

Sea Turtle Stranding and Salvage Network – Gross Necropsy Form Instructions

Introduction: All sea turtles in United States waters are listed as threatened or endangered under the Endangered Species Act (ESA). Postmortem examination (necropsy) of deceased sea turtles is an important means of identifying causes of mortality, monitoring wildlife health, and collecting life history data and biological samples. Valuable information about threats and sea turtle populations is gleaned from necropsy and is used by NOAA to implement ESA and support management and species recovery. These forms are used to document macroscopic (gross) observations during necropsy and pertinent contextual information related to the examination. The forms consist of 4-page and abbreviated 2-page versions. The latter may be used under time-limited circumstances. The data fields are intended to facilitate the consistent recording of important life history, health, and mortality information, including specific data captured within the contemporary STSSN database. These forms are not intended to replace other necropsy data forms in use by various organizations, as long as the same data can be obtained from alternative forms. However, use of the STSSN forms may be strongly encouraged under certain circumstances where maximum consistency benefits mortality investigation (e.g., unusual events). Additional information, including photographic examples of the abnormalities noted in these forms, can be found in NOAA’s Online Sea Turtle Necropsy Lecture Series, which is freely accessible at: <https://www.fisheries.noaa.gov/national/marine-life-distress/online-sea-turtle-necropsy-lecture-series>.

STSSN #: This identifier is assigned on the Sea Turtle Stranding and Salvage Network – Stranding Report and consists of the initials of the observer that documented the turtle followed by the by two-digit year, month, and day, and ending in the numbered order in which the turtle was documented by the observer and on this day. For example, if Jane Allen Doe documents two turtles on 3/1/2021, the STSSN # for the second turtle is JAD210301-002. This number cross-references the necropsy form with additional data collected in the Stranding Report.

Other identifier(s)/#: Any additional identifiers assigned to the turtle, including patient name, alternative alphanumeric IDs, or tag numbers may be entered here.

Rehab: Indicate whether the sea turtle was admitted to a rehabilitation facility.

Found dead: Indicate whether the sea turtle was deceased when it was found.

If no, date of death: If the sea turtle was found alive, provide the date of death in the following format: MM/DD/YYYY.

Euthanized: Select whether the sea turtle was euthanized.

Frozen/Thawed: Indicate whether the carcass was frozen prior to examination.

Condition at necropsy: Select the condition of carcass at the time of examination according to the following criteria:

1 - Fresh or mildly decomposed: The carcass may be in rigor mortis, but the eyes should be clear and there should be no smell of decomposition or evidence of bloating. If the carcass smells at all or is bloated, it is more than mildly decomposed (see below).

2 - Moderately decomposed: There is a mild to moderate smell of decomposition and mild to moderate bloating and bulging eyes (if present). The soft tissue may feel spongy and the scutes and skin may be beginning to slough.

3 - Severely decomposed: There is a foul smell and the carcass either is very distended by gas or has completely degassed (appears deflated). There is a mass of rotting flesh in areas of degassing and the scutes and skin are sloughing or missing. The limbs and carapace may be starting to disarticulate (especially upon handling) and there could be inundation by insect larvae (e.g., maggots).

4 - Dried carcass: The carcass is completely desiccated with only dry skin and bones with little to no smell.

5 - Skeletal: The skeletal features are prominent and are disarticulating. Skin may still be present but large portions of the carcass are skeletonized.

Date necropsied: Provide the date of examination in the following format: MM/DD/YYYY.

Examiner: Enter the name of person(s) conducting the necropsy.

Affiliation: List the affiliation(s) of person(s) conducting the necropsy.

Necropsy description: Select the entry that best describes the examination:

Complete examination: All internal organs are present and recognizable.

Partial examination: Some internal organs are missing or cannot be recognized.

Limited examination: All internal organs are missing or unrecognizable.

Disposition of carcass: Select the option that describes what was done with the carcass following necropsy.

Species: Identify species based on distinguishing morphological characteristics. Select “unknown” if a confident identification cannot be made.

CC: *Caretta caretta* (loggerhead turtle)

CM: *Chelonia mydas* (green turtle)

DC: *Dermochelys coriacea* (leatherback turtle)

LK: *Lepidochelys kempii* (Kemp's ridley turtle)

EI: *Eretmochelys imbricata* (hawksbill turtle)

LO: *Lepidochelys olivacea* (olive ridley turtle)

UNK: Species not determined

Sex: Select the sex of the turtle based on examination of the gonads and/or identification of a phallus in maturing or adult males. Select "undetermined" if a confident identification cannot be made.

Explanation of Anatomic Location Codes and anomaly characteristic fields (shaded)

This form provides a mechanism whereby anatomical locations of abnormalities and important features can be clearly and efficiently documented with the ability to record multiple concurrent observations in one individual sea turtle. Anatomic Location Codes provide one or two-letter abbreviations for different external locations on the body and regions of the alimentary tract (digestive system) and are entered into the blanks following an abnormality to note its location. For some abnormalities, there also are shaded fields that document important characteristics, such as those related to severity. Specific guidance for these entries is provided for the relevant sections below.

Cannot be Determined

Multiple fields have the optional entry of Cannot Be Determined (CBD). CBD may be selected for any circumstance in which confident evaluation is not possible, including:

- limitations resulting from postmortem condition of the carcass (e.g., decomposition, scavenging;
- observer knowledge/experience.

External injuries

Select whether there are any external injuries present. The emphasis here is external injuries of significance to sea turtle conservation and recovery based on potential association with the cause of stranding, an indication of human interaction, or implication on health and fitness. Minor, nonspecific injuries likely superficial abrasions, healed wounds involving the distal flippers or edges of the carapace, and injuries attributed to scavengers are not documented in this section, but may be described in the Comments field of this section.

If an injury is present, take wide vantage and close photographs with a scale, taking care not to cover or obscure the injury. Select the photos box to indicate that images were taken.

Next, check the box next to the injury type that best describes it according to the following definitions:

1-Parallel chop wounds: Two or more linear or curvilinear chop wounds that are parallel to one another (as caused by a watercraft propeller).

2-Single/non-parallel chop wound: A single distinct straight or curved chop wound.

3-Blunt/crushing: Depressing (crushing) or fractured bone and/or lacerated (tearing) skin.

4-Amputation: Loss of 50% or more of a flipper(s).

5-Entangle-type: This refers to depressions or wounds that partially or completely encircle the neck or appendages as caused when linear material becomes wrapped around part of the body.

6-Penetrating: A penetrating or perforating wound is deeper than it is wide. Penetrating wounds extend into tissues whereas perforating wounds pass all the way through the affected structure. In lay terms, they are often described as “holes” in a body part or tissues. Causes observed in sea turtles include wounds created by projectiles (firearms, spearguns), sharp manmade objects such as fish hooks and gaffs, and objects from nature such as fish bones, stingray barbs, and sea urchin spines

7-Bite wound: Wounds inflicted by marine or terrestrial predators. The most frequently encountered in sea turtles are shark bites that are characterized by sharply incised, deep scoring of bone and soft tissue, amputation or removal of body parts, and wounds created in a semicircular pattern

8-Incised/mutilation: These are wounds inflicted by humans and may occur under circumstances such as malicious injury, postmortem specimen collection, or butchery of turtles for meat. This category includes injuries that are cleanly incised as created by a knife or other sharp instrument.

9-Other: Any injury that may have been contributed to the cause of stranding, resulted from human interaction, or significantly compromised health and fitness and that has not been captured in previous entries is recorded in this field. This includes major chronic or healed injuries (e.g., loss of large portions of the shell, skeletal fractures) of uncertain cause.

After the appropriate injury type is selected, enter the Anatomic Location Code for the part of the body that is affected by the injury. For example, for a blunt injury involving the carapace (upper shell), “C” would be entered on the line following “Blunt/crushing”

Next, review the entries in the shaded area, select any that apply to the injury, and enter the number of the injury type on the associated line. For example, if a blunt/crushing injury was found to breach the coelom (body cavity) and had associated blood clots, these entries would be selected and “3” would be entered in the provided spaces as shown here.

If there are multiple types of abnormalities, this format allows for distinct characteristics to be assigned to specific injuries. For example, if the same turtle also had a partially healed entanglement wound involving the right front flipper, the entry would look like this:

Partial healing 5F

External Injury Comments & External Diagram: Add any additional details or clarifying information to clearly describe the observed injuries. The diagram may be used to show the specific locations of any injuries as well as wound measurements. Injury type numbers can be used for these notations.

Dorsal and Ventral Photos: Photos that clearly show all dorsal and ventral aspects of the carcass should be taken prior to internal examination. Select these boxes to indicate that these photos were taken.

Man-made Material (External)

Note the presence or absence of any man-made material.

Assoc with injury? If material is observed and is associated with an injury that was described in the previous section, select this entry and note the injury type number in the provided field.

Select the type of man-made material that is present and enter the anatomical location codes where it is present on the associated line.

If entangled, how many of wraps around body part, which part? For entanglements, enter the number of times the material is wrapped around a body part and the appropriate anatomic location code. For entanglements involving multiple areas of the body, there are spaces for up to 5 different anatomic locations.

If a ligature (entanglement-type) mark/wound present: select the entry that most accurately describes the resulting injury.

Description of Material: Thoroughly describe the material. All anthropogenic material should be photographed with a scale. Note that photos were taken by selecting the box for this field.

Disposition of Material: Record whether the material was collected and its current location.

Other External Anomalies

Note the presence or absence of any abnormal epibionts, marine leeches, or externally apparent disease conditions. Photograph any observations if present and affirm that an image was taken.

Heavily encrusted w/ epibiota: Select this entry if large areas of body are densely covered by barnacles or other anomalous accumulated epibionts.

Leeches: Indicate the presence of marine leeches in the genus *Ozobranchus*. If present, select which abundance best characterizes the number of eggs or adults:

Few - Small patches of eggs or less than 100 adults.

Many - Eggs cover large areas of the flippers or body or there are more than 100 adults

Gooseneck barnacles: Select this entry to indicate the presence of gooseneck barnacles (genus *Lepas*).

FP (fibropapillomatosis): Record the presence of any skin tumors that represent the classical manifestations of FP. Anatomic location codes for tumor locations are entered in the adjacent space. If tumors are present, note if they have a papillary surface, involve the eyes, or are present inside the mouth. Circle the relative score (1-3) that best describes the extent of tumor formation as described in NOAA Technical Memorandum NMFS-OPR-60.

Ulceration/dermatitis: This section is used to document inflammation/ulceration of the skin. Indicate if present and select whether the observation is characterized as superficial crusts and/or

ulcers that expose deep tissues. If present, select the extent of the lesions that best characterize their distribution as follows:

Few/small – involve less than 10% of an affected appendage or the shell or other anatomical area and do not include involvement of either cornea (the clear part of the eye).

Large - involve 10% or more of an affected appendage or the shell or other anatomical area, or include involvement of either cornea.

Masses (non-FP or uncertain): This selection is used to document any tumor-like growth involving the skin that does not have the features depicted in “fibropapilloma-like tumor.” This includes other types of tumors, which are rare in sea turtles, as well as abnormalities that likely are not true “tumors” (i.e., that are non-neoplastic), such as aberrant accumulations of scar tissue or inflammatory material (e.g., abscesses). The common feature is that the external appearance is a space-occupying mass that extends from or upheaves the skin but does not have the features of an FP tumor or it is not obviously associated with an identifiable injury.

Other: Use this entry to record any other type of anomaly not described by other fields that may have contributed to stranding or death or significantly affected health and fitness. An example of anomalies recorded here is major congenital deformities.

Other External Anomalies Comments: Provide any additional details on entries for this section, including information on the nature of any entries as “Other.”

Internal examination

Muscle status: Select the characteristics that best describe the condition of skeletal muscle.

Fat status: Select the characteristics that best describe the condition of body fat. Standard necropsy photos show the ventral aspect of the carcass with the plastron removed to display the condition of the pectoral muscles and body fat, as well as close-up images, as necessary. Use the check box to indicate that this photo(s) was taken.

Musculoskeletal: Select whether the musculoskeletal system (muscle, bones, joints, and related tissues) was examined and all entries that best describe these observations. Provide any additional detail in the Findings/Comments section.

Coelom: Indicate whether the coelom (body cavity) could be examined. Determine the fluid volume in milliliters and indicate whether the value provided is measured (actual) or estimated.

Select all entries that best describe any observations and provide any additional details in the space below.

Internal FP: Select this box if tumors indicative of internal manifestations of fibropapillomatosis. List the location(s) and number of tumors, their sizes, and any significant related observations in the space provided (4 page form) or under the appropriate organ system (2 page form).

Heart and major vessels: Select whether the cardiovascular system was examined. Note whether there is blood within the heart chambers (absence can indicate substantial blood loss and other forms of anemia). Choose any entries that describe findings within this system and write any details in the provided space.

Liver and gallbladder: Complete as for the other organ systems.

Alimentary tract: This section records any observations related to the tubular portion of the digestive system, from the mouth to the cloaca. First enter whether the alimentary tract was examined. If one or more segments are missing, select “examined,” but not which area(s) is missing in the Findings/Comments field.

Mouth examined: Confirm that the inside of the mouth was evaluated.

General entries: In the next line, select whether any abnormality(ies) was observed and whether any ingested fish or penaeid shrimp were found.

Specific abnormalities: This section is completely similar to the External Injuries section. The appropriate numbered abnormality is selected and the Anatomical Location Code is entered into the associated blank. The extent of the finding is selected based on the percentage involvement that most accurately describes the abnormality and the corresponding number is provided in the adjacent space. Here is an example:

GI TRACT: No findings Abnormal Ingested fish Ingested shrimp CBD Mouth examined?
 10-Ulcers/exudate Co 11-Trauma/perforation 12- Obstruction/blockage 13-Intussusception
 14-Plication 15-Fluke eggs 16-Other
 <5% affected 5-25% >25-50% 10 >50% N/A

Man-made material (internal): Indicate whether any anthropogenic material was found within the alimentary tract. If present, also indicate whether it was associated with any injury and note the numeric entry for that injury type in the provided space. Select the type of man-made material that best fits the finding. All man-made material should be photographed with a scale; indicate that images were collected using the provided checkbox and indicate whether the material was saved. Lastly, describe what was done with the material and provide any additional

detail, including measurements, under Findings/Comments. Here is an example of a completed entry for this section (sea turtle with ingested fishing line resulting in plication of the intestine):

GI TRACT: No findings Abnormal Ingested fish Ingested shrimp CBD Mouth examined?
 10-Ulcers/exudate 11-Trauma/perforation 12- Obstruction/blockage 13-Intussusception
 14-Plication 15-Fluke eggs 16-Other
 <5% affected 5-25% >25-50% >50% 14 N/A
MAN-MADE MATERIAL: Y N Assoc with injury? If yes, enter the number(s) here: 14 (e.g., 14) Saved? PHOTO:
 w/ scale

Alimentary tract contents: Indicate the contents of the different regions of the alimentary tract (mouth, esophagus, stomach, intestine). List the contents as specifically as possible and include a note of relative volume (e.g., “full,” partially filled,” “abundant”) or estimate a percentage (e.g., 20% filled).

Spleen and Pancreas, Urogenital, Respiratory, Central Nervous System: Select whether each organ system was examined and indicate all pertinent findings as for the previous section. Provide any additional detail in the Findings/Comments section. Note that the sex on page 1 should be completed based on evaluation of the gonads. Additional information about characteristics of the gonads is entered depending on whether the turtle is male or female (if determined).

Summary Comment Section

Use this section to provide any additional description or detail of observations that either would not fit within previous sections or was not otherwise recorded. Provide a concise numbered summary of findings that includes any major anomalies, nutritional condition, and a summary of digestive contents. Here are some examples:

1. Parallel chop wounds with blood clots; 2. Partial atrophy of fat; 3. Crab shell in stomach and intestine

1. No injuries; 2. Abundant fat; 3. Fish within stomach, gastropods in intestine

1. Heavily encrusted by epibiota; 2. Severe atrophy of fat; 3. Ulcerated colon (70%)

Specimen Collection Inventory

Enter information about any samples or specimens collected from the sea turtle within this section.