



Northeast Fisheries Science Center Reference Document 11-10

# Evaluating Sea Turtle Injuries in Northeast Fishing Gear

**Report of the Sea Turtle Injury Workshop**

November 17-18, 2009 Boston, Massachusetts

and

**Technical Guidelines for Assessing Injuries of Sea Turtles  
Observed in Northeast Region Fishing Gear**

by Carrie M. Upite

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**US DEPARTMENT OF COMMERCE**  
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## EXECUTIVE SUMMARY

Fisheries incidentally capture sea turtles as bycatch, resulting in varying levels of injuries. In 2003, NOAA's National Marine Fisheries Service (NMFS) Northeast Region (NER) developed working guidance to determine the severity of injuries for hard-shelled sea turtles taken in the Atlantic sea scallop dredge fishery. This working guidance was used in Section 7 consultations to help determine if a sea turtle caught (with varying types of injuries) in scallop dredge gear should be considered a lethal or non-lethal interaction. NMFS recognized the need to revisit the working guidance to attempt to encompass other NER gear types (e.g., gillnet, trawl, pound nets, pot/trap) and a wide range of sea turtle injuries, and to use a consistent approach for assessing post-release survival. A November 2009 workshop gathered various experts in sea turtle veterinary medicine, health assessment, anatomy, and/or rehabilitation to: (1) discuss case studies of sea turtles caught in fishing gear with varying levels of injuries; (2) critique the NMFS working guidance and approach for evaluating post-release survival; and (3) comment on the level of information collected by observers. Workshop participants discussed types of sea turtle injuries and associated survivability, turtle behavior, and resuscitation, as well as specific information that should be collected by observers to better assess sea turtle injuries. The information gathered by individual participants at this workshop was then used by NMFS to develop technical guidelines for assessing sea turtle injuries in Northeast fishing gear. The more significant changes to the revised guidelines are described, and the final technical working guidelines are presented. This document represents a summary of the scientific discussions that occurred at the workshop and the technical working guidelines developed by NMFS after consideration of that information. It should be noted that NMFS' revision of the technical guidelines would not have been possible without the valuable comments and insight by the individual workshop participants.

# REPORT OF THE SEA TURTLE INJURY WORKSHOP

## Workshop Purpose and Overview

### *Goals and Objectives*

The purpose of the workshop was to gather various experts in sea turtle veterinary medicine, health assessment, anatomy, and/or rehabilitation to: (1) discuss case studies of sea turtles caught in fishing gear with varying levels of injuries; (2) critique the National Marine Fisheries Service (NMFS) working guidance and approach for evaluating post-release survival; and (3) comment on the level of information collected by observers. The desired goals of the workshop were to obtain information needed to revise the guidance on evaluating sea turtle injuries in fishing gear and to acquire input on NMFS' approach for conducting post-release mortality determinations in the Northeast Region (NER). The goal was not to obtain consensus recommendations from workshop participants, but instead to gather information from each individual (based on their own expertise) that could be used by NMFS to evaluate and revise the guidance at a later date.

### *Workshop Background*

All sea turtles are listed as either endangered or threatened under the U.S. Endangered Species Act (ESA). Section 7 of the ESA requires Federal agencies to consult with NMFS to ensure their actions are not likely to jeopardize listed marine species. In the case of fisheries managed under a Federal Fishery Management Plan, NMFS must consult with itself on the impacts of the fishery on endangered and threatened species. The Sustainable Fisheries Division, Northeast Region, provides information on the action to the Protected Resources Division, which conducts the analysis.

Sea turtles are taken incidentally as bycatch in fisheries. Observers are present on a small percentage of Federally permitted fishing trips and record data on sea turtle bycatch, among other things. Sea turtles are observed alive or dead, and with varying levels of injuries.

In 2003, NMFS initiated an assessment of the magnitude of injuries from sea turtle interactions with Atlantic sea scallop dredge gear. Sea turtles caught in that fishery have been documented with varying types of injuries. Through a detailed questionnaire sent to various experts in sea turtle veterinary medicine and rehabilitation, NMFS obtained feedback on sea turtle injuries and the potential impacts of such damage on the long-term survivability of the sea turtle. The comments received were used in developing working guidance for serious injury determinations for hard-shelled sea turtles taken in the scallop dredge fishery. This working guidance was used in Section 7 consultations to help determine if a sea turtle caught (with varying types of injuries) in scallop dredge gear should be considered a lethal or non-lethal interaction. To make that determination, NMFS reviewed and evaluated observed sea turtle takes utilizing the working guidance.

While NMFS had prepared guidance specific to the scallop dredge fishery, during Section 7 consultations on other fisheries, it became apparent that injury criteria should be relevant to all other fishing gear and sea turtle injury types. As such, the working guidance was recognized as needing revision to attempt to encompass other NER gear types and a wide range of fishing gear-related sea turtle injuries. Some examples of gear types with observed sea turtle interactions and/or injuries in the Northeast Region include, but are not limited to, gillnets, trawls, dredges, pound nets, and pots/traps.

Note that this initiative was only focused on those fisheries found in the NMFS Northeast Region (Maine through Virginia<sup>1</sup>). The geographical scope was chosen given the similarities of the fisheries and gear types used in the NER, environmental characteristics, the information available for review (e.g., Northeast Fisheries Observer Program (NEFOP) comments), and the future applicability of the workshop results to Northeast Regional Office management. However, some of this information may apply (or be applied) to other fisheries in other areas as appropriate. This initiative also excludes the longline fishery, which has a separate post-interaction mortality assessment (Ryder et al. 2006).

## ***Workshop Overview***

This two day workshop was convened by the NMFS Northeast Regional Office (NERO) and Northeast Fisheries Science Center (NEFSC) and held in Boston, Massachusetts, on November 17 and 18, 2009. Participants were invited based upon their experience in sea turtle veterinary medicine, health assessment, anatomy, and/or rehabilitation; a total of 17 individuals attended the workshop.

As noted in Appendix 1, the first day included a background presentation describing other injury determinations (e.g., marine mammal and sea turtle/longline), NMFS' previous scallop dredge injury initiative, the utility of such injury guidance, and an overview of the existing working guidance (Appendix 2). Twelve case studies, representing a variety of sea turtle species, injury types, and commercial fishing gear, were then presented. The workshop participants were asked to individually evaluate the case studies based upon the information presented (e.g., the observer reports and photos), and make injury recommendations using the existing NMFS working guidance as well as their expert opinion. Participants completed a feedback form (Appendix 3), which was collected at the end of Day One. Day Two consisted of a presentation on the NEFSC observer program, and discussion on the case studies and expert opinion. Participants proceeded to discuss the injury working guidance, as well as other relevant injury topics.

Input received from individual participants at the meeting was later then used by NMFS to revise the technical guidelines for assessing sea turtle injuries in Northeast fishing gear. The technical guidelines are applicable to sea turtles observed alive with or without injuries.

## **Presentation Summaries**

The number of formal presentations was limited in order to provide for case study review and ample time for discussion. Brief summaries of the two presentations that were given are as follows.

### ***Introduction and Background***

Carrie Upite, NMFS Northeast Regional Office

### **Marine Mammal and Sea Turtle/Longline Initiatives**

The first topics discussed were the marine mammal and sea turtle/longline serious injury guidance. Through regulatory action, NMFS has defined serious injury for marine mammals as

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<sup>1</sup> While the NMFS Northeast Region includes Maine through Virginia, the Northeast Fisheries Observer Program extends observer coverage into portions of North Carolina, as does Northeast Fisheries Science Center sea turtle bycatch estimates.



“any injury that will likely result in mortality.” “Injury” is further defined as “a wound or other physical harm. Signs of injury to a marine mammal include, but are not limited to, visible blood flow, loss of or damage to an appendage or jaw, inability to use one or more appendages, asymmetry in the shape of the body or body position, noticeable swelling or hemorrhage, laceration, puncture or rupture of the eyeball, listless appearance or inability to defend itself, inability to swim or dive upon release from fishing gear, or signs of equilibrium imbalance. Any animal that ingests fishing gear, or any animal that is released with fishing gear entangling, trailing or perforating any part of the body will be considered injured regardless of the absence of any wound or other evidence of injury.” (50 CFR 229.2). In 1997, a workshop was held that discussed injuries to marine mammals from commercial fishing operations, and the result was a series of recommendations on which injuries should be considered serious (Angliss and DeMaster 1998). In 2007, another workshop was convened to review the previous recommendations and guidance, review any newly available information, and discuss the use of, and necessary changes to, existing guidance for distinguishing serious from non-serious injuries (Andersen et al. 2008). A matrix was developed that highlighted injury categories and serious injury status by taxonomic group. Using this table as a starting point, NMFS is currently working on national criteria for marine mammal serious injuries.

In 2001, NMFS developed criteria for post-hooking mortality of sea turtles from longline gear. In 2004, a workshop was convened to review the 2001 criteria and revise if necessary. The result of subsequent NMFS discussions on the information obtained at this workshop was a table highlighting various injury categories, release conditions, species differences, and percent mortality after release from longline gear (Ryder et al. 2006). These criteria have been applied to sea turtle takes in the Atlantic pelagic longline fishery, as well as recently to the Gulf of Mexico reef fish bottom longline fishery.

## **2004 Scallop Dredge Injury Determinations**

Prompted by observations of sea turtles with varying levels of injuries in the Atlantic sea scallop dredge fishery in 2001 and 2002, NMFS recognized the need to better assess post-release survivability for animals taken in this fishery. In 2003, NMFS sent a questionnaire to individuals with identified expertise in sea turtle carapace injuries, anatomy and/or veterinary medicine. Based on the feedback received, serious injury guidance for hard-shelled sea turtles taken in scallop dredge gear was developed and finalized in 2004. The guidance consisted of three categories (low, medium (50%), and high chance of survival) and corresponding injury type descriptions in each of the categories. This guidance was applied to 2003 observed scallop dredge sea turtle takes. A working group, consisting of staff from the NMFS NERO and NEFSC, reviewed each take record and placed the observed turtles into one of the three categories. NMFS NERO Section 7 staff used these results to develop a mortality rate for scallop dredge interactions of 64%; this mortality rate was applied to the fishery’s anticipated take in development of the Incidental Take Statement. Due to a number of reasons, one of which was the recognized need to expand the guidance to other gear and injury types, the injury guidance has not yet been applied to scallop dredge observed takes after 2003.

## **Current Project**

Because there was a need to include other fishing gears, including scallop dredges, there was a need to discuss and update the injury determination guidance. Expanding the guidance on sea turtle injuries occurring from all NER gear types was identified as a priority for the NMFS

NERO sea turtle management program. In Section 7 consultations, it is necessary to estimate the amount or extent of take (lethal and non-lethal) expected from the proposed action. More accurately assessing the post-release survivability from sea turtle and fishery interactions would help predict the level of lethal versus non-lethal incidental take, assess the impacts of Federal fishery actions on sea turtles, and monitor lethal and non-lethal take levels.

The guidance would be implemented by having NMFS staff evaluate each observed sea turtle take record and determine: (1) if the injury likely came from the observed haul/tow/set (which may be interpreted as a “fresh” injury); and, if fresh and from the interaction in question, (2) the corresponding chance of survival, based upon the working guidance categories. The fishery observers will not be making the post-release survival assignments at sea; those determinations will be made by the NMFS NERO and NEFSC staff, in consultation with veterinarians, when appropriate and available (“the workgroup”). The workgroup will evaluate all sea turtle takes observed by the NEFOP and apply the appropriate working guidance, which may be the guidance finalized in this document or through a separate initiative (e.g., longline post-release mortality workshop). For example, if a sea turtle is observed in Northeast bottom longline gear by the NEFOP, the workgroup would evaluate the likely interaction result using the current longline post-release criteria. Pound net takes documented by the NEFOP will also be evaluated by the workgroup. The existing pound net evaluation criteria may be amended in the future, as necessary. [Note that the distinction of the various available post-release criteria and their use by this workgroup was not highlighted in the workshop presentation, but is added here for clarification.] For post-release mortality, the workgroup will only be evaluating sea turtles documented as alive or unknown by the observer, as those noted as dead will be recorded as such in the observer database. It is the intent for the workgroup to meet to discuss the observer records, and then develop a document describing each sea turtle take, workgroup discussion comments, and corresponding chance of survival. To the extent possible, the goal is for the workgroup to use a consistent objective approach for assessing sea turtle injuries documented in observed interactions to better estimate post-release mortality from fisheries.

### *Northeast Fisheries Observer Program Overview*

Sara Wetmore, NMFS Northeast Fisheries Science Center

An overview of the NEFOP was presented to give the participants background information on how and what fishery observer data is collected and used. A description of the program was provided, followed by the process of allocating program funding and seadays. The three-week observer training was described, including a detailed description of the sea turtle training and exam. The sea turtle training component includes classroom training, hands on workshops, and exams on sea turtle species identification, measuring, tagging, and handling (among other things), and typically lasts one full day. The type of information observers collect consists of vessel and trip information, economic costs, gear characteristics, haul information, environmental conditions, catch composition and disposition, biological sampling, sightings of marine mammals and sea turtles, and incidental take information. Incidental take information is entered onto an Incidental Take Log and Biological Sampling Log (Appendix 4). If a turtle is captured, observers are instructed to handle, photograph, measure, tag and biopsy the animal. The observer program operates under the auspices of an ESA section 10(a)(1)(A) scientific research permit issued to the NEFSC. Observers collect detailed information on sea turtle injuries, but do not state, record, or determine whether the sea turtle is “injured” or “not injured”.

After the trip, NMFS NEFOP staff review the information, de-brief observers, enter data, and post the information on the NEFOP website (<http://www.nefsc.noaa.gov/fsb/>).

For reference during the meeting, workshop participants were given a binder with veterinarian comments from previously observed turtle takes, necropsy reports and veterinarian comments on cases in which the ultimate fate of the sea turtle was known, sea turtle incidental takes with observer comments from 1995 to 2009 for all Northeast Region areas and gear types, and blank observer sampling logs.

## **Information Available for Review**

### ***Case Studies***

The following represent the range of case studies that were evaluated by the workshop participants. Workshop participants were asked to review the information available on each case, indicate if the injury was fresh (likely a result of the gear interaction), the risk category based on the existing draft NMFS Working Guidance (Appendix 2), and the survival determination based on their expertise. The list of case studies is provided here for insight into the species, gear types and seasonality of the case studies evaluated. The animals presented with varying levels and types of injuries, such as carapace cracks, bleeding, and no wounds but needing resuscitation.

1. Leatherback; otter trawl; November 2007
2. Loggerhead; scallop dredge; July 2004
3. Loggerhead; scallop dredge; October 2005
4. Kemp's ridley; beach seine; December 2007
5. Kemp's ridley; scallop dredge; August 2005
6. Loggerhead; scallop dredge; October 2004
7. Loggerhead; scallop trawl; July 2005
8. Loggerhead; scallop dredge; October 2003
9. Loggerhead; scallop dredge; September 2009
10. Loggerhead; otter trawl; September 2009
11. Loggerhead; scallop dredge; August 2009
12. Loggerhead; otter trawl; January 2007

### ***Known Fate Cases***

In order to provide the participants a range of scenarios and circumstances to consider before reviewing the case studies, a series of cases was presented in which the fate of the turtle after capture in the gear was known. The purpose was to exemplify the range and variability of injuries that contributed to mortality after interactions with Northeast and Mid-Atlantic fishing gear. The veterinarian's comments for each of these case studies were also provided to the participants for reference. Some of the following cases presented with conditions or injuries similar to other turtles that were released alive (some of which were included in the case studies noted above).

1. Loggerhead; otter trawl; January 2007  
Resuscitated without success
2. Loggerhead; gillnet; June 2008  
Lethal encounter without significant external injury

3. Loggerhead; scallop dredge; June 2008  
Alive when found, significant internal injuries, released dead
4. Loggerhead; scallop dredge; August 2009  
Alive and active when found, carapace cracks and flipper injury, transported to rehabilitation facility
5. Leatherback; gillnet; December 2006  
Thought to be alive when first observed, entangled in gear, when net able to be hauled, found dead

### ***Observer Reporting Logs***

The participants were provided with blank NMFS NEFSC observer reporting forms and asked to review the documents and provide verbal comments. The purpose was to determine if the information needed to make a decision on sea turtle injury and post-release survival is currently being collected by the observer program or if additional data fields are necessary. Appendix 4 contains the NMFS NEFOP information distributed, including:

1. Marine Mammal, Sea Turtle, and Sea Bird Incidental Take Log
2. Sea Turtle Biological Sample Log
3. Sea Turtle Injury Reporting Form

Note that the Sea Turtle Injury Reporting Form is not currently provided to the observers to fill out at-sea, but the NMFS data manager collects the information from the observer during the post-deployment de-briefing interviews.

## **Discussion of Injuries and Observer Information**

Upon reviewing the participant comments, there was a wide variation in responses to the case studies. This was often due to the veterinarians' interpretation and/or documented uncertainty of the observer photos and logs. Given the duplicative discussion on the various case studies, the following summary is grouped by injury-specific comments and then comments related to the quality or amount of information collected by fishery observers. Some of the information presented in the injury discussion may also apply to the information collected by observers. Many of these comments applied to different case studies, but several examples are provided to highlight specific injury conditions.

### ***Comments on Injuries and Working Guidance Categories***

#### **Types of Injuries**

- Eye injuries: It is important to distinguish between an injury to the eye versus an injury to the eyelid or to the skin surrounding the eye. For instance, an injury to the globe of the eye would result in a lower chance of survival, while an injury to the area around the eye (e.g., the eyelid) may not have a large effect on survival as the injury would not likely impact the sea turtle's long term vision. Similarly, an injury to only one eye may not be as life threatening as an injury to both eyes. As such, these differences were considered in the revised technical guidelines. Workshop participants also noted the importance of recording and considering unequal pupil size. Adding flashlights to the observer kits, demonstrating the pupil assessment during training, and including a field for recording this information would aid in pupil size assessments.

- Carapace cracks:
  - It is important to note (to the extent possible) whether the injury was previously existing or fresh. One consideration in this assessment may be to record the conditions of the crack edges (e.g., smooth or rough).
  - The injury guidance should clarify what is meant by “carapace crack”. That is, the previous guidance did not differentiate between cracks through the scutes versus underlying bone. The term “fracture” has a clinical meaning (e.g., a crack all the way through the bone), so may be a more appropriate term for these injury assessment purposes.
  - It was suggested that cracks be described as acute.
  - The depth of crack is also important to consider. Currently observers do not measure crack depth and geographic relation to the midline (e.g., whether it crosses the spinal cord).
  - For example, in one case study, the turtle presented with multiple carapace and plastron cracks, and the cloaca was slack. These signs suggested that the turtle received peripheral nerve damage, which led to a majority of the participants giving the animal a poor prognosis for survival.
- Flipper injuries: Workshop participants noted that post-release survival for those animals experiencing injuries to flippers depends on the magnitude of the injury and whether it affects movement or function. For example, if half or more of the flipper is amputated, this would present as a lower probability of survival compared to injuries (e.g., deep cuts) to flippers that may affect swimming ability. Similarly, if only superficial cuts are documented on a flipper, this case would result in a higher probability of survival compared to the preceding two examples. Considering the location of the fractures (e.g., bilateral, multiple blade fractures) should also be part of the assessment. Ligature wounds may not always be immediately apparent on sea turtles and are important to consider when evaluating flipper injuries.
- Location/source of injury: Details on observed interactions that may have caused the injury (e.g., dredge dropping on turtle) are important to record, but the observer should not speculate on cause of injury. When the workgroup evaluates each case however, the location of the injuries and potential cause of injury should be considered.
  - For example, in one case study, it could not be determined whether the plastron wounds were a previous injury or caused by the turtle’s interaction with the fishing gear. Some veterinarians thought they could have been pressure wounds from being out of the water, while others disagreed with that conclusion because the wounds appeared in an area not normally associated with these types of wounds (i.e., the wounds occurred posteriorly, not anteriorly).
  - If blood is present on the turtle, it is important to note from where the blood originated. In one case study, according to the observer notes, no blood was coming from the animal’s nares, but the photograph showed blood near the nares. It was discussed if the blood came from the turtle or if the fish in the catch was the source. That uncertainty resulted in difficulty assessing the true fate of the animal. If the blood was from the turtle’s nares, it may indicate a more serious condition compared to a superficial cut or transfer from the catch.

- The color of the blood (as included as a field on the draft Sea Turtle Injury Reporting Form) is not necessary to collect. The color of the blood may not be informative, but sources of the blood will be.

## **Behavior**

- Considerable discussion occurred on the importance of fully describing the sea turtle's behavior upon observation, in as much detail as possible.
  - For example, in one case study, the sea turtle's eyes were closed in the photograph. Participants noted that whether the turtle's eyes were closed is an important consideration for post-release survivability, as persistent eye closure is abnormal sea turtle behavior. It was assumed, because no further elaboration was made on the observer form, that the animal kept its eyes closed throughout the observation period and as a result, the participants discussed a potentially low post-release survival.
  - In another case study, the observer described the turtle as moving and eating, therefore showing near normal behavior. This, along with the assessment of injuries, resulted in a placement of high probability of survival.
- If an animal is reported as lethargic, it is important to consider the water temperature and geographic location in order to determine whether this was a cold stun event. Water temperature is an important factor in subsequent survival. It was recommended that the injury guidelines or observer forms include a section where behavior and cold stun characteristics of sea turtles are described. These descriptions would also be valuable for observer training, and videos demonstrating normal and abnormal sea turtle behavior could be shown. This would aid in a more accurate description of the animal's behavior in the field.

## **Resuscitated Animals**

Regulations at 50 CFR 223.206(d)(1)(i)(B) identify resuscitation procedures for sea turtles that are comatose or inactive but not dead. However, as with other types of injuries, it is difficult to conclusively determine the ultimate fate of the animal when the animal is released after those procedures. Other initiatives have considered post-release survival of resuscitated animals caught in certain types of fishing gear (e.g., pelagic longline; Ryder et al. 2006), and similarly, participants at this workshop discussed the various facets to consider when assessing the ultimate survival of a turtle released after on-board resuscitation.

- First, some veterinarians did not feel that the term "resuscitation" accurately defines what the observers (or others) do for turtles on-board. From a clinical perspective, resuscitation indicates an active process of doing something to the animal to aid, or cause, its revival (i.e., medical intervention). What occurs on-board the vessel by the observers is more of a "recuperation" from a trauma or oxygen deprivation event, with the animal becoming revived. While these comments were considered in the revised technical guidelines, the regulations at 50 CFR 223.206 use the term resuscitation.
- Workshop participants discussed several conditions or symptoms of drowning and impairment after revival, some of which were related to specific case study examples.
  - If an animal is observed to have froth around its nares and/or mouth, it may be a sign of respiratory impairment due to fluid in the airways and/or lungs (pulmonary edema).

- There is a need to define abnormal and unresponsive behavior and for such behavior to be recorded on the observer data log. There is certain behavior that may be indicative of an underlying problem after revival.
- In one case, the animal was unresponsive initially (i.e., inactive, no reflexes), but after being placed in an incline position, the turtle became more responsive. The right eye of the animal was also swollen. The initial unresponsive behavior of the animal, in addition to the swollen right eye, led some experts to believe that this animal may have suffered from a metabolic disturbance, neurological impairment, or fluid present in the lungs. The latter was the more accepted conclusion of why the animal was initially unresponsive. An alternative explanation provided by one veterinarian was that the cause of the animal's unresponsiveness was due to dry drowning (when an air breathing animal dies of forced submergence, but the lungs remain dry). However, most experts believed that this topic is highly debatable in the literature and may not apply to this case.
- In another case study, the animal was unresponsive initially, but after inclination, the animal became responsive and "spit up" water. Some participants expressed concern about the animal being unresponsive initially and then becoming more active after one hour had passed. This type of response may be a sign of dangerous internal injuries that may not be apparent right away, but instead, appear within a few hours to days.
- Veterinarians believed that animals that are revived should not be released immediately, as the animal may have severe internal injuries (e.g., salt water intrusion into the lungs, aspiration pneumonia) that may not be apparent for a few days. Even if a turtle recovers from an unresponsive episode on-board, it still may have lung injury, resulting in a difference between the short and long term prognosis. If animals are released immediately after resuscitation, some experts believed that they will have a lower probability of survival. As such, the veterinarians suggested holding the animal for at least 24 hours (ideally longer), observing all behaviors and symptoms. Rehabilitation was suggested for all animals initially recovered unconscious/unresponsive.
- Unresponsive, rather than comatose or inactive, is a more appropriate way to describe the condition. Veterinarians recommended replacing "comatose" in the guidelines with "unresponsive" and placing these animals in the high probability of mortality category, instead of intermediate probability of mortality.

## **Animal Condition**

In the evaluation of the case studies, workshop participants were asked to determine if the injury was fresh. A fresh injury may be interpreted as one likely occurring as a result of the observed gear interaction. Determining whether an injury was the result of the gear interaction will be important in the future evaluation of each observer record and whether the injury/take will be attributed to a particular fishery or gear type. The description of a "fresh" injury was determined by evaluating the participant case study evaluation forms and related workshop discussion. In some cases (5 of 12), the determination of a whether an injury was fresh varied by respondents, with most participants interpreting the injury to be fresh, while others not considering the injury to be fresh, noting that it could not be determined given the information provided, or stating that a "freshness" determination was not applicable to the case study (e.g.,

no apparent injuries). In other cases (7 of 12), there was unanimous or near unanimous (e.g., varied by 1) agreement that the injury was fresh.

From the written feedback received, the characteristics of a fresh injury may include (but are not necessarily limited to):

- Active bleeding (noted most commonly to be the deciding factor of freshness)
- White bone, if exposed
- Clean or sharp edges to scrapes/cracks
- No epibiotic growth over or in lesions
- Observer comments of “red tissue” (assumes this is muscle, viscera, etc.)
- Became active on board or “spit up water” (observer notes), if originally found comatose

When evaluating whether the injury is old, factors to consider are whether the fractures (if present) have smooth or rounded edges, whether any exposed bone is gray or green (not white), or whether the injury shows signs of healing.

### ***Information Collected by the Observer Program***

During the discussion on case studies and the review of the observer reporting logs (Appendix 4), participants suggested several revisions and/or clarifications on the types of information the observers should record in order for NMFS to make a more accurate assessment of the animal’s injuries. Note that, if deemed necessary by NMFS, some subsequent revisions to the observer reporting forms may also stem from discussions on sea turtle injuries, as included above.

### **Injury Documentation**

- When taking photographs, it is important to focus on the lesions, cracks, abrasions, depressions, etc. Detailed photographs of the lesions/injuries were thought to be more helpful than drawings, but both should be collected/recorded.
- The observer should record detailed information on things such as the depth, size, location, and length of injuries. For example, it is important to clarify whether the crack only affected the scute or if it extended into the bone and into the coelomic lining, as well as the overall depth and length of the crack. Further, additional descriptive details may include if there was bleeding and from where; if the carapace adjacent to a fracture was mobile; and the extent of displacement if the carapace was depressed. The observer should be as descriptive as possible so that when the case is analyzed, an accurate determination of the severity of the injuries and the probability of survival can be made.

### **Observer Logs**

- It was recommended that the Sea Turtle Injury Reporting Form (or another comparable form with specific injury fields) be made mandatory for the observers to fill out while in the field.
- An observer data form should be drafted or modified that includes all necessary information to allow for accurate injury determinations. By gathering more focused information from the observer and their hands-on assessment, this may minimize problems due to variance in injury determinations. Such an injury reporting form could be comprised of important characteristics that describe abnormal/normal behavior (e.g., lifted head, moved limbs, eyes open/closed), responsiveness (e.g., response to cloacal pinch, bilateral eye reflex, front and rear flipper pinch), activity level, and injuries (e.g., is



there an open cavity?). These characteristics could be provided in a way to be checked off/circled in the field, allowing for a written description once the observer is on shore or off-duty. This would also alleviate illegible handwriting issues that may affect NMFS' ability to assess the case, increase objectivity in reporting, and potentially decrease observer recording time. Another way to expand on the information collected by observers is to develop a data log where particular questions related to each NMFS Category for injury are provided. After the observer answers the particular injury element, assigning post-release survival (based on the NMFS Categories) may be performed more efficiently as specific characteristics of the injuries will be clearly documented.

- It was suggested that a detailed picture of a sea turtle head/eye should be included on the observer data sheets for recording specific injuries. Another recommendation was that a diagram of a sea turtle could be added (or modified) and by each flipper and the head, a space could be provided to record information on whether each limb was mobile or the head was lifted voluntarily.
- On the existing Sea Turtle Injury Reporting Form, there is a question that asks whether the turtle had "buoyancy problems." It was recommended that this be clarified and perhaps rephrased to whether the turtle remained on the surface after release and if so, for how long.
- Only one measurement of the turtle's body size (e.g., only measuring notch to tip length) is necessary for the injury assessment process.
- One commenter noted the importance of recording the turtle's responsiveness and any reflex tests completed by the observer. A field or checkbox that notes the reflex test results may ensure consistent, objective assessments of responsiveness. The reflex tests that may be conducted include bilateral eye reflex, bilateral front and rear flipper pinch, corneal reflex, or cloacal clasp. This information will be valuable in determining the difference between a lethargic and unresponsive animal.

### **Observer Training/Permit**

- It was suggested that, during observer training, the difference between the scute and the bone be clarified, as latter implies a more serious injury to the turtle. By understanding the difference, in the field, the injury can clearly be defined, which will then aid in the final injury assessment.
- Workshop participants suggested making the sea turtle exam a requirement for observer approval, similar to the exam for fish and marine mammals.
- It was recommended that observers PIT tag all sea turtles, in addition to Inconel flipper tag. This would involve a modification to the existing NEFSC observer program scientific research permit and additional training on the technique.
- Workshop participants suggested changing the NEFSC observer program scientific research permit to allow for on-board holding of sea turtles for 36 hours after recuperation (or revival), instead of the 24 hours as required by the regulations. This would enable observers to better monitor sea turtles after an unresponsive period and document subsequent breathing problems. Further, it was recommended that all sea turtles found unresponsive be transported to the closest rehabilitation facility. While the NEFSC permit specifies that stressed or injured animals should be transported to a

rehabilitation facility when possible, the requirement to do so for unresponsive (and revived) animals should be better emphasized during training and in the observer manual.

## **TECHNICAL GUIDELINES FOR ASSESSING INJURIES OF SEA TURTLES OBSERVED IN NORTHEAST REGION FISHING GEAR**

After the workshop, NMFS staff discussed the case study results, participant notes, discussion at the workshop, and comments on the working guidance. As revisions to the previous working guidance were deemed necessary, all available information was considered in that revision. The following “Technical Working Guidelines for Assessing Injuries of Sea Turtles Observed in Northeast Fishing Gear” (Table 1) represent the final guidelines as developed as a result of the information generated by the workshop and subsequent NMFS discussion on that information. This is the version that will be used by NMFS to review each record of observed sea turtle take and determine associated survival. It is worthwhile to clarify that previous injury assessment categories were referred to as “Working Guidance”, while the revised version (and subsequent mention of the injury assessment categories in this document) is called “Technical Guidelines” or “Technical Working Guidelines”.

### **Changes to Guidelines**

While each specific modification is not listed here, the following represents a summary of the more notable changes to the revised guidelines. In general, the language related to specific injuries and sea turtle anatomy was made clearer and more clinically accurate.

- The category numbers were switched so that animals with a high probability of mortality are in Category III (previously Category I) and those with a low probability of mortality are in Category I (previously Category III). This change occurred in order to present the injuries in a more logical fashion and be consistent with sea turtle stranding codes, in which the lowest number is alive and dead sea turtles are classified by progressive decomposition state as code number increases. Throughout the remainder of this document, the revised category numbering will be used.
- The previous guidance did not have associated mortality rates for each category, largely because it was uncertain what those percentages would be based upon. At the workshop, it was noted that if mortality rates were not assigned in the formulation of the revised guidelines, percent mortality for each category likely would be determined by NMFS Section 7 staff to determine anticipated take. It is likely that those percentages would be the same as used in previous years, or the 100% mortality rate for Category III and the 0% mortality rate for Category I. Workshop participants felt that the 100% and 0% mortality rate assignments were not the most accurate, and, upon discussion, agreed that refined mortality rate percentages could be assigned to each category. As such, NMFS’ decision on the associated mortality rates is reflected in the revised guidelines categories. In addition, the associated mortality percentages (included in the revised guidelines) are based on the evaluation and discussion of hardshell and leatherback turtles. A 100% mortality rate will be assigned to any animal released into the water in a dead or unresponsive state regardless of its condition at first encounter.
- Those animals that are recorded as unresponsive, revived and released were moved from the intermediate mortality category (II) to high mortality (III). This change is due to the

concern over the long term prognosis of a previously unresponsive, released animal with potentially compromised lungs/airway. The term “unresponsive” was used instead of “comatose,” and a description of the definition of and criteria for unresponsive was added. A distinction was made between those animals found unresponsive and those found lethargic (i.e., responsive to external stimuli but in a reduced manner, sluggish). Animals that are found lethargic, but become active on-board before release, remain in Category II.

- The previous guidance only considered injuries to and associated survivorship of hard-shelled sea turtles, because the 2003 questionnaire, on which the guidance was largely based, focused on hard-shelled turtles in scallop dredge gear and associated impacts. NMFS and the participants at this workshop noted that any revised guidelines should address leatherback injuries as well. Participants at the workshop addressed injuries and impacts to leatherbacks, and those considerations are reflected in NMFS guidelines in Table 1.
- Instead of including cracks through various locations on the carapace or plastron (as noted in Appendix 2), the revised guidelines refined those injury categories as “Any shell fracture, excluding marginals” and “Penetration of body cavity.” Both of those descriptions now are included in Category III (high mortality), as were most of the similar injury types in the previous guidance. The change was made to be more inclusive of all types of injuries and to be technically accurate with respect to sea turtle anatomy and veterinary terminology. For example, using the term “fracture” (referring to scute and bone trauma) is more descriptive and relevant for injury assessments versus cracks which may extend through the scutes in various carapace locations but not into the bone.
- The degree and location of flipper related injuries were expanded upon, with flipper amputations of half or more being included in Category III and other injuries to flippers in Category I or II.
- Injuries to eyes were differentiated by whether one or two eyes were affected (Category II or III respectively).
- Shell fractures affecting the marginal scutes were distinguished by the width of peripheral bone affected (greater, equal to, or less than 50%), resulting in different categories for those injuries as compared to all marginal scute injuries originally being in Category I.
- Several injury categories were expanded. For instance, examples of behavioral abnormalities were added and more descriptive locations of bleeding were noted. The entry of “Animals with no apparent injuries” was expanded to include “and active normal behavior,” as workshop participants noted that the turtle’s behavior was an important consideration when assessing survivability.
- The condition of “Any remaining gear left on the animal at release” was added to Category III.
- Language was added related to the consideration of old injuries and adverse environmental conditions (e.g., extreme cold water temperatures). The purpose of adding these factors was to aid in the subsequent assessment of injuries and ensure all components of the gear interaction are addressed and considered.

## Definitions

There are several terms used by workshop participants to describe injuries and raised in the workshop discussion as a potentially beneficial for injury descriptions, or determined by NMFS to be sufficiently explanatory for future evaluations of injuries. These terms are either included in the revised guidelines or will be considered by the NMFS workgroup when assessing sea turtle injuries from gear interactions. Definitions are provided here so application of such terms used in the technical guidelines (Table 1) is uniform and they may be considered in the future assessment of such injuries. For instance, the NMFS workgroup will first determine if the injury is fresh (and likely a result of the observed gear interaction) and, if fresh, then determine the associated probability of mortality using the information in Table 1.

### *Active normal behavior:*

In this instance, active normal behavior refers to, but is not limited to, the animal's voluntary movement around the vessel, using/flapping its flippers appropriately, and lifting its head to breathe. As noted previously, it was recommended that observers record the specific behavior of the turtle, and that a description of normal versus abnormal sea turtle behavior be included in the observer training.

### *Acute:*

During the workshop, participants suggested that the term “acute” be included with the mention of shell fractures. In medicine, acute generally refers to the time frame of an injury or illness; as sudden in onset, sharp rise, and short course (Merriam-Webster's Medical Dictionary). The purpose of adding “acute” to the description of shell fractures was to refer to a fracture that occurred recently (versus one that the animal sustained weeks/months previously or an ongoing chronic condition). For example, an acute fracture should be considered fresh.

In the evaluation of sea turtle injuries by the NMFS workgroup, whether an injury was a result of the gear interaction will first be determined, followed by the assignment of probability of mortality using the working guidelines. As such, all of the conditions included in Table 1 should relate to the gear interaction in question (should be “fresh” injuries). In the technical guidelines, acute was not included in the description of shell fracture injuries, as Table 1 only refers to acute/fresh injuries. It was noted that acute fresh injuries may occur in addition to chronic conditions. The latter may be discussed in the comments section of the observer logs.

### *Fresh:*

Characteristics of a fresh injury include active bleeding; white bone (if bone is exposed); clean or sharp edges to scrapes/cracks; no epibiotic growth over or in lesions; and red or pink exposed tissue.

While subject to some interpretation, a fresh dead animal may exhibit the following characteristics: little to no odor; fresh blood present; fresh (not necrotic, pink/healthy color) tissue, muscle, or skin; no bloating; color consistent with live animal; eyes clear; and live barnacles. Note that all of these characteristics need not be met in order to be categorized as “fresh”. Each case needs to be evaluated independently and thoroughly by trained individuals. Again, these characteristics are presented here for guidance only.

### *Major long bones:*

The revised technical guidelines have an injury description of “Any open fracture of major long bones”. To clarify what constitutes a “major long bone” and to aid in NMFS’ subsequent review of observed injuries, major long bones refer to the humerus, radius, ulna, femur, fibula, and tibia. For this project, carpals, metacarpals, tarsals, and metatarsals are not included in the definition of major long bones.

### *Superficial:*

Of, relating to, or located near the surface; and lying on, not penetrating below, or affecting only the surface (Merriam-Webster’s Medical Dictionary).

In the application of the working guidelines, a superficial injury refers to a cut, scrape, abrasion, chip, scuff, etc. that only affects the keratinous scutes (not penetrating into the carapace bone) or surface of the skin (not impacting any muscles or underlying bones).

### *Unresponsive/lethargic:*

The determination of whether an animal is lethargic or unresponsive after capture will dictate the appropriate injury category in which to place the turtle (Category II or III, respectively). The observer comments will be critical in determining whether the animal was lethargic or unresponsive, and observer training on sea turtle behavior may help make these distinctions. The term “unresponsive” is currently defined in the revised guidelines. Unresponsive refers to an episode of lack of response to external stimuli at any time. Lack of response criteria may include bilateral eye reflex, bilateral front and rear flipper pinch, corneal reflex, or cloacal clasp. The definition of lethargy includes: abnormal drowsiness, sluggish, or indifferent to stimuli (Merriam-Webster’s Medical Dictionary). In this instance, lethargic behavior refers to an animal that responds to external stimuli but in a reduced manner, moves slowly, or is sluggish.

## **Observer Form Modifications**

As described throughout this document, the workshop participants provided helpful insight into potential modifications of the type or quality of information collected by observers. NMFS is in the process of evaluating the workshop comments and revising the observer forms as deemed necessary and appropriate. After the Technical Working Guidelines are finalized, NMFS will consider potential changes to the observer forms.

## **ACKNOWLEDGEMENTS**

This document and NMFS’ revision of the technical guidelines would not have been possible without the valuable comments and insight by the participants at the 2009 workshop. I am extremely grateful for their participation and feedback.

Thank you to Heather Haas and Sara Wetmore for helping organize the workshop as well as for valuable review comments and guidance. Thanks also goes to Dave Gouveia for facilitating the workshop, and Mary Colligan for helpful edits and assistance. The NEFOP should also be acknowledged for collecting and providing the fishery observer information which helped shape the workshop discussion and subsequent technical guidelines.

**TABLE 1.**

**TECHNICAL WORKING GUIDELINES  
FOR ASSESSING INJURIES OF SEA TURTLES  
OBSERVED IN NORTHEAST REGION FISHING GEAR<sup>2</sup>**

**Category I – Low probability of mortality (20% mortality rate)**

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- Any shell fractures of the area of the marginal scutes, involving less than 50% of width of the underlying peripheral bone
- Superficial abrasions, chips, or scuffs to carapace or plastron
- Minor or superficial injuries to skin
- Animals with no apparent injuries and active normal behavior

**Category II – Intermediate probability of mortality (50% mortality rate)**

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- Any shell fractures of the area of the marginal scutes, involving 50% or more of width of the underlying peripheral bone
- Injuries to flippers (including ligature wounds), which may impair movement or function
- Injuries to one eye
- Lethargic, but becomes active before release

**Category III – High probability of mortality (80% mortality rate)**

---

- Any shell fracture, excluding marginals
- Fractures or wounds penetrating the body cavity
- Evidence of bleeding from cloaca, nares, eyes, or oral cavity, unrelated to superficial wounds
- Skull or mandibular fracture
- Injuries to both eyes
- Injuries to neck (including ligature wounds) which affects the spinal cord, major blood vessels, or airway
- Amputation of half or more of one or more flippers
- Any open fracture of major long bones
- Behavioral abnormality, including circling, not using all four flippers appropriately, head tilting, not raising head, not breathing, eyes closed, listing/rolling, lethargic at release, inability to right itself in the water
- Unresponsive<sup>3</sup>, revived, and released
- Any remaining gear left on the animal at release

*If an animal is found with multiple injuries in different categories, the animal should be placed in the category encompassing the most severe of the injuries.*

*A 100% mortality rate will be assigned to any animal released into the water in a dead or unresponsive state regardless of its condition at first encounter.*

*Old injuries determined to be unrelated to the current gear interaction or animals subject to adverse environmental conditions will be considered in the overall health assessment/survivability determination of the animal.*

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<sup>2</sup> For the purposes of these guidelines, Northeast Region fishing gear excludes longline gear.

<sup>3</sup> Unresponsive refers to an episode of lack of response to external stimuli at any time. Lack of response criteria may include bilateral eye reflex, bilateral front and rear flipper pinch, corneal reflex, or cloacal clasp.

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# **APPENDIX 1: WORKSHOP AGENDA**

## **Workshop on Evaluating Sea Turtle Injuries in Northeast Fishing Gear**

National Marine Fisheries Service Northeast Region

Mariner's House • 11 North Square • Boston, MA

November 17-18, 2009

### AGENDA

#### **DAY ONE • Tuesday, November 17**

- 1:00 PM Welcome – Dave Gouveia
- 1:15 PM Introduction and background – Carrie Upite
- Other serious injury assessment efforts
  - Previous scallop dredge initiative
  - Utility of such guidance
  - Review existing NMFS working guidance
- 2:15 PM Evaluation process – Dave Gouveia
- 2:30 PM Cases with known fate and case studies for evaluation – Rogers Williams
- 3:15 PM Independent evaluation of case studies – Workshop participants
- 4:30 PM Adjourn

#### **DAY TWO • Wednesday, November 18**

- 8:30 AM Recap of Day One; Overview of Day Two – Dave Gouveia
- 8:35 AM NE Fisheries Observer Program overview – Sara Wetmore
- 9:10 AM Review of guidance and evaluation process – Rogers Williams  
Discussion of case study results
- 10:15 AM Break
- 10:30 AM Improving the working guidance to link animal condition to risk level
- 12:30 PM LUNCH
- 2:00 PM Evaluation of observer/sea turtle reporting forms
- 3:30 PM Wrap up and next steps



## APPENDIX 2. PREVIOUS INJURY GUIDANCE

(Used in case study evaluations by workshop participants)

### DRAFT WORKING GUIDANCE FOR SERIOUS INJURY DETERMINATIONS FOR HARDSHELLED SEA TURTLES TAKEN IN FISHING GEAR

#### Category I – Low probability of survival

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- Carapace crack that goes entirely through<sup>1</sup> any non-marginal scute
- Carapace crack through or not through vertebral scutes
- Carapace crack through or not through any portion of the region from anterior (nuchal notch) to mid-carapace scute (center of third vertebral scute), besides marginal scutes
- Crack through plastron (any location)
- Unstable carapace or plastron (e.g., edges of crack do not meet, shell depressed)
- Bleeding from rectum, nose, or other orifice
- Injuries to head, eyes, nares or oral cavity
- Injuries to neck, affecting spinal cord, dorsal musculature, dorsal cervical sinus or trachea
- Behavior abnormal (e.g., not able to right itself or not moving in water)
- Comatose, revived, and released with injuries other than the ones listed in Category III

#### Category II – Intermediate probability of survival

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- Comatose, revived, and released either without injuries or with the injuries listed in Category III
- Non-marginal carapace cracks that do not go through the scutes (on any area of the carapace besides vertebral column or region from anterior to mid-carapace)
- Plastron cracks that do not go through the scutes (any location)
- Injuries to flippers, which may impair movement or function

#### Category III – High probability of survival

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- Carapace cracks to marginal scutes
- Superficial abrasions, chips, or scuffs to carapace
- Minor or superficial injuries to neck
- Superficial cuts to flippers, that do not impair movement or function in animals with good body condition
- Animals with no apparent injuries

*Note: If an animal is found with multiple injuries in different categories, the animal should be placed in the category encompassing the most severe of the injuries.*

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<sup>1</sup> “Through” a scute refers to a crack from the surface to the interior of a scute.

## APPENDIX 3. EVALUATION FEEDBACK FORM

### Workshop on Evaluating Sea Turtle Injuries in Northeast Fishing Gear

National Marine Fisheries Service Northeast Region • November 17-18, 2009

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#### CASE STUDY EVALUATION – FEEDBACK FORM

For each case study, indicate if the injury is fresh (likely a result of the gear interaction), the risk category based on the Working Guidance (WG), and the survival determination based on your expertise. Briefly justify your decision. *Risk I = Low probability of survival; Risk II = Intermediate probability of survival; Risk III = High probability of survival.*

Case Study	Circle 1 per row	Justification
1	<i>Fresh: Yes, No</i>	
	<i>WG Risk: I, II, III</i>	
	<i>Your Risk:</i>	

*Author's note: In the feedback form distributed to the workshop participants, there was a separate field for each case study (n=12). However, in the interest of space, for this report, only one field is presented to provide an example of what information was requested of and collected from the participants.*

## APPENDIX 4. NMFS NEFOP REPORTING LOGS

### MARINE MAMMAL, SEA TURTLE, AND SEA BIRD INCIDENTAL TAKE LOG NMFS FISHERIES OBSERVER PROGRAM OBINC 01/01/10

OBS/TRIP ID	
DATE LANDED mm/yy	/
PAGE #	<input type="checkbox"/> OF <input type="checkbox"/>

PSID #	HAUL NUM	GEAR NUM	NET NUM/ DREDGE/NET POSITION (p/s/u/a)	TIME (24 hours)	ADD COND CODE	SPECIES		TAG		ENTANG SITU CODE	ANIMAL COND CODE	ANIMAL ONBRD? 0=No 1=Yes	PHOTO TAKEN? 0=No 1=Yes	SAMPLED? 0=No 1=Yes 2 = Yes, feathers only	EST LEN (cm) (if no actual) (no birds)
						NAME	CODE	NUMBER(S) (record most recent first)	CODE(S)						
_____ 1				:											
_____ 2				:											
_____ 3				:											
_____ 4				:											
_____ 5				:											
_____ 6				:											
_____ 7				:											
_____ 8				:											
_____ 9				:											
_____ 0				:											

COMMENTS: List identifying characteristics, describe in detail the entanglement situation, include a description of the overall body condition of the animal, behavior on deck and upon release and any other related information. Use back of log if more room is needed.

		OBS/TRIP ID	
		DATE LANDED mm/yy	/
		PAGE #	<input type="checkbox"/> OF <input type="checkbox"/>

<b>ACTIVE DETERRENT DEVICE</b> <b>(ADD) CONDITION CODES:</b> 0 = Unknown 1 = No Pingers Used On Gear 2 = Audible 3 = Inaudible, Tested and Working 4 = Inaudible, Tested and Not Working 5 = Inaudible, Not Tested 6 = Absent (Lost) 9 = Other  <b>TAG CODES:</b> 0 = Unknown 1 = Tag Applied by Observer 2 = No Tag(s) 3 = Tag Already Present, Left On 4 = Tag Already Present, Removed  NOTE: Record Turtle Pit Tags on the Sample Log.	<b>ENTANGLEMENT / INTERACTION SITUATION CODES:</b> 00 = Unknown 01 = Fell From Gear at a Point Unknown 02 = Fell From Gear Before Exiting Water 03 = Fell From Gear Once Hauled Out of Water 04 = Fell From Gear Due to Force of Roller 05 = Removal Requires Cutting of Gear/Animal 06 = Removal Does NOT Require Cutting of Gear/Animal 08 = Caught in Wings of Trawl Net 10 = Sea Bird Caught, Gangion Attached to Mainline 11 = Sea Bird Caught, Gangion Unattached to Mainline 12 = Hooked, Ingested 13 = Hooked, Beak 14 = Hooked, Head 15 = Hooked, Flipper 16 = Hooked, Carapace 17 = Hooked, Other/Unknown  NOTE: If more than one code applies to a situation choose the code that describes the primary entanglement/interaction (e.g. a turtle is observed inside the twine top of a dredge and falls from the gear as it is hauled up - choose code 21 as it best describes the primary interaction).	18 = Caught Inside Dredge Chain Bag 19 = On Top of Dredge or Dredge Frame 20 = Caught in Dredge Frame or Between Bails 21 = Caught Inside Dredge in Twine Top 22 = Caught on Sweep/Tickler/Rock Chains 23 = Caught in Bridles/Cables/Warp 24 = Inside Mouth of Trawl Net 25 = Inside Belly of Trawl Net 26 = Inside Codend of Trawl Net 27 = Caught in Sweep or Footrope of Trawl Net 28 = Contact with Vessel or Vessel Equipment other than Fishing Gear 29 = Entangled in Gear other than Vessel's Fishing Gear (e.g. Ghost Gear Caught by Vessel) 99 = Other  NOTE: If more than one code applies, choose the code that describes the most specific condition (e.g. a turtle is alive and released with gear around the left front flipper - choose code 05 as it is most specific at release).
<b>ADDITIONAL COMMENTS</b>		

**SEA TURTLE BIOLOGICAL SAMPLE LOG**  
**NMFS FISHERIES OBSERVER PROGRAM**  
**OBBTU 01/01/10**

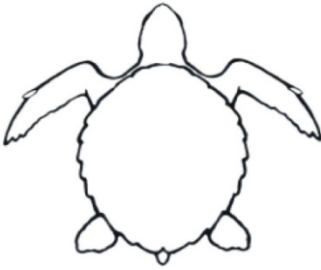
OBS/TRIP ID	
DATE LANDED mm/yy	/
PAGE #	<input type="checkbox"/> OF <input type="checkbox"/>

PSID #	SPECIES NAME	TAGS		MEASUREMENTS (Curv)			IDENTIFICATION CRITERIA						NUMBER OF SAMPLES		
		Scan? 0=N 1=Y	Pit Tag Number	Notch-to- Tip Length cm	Notch-to- Notch Length cm	Width cm	Vertebral Scute Count	Lateral (Costal) Scute Count	Infra- marginal Scute Count	1 Pair Pre- frontals? 0=N,1=Y	Overlap Scutes? 0=N,1=Y	Dorsal Color Code	Whole? 0=N,1=Y	Biopsy/ Skin	Other list in comments
				.	.	.									
				.	.	.									
				.	.	.									
				.	.	.									
				.	.	.									
				.	.	.									

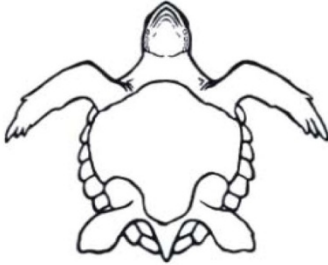
General Comments	<b>DORSAL COLOR CODES:</b> 01 = Black 02 = Gray-Green 03 = Orange/Red-Brown 04 = Brown 99 = Other 00 = Unknown
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Sketch and describe ID characteristics, overall condition of carapace, plastron and soft tissues, note any scavenger damage and/or decomposition, new and/or healed wounds, tag and biopsy location, any gear on the animal, etc.

PSID# \_\_\_\_\_



Dorsal View

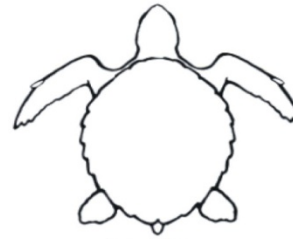


Ventral View

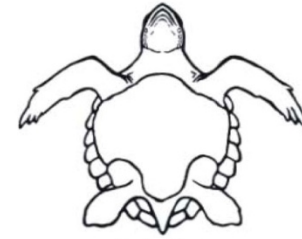
OBS/TRIP ID	
DATE LANDED mm/yy	/
PAGE #	<input type="checkbox"/> OF <input type="checkbox"/>

Sketch and describe ID characteristics, overall condition of carapace, plastron and soft tissues, note any scavenger damage and/or decomposition, new and/or healed wounds, tag and biopsy location, any gear on the animal, etc.

PSID# \_\_\_\_\_



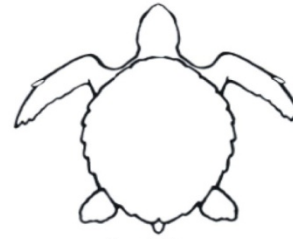
Dorsal View



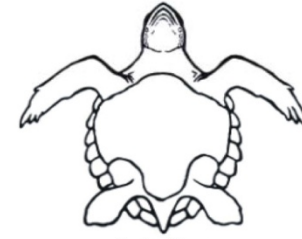
Ventral View

Sketch and describe ID characteristics, overall condition of carapace, plastron and soft tissues, note any scavenger damage and/or decomposition, new and/or healed wounds, tag and biopsy location, any gear on the animal, etc.

PSID# \_\_\_\_\_



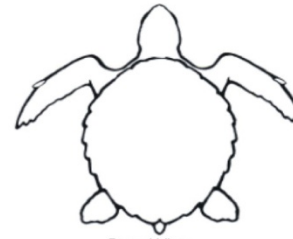
Dorsal View



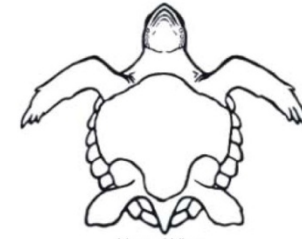
Ventral View

Sketch and describe ID characteristics, overall condition of carapace, plastron and soft tissues, note any scavenger damage and/or decomposition, new and/or healed wounds, tag and biopsy location, any gear on the animal, etc.

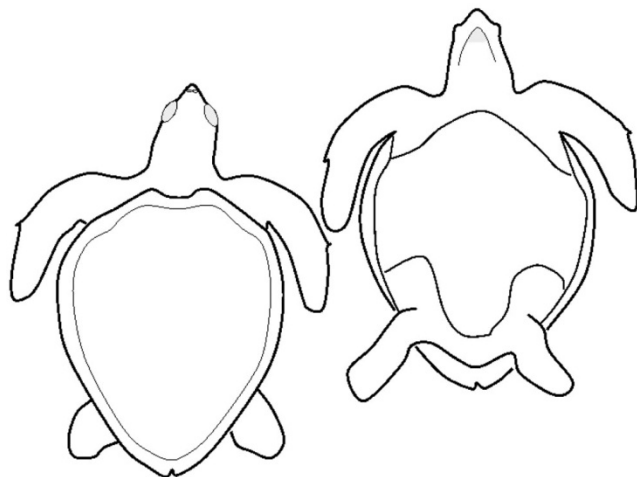
PSID# \_\_\_\_\_



Dorsal View



Ventral View



## SEA TURTLE INJURY REPORTING FORM

Blood? ( Y / N ) From where? Amount? Dried or liquid, on-going? Bright red, dark red, brown red, black red, other?
Other Discharge? ( Y / N ) From where? Color? Consistency?
Comatose or inactive?
Buoyancy problems?
Behavior of animal (on land and/or in water)?
How long observed in water?

Please draw and number each injury on diagram. The numbers of the injuries correspond to chart below.

	(1)	(2)	(3)	(4)	(5)	(6)
<b>SHELL</b>						
Cut, abrasion, chip, crack, or other?						
Plastron or carapace?						
How deep (in cm)?						
How long (in cm)?						
Does injury penetrate through scutes?						
Does injury cross vertebral column?						
Do edges of injury line up?						
Is shell depressed where cracked?						
Discoloration?						
Any part of shell missing?						
<b>HEAD, NECK, FLIPPERS</b>						
Which body part?						
Laceration, abrasion, other?						
How deep (in cm)?						
How long (in cm)?						
Discoloration?						
Any body parts missing?						

ADDITIONAL COMMENTS:

# **Procedures for Issuing Manuscripts in the *Northeast Fisheries Science Center Reference Document (CRD) Series***

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## **Clearance**

All manuscripts submitted for issuance as CRDs must have cleared the NEFSC's manuscript/abstract/webpage review process. If any author is not a federal employee, he/she will be required to sign an "NEFSC Release-of-Copyright Form." If your manuscript includes material from another work which has been copyrighted, then you will need to work with the NEFSC's Editorial Office to arrange for permission to use that material by securing release signatures on the "NEFSC Use-of-Copyrighted-Work Permission Form."

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Manuscripts must have an abstract and table of contents, and (if applicable) lists of figures and tables. As much as possible, use traditional scientific manuscript organization for sections: "Introduction," "Study Area" and/or "Experimental Apparatus," "Methods," "Results," "Discussion," "Conclusions," "Acknowledgments," and "Literature/References Cited."

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The CRD series uses the American Fisheries Society's guides to names of fishes, mollusks, and decapod

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For in-text citation, use the name-date system. A special effort should be made to ensure that all necessary bibliographic information is included in the list of cited works. Personal communications must include date, full name, and full mailing address of the contact.

## **Preparation**

Once your document has cleared the review process, the Editorial Office will contact you with publication needs – for example, revised text (if necessary) and separate digital figures and tables if they are embedded in the document. Materials may be submitted to the Editorial Office as files on zip disks or CDs, email attachments, or intranet downloads. Text files should be in Microsoft Word, tables may be in Word or Excel, and graphics files may be in a variety of formats (JPG, GIF, Excel, PowerPoint, etc.).

## **Production and Distribution**

The Editorial Office will perform a copy-edit of the document and may request further revisions. The Editorial Office will develop the inside and outside front covers, the inside and outside back covers, and the title and bibliographic control pages of the document.

Once both the PDF (print) and Web versions of the CRD are ready, the Editorial Office will contact you to review both versions and submit corrections or changes before the document is posted online.

A number of organizations and individuals in the Northeast Region will be notified by e-mail of the availability of the document online.

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166 Water St.  
Woods Hole, MA 02543-1026

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MAIL**

## **Publications and Reports of the Northeast Fisheries Science Center**

The mission of NOAA's National Marine Fisheries Service (NMFS) is "stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment." As the research arm of the NMFS's Northeast Region, the Northeast Fisheries Science Center (NEFSC) supports the NMFS mission by "conducting ecosystem-based research and assessments of living marine resources, with a focus on the Northeast Shelf, to promote the recovery and long-term sustainability of these resources and to generate social and economic opportunities and benefits from their use." Results of NEFSC research are largely reported in primary scientific media (*e.g.*, anonymously-peer-reviewed scientific journals). However, to assist itself in providing data, information, and advice to its constituents, the NEFSC occasionally releases its results in its own media. Currently, there are three such media:

*NOAA Technical Memorandum NMFS-NE* -- This series is issued irregularly. The series typically includes: data reports of long-term field or lab studies of important species or habitats; synthesis reports for important species or habitats; annual reports of overall assessment or monitoring programs; manuals describing program-wide surveying or experimental techniques; literature surveys of important species or habitat topics; proceedings and collected papers of scientific meetings; and indexed and/or annotated bibliographies. All issues receive internal scientific review and most issues receive technical and copy editing.

*Northeast Fisheries Science Center Reference Document* -- This series is issued irregularly. The series typically includes: data reports on field and lab studies; progress reports on experiments, monitoring, and assessments; background papers for, collected abstracts of, and/or summary reports of scientific meetings; and simple bibliographies. Issues receive internal scientific review and most issues receive copy editing.

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