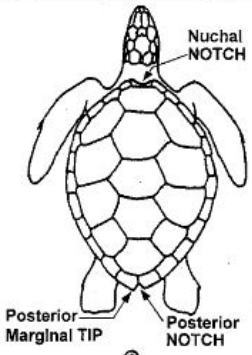
SPECIES: (check one)
- ☐ CC = Loggerhead
- ☐ CM = Green
- ☐ DC = Leatherback
- ☐ EI = Hawksbill
- ☐ LK = Kemp's Ridley
- ☐ LO = Olive Ridley
- ☐ UN = Unidentified

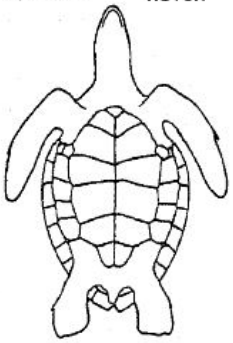
Check Unidentified if not positive. Do Not Guess.

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.**
_____
_____
_____
_____
_____
_____

Appendix 2. STSSN level A data sheet

SEA TURTLE STRANDING AND SALVAGE NETWORK – GROSS NECROPSY REPORT

IDENTIFICATION

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

4. Found dead: ☐Yes ☐No 5. In 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 ☐ 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(6)_____ ☐Puncture(8)_____
☐Probable bite wound(9)_____ ☐Tar in mouth(10)
☐Ligature/entanglement-type(11)_____[a]
☐Entangling material attached(12)_____[a]
☐Hook and/or line present (13)_____[a]
☐Other(14) _____ describe under 26o

[a] If yes, complete 25d

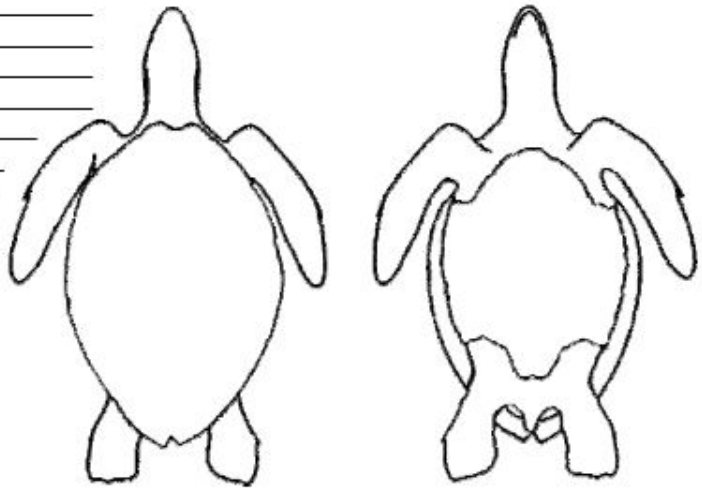
25b. T/HI- Description: (check all that apply)
Enter 25a. + anatomic codes: (Example: ⊗ Exudate/fibrin 1C)

☐Exudate/fibrin_____ ☐Fibrous tissue formation_____
☐Bone formation/remodeling_____ ☐Hemorrhage_____
☐Encapsulated sand/debris_____ ☐Blood clots_____
☐Completely healed_____ ☐Other_____ describe under 26o

☐ 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: _____

Appendix 3. SC STSSN necropsy form, page 1

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/Papillomas(15)_____ ☐Ulcers(16)_____
☐Crust/exudate(17)_____ ☐Masses (non-FP or uncertain)(18)_____
☐Other(19)_____ describe under 26o
☐ 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_____ ☐10-25% 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
28. Fat status: ☐Abundant/No atrophy ☐Mild to moderate atrophy ☐Severe atrophy ☐ PHOTOGRAPHS TAKEN

29a. MUSCULOSKELETAL (internal) – ☐EXAMINED **29b. Joint Fluid:** ☐No findings ☐Cloudy/solid material ☐Blood-tinged
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 **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 **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
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: _____

Appendix 3, cont. SC STSSN necropsy form, page 2

INTERNAL EXAMINATION (CONT.)

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

33a. ALIMENTARY SYSTEM – ☐EXAMINED

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

☐Ulcers(20)_____ ☐Perforation (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%_____ ☐10-25%_____ ☐>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. Small intestine: ☐ Empty ☐ Contents, describe: _____

33i. Colon: ☐ 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 **34b. Spleen Findings:** ☐No findings ☐Trauma ☐Enlarged ☐Masses ☐Other

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

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

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

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 **36b. Foam/froth in trachea:** ☐Yes ☐No

36c. If froth present: ☐Anterior to bifurcation ☐Posterior to bifurcation **36d. Froth amount:** ☐Small ☐Moderate ☐Copius

36e. Sand/sediment in trachea: ☐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: _____

Appendix 3, cont. SC STSSN necropsy form, page 3

INTERNAL EXAMINATION (CONT.)

37a. CENTRAL NERVOUS SYSTEM – ☐Brain EXAMINED 37b. ☐Spinal Cord EXAMINED

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): _____

Specimen (label w/ ID#)	Fixed	Frozen-bagged	Frozen-Foil	Other (specify)	Location

DISCLAIMER

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

Appendix 3, cont. SC STSSN necropsy form, page 4

Beach ID_____Observer Last name_____Date_____Page __ of __

Seabird Ecological Assessment Network
Beached Bird Survey Data Sheet

PROGRAM DATA

Name(s)_____
_____
Email address or Phone#_____
_____
Beach Name:_____
Beach ID:_____
(example: MA_25)

Date:_____
(mm/dd/yyyy)

Start Time:_____AM/PM

Survey Duration:_____
(hours and minutes)

Number in party:_____

CONDITIONS DATA

Temperature:_____ **Fog:** ☐No ☐Yes **Sky:** ☐ Clear ☐ Partly Cloudy ☐ Overcast

Wind Direction: (*direction wind is coming from*)
N NE E SE S SW W NW Calm

Wind Speed
☐ No wind ☐ Light wind ☐ Strong wind

Precipitation? ☐ None ☐ Rain ☐ Snow
Storm in last 48 hrs? ☐ No ☐Yes

Tide (*circle one*): **outgoing / incoming**
Tide State: ☐ Low ☐ Mid ☐ High

Ice/Snow on beach? ☐ None ☐ Partial ☐ Full coverage
Wrack Line: ☐None ☐Patchy ☐Continuous
If Continuous: ☐ Narrow (<1m wide) ☐ Wide (>1m)
Human-generated wrack: ☐ plastic bottles ☐ balloons ☐ fishing line ☐ plastic bags
☐ crab/lobster traps Other_____
Beach raked? ☐ No ☐ Yes **Recent beach stabilization?** ☐ No ☐ Yes
Oil on beach: ☐YES ☐NO **Did you have a dog with you on your walk?** ☐YES ☐NO
Other observations? (e.g. fish kill, shellfish kills, marine mammal or sea turtle strandings)
_____
_____

LIVE BIRD COUNTS **Is this a complete list of all live birds seen?** ☐YES ☐NO

Confidence in ID codes: V = very S= somewhat NV= not very

Species:	Confidence in ID	Total #	Use this space for running tallies

Counts continued on page ___

Appendix 4. SEANET survey data sheet, page 1

Beach ID_____Observer Last name_____Date_____Page __ of __

BEACHED BIRD

Common Name_____
Example (Great Black- backed Gull)

BEACHED BIRD CONDITION:

Status (*check one*):	**Body Parts Found:**	**Entangled:**	**Oil** (*check one*):	**Evidence of Scavenging:**
☐Fresh Dead	☐ Whole carcass	☐ No	☐ None	☐ Yes ☐No
☐Moderate Decomposition	☐ Head	☐ Net	☐ Slightly	
☐Advanced Decomposition	☐ Breastbone (sternum)	☐ Line	☐ Moderate	
☐Mummified Skeletal	☐ Wings (L R Both)	☐ Hook	☐ Heavily	
☐Alive	☐ Feet (L R Both)	☐ Plastic		

Sex	**Age Class**
☐ Male	☐ Adult
☐ Female	☐ Subadult
☐ Unknown	☐ Chick
	☐ Unknown

Banded? ☐ No If YES, type of band? leg / wing Band #_____ **Band color(s)?**_____
Was band # reported to Bird Banding Lab? ☐ Yes ☐No

Measurements:
Wing Chord: _____**cm** Culmen: _____**mm** Tarsus: _____**mm**

Bird Disposition: ☐ Left at Site ☐Transferred for necropsy (Facility _____)
☐ Discarded ☐Transferred for rehabilitation (Facility_____)

If Left at Site, which body parts were marked?_____
If numbered cable tie placed on bird, number?_____

Additional Notes:_____

SEANET, Cummings School of Veterinary Medicine at Tufts University
Wildlife Medicine Building
200 Westboro Rd., North Grafton, MA 01536
EMAIL: seanet@tufts.edu OR julie.ellis@tufts.edu

Appendix 4, cont. SEANET survey data sheet, page 2

COASTAL OBSERVATION AND SEABIRD SURVEY TEAM
DATA SHEET

PROGRAM DATA - DO NOW!

Notetaker: _____

Data Collecter: _____

Region: _____

AK: Southeast, Gulf of Alaska, Aleutian Islands, Bering Sea
WA: Puget Sound, North Coast, South Coast, Strait, San Juans
OR: Oregon North, Oregon South
CA: Humboldt

Beach Name: _____

Date: _____
(mm/dd/yyyy)

Round trip travel time to beach:
_____ *approx (hh:mm)*

Survey Start Time: _____

Survey End Time: _____
(24:00)

PHYSICAL DATA - DO @ THE HALF

Weather *(circle predominant)*

Sun Clouds Fog Rain Snow

Oil *An oil patch was encountered every:* *(circle all that apply)*

None 1Km 100m 10m 1m Sheen Tarballs Goopy

Wood Present

☐ Yes ☐ No *If present:*

Circle Predominant Wood Size (circle one): SM (<20cm diameter) / Med / LG (>1M diameter)

Circle Wood Continuity: Patchy / Continuous

Circle Wood Zone: Low / High

Wrack Present

☐ Yes ☐ No *If present:*

Circle Wrack Width: Thin (<1M wide) / Thick

Circle Wrack Continuity: Patchy / Continuous

HUMAN DATA - DO ON RETURN LEG

	TRACKS OBSERVED? (Y/N)	INDIVIDUALS ACTUALLY SEEN? RECORD #
Humans		
Dogs		
Horses		
Cars/Trucks		
ATVs		

COMMENTS - any additional information that could not be recorded in the above form.

Appendix 5. COASST survey data sheet, page 1

Appendix 5, cont. COASST survey data sheet, page 2

Bird # of day	WF	R	C	FC	E	BP	EN	O	FOOT TYPE	BILL (mm)	WING (cm)	TARSUS (mm)	SPECIES	A	P	SEX	# OF PHOTOS
COMMENTS:													Tag ID#	COLOR SEQUENCE		WHERE TAGGED	
COMMENTS:													Tag ID#	COLOR SEQUENCE		WHERE TAGGED	
COMMENTS:													Tag ID#	COLOR SEQUENCE		WHERE TAGGED	
COMMENTS:													Tag ID#	COLOR SEQUENCE		WHERE TAGGED	
COMMENTS:													Tag ID#	COLOR SEQUENCE		WHERE TAGGED	

WHERE FOUND
- HIGH
- WRACK
- SURFLINE
- UNKNOWN

REFOUND (Y/N)

COLLECTED (Y/N)

FOOT CONDITION
- PLIABLE
- STIFF
- ROTTEN
- UNKNOWN

EYES
- CLEAR
- SUNK
- GONE
- UNKNOWN

BODY PARTS
- INTACT
- HEAD
- BREAST
- FEET (# and L or R)
- WINGS (# and L or R)

ENTANGLED
- NO
- NET
- LINE
- HOOK
- 6 PACK

OIL (Y/N)

TAKE MEASUREMENTS AND ID BIRD

AGE
- UNKNOWN
- ADULT
- JUVENILE
- SUBADULT

PLUMAGE
- UNKNOWN
- BREEDING
- NON BREEDING
- TRANSITIONAL
- JUVENILE

NOFU ONLY LIGHT, DARK OR INTERMEDIATE

SEX
(UNK /MALE/FEMALE)

Page ____ of ____ Beach Name: ______________________ Date: ______________

Entanglement

Birds can become entangled in fishing gear or other floating material before, *and after*, death. Seabird bycatch in fishing gear can be a significant source of mortality in certain small or restricted populations. However, bycaught birds rarely wash ashore in nets. More often, floating carcasses become entwined in line or other "ghost" fishing gear as currents concentrate floating material in windrows, and waves wash everything to shore.

In wavy conditions, carcasses, kelp wrack, fishing gear and any number of other natural and manmade items may end up in piles along the wrackline, making it difficult to determine whether a carcass is actually entangled, or simply part of the same wrack pile. (A carcass "entangled" in wrack does *not* count as entangled.) If you find a carcass entangled in any sort of manmade material, take a photograph of the carcass *before* you unravel it. Record the type of material as fishing **NET**, monofilament fishing **LINE (L)**, **HOOKED (H)** by the beak or wing, or **PLASTIC (P)**. Be sure to also describe the entanglement in the ***COMMENTS*** line, including type of material if other than above, which body part(s) are entangled, and any other aspects you find significant and/or particular. For instance, one COASSTer found a Common Murre entangled in a kite string! If there is no sign of entanglement, enter **NOT (N)** on your data sheet.

B. Blackie

A Sooty Shearwater with its right wing entangled in a net.

B. Baccus

A Common Murre entangled in a hook and line.

BB-10

Appendix 6. COASST entanglement protocol

This page is intentionally left blank.

United States Department of Commerce
Penny Pritzker
Secretary of Commerce

National Oceanic and Atmospheric Administration
Kathryn D. Sullivan
Under Secretary of
Commerce for Oceans and Atmosphere,
and NOAA Administrator

National Ocean Service
Russell Callender
Acting Assistant Administrator