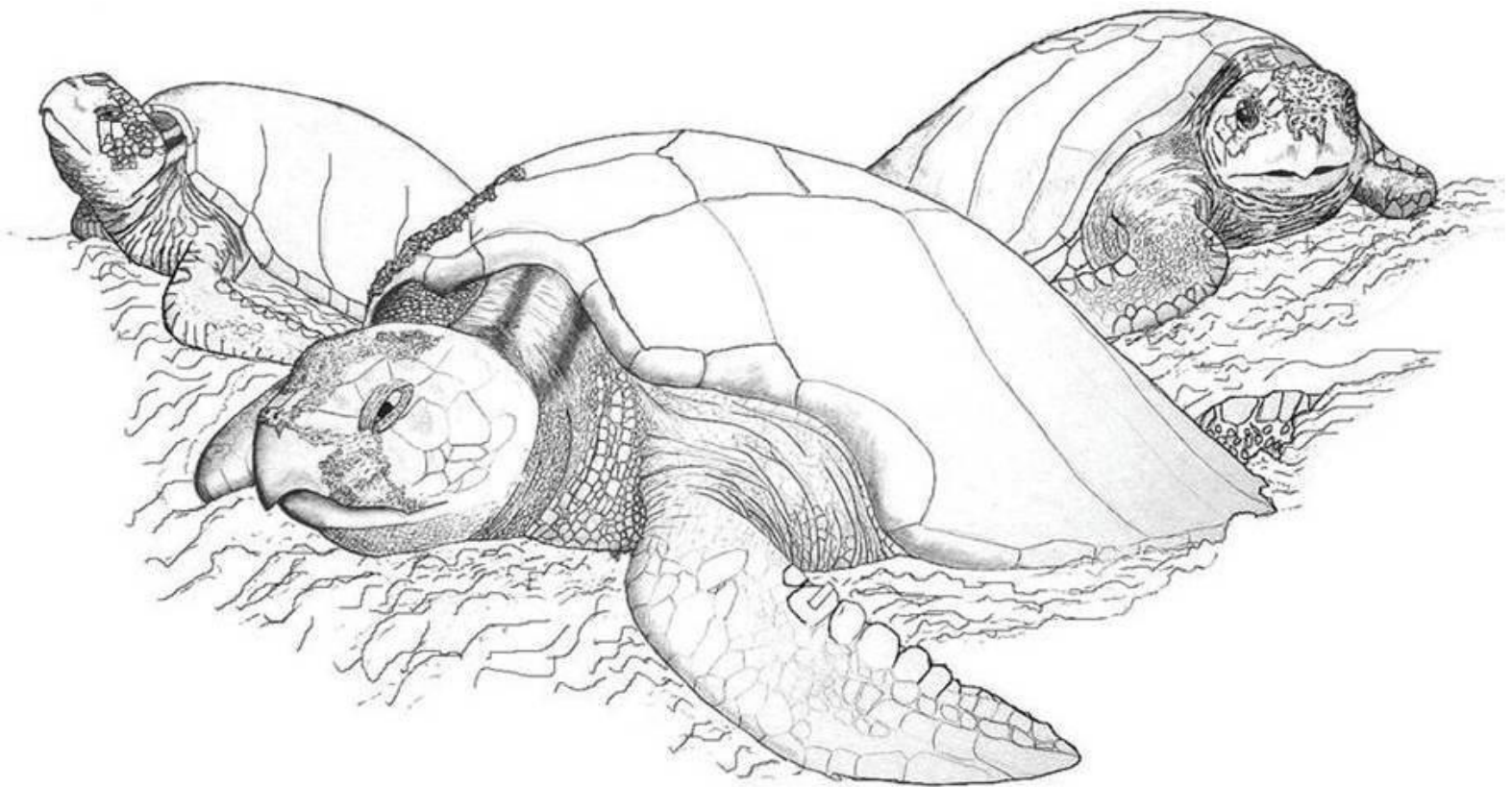




# Texas Sea Turtle Nesting and Stranding Manual



U.S. Department of the Interior  
National Park Service  
Padre Island National Seashore  
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# Texas Sea Turtle Nesting and Stranding Manual

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## **Purpose of this Manual**

The purpose of this manual is to describe the procedures and techniques used in Texas in order to standardize the documentation and protection of stranded and nesting sea turtles, eggs, and hatchlings. All species of sea turtles that occur in Texas are protected under the Endangered Species Act of 1973 and only those individuals with proper U.S. Fish and Wildlife Service (USFWS) and Texas Parks and Wildlife Department (TPWD) permits are authorized to handle sea turtles. These permits are also required for individuals handling samples collected from sea turtles and each activity type must be specifically permitted for each individual. Although this manual contains the latest procedures, methods and techniques are subject to change.

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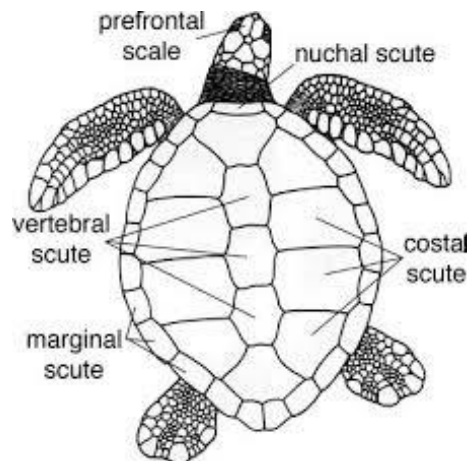
## Sea Turtles in Texas

All five species of sea turtles that occur in the Gulf of Mexico have been documented nesting on the Texas coast including: Kemp's ridley (*Lepidochelys kempii*), green turtle (*Chelonia mydas*), loggerhead (*Caretta caretta*), hawksbill (*Eretmochelys imbricata*), and leatherback (*Dermochelys coriacea*). Most of the nesting activity is by Kemp's ridleys, followed by green turtles and loggerheads. One recent leatherback nest (found in 2008), and historic nests, have been documented in Texas at Padre Island National Seashore (PAIS). One hawksbill nest has been documented in Texas and was found at PAIS in 1998. Padre Island National Seashore is the only location in Texas to have documented nesting by all five species. Nesting sea turtle protocols in this manual focus on Kemp's ridley since it has been the focus of bi-national efforts to form a secondary nesting colony on Padre Island since 1978, is endangered, and is the most frequently nesting sea turtle species in Texas.

All five species of sea turtles that occur in the Gulf of Mexico have been observed stranded on the Texas coast. Since 2009, green turtles have represented the majority of strandings that occur in Texas, due primarily to their abundance in Texas inshore waters where they feed on algae and seagrasses, and their propensity to hypothermic stunning there during periods of freezing air temperatures. Kemp's ridley, loggerhead, and hawksbill sea turtles are also found stranded throughout the year. Leatherback strandings are rare but occasionally occur on the Texas coast.

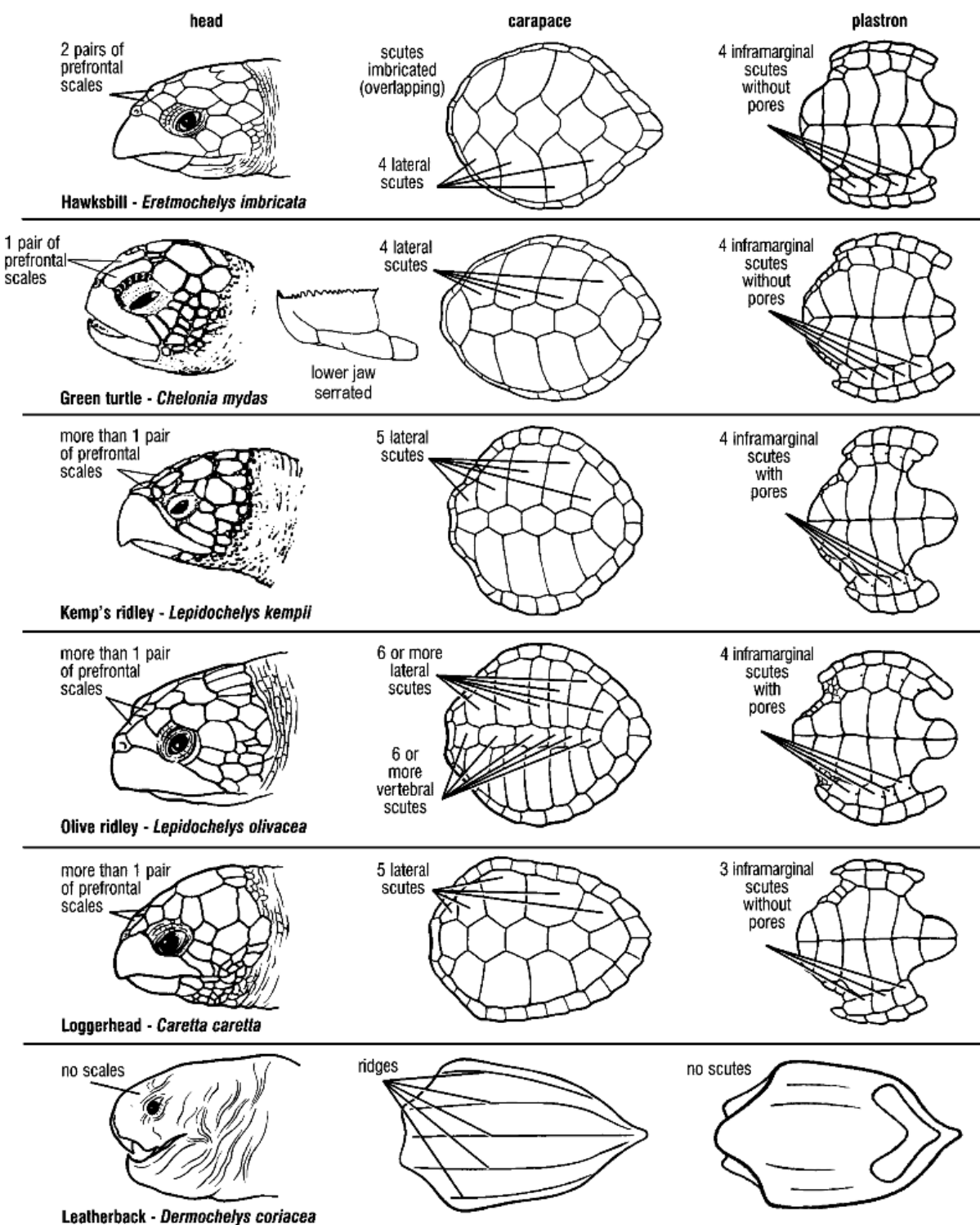
## Sea Turtle Species Identification

Sea turtle species can be identified by specific anatomical and morphological features, such as scute sequences on the carapace (upper shell) and plastron (lower shell), prefrontal scales (scales between the eyes), and coloration (Fig. 1). However, these features can vary greatly within species and between individuals. Figure 2 lists identifying characteristics of the sea turtle species found in the U.S. Olive ridleys (*Lepidochelys olivacea*) have never been documented in Texas.



**Fig. 1.** Carapace scutes and prefrontal scales.

## Section 1: Sea Turtle Species Identification



**Fig. 2.** Sea turtle species identifying characteristics.



**Fig. 3.** Adult Kemp's ridley.

**Kemp's ridley (*Lepidochelys kempii*) (Fig. 3)**

- Carapace width is similar to length (circular); five pairs of costal scutes with a maximum straight carapace length (SCL) of 72 cm
- Two pairs of prefrontal scales
- Light grey/olive green carapace
- Plastron off-white with a distinct small pore on each of the four pairs of inframarginal scutes

**Green turtle (*Chelonia mydas*) (Fig. 4)**

- Carapace broadly oval; four pairs of costal scutes with a maximum SCL of 120 cm
- One pair of prefrontal scales
- Carapace dorsally becoming brown with radiating streaks
- Plastron light yellow to white with four pairs of inframarginal scutes



**Fig. 4.** Adult green turtle.



**Fig. 5.** Adult loggerhead.

**Loggerhead (*Caretta caretta*) (Fig. 5)**

- Carapace moderately broad and oval; five pairs of costal scutes with a maximum SCL of 105 cm
- Two pairs of prefrontal scales
- Carapace unmarked reddish-brown
- Plastron yellow to orange with three pairs of inframarginal scutes



**Hawksbill** (*Eretmochelys imbricata*) (Fig. 6)

- Carapace oval, with thick overlapping scutes; four pairs of costal scutes with a maximum SCL of 90 cm
- Straight bird-like beak; two pairs of prefrontal scales
- Carapace dark to light brown, often boldly marked with amber and brown
- Plastron light yellow to white, occasionally with black markings and four pairs of inframarginal scutes



**Fig. 6.** Adult Hawksbill.

**Leatherback** (*Dermochelys coriacea*) (Fig. 7)

- Carapace elongated with seven prominent longitudinal ridges (keels); scutes are always absent; maximum SCL of 180 cm
- Head covered with unscaled skin
- Body predominantly black dorsally with variable degrees of white spotting; spots may be bluish or pink on the neck and the base of the flippers
- Plastron is predominately light in coloration
- Plastron light yellow to white, occasionally with black markings and four pairs of inframarginal scutes



**Fig. 7.** Adult leatherback. (Photo by Suzanne Livingstone)

Identifying characteristics adapted from: Eckert, K. L., K. A. Bjorndal, F. A. Abreu-Grobois, and M. Donnelly (Editors). 1999. *Research and Management Techniques for the Conservation of Sea Turtles*. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.

### **Receiving Nesting and Stranded Sea Turtle Reports**

Many sightings of sea turtles (alive and dead) are reported by beach visitors. Upon receipt of such a report, the following information should be collected from the initial observer to aid those who will be responding to the call:

1. Observer's name and telephone number in the event that the connection is lost or additional information is needed to finalize the report.
2. Date and time of sea turtle observation.
3. Location of the turtle(s), including: landmarks, mile markers, access roads, beach position (i.e. at the surf line).
4. Status and description of the turtle(s): condition (alive or dead), activity (if alive), size, color, presence of metal tag(s) or transmitter, and any wounds or abnormalities.
5. Ask the individual filing the report if they are willing to share any photographs that may assist with identification.
6. If the turtle is alive and/or nesting, request that someone stay with the turtle, if they are able, until a responder arrives.

## Patrolling for Nesting Sea Turtles and Tracks

The Texas sea turtle nesting season extends from late-March through September, and varies by species. Kemp's ridleys typically nest earlier in the season, from late-March to mid-July. The other four species nest from May through September. These times may vary due to seasonal temperature fluctuations and other factors. Kemp's ridley is the only species of sea turtle to nest mostly during daylight hours; the other four species nest primarily at night. Nests may be constructed along the entire beach width, ranging from the high tide line into the dunes. Kemp's ridleys frequently nest on days with strong onshore winds (over 15 mph), storm activity, and/or abrupt shifts in barometric pressure; however, nesting can occur during temperate weather conditions. Kemp's ridley nesting can occur individually or in groups called *arribadas* (meaning mass arrival).

In Texas, sea turtle patrols are used to detect, document, monitor, and protect all nesting sea turtles, eggs, and hatchlings occurring on Texas beaches (Fig. 8). Turtle patrollers are those individuals who search the beaches, on foot or by vehicle, for nesting sea turtles and their tracks. Patrollers may be contacted by other patrollers, volunteers, various agencies, and the public concerning nesting activities. Nest investigators are those individuals who respond to probable nesting sites to investigate the area and lead activities at the site, such as sample collection, tagging, locating the egg chamber, and collecting the eggs. Project leaders are those that lead the overall patrol project for a specified area.



**Fig. 8.** Patrolling the beach for sea turtles wearing personal protective equipment.

The best area to patrol the beach for nesting sea turtle tracks is near the high tide line. Sea turtle tracks are usually most visible on the lower, wetter portions of the beach above the intertidal zone. A patrol conducted outside of the preferred patrol zone may cause nest sites to go unnoticed. If traveling too high on the beach, a patroller may miss tracks in dry sand blown away by wind. A patroller traveling too low on the beach, close to the water, may miss tracks that have been washed over by the surf. Vehicle patrollers should maintain speeds between 10 and 15 mph or slower in rough driving conditions. Patrolling at higher speeds reduces observation time, making it difficult to locate tracks and/or nesting turtles. Patrollers should always remain aware of their current location and the locations of other patrollers to maintain evenly spaced beach coverage. It is recommended that proper personal protective equipment (PPE) be worn while patrolling, as determined by the project leader of the area (Fig. 8). All valid state and federal permits must be carried while patrolling and when transporting sea turtles (live or dead), eggs, or samples.

## Sea Turtle Track Characteristics

A nesting sea turtle will often crawl onto the beach and return to the water before a patroller crosses their path, leaving only tracks as evidence to locate the nest. Tracks will appear as a flat path, bordered by “check marks” (Fig. 9). Most tracks will be perpendicular to the water’s edge and follow a straight or meandering path. The nest is typically located at the intersection of the inbound and outbound tracks, with the top eggs anywhere from two to 20 inches below the sand surface. The flat, circular area of disturbed sand directly above the nest is referred to as a disturbed area (Fig. 10). A set of turtle tracks may also be produced from an abandoned nesting attempt (this is referred to as a non-nesting emergence or false crawl). A false crawl is usually identified by observing continuous tracks with no disturbed area. Open nest cavities may be found with a set of tracks, regardless of whether eggs were laid or not.



Fig. 9. Kemp’s ridley turtle tracks.

Each species of sea turtle leaves a different track pattern when they crawl onto the beach to lay their eggs. Characteristics of tracks such as whether flipper impressions are alternate or opposite and the width of the tracks should be noted to determine which species made them. Kemp's ridley, loggerhead, and hawksbill turtles leave alternate flipper impressions, while green and leatherback turtles leave opposite flipper impressions (Fig. 11). See Figures 12, 13, and 14 for descriptions and pictures of Kemp’s ridley, green turtle, and loggerhead tracks, the most common on Texas beaches.



Fig. 10. Kemp’s ridley disturbed area.

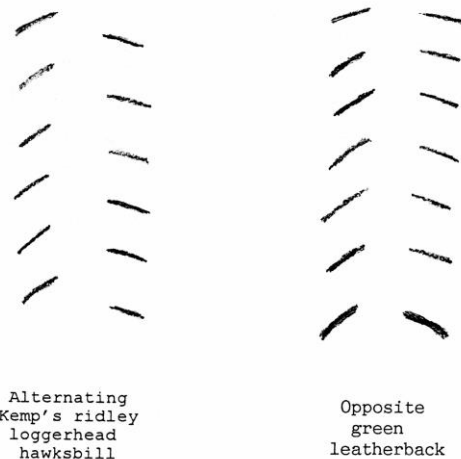


Fig. 11. Alternating and opposite flipper impressions.



**Kemp's ridley** (*Lepidochelys kempii*)  
(Fig. 12)

- Track width: 24-28 inches (60-70 cm)
- Alternate flipper impressions
- Center tail drag mark lacking or inconspicuous
- Sometimes difficult to see; disappears quickly
- Average clutch size: 100 eggs



**Fig. 12.** Kemp's ridley tracks.



**Fig. 13.** Loggerhead tracks.

**Loggerhead** (*Caretta caretta*) (Figs. 13-14)

- Track width: 26-40 inches (65-100 cm)
- Alternate flipper impressions
- Moderately deep cut
- Center tail drag mark evident, generally not along a straight line
- Average clutch size: 110-130 eggs



**Fig. 14.** Loggerhead body pit.

**Green turtle (*Chelonia mydas*) (Figs. 15-17)**

- Track width: 39-50 inches (100-130 cm)
- Opposite flipper impressions
- Deeply cut tracks
- Center drag mark from tail evident, generally along a straight line
- May have multiple body pits that are larger and deeper than loggerheads
- Average clutch size: 113 eggs



**Fig. 15.** Green turtle tracks.



**Fig. 16.** Green turtle body pit.



**Fig. 17.** Green turtle body pit.

**Hawksbill** (*Eretmochelys imbricata*) (Fig. 18)

- Track width: 27-33 inches (70-85 cm)
- Alternate flipper impressions
- Deeper cut flipper impressions compared to ridleys
- Nests under or in dune vegetation
- Average clutch size: 130 eggs



**Fig. 18.** Hawksbill tracks.  
(Photo by Kelly Pendoley)



**Fig. 19.** Leatherback tracks.  
(Photo by Jacey Biery)

**Leatherback** (*Dermochelys coricea*) (Fig. 19)

- Track width: 59-90 (150-230 cm)
- Opposite flipper impressions
- Broad, deeply cut tracks
- Deep center drag mark from long tail
- Average clutch size: 80-90 eggs



### Documenting and Protecting Nests and Tracks

When a nesting turtle, tracks, or nest is found, the patroller should immediately call to request assistance from a nest investigator. If a nesting turtle is observed, specific procedures will need to be followed (Refer to Section 3: Nesting Sea Turtle Documentation). All tracks, whether from a false crawl or a successful nesting, should be reported, investigated, and documented on the Texas Data Sheet for Sea Turtle Tracks and Nests (Appendix A).

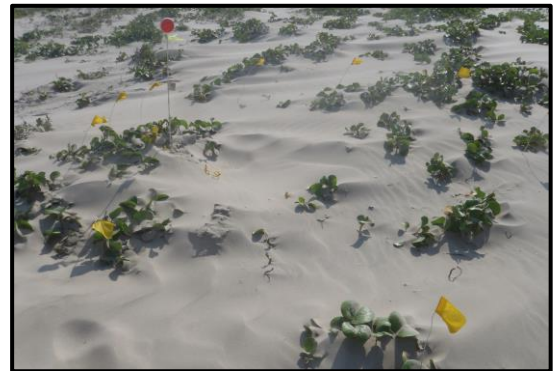
Immediately notify the Texas Coordinator (Dr. Donna Shaver) every time a nesting sea turtle, nest, or tracks are found or suspected. If it is a Kemp's ridley nest, she will notify other project leaders throughout Texas. By the end of each nesting day, the total number of nests found (by species) must be reported to ensure that this information is added to the real-time nest tally, distributed to all participating state programs. Nesting data sheets must be transferred with the collected clutches transported to the Padre Island National Seashore incubation facility or faxed (361-949-9134) within 24 hours for clutches incubated elsewhere. In addition, original forms should be mailed to Dr. Donna Shaver within 24 hours at Padre Island National Seashore, P.O. Box 181300, Corpus Christi, Texas, 78480.

Whenever a set of unaccompanied tracks is discovered or a female is observed returning to the ocean, the nest location may not be obvious. While the investigator is en route, precaution should be taken to preserve, mark, and photograph the tracks and disturbed area(s) to help nest investigators identify the nest location. Tracks made on windy or stormy days will vanish relatively quickly so it is important to remain alert and search even more carefully for tracks on days with these weather conditions.

The patroller should carefully investigate the area, making sure not to step on the turtle tracks or any suspected nest locations. Flagging tape, reflective stakes, cones, and debris may be used to safely mark the tracks and disturbed area or any suspected nest site (Fig 20., Fig 21.). Place the objects around the perimeter of the disturbed area to mark it and protect the nest site from passing traffic. Do not pierce anything into the nest cavity as it may damage the eggs. Photograph the tracks and the disturbed area. Upon arrival, the nest investigator will attempt to locate the nest before signs of turtle activity are destroyed by weather or human disturbance. If no obvious nest location is found, the end of the visible tracks should be marked well and photographed. The age of the tracks should be estimated based on the clarity of the impression and whether the tracks are present in the intertidal zone, taking into account the wind level and tidal direction. If time permits, and only if the turtle was



**Fig. 20.** Marked Kemp's ridley tracks.



**Fig. 21.** Nest location marked by flags, lollipop stake, and nest stringer.



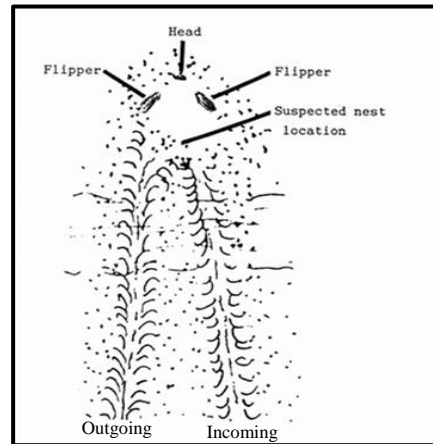
## Section 2: Patrolling for Nesting Sea Turtles and Tracks

not observed, the width of the track should be measured straight across, not diagonal, from the widest point of the marks left by the flippers (Fig. 22).

A clutch of eggs laid during a successful nesting event will usually be located beneath a disturbed area, which is often 2-6 feet in diameter. Since the nesting female may move a few feet while covering the nest or face any direction when depositing the eggs, the actual nest can be located under any portion of the disturbed area. Closely examine the area for head and front flipper impressions, while being careful not to disturb any evidence. The impressions will indicate how the female was positioned when she laid the clutch of eggs or covered the nest. If these impressions are found, the portion of the area directly opposite them should be targeted as the most probable nest location (Fig. 23). Also, look for sprayed sand, which is a likely indicator of successful nesting and covering.



**Fig. 22.** Measuring the width of the tracks.



**Fig. 23.** Impressions indicating a suspected nest location.

The nest investigator will lead nest location and protection activities. Gloves must be worn at all times while uncovering a suspected nest location. If eggs are found, it should be noted on the data sheet and excavation procedures detailed in Section 4: Sea Turtle Nest Management should be followed. A sea turtle emergence is considered a false crawl when no eggs are found after a thorough investigation of clear tracks with or lacking a disturbed area. An event will be considered “unknown” if the observed tracks are windblown or otherwise not clear, do not intersect (i.e. no disturbed area is seen), and an extensive search does not reveal a nest cavity. For both false crawls and unknowns, the area should be marked and inspected daily during the course of the projected incubation and hatching period (45-60 days) for signs of predation and hatching.

In summary, when unaccompanied turtle tracks are found, the following steps should be taken:

1. Call to notify and/or request assistance.
2. Mark and photograph tracks and possible nest location, making sure not to step on them.
3. Collect and record data on nesting data sheet.
4. Attempt to identify species from track pattern and width.
5. If requested, aid with nest excavation. Do not dig into or excavate a nest unless instructed to do so by the project leader.
6. After the site investigation is complete, including all data collection and nest protection, mark the tracks well, to ensure that they are not reported multiple times, as well as to distinguish those old tracks from any new tracks found in the same vicinity.

## Nesting Sea Turtle Documentation

Kemp's ridleys require approximately 30 to 90 minutes to complete the nesting process from emergence onto the beach to re-entry into the ocean. Nesting is generally slower in the cooler, earlier part of the season. As the season progresses and temperatures rise, nesting may take less time. A female can easily be deterred from nesting if she is approached or disturbed before she has selected a nest site, dug a cavity, or begun depositing eggs. She may abandon nesting if her tail or rear flippers are touched during this process. If a turtle is observed emerging from the water or crawling toward the dunes (away from the water), the patroller should stop the patrol vehicle and quietly observe the turtle before approaching. The patroller should also advise any visitors in the area to avoid making noise and stand away from the turtle until nesting is complete.

Nesting Kemp's ridleys blend in extremely well with the sand and vegetation. They often nest in vehicle ruts and become partially covered with sand during nesting. They will not and cannot move quickly to avoid approaching vehicles. The person on-scene must take charge to protect the turtle from traffic and disturbance. They must also keep vehicles and pedestrians off the nest area, and, if the nest location is unknown, off the tracks.

If the turtle is discovered while she is laying eggs, she must not be approached until after she has laid a few eggs. The egg chamber location should be marked as soon as it is safe to approach. To mark a nest, cautiously approach the turtle from the rear to minimize disturbance. As the female deposits her eggs, carefully remove some sand to reveal the nest cavity (Fig. 24) and insert one end of a nest stringer (i.e. a cord with smooth PVC rings at both ends). The cord must then be shifted so that it emerges from one side of the turtle to prevent her rear flippers from becoming entangled and tugging on the stringer (Fig. 25). Dig a small trench to bury the section of stringer near the turtle to secure it during the turtle's activities. The other end of the stringer should be attached to a stake that is inserted into the sand at about two feet away from the egg chamber. An alternative marking method is to place multiple markers on the sand surface, surrounding the disturbed area. However, this is not as effective because the turtle may move or cover the markers during the nesting process.



**Fig. 24.** Kemp's ridley nest cavity after sand cleared.



**Fig. 25.** Nest with stringer and marker.

## Holding the Turtle

A nesting turtle should only be held on the beach after egg laying is completed and more time is needed to take measurements, apply tags, or if the turtle has been selected to receive a satellite transmitter. Visitors may be asked to assist with holding when instructed to do so properly and are supervised by a permitted individual. Turtles may be held safely from the front (Fig. 28) or from behind (Fig. 26, 27) by holding the edge of the anterior carapace, just behind the head.

- Do not place hands or other body parts near the mouth of the turtle.
- Extreme care should be taken to ensure that the nesting turtle does not overheat while on the beach. Methods to prevent the turtle from over-heating include:
  1. Hold the turtle when she gets closer to the tideline (where the wet sand is cooler).
  2. Place a moistened towel over the carapace and re-wet repeatedly every 10 minutes.
  3. Use an umbrella, tarp, or other object over the turtle to provide shade.
  4. Continuously wet the turtle and the underlying sand with water.
- If a turtle has a satellite transmitter, do not grasp the transmitter or press against the transmitter or material that was used to adhere it to the turtle. Hold the turtle by the front and side of the carapace (Fig. 28).
- Do not press or lean your weight onto the carapace of a turtle, which could limit her breathing.
- Do not flip the turtle onto its carapace. Leaving a nesting turtle on its carapace for extended time periods is extremely stressful and potentially fatal.



Fig. 26. Safely holding turtle from behind.



Fig. 27. Safely holding turtle from behind.



Fig. 28. Safely holding a transmitter turtle from the front.

### Assisting the Turtle

There are rare occasions when a turtle may need assistance digging a nest, and this assistance should only be rendered once it is clear that the turtle is unable to successfully complete her egg chamber. The turtle may have a missing rear flipper, or the flipper may be present yet unable to function normally, which could necessitate intervention. The turtle is not touched during this entire process, and caution is important so as not to disturb the turtle. If done correctly the turtle should not know that a person was ever there. After the decision has been made to help the turtle dig, the following steps should be taken:

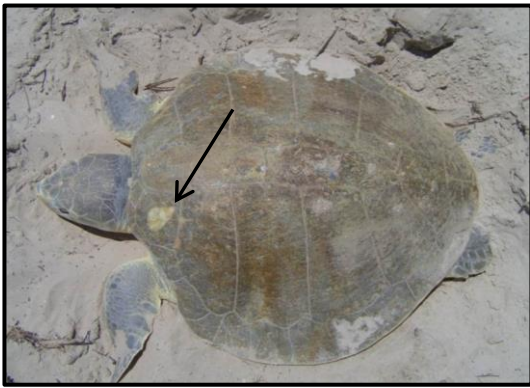
- Slowly and quietly approach from directly behind the turtle while keeping low. Keep the carapace of the turtle between you and the head, essentially hiding from sight behind the shell. The final distance should be belly-crawled. Do NOT touch the turtle.
- Assess the situation again, and be certain the turtle needs assistance digging.
- Observe the turtle and determine its rhythm of digging, to see when you are able to intervene.
- Prepare the rear of the digging site by removing any sand mounds to facilitate access to the cavity.
- When possible, wait for the working flipper to exit the nest cavity and carefully but quickly reach in, and scoop some sand out. Be careful to not collapse the egg chamber.
- Continue this process, working primarily on the side where the missing flipper would be.
- If the turtle aborts the location and moves, crawl away while remaining behind the turtle until at a safe distance. Allow it to select a new site, and then begin this list again.
- When the turtle is ready to begin laying eggs, she will leave both flippers out of the cavity and cloacal contractions will begin. When this happens, stop digging and wait for the first egg to drop.
- Once the first egg has dropped, you may treat this turtle the same as all other turtles and begin working up as normal.



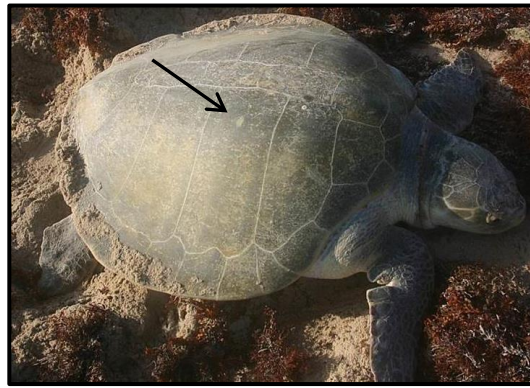
## Identifying Tags and Recording Tag Data

### Living Tags

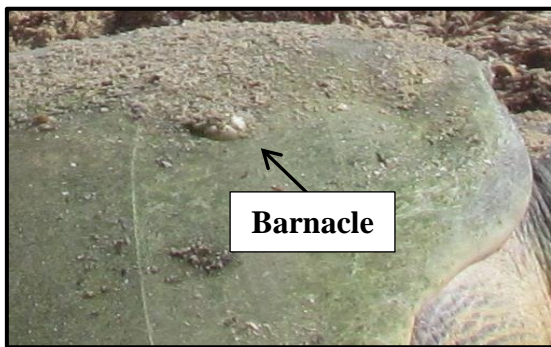
A living tag is a type of tag created when a small plug of the plastron is glued to the surrounding surface of the carapace leaving a light patch on the darker, olive colored carapace (Figs. 29, 30). Living tags were applied to some Kemp's ridley and green sea turtles that were head-started and released in the Gulf of Mexico. To check for living tags, it is important that the entire carapace is visible (Figs. 31, 32). Use a scouring pad or brush to remove any sand and epibiota by applying gentle pressure to the carapace in a sweeping (not grinding) manner. If a turtle responds to the brushing while laying eggs, discontinue use until all eggs have been laid. If a living tag is found, its location on the carapace should be recorded on the nesting form and photographs must be taken to document and verify the tag. Photographs of suspected living tags must be submitted to Dr. Shaver for verification; living tags can be confused with barnacle scars.



**Fig. 29.** Living tag on a head-start Kemp's ridley.



**Fig. 30.** Living tag on a head-start Kemp's ridley.



**Fig. 31.** Carapace before being cleaned.



**Fig. 32.** Same turtle as Fig. 29 after being cleaned, revealing a living tag and barnacle scar.

**Metal Flipper Tags**

Metal (Inconel) flipper tags are frequently used to identify an individual sea turtle. Flipper tags may be located on the trailing edge of the front and rear flippers. Closely examine all four flippers to indicate the presence of a flipper tag or tag scar (torn or missing portion of the flipper where a flipper tag was once applied) (Fig. 33). If you find a large right front tag scar on a Kemp’s ridley (Fig. 34) this turtle is likely a head-start turtle and should be examined very



**Fig. 33.** Inconspicuous tag scar on the left front flipper of a wild Kemp’s ridley.



**Fig. 34.** Large, obvious tag scar on the right front flipper of a head-start Kemp’s ridley.

closely for living, magnetic, PIT and metal tags. Most metal tags have a sequence of three letters followed by three numbers (Fig. 35a), but some have two numbers followed by four letters (Fig.35b). If the tag appears old or unusual, write down the address found on the back of the tag. If metal tags or tag scars are present, record the identification number(s) (do not guess at obscured characters!) or tag scar size and location on the nesting form and take photographs for verification. Tags should be applied to turtles that lack tags or possess old tags that are damaged. If the tag is covered in epibiota and cannot be read or if it is almost falling off, a new tag should be applied to the next scale or the flipper on the other side of the body. Do not remove the old tag unless it is unlatched on the back. If there are large tag scars on all flippers, then do not apply any additional metal tags, but verify that a PIT tag is present. A correctly latched tag will have the metal tag point inserted through the opening on the back of the tag and folded over smoothly (Figs. 35a,35b). See below for instructions about how to apply metal tags.



**Fig. 35a.** Metal tag, front: YYA 669, and back: showing crimp and address.



**Fig. 35b.** Metal tag, front: HG 9581.



**Metal Tag Application**

If two metal tags are not present, these should be applied along the trailing edge of the left front flipper through the center of the second large scale down from the axilla (“armpit”) (Fig. 36) and in the trailing edge of the left rear flipper through the center of the largest scale (Fig. 37). Prior to tag application, the tag prong should be checked and adjusted if needed to line up with the hole on the other side of the tag. Antibacterial ointment should be placed on the tag prong and the flipper area to be tagged should be brushed free of sand and cleaned with iodine or isopropyl alcohol. Make sure that the gap within the tag is wider than the thickness of the flipper where the tag will be applied. The tag should be placed into tagging pliers with the number side up. Holding the flipper firmly, line the tag to the proper location allowing about ¼ of the length of the tag (1 cm) to extend past the flipper edge. Squeeze firmly on the pliers (this may take both hands), allowing the tag to quickly push through the skin and latch into place (Fig. 38). Examine the ventral side of the flipper to confirm that the tag clasping mechanism was properly engaged and the tag is secure (Fig. 35a). After tag application, antibacterial ointment should be applied to the area. Pressure should be applied if bleeding occurs and the turtle should not be allowed to re-enter the water until bleeding stops. Record each tag number on the nesting form and photograph all flippers.



**Fig. 36.** Metal flipper tag on left front flipper.



**Fig. 37.** Metal tag on left rear flipper.



**Fig. 38.** Metal flipper tag application.

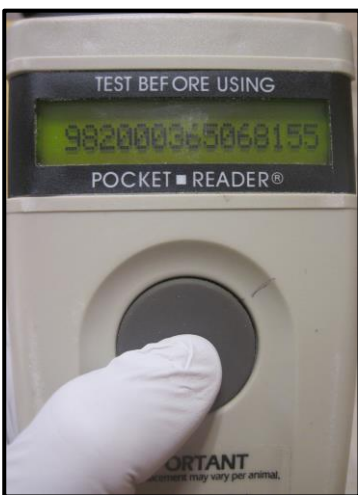
**PIT Tags**

PIT (Passive Integrated Transponder) tags are radio frequency emitting devices that are injected into sea turtles and used as one of the more permanent methods of individual identification. PIT tags have a unique 10 to 15 digit alpha-numeric identification code that is easily read by a scanning device (Figs. 39a, 39b). Most PIT tags have been applied in the muscle on the dorsal surface of the left front flipper between a projecting bone near the axilla and another projecting bone located about one-third of the way down the flipper (Fig. 41). However, some PIT tags have been injected into the right front flipper or the anterior shoulder areas close to the carapace. If a scanner is available, the nesting turtle should be scanned in these areas to determine the presence or absence of a PIT tag. To use the scanning device, press the round button once then wait until a beep is heard and the screen displays “READY”. Press and continue to hold the button down to scan (screen should say “WORKING” the entire time) while slowly pressing the flat back surface of the scanning device against the skin along the described scanning areas repeatedly (Fig. 39c). Tag presence is signified by a beep and an identification number will be displayed on the screen. Indicate the tag as “present” and record the identification number and

location on the form. If there is a period after the first three numbers, make sure to carefully record all numbers and the period on the data sheet. Also, photograph the tag number visible on the display to document it. If a PIT tag is not detected after thorough scanning, one should be applied and the information should be recorded on the nesting form. See instructions below on how to apply PIT tags.



**Fig. 39a.** PIT tag reader displaying numeric identification number.



**Fig. 39b.** PIT tag reader displaying numeric identification number.

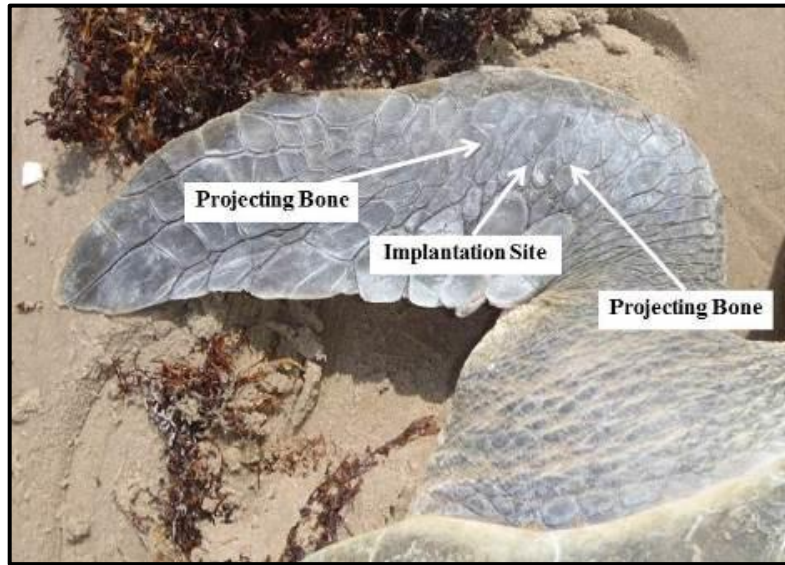


**Fig. 39c.** Incorrect (top) vs correct (bottom) use of PIT tag reader. In order for tag presence to be detected, the back of the scanner must be pressed flush against the flipper.



**PIT Tag Application**

If a PIT tag is not detected during scanning, a PIT tag should be implanted in the left front flipper in the muscle mass between the two projecting bones (Fig. 41). Do not implant a tag if the turtle has not been scanned. Prior to PIT tag implantation, clean the area to be tagged with iodine or isopropyl alcohol. Scan the PIT tag through the envelope to ensure that it is functional and the ID number is identical to that listed on the adhesive label (Fig. 42). Insert the tag/needle assembly into the applicator, remove the plastic cap, and locate the implantation site (Fig. 41). Hold the applicator and needle at a 45 degree angle from the flipper, insert the needle between two scales, and inject the tag into the center of the muscle (Fig. 43). Once the tag has been inserted, the needle should be pulled out gently. Carefully remove the needle from the applicator and discard it in a sharps container. Apply pressure at the implantation site to reduce bleeding. Re-scan the flipper to verify implantation and that the tag is working properly; then apply antibiotic ointment. Attach one copy of the adhesive label to the nesting form and mark “applied”. Retain PIT tag envelopes with the remaining adhesive stickers with the original nesting form and submit them to the Texas STSSN Coordinator.



**Fig. 41.** PIT tag implantation site.



**Fig. 42.** Two styles of PIT tag in envelope.



**Fig. 43.** Left front flipper PIT tag implantation.

**Magnetic (Coded Wire) Tags**

Magnetic (coded wire) tags were applied to the front flippers of many head-start Kemp’s ridley turtles. Due to the expense, the number of magnetic coded wire tag detectors (magnetometers or wands) is limited and not all patrollers will be equipped with one. If a magnetometer is available, the entire lengths of both front flippers should be scanned for magnetic tags. Tag presence is signified by a beep emitted from the wand. All metal objects will cause a magnetometer to emit a beep, including implanted PIT tags. Any jewelry and surrounding metal items should be removed before scanning the turtle. If a magnetic tag is not detected, a magnet should be swept over the flippers in an effort to re-magnetize the tag (in the event that one is present but has lost its magnetism), prior to rescanning. See Appendix B for detailed instructions on scanning with a magnetometer.

**Satellite Transmitters**

A few Kemp’s ridleys may be equipped with a satellite transmitter or Platform Transmitter Terminal (PTT) (Fig. 44). If a nesting turtle is found with a satellite transmitter, the salt water switches located on the transmitter should be gently scrubbed with a scouring pad to remove any epibiotic growth before the turtle is released back into the water (Figs. 45, 46, 47). Cleaning these switches improves the longevity of the transmitter. The transmitter presence should be recorded on the nesting form, as well as the ID number if visible. Use extreme care when handling a sea turtle with a transmitter, making sure not to press against it, which could dislodge the transmitter (Fig. 28).



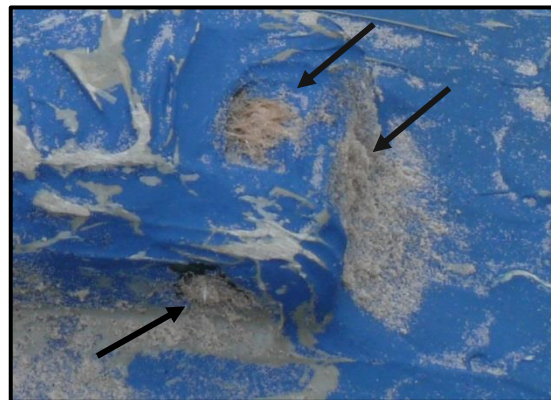
**Fig. 44.** Kemp’s ridley with a transmitter.



**Fig. 45.** Transmitter with epibiotic growth.



**Fig. 46.** Salt water switches with no epibiotic growth.



**Fig. 47.** Salt water switches with epibiotic growth.



## Sample Collection and Measurements

### Photographs

Photographs should be taken of nesting turtles whenever possible. Photographs should be composed well (ie. close enough to view the subject clearly, not overexposed or underexposed, and avoid including shadows, camera straps, photographer's fingers or hair, and unnecessary clutter). Care should be taken to exhibit proper uniform use and adherence to permit and Institutional Animal Care and Use Committee (IACUC) conditions. Photograph the entire cleaned carapace from a downward angle to document and confirm the species, the presence or absence of living tags, and any deformities, tumors, or defining characteristics. Each flipper should be photographed to indicate any tags, tag scars, deformities, or lack thereof. A clear photo of the PIT tag number in the scanner display should be taken to reference and verify existing and applied PIT tags. Photograph the turtle tracks from different angles if the species or nest location is unknown. The track photos should show the incoming and outgoing tracks and any potential disturbed areas (Fig. 48) and close-up photos should show the crawl pattern (Fig. 49). It is helpful to include an object of known size (pen, measuring tape, etc.) in order to visually display the width of the track. Scenic photographs of the nesting turtles can be taken if time permits.



**Fig. 48.** Photograph of incoming (left) and outgoing (outgoing) tracks.



**Fig. 49.** Close-up track photograph displaying an alternating track pattern.

### Measurements

Straight and curved carapace measurements should be taken for each nesting female in centimeters (cm). A set of calipers is used to obtain straight carapace measurements (Fig. 50, 52) and a non-metal flexible tape is used to obtain curved carapace measurements (Fig. 51). A set of three measurements should be taken using both of these measuring instruments: notch to tip, notch to notch, and width (Fig. 53, 54).



**Fig. 50.** Measuring straight carapace length using calipers.

### Section 3: Nesting Sea Turtle Documentation

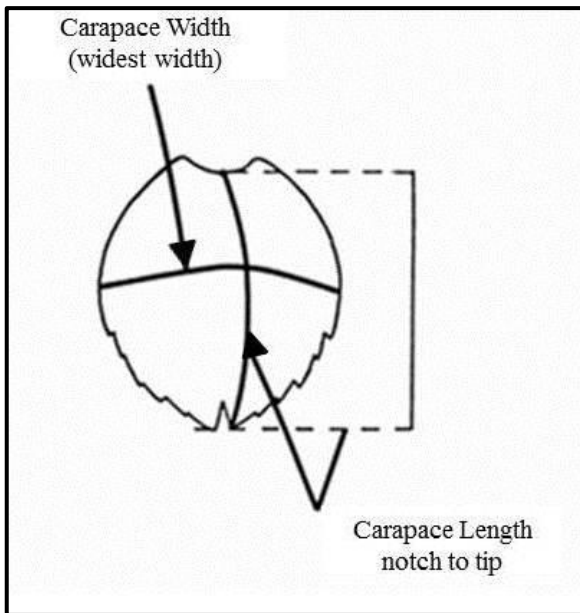
Each instrument is stretched from the center of the nuchal notch to the longest tip of the posterior carapace to obtain the notch-tip measurement (maximum) and from the center of the nuchal notch to the notch between the posterior carapace tips to obtain the notch-notch (minimum) measurement. Straight and curved width measurements should be taken at the widest point of the carapace. All measurements should be recorded on the nesting form.



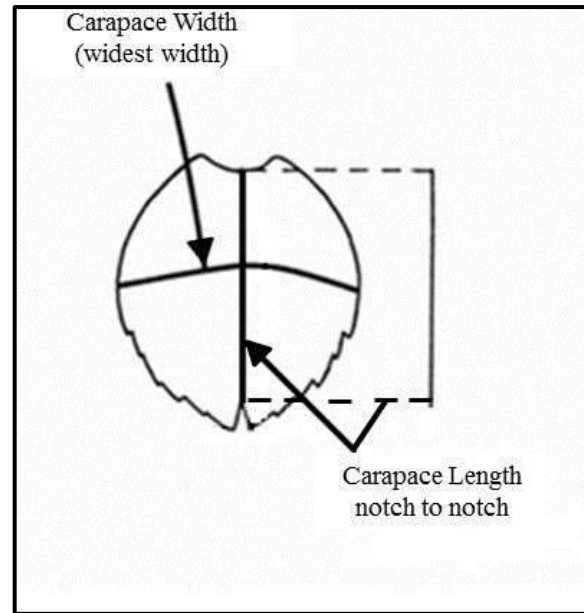
**Fig. 51.** Measuring curved carapace length using non-metal flexible tape measure.



**Fig. 52.** Measuring straight carapace length using metal calipers.



**Fig. 53.** Carapace measurements: width and length (notch to tip).



**Fig. 54.** Carapace measurements: width and length (notch to notch).

### **Tissue Biopsy**

A tissue biopsy should be collected from each nesting turtle. Clean the skin on the left rear flipper's trailing edge with an isopropyl alcohol pad. Place a hard surface underneath the cleaned area (i.e. plastic jar lid or clipboard). Align the 6 mm sterile, disposable biopsy punch over the area and apply gentle pressure and rotation to remove a 3/4 moon shaped section of tissue (Fig. 55). Place the sample in a small vial labeled with the date, species code, and PIT or metal tag number (Ex.: 5 June 2017 LK, ABB 554). Apply pressure to stop bleeding if it occurs and apply antibiotic ointment. Dispose of the biopsy punch in a sharps container. Record sample collection information on the nesting form. The sample should be transported in a cooler with ice and frozen as soon as possible.



**Fig. 55.** Biopsy punch on rear flipper. Note: sample is skin, not scale tissue.

## **Nesting Sea Turtle Documentation**

### **Overview**

Steps to complete once a nesting sea turtle is observed on the beach:

1. Observe the nesting turtle's behavior and approach only after she has begun laying eggs.
2. Insert nest stringer into the nest cavity as the turtle is laying eggs.
3. Check for metal tags, PIT tags, magnetic tags, transmitter ID, and tag scars and record on nesting form.
4. Apply PIT and metal tags if applicable and record numbers on nesting form.
5. Brush/scrub top of shell to check for living tag and record location on nesting form.
6. Obtain a tissue sample.
7. Obtain carapace measurements.
8. Photograph carapace, tags, transmitter, flippers, and/or abnormalities.



## Sea Turtle Nest Management

While relocating nests, it is important that eggs are excavated in a safe but expeditious manner. Eggs left uncovered for a long time can be damaged by exposure to sunlight, desiccation, or insect infestation. Also, older eggs are more vulnerable to movement-induced mortality and must be handled more carefully. The age of the eggs should be estimated based on when the turtle was seen or if no turtle was seen, and the translucence of the shell. Eggs with a white spot on top have incubated for at least 12-24 hours and must be handled with extreme care when moved. On *arribada* days, nests and suspected nest sites may need to be marked and retrieved later that day if they can be protected on the beach until that time. However, the time between egg laying and retrieval (excavation, transportation, placement into the incubation facility or corral) should be minimized to reduce the likelihood of movement-induced mortality.

### Nest Excavation Procedures

Eggs should be packed in Styrofoam boxes that have been soaked, drilled, washed, dried, and stored properly (see Appendix C: Nest Handling Equipment). Identical procedures should be used to pack eggs, regardless of whether they will be incubated in a Styrofoam box or transported for incubation in a corral. If multiple boxes are required for the excavation be sure to label the first box “A”, the second box “B”, and so on.

Additionally, label the boxes with the number of eggs they contain.

It is not necessary to split single clutches into multiple boxes or install temperature probes in boxes that are only used to transport eggs to a corral.



**Fig. 56.** Excavating a Kemp’s ridley nest.

### Excavation Beach Preparation

Begin by leveling the sand where the egg box will rest during the packing procedure. Scrape away the hot sand on the surface during this leveling, so that the sand beneath the box is moister, cooler sand. Take note of the sun’s angle, and position the egg box where it is shaded by people, a vehicle, the dune line, or a towel.

### Egg Packing

While wearing gloves, add a three inch layer of moist sand from the nest cavity (or from similar depth in the nest vicinity) to the bottom, and a two inch layer around the side walls, of the Styrofoam box. Do not use sand with high clay content, sharp shells, *Sargassum sp.*, sea grasses, or any other debris (Fig. 57a, 57b). Additionally, avoid using sand that is near the water’s edge since it is high in salt content and saltwater. It may be necessary to go to a different location to obtain appropriate sand. Make sure the egg box and sand do not smell musty. Do not allow the egg boxes or sand buckets to get wet and remain damp, as mildew could grow.

While the eggs are being packed, prevent the collected sand from becoming too hot and dried from the sun by using a towel to shade the bucket(s). Similarly, keep the eggs shaded during excavation. Eggs should be handled with caution, but do not take too long as this could cause the eggs and sand to dry out. Eggs should not be rotated and should be lifted individually when placed into the box. Egg packing should simulate the deposited structure of the eggs in a natural nest; therefore, do not put sand between layers of eggs. Eggs should be placed so that a two inch gap exists between the eggs and the side walls of the box (Figs. 56, 58). As eggs are being stacked, continue to fill the two-inch space along the walls of the box with sand, to stabilize the eggs in the box.



Fig. 57a. Sand with high shell content.



Fig. 57b. Sand with high clay content.

**Broken Eggs and Predated Nests**

Be sure to clean off any eggs that have yolk material on them from neighboring broken eggs. Use moist sand to gently wipe away the yolk material. If possible, segregate highly misshapen eggs, and eggs with yolk on them that could not be cleaned, to another incubation box. Note on the egg box if the contents have been exposed to yolk.

If a nest has been predated, check to see if any eggs remain in the nest cavity. Collect broken eggshells and estimate the number of eggs broken. Count and carefully pack any remaining intact eggs, making sure to wipe away any yolk material and to not include any visible insects or pests. Clutch size based on the broken and intact eggs may be an underestimate because some eggs may have been removed from the nest site. Since larvae could be present on eggs and in sand, use sand that is from several feet away, and not from the nest cavity itself. Isolate the collected intact eggs to a distant part of the corral or incubation facility and cover with tulle so that if insects emerge from undetected larvae they do not impact other clutches.

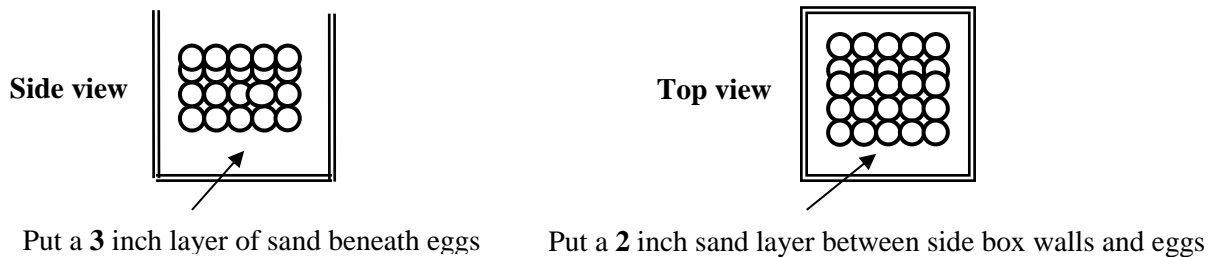


Fig. 58. Arrangement of sand and eggs in the Styrofoam box from side view and top view.

### Clutches Held in the Incubation Facility

Additional procedures are described here for clutches of eggs that will be placed in the incubation facility. Note: Not following these guidelines can result in lethal temperatures during incubation.

- **Kemp's ridley** clutches with 100 eggs or less should be placed into one Styrofoam egg box. Kemp's ridley clutches with more than **100** eggs should be split evenly into two boxes (with a similar number of eggs in each box) (Fig. 59).
- **Loggerhead** clutches should be distributed evenly into as many boxes as needed so there are no more than **60** eggs per box.
- **Green turtle** clutches should be distributed evenly into as many boxes as needed so there are no more than **40** eggs per box.
- Unknown species and any nests collected after August 1<sup>st</sup>, should be distributed evenly so there are no more than **40** eggs per box.

If it is not possible to split the clutch evenly, the box with fewer eggs should have four inches of sand on the bottom instead of three inches. Ideally, clutches should be split in the field during initial excavation. If for some reason the nest is not split in the field, it should be done as soon as possible, usually immediately upon the arrival to the incubation facility.

After approximately half of the eggs to be placed in the Styrofoam box have been transferred, a thermocouple probe should be inserted through a hole on the side of the box, UNDERNEATH the plastic red hole made for the box handle (Fig. 61). That hole is too high. The probe should lie flat between the egg rows and the tip should be situated in the center of the egg mass (Figs. 60, 62). To accurately record mid-nest temperatures, the probe must be firmly affixed so that the tip resides in the center of the egg mass in the box. Using duct tape, secure the probe with a small section of tape (1/2 inch or shorter) on the inside of the box and with a large section of tape on the outside of the box to prevent accidental removal. Be careful not to damage or pierce any of the eggs while inserting the probe. Do not bend the probe at sharp angles or the wires inside of it could be damaged. At least six inches of the probe, including the prong contact, should remain outside of the box to be attached in the incubation facility. If the contact is



Fig. 59. Splitting a larger clutch.



Fig. 60. Insert the thermocouple probe straight into the center of the egg mass.

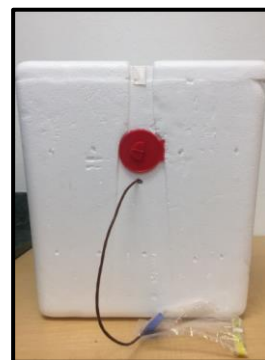


Fig. 61. Insert the probe through a hole underneath the box handle.



less than six inches from the outside of the box, the nest may not be able to be linked to the temperature monitoring system in the incubation facility, preventing the ability to monitor incubation temperatures. Place the remaining eggs into the Styrofoam egg box(es) and fill the spaces between the eggs and the box walls with sand. To secure the eggs in place and retain moisture, lightly sprinkle a one and a half inch layer of sand on top of the eggs for transport. There should be no exposed eggs. After the eggs have been placed in the incubation facility, an additional 1-2 inches of sand will be carefully added.



**Fig. 62.** Styrofoam incubation box showing placement of temperature probe from side view and top view.

### Transporting Eggs

A four-wheel drive vehicle may be required to transport the eggs on the beach. Eggs should be kept from jarring during transport by carefully placing them in an egg carrier while keeping the eggs level (Fig. 63) (see Appendix C: Nest Handling Equipment). Packed egg boxes must not be tilted for any reason and should always be carried by two people on opposing sides of the box to limit movement. After the egg boxes are placed into a carrier, the carrier should be positioned in the seat of the vehicle (Fig. 64). Place pieces of foam or clean towels between the box and the carrier and between the carrier and the seat to keep the carrier level. Pull the seatbelt around the carrier and buckle it. Bungee cords should be placed around the head rests of the seats and then hooked to the carrier to secure. If box carriers are not available, the box should be transported on a passenger's lap. All eggs transported should be protected from direct sunlight by shading the vehicle windows with towels. Nests must be maintained at moderate temperatures within vehicles, using limited air conditioning. Never leave eggs in a closed vehicle in the sun, as temperatures can reach lethal levels in as little as 15 minutes. Drive the vehicle at slower than normal speeds when off-road to prevent jarring the eggs. Always have someone assist with unloading the eggs from the vehicle, as the boxes will be heavy.



**Fig. 63.** Packed eggs in carrier.



**Fig. 64.** Carrier secured in vehicle using foam, bungee cords, and seatbelt.

## Incubation and Hatching

### PAIS Incubation Facility

The following procedures should be followed when preparing eggs packed in Styrofoam boxes for placement in the PAIS incubation facility. The clutch number and number of eggs should be neatly recorded on the outside of the egg box. Egg boxes will be placed on an assigned shelf in the incubation facility (Figs. 65, 66) and the location recorded. The temperature probe will be connected to the data acquisition system on the shelf where the box is positioned.



**Fig. 65.** Incubating eggs in PAIS facility.



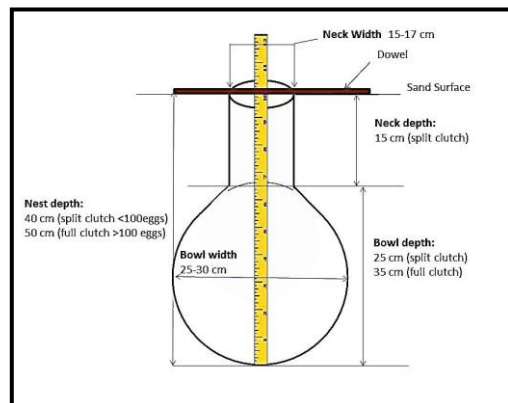
**Fig. 66.** Incubating eggs in PAIS facility.

### Corral Installation

Establish a map of the corral to determine and log nest placements (Fig. 67). Push away loose dry sand from the top of a site until moist, firm sand is exposed. Use post-hole diggers to dig a cavity (Fig. 68). It is best to install clutches during the cooler part of the day. If installation occurs while it is still hot, be sure to shade the eggs during transfer, and do not place hot sand on the clutch. Be mindful of the sand moisture. Do not rush, but do not take too long as eggs can dry out. Carefully place half of the eggs, one at a time, in the completed chamber while maintaining proper egg orientation. Install a data logger in the center of the eggs with the black top oriented upward. Continue to place eggs in the nest, making sure to cover the data logger with eggs. Once all eggs are placed in the cavity, take moist sand and sprinkle over the eggs in a fluffing motion. When the eggs are completely covered, scoop the remainder of the sand into the nest chamber. To compress the neck of the nest chamber, place hand in the center of the opening and push down on the chamber firmly to make a 1”-2” indentation. Mark the center of the chamber by making a small indentation. Place a “corralito” over the nest, with the mark in the center.



**Fig. 67.** Nest placement and spacing in corral.



**Fig. 68.** Nest measurements for corral clutch installation.

Push the corralito down into a 1” trench and level the sand around the corralito. Label a flag with the clutch number and install outside of the corralito. Mark a dowel with the sand level and place outside of the corralito. Monitor the sand level of the original nest placement date. If sand builds up or blows away, then adjust accordingly.

**Documenting *in-situ* Nests and Protecting Emerging Hatchlings on the Beach**

Occasionally, undetected nests will be discovered during the incubation period or after hatching has taken place (Fig. 69, 70). If this occurs, a project leader and Texas STSSN Coordinator should be notified immediately. Protect all hatchlings from predators, beach traffic, and foot traffic as they crawl to the surf. Count the number of hatchlings seen entering the surf. If any become trapped in sand, *Sargassum sp.*, or debris, carefully move them closer to the water and monitor their progress. Trace back the hatchling tracks to identify where the nest chamber is located, while being careful not to disturb any evidence. Mark the *in-situ* nest site so that eggshells and any trapped hatchlings can be recovered. If some hatchlings are still in the process of emerging from the nest, do not touch the hatchlings or attempt to remove them from the nest unless they are weak, in danger, or you are directed to do so by a supervisor. Permitted responders should wait two minutes after the last hatchling has naturally emerged, before attempting to retrieve any hatchlings trapped in the chamber.

The permitted responder should collect all remaining eggshells, unhatched eggs, and dead hatchlings from within and around the nest (Fig. 71). If the nest site has been disturbed by predators, search for eggshells, eggs, and hatchlings within a 10 foot radius of the nest chamber, including at the first few inches of ghost crab (*Ocypode quadrata*) burrows. Do not leave any residual nest content materials in the nest or scattered around the site. Non-viable eggs should be bagged along with eggshells and dead hatchlings. If viable eggs or partially pipped hatchlings are found in the nest, immediately contact the Texas STSSN Coordinator for instructions. For instructions on how to determine hatching and emergences success, refer to Appendix D. Complete a nesting form to document the *in-situ* nest. This will require completing a new form if this site was never reported or will require updating a previously completed form for a site that was categorized as unknown or a false crawl. Take photographs of the hatchlings, their tracks, and the nest site (Fig. 69, 70). Refer to section below for identifying characteristics and pictures of the different hatchling species.



**Fig. 69.** Tracks leading from a nest discovered after hatching.



**Fig. 70.** Hatched *in situ* nest.

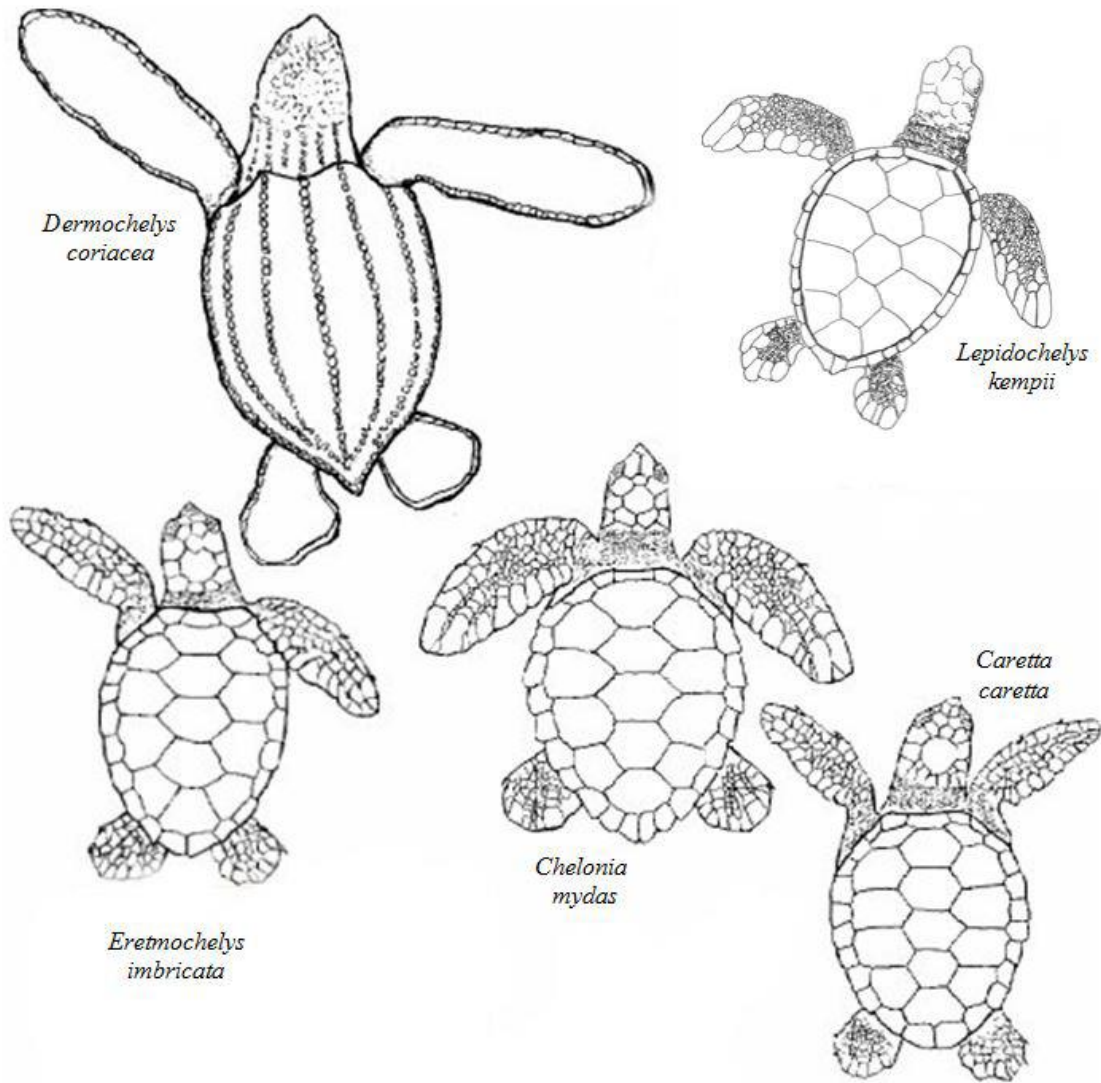


**Fig. 71.** Predated *in situ* nest.



**Hatchling Identification**

The key characteristics for identifying sea turtle hatchlings (apart from color) are similar to those used for subadults and adults. However, hatchlings show greater variation in the number and configuration of carapace scutes (abnormalities). The attached composite drawings portray relative differences in size and morphological variation among the sea turtle species as well as other diagnostic features (Fig. 72-77).



**Fig. 72.** Five species of sea turtle hatchlings found in the Gulf of Mexico.

Adapted from: Eckert, K.L., K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly Editors. 1999. *Research and Management Techniques for the Conservation of Sea Turtles*. IUCN/SSC Marine Turtle Specialist Group Publication No. 4.



**Fig. 73.** Kemp's ridley hatchling.



**Fig. 74.** Green turtle hatchling.



**Fig. 75.** Loggerhead hatchling.



**Fig. 76.** Hawksbill hatchling.



**Fig. 77.** Leatherback hatchlings. (Photo by Suzanne Livingstone)

## Sea Turtle Stranding and Salvage

A stranded sea turtle is one that is found washed ashore or floating, alive or dead. Sea turtles strand in inshore and offshore areas throughout Texas for a variety of reasons. They are also occasionally captured incidentally by commercial and recreational fishing activities, fisheries research sampling, dredging, and power plant entrainment. All observed or reported strandings and incidental captures should be thoroughly documented on a Sea Turtle Stranding and Salvage Network (STSSN) stranding report (Appendix E). Detailed instructions for completing STSSN stranding reports are listed in Appendix F. Mail or fax stranding reports to Dr. Donna Shaver (Texas STSSN Coordinator) within 24 hours and mail original forms to:

Dr. Donna Shaver, Padre Island National Seashore  
P.O. Box 181300, Corpus Christi, TX 78480-1300  
Telephone: (361) 949-8174, ext. 226, Fax: (361) 949-9134

Always wear the appropriate protective equipment when handling stranded sea turtles (particularly gloves), take care not to injure your back while lifting heavy turtles, and follow the provided procedures to process stranded sea turtles appropriately.

### Live Stranded Sea Turtles

Most live turtles found stranded on the beach are injured, ill, or entangled and must be transported to a rehabilitation facility that meets all conditions detailed in *Care and Maintenance Requirements* (see *Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles*). Some lethargic or inactive turtles may be mistakenly assumed dead. Check for signs of life by watching for breathing or lightly pinching the turtle's neck or flipper and look for a response. Live stranded turtles should be transported to a rehabilitation facility with a copy of the completed stranding report. During beach and highway transport, turtles should be kept moist and at temperatures between 60°F (15.5°C) and 70°F (21°C) during the winter, and between 70°F (21°C) and 80°F (27°C) during the summer, avoiding both drastic changes in temperature and temperature extremes such as those caused by direct sunlight or too much air conditioning. Do not transport turtles in water, as they could drown.

Turtles found entangled or caught on hook and line may have minimal to no injuries, or may be severely injured. All must be documented on a stranding form, and the type of fishing gear should be noted. If a turtle is loosely entangled or lightly foul hooked by an angler, and has no other injuries or apparent illness, the turtle may be released back into the water after removal of those items and documentation. Healthy, releasable turtles should be able to crawl to the water on their own. If the turtle is found too debilitated to be safely returned to the water, it should be transported to a rehabilitation facility following documentation and fishing gear removal. If the turtle is injured, deeply foul-hooked, hooked in the mouth, or has swallowed a hook, the turtle must be taken to a facility where the hook can be safely removed by a veterinarian or rehabilitation specialist and the turtle can be X-rayed for additional hooks. Fishing line attached to an ingested hook should be cut so that 6 to 8 inches remain outside of the turtle's mouth to aid in hook removal. All retrieved fishing gear should be provided to the STSSN Texas Coordinator. If a turtle is considered healthy enough to release and has a straight carapace length (SCL) greater than 30 cm, it should receive a PIT tag prior to release. Refer to previously described PIT



tag application instructions (Figs 41, 43) and Appendix G for the proper PIT tag scanning methodology.

Proper sea turtle handling techniques are vital to ensure the safety of the animal and the responder. Fractures have been detected in the humerus bones of recovered sea turtles possibly a result of improper handling techniques (i.e. grasping turtles by their flippers or allowing turtles to flap their flippers vigorously). Smaller turtles should be handled by grasping the outer edges of the carapace (Fig. 78) and supported by the head, neck, and flippers whenever possible (Fig. 79). Larger animals should be handled by at least two individuals, each grasping an anterior and posterior portion of the carapace (Fig. 80).



**Fig. 78.** Proper handling technique grasping the outer edges of the carapace.



**Fig. 79.** Proper handling technique supporting the head, neck, and flippers.



**Fig. 80.** Proper large turtle handling technique with two individuals.

### Dead Stranded Sea Turtles

A STSSN stranding report must be completed for all stranded sea turtles regardless of condition. Photographs should be taken of the carapace (Fig. 81), plastron (Fig. 82), and any injuries (Figs. 83, 84). Include all areas of the turtle's body, and ensure photos are clear and focused. After measuring the carapace, checking for tags, and recording all required data on the form, the turtle should either be salvaged, disposed of behind the dunes (erase any drag marks), or buried on the beach at the base of the dunes. Always salvage all tagged turtles (those with metal tags, PIT tags, living tags, coded wire tags, or satellite transmitters). Contact the local stranding coordinator for the most current information on what additional turtles need to be salvaged. All salvaged turtles should be placed in a plastic bag with a copy of the stranding form enclosed in a sealed freezer bag. The outside of the bag should be marked with the stranding ID number comprised of the year, month, day, person's initials, and number by day along with the species code from the stranding form (e.g. 20130212AFA02 - LK). If a turtle is not being salvaged and is left on the beach, mark the carcass clearly with spray paint or biodegradable flagging tape to prevent the turtle from being reported multiple times.



**Fig. 81.** Correct photographic documentation of a stranded turtle's carapace.



**Fig. 82.** Correct photographic documentation of a stranded turtle's plastron.



**Figs. 83 & 84.** Correct photographic documentation of a stranded turtle's injuries



## **Procedure for Cold Stunning Events in Texas**

All observed or reported cold stunned sea turtles should be thoroughly documented on a Sea Turtle Stranding and Salvage Network (STSSN) stranding report (Appendix E). Detailed instructions for completing STSSN stranding reports are listed in Appendix F. Mail or fax stranding reports to Dr. Donna Shaver (Texas STSSN Coordinator) within 24 hours and mail original forms to:

Dr. Donna Shaver, Padre Island National Seashore  
P.O. Box 181300, Corpus Christi, TX 78480-1300  
Telephone: (361) 949-8174, ext. 226, Fax: (361) 949-9134

### **Hypothermic Sea Turtles**

Sea turtles become susceptible to hypothermia when there is a sudden shift in weather patterns and water temperatures quickly drop below 50°F (10°C), between November and March. Hypothermic or cold stunned sea turtles lose their ability to swim and dive and often exhibit no signs of life. Although a few cold stunned turtles may be found on Gulf beaches, most are found inshore. They may be found floating on the water's surface, completely submerged in shallow water, or onshore. Live animals need to be rescued quickly before they are injured or die from predation, exposure, or boat strikes. During the winter, many sea turtles may be affected by hypothermia and strand simultaneously, and cold stunning may occur for days, weeks, or months at a time.

### **Receiving Reports of Cold Stunned Sea Turtles**

Prior to November, area coordinators and their staff should increase efforts to distribute contact information for reporting cold stunned sea turtles. The following numbers should be made available to the public:

- North Padre and Upper Laguna Madre areas call: (361) 949-8174, Ext. 226
- North Padre and Upper Laguna Madre After Hours call: (361) 876-8462
- Other areas in Texas: call 1-866-887-8535

When receiving a report of a cold stunned sea turtle, it is important to obtain information from the observer regarding the date and time of observation, location of sighting, the number of turtles, the condition of the turtle(s), and the accessibility of the turtle(s). Be sure to record the contact information of the observer in the event the connection is lost, or additional information is required later. Before deploying additional responders to the site, determine if there is a responder nearby in the field that can assist with recovery, or if the individual who reported the turtle can be deputized to transport it to the holding facility. This will ensure maximum efficiency of rescue operations.

The Texas STSSN Coordinator must be contacted as soon as a hypothermic sea turtle is found. This information is important so that other area coordinators on the Texas coast can be contacted immediately and organized searches can be initiated.

### **Preparation**

Beginning in November, area coordinators should begin monitoring the forecast for days where water temperatures are expected to drop below 50°F (10°C). Area coordinators should monitor daily changes in water temperature (see Appendix H) when severe weather conditions are forecasted, and their staff should have the ability to measure local water temperatures manually if remote monitoring is unavailable.

Contact information for local and state-wide agency partners and individuals including veterinarians, rehabilitation facilities, law enforcement, Texas Parks and Wildlife Division (TPWD), United States Fish and Wildlife Service (USFWS), and community volunteers should be updated beginning in November. Ensure there are individuals able to answer calls and respond to reports of stranded turtles “after hours” and on weekends. Rehabilitation facilities (see Rehabilitation Facilities section) and holding facilities (see Holding Facilities section) should be contacted to obtain an updated report of capacity and available resources. See Appendix I for locations of Texas rehabilitation facilities equipped to care for cold stunned sea turtles, as well as TPWD hatchery locations which may be used for temporary holding and/or initial assessment under a veterinarian’s supervision when other local facilities do not exist or are at capacity. Area coordinators should identify agencies and facilities that will have access to, or companies that will provide, large box trucks or vans for transport of turtles. Turtles will potentially need to be transported from holding facilities, to rehabilitation facilities, and to release sites. Area coordinators should identify available freezer storage for sea turtle carcasses at all rehabilitation and holding facilities, and develop contingency plans in the event of reaching freezer capacities. Note that cold stunned carcasses should not be retained at the expense of non-cold stunned turtle carcasses. Coordinators should identify individuals permitted and capable of conducting necropsies.

Area coordinators should procure and ready supplies for cold stunning, which begins in November. Primary response facilities that serve as hubs for cold stunning events should have equipment for surveyors and for processing sea turtles. Supplies for surveyors include but are not limited to: boats, vehicles, waders, life vests, medical equipment, radios, satellite phones, GPS units, cameras, biodegradable flagging tape, and event bands for sea turtles. Boats and vehicles should be well maintained and serviced so they are available to deploy immediately during a cold stunning event. Supplies for processing include but are not limited to: high speed copy machine, disposable gloves (various sizes), straight length calipers, soft measuring tape, PIT tag scanners, PIT tag applicators, PIT tags, alcohol/iodine swabs, cameras, towels, small stackable totes, medium and large tubs, wagons, plastic kiddie pools, and biodegradable flagging tape.

Prior to a cold stunning event, a universal system of identifying recovered sea turtles should be established for all participating agencies. Every observed and recovered sea turtle should be given a stranding ID number comprised of the year, month, day, person’s initials, and number by day, along with the species code from the stranding form (e.g. 20130212AFA02 - CM). Note that the turtle number by day is specific to the observer and is not the total of all strandings located by multiple observers in a single day. Stranding identification numbers may be applied directly to the sea turtle’s cleaned and dried carapace using a permanent marker, or may be inscribed on an event band or biodegradable flagging tape and applied to the turtle’s front left flipper. If the turtle displays evidence of fibropapilloma (see Fibropapilloma section), write “FP” on the event band, flagging tape, or carapace. Contact the Texas STSSN Coordinator for event bands.

When the forecast is indicative of cold stunning conditions, area coordinators should schedule an appropriate number of response personnel, based on the estimated duration and severity of weather, to aid with the upcoming event. Area coordinators should directly assign their staff and volunteers roles of surveyor, transporter, processor, or overseer.

- **Surveyors** are individuals responsible for locating and retrieving stranded sea turtles in the field via boat, vehicle, or foot surveys.
- **Transporters** are individuals with vehicles responsible for collecting recovered sea turtles from boat surveyors at a designated meeting point, and safely transporting the turtles to the holding facility.
- **Processors** are individuals stationed at the holding facility who systematically document each recovered sea turtle via measurements, tagging, and photos.
- **Overseers** are individuals responsible for monitoring rescue and recovery operations. Overseers assign tasks to volunteers, aid processors, and coordinate transfers of fully documented turtles from holding facilities to rehabilitation facilities.

Survey routes and critical search areas should be identified prior to the event and clearly defined via map or written directions. Areas where cold stunned turtles are known to aggregate should be searched each day of the cold stunning event. Depending on the area, searches may be done by boat, vehicle, foot, or a combination of these. Meeting points easily accessible by both vehicles and boats should be designated as central locations for transfer of recovered sea turtles from survey boats to holding facilities. Area coordinators should strive to have multiple boats and vehicles available for moderate and severe cold stunning events. A daily plan of operation should be discussed with all boat operators prior to deployment. The recovery plan should aim for maximum sea turtle recovery while minimizing exposure of recovered turtles to the elements. If surveying long shorelines with no accessibility other than boat, it is desirable to periodically transfer recovered turtles between primary and secondary vessels, allowing primary surveyors to continue their route. Area coordinators should also encourage aerial surveys, by aircraft or drone, where permitted and funding allows.

### **Searches**

Once hypothermic sea turtles are found in an area or the water temperature drops below 50°F (10°C), organized searches should be initiated, and should continue throughout the duration of the event. Area coordinators will work directly with their staff and volunteers to assign search zones, communicate rescue and transport logistics, and provide reporting procedures. Area coordinators will contact the Texas STSSN Coordinator directly with updates by phone or email, reporting, in real time, the number of live and dead turtles found and the locations. Surveyors should cover an area as thoroughly as time allows, and during subsequent days surveyors should proceed directly to areas that were not searched previously in order to minimize turtle fatalities. Surveys should not cease until observations of cold stunned sea turtles have ceased.

Remember that the safety of surveyors and recovery personnel is the priority. Additionally, as searches often occur in uninhabited areas, efforts should be made to preserve the state of natural resources while surveying. Before initiating recovery of hypothermic and stranded sea turtles, review the forecasted weather conditions and assess any potential environmental hazards.

## Section 5: Sea Turtle Stranding and Salvage

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Surveyors should be knowledgeable about navigation in boggy and muddy terrain. Discuss safety protocols with search personnel, ensure all participants have appropriate safety gear, and be mindful of individual fitness and capability when organizing teams.

Turtles should be collected if they are on the shoreline or water's edge or if they are in the water floating and cannot dive. Hypothermic turtles must be removed from the mud and the water and placed on a boat deck or transported to the shoreline in order to be fully examined. Ideally, all sea turtles should be recovered from the field; however, if space in rescue boats and vehicles is restricted, prioritize rescue of live turtles over dead. Turtles that are unresponsive but do not display rigor mortis may possibly be alive, and should be retrieved for rehabilitation. Turtles that are obviously dead (i.e. are in rigor mortis, bloated or skin is detaching) do not have to be recovered if space is limited on the boat, but they must be documented on a stranding form in the field, marked with biodegradable flagging tape or spray paint, and photos should be taken of the GPS location and of the turtle. Place the carcass behind a dune or vegetation to avoid duplicate counting. Contact the local stranding coordinator for the most current information on what turtles need to be salvaged. Boat surveyors should carry a triage kit containing gauze sponges, gauze bandages, alcohol wipes, waterproof adhesive tape, medical scissors, and a hemostatic agent, with them in the event that a live injured sea turtle is discovered. Immediate medical attention in the field, such as reducing blood loss by dressing wounds, increases the chance of survival for cold stunned sea turtles, especially when there is a lengthy transport to the rehabilitation center.

Always wear gloves when handling cold stunned sea turtles, and to prevent injury, use proper lifting techniques and request assistance when handling large sea turtles (over 50 cm or more, if needed). Boogie boards or other flotation devices may also be used to transport stranded sea turtles. Mark the turtle with an identifier or an event band, and record location (including GPS) so that the remainder of the stranding form for that turtle can later be completed. Once personnel have surveyed the search area:

1. Protect the animal(s) from the weather by covering with dry towels, tarps, or blankets, especially when traveling by boat. Transport on a padded surface when available.
2. Immediately transport the live hypothermic animal(s) to a designated facility or meeting point for retrieval by other personnel. Surveyors must convey the location of recovered turtles to the individual responsible for transport.
3. Ensure local area coordinators have been contacted and updated with all relevant stranding information.

Once on land, hypothermic sea turtles recovered should be transported to a designated holding facility using an enclosed vehicle. Do not attempt to warm hypothermic turtles using a direct heat source during transport. Sea turtles must be warmed gradually over many hours.



### **Holding Facilities**

Holding facilities should be identified prior to the onset of an event. These facilities serve as processing and triage sites for all sea turtles recovered, and should adhere to all applicable permit requirements (see *Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles*). The Padre Island National Seashore (PAIS) Sea Turtle Science and Recovery Laboratory is the central receiving facility for cold stunned sea turtles reported from North Padre Island and the Upper Laguna Madre. Turtles found elsewhere in the Texas Coastal Bend or processed at the PAIS Sea Turtle Laboratory are taken to the ARK, Texas State Aquarium, or Texas Sealife Center. Sea Turtle, Inc. is the central receiving facility for cold stunned sea turtles reported from South Padre Island, Boca Chica Beach, and the lower Laguna Madre. The NOAA-Fisheries Galveston Laboratory is the primary receiving facility for cold stunned sea turtles reported from the upper Texas coast.



**Fig. 85.** Cold stunned turtle with unique stranding ID number.

Hypothermic sea turtles that do not exhibit signs of life but are intact and show no signs of rigor mortis should be held for a minimum of eight hours in an area protected from weather and predators to determine if the animal is alive. Turtles should be transported to designated temporary holding facilities to enable stabilization and documentation. Upon arrival at the holding facility, all turtles should be examined by a trained biologist for evidence for Fibropapilloma. Turtles exhibiting signs of the growths must be segregated (see Fibropapilloma section below).

Trained personnel should work in pairs to systematically process each turtle that is brought to the holding facility. If cold stunning events are very large, upon approval and concurrence from the National Coordinator and Texas Coordinator of the STSSN, specified documentation and tagging procedures may be reduced if time spent to document rescued turtles jeopardizes their survival. For example, it may be decided to only obtain straight line measurements rather than both curved and straight line. Pairings of trained personnel should consist of a recorder and a tagger. The recorder is responsible for completing the STSSN stranding form and taking photos of the turtle's stranding identification number (Fig. 85), carapace, plastron, and completed stranding form. With approval by the Texas Coordinator of the STSSN, turtles can be documented on the cold stun event turtle data form (Appendix J) instead of the original STSSN stranding form if large numbers of cold stunned turtles are being found (more than 100 per day). The



**Fig. 86.** Data collection at a holding facility.

tagger is responsible for measuring the turtle and marking each turtle with a PIT tag in the front left flipper prior to transport to a rehabilitation facility. The recorder should note the PIT tag number on the completed stranding form. Tagging will allow precise tracking and accountability of turtle location in accordance with sea turtle handling permit requirements. To facilitate identification of turtles received at a holding facility, each turtle should retain the event band labeled with its stranding identification number, and should have the sticker displaying the applied PIT tag serial number placed on its carapace, prior to transport to a rehabilitation facility. Facilities completing the original STSSN stranding form for each turtle must retain the original and should provide a copy that will travel with the turtle to the rehabilitation facility. As stated above, original copies must be mailed or faxed to the Texas STSSN Coordinator within 24 hours. Holding facilities should maintain a spreadsheet updated daily with the number of sea turtles given to each rehabilitation facility, and how many additional turtles those facilities can accommodate as the cold stunning event continues.

General guidelines for holding facilities:

- Restrict access to holding facilities: only permitted personnel should be allowed near hypothermic animals which are easily stressed in the presence of loud noises, excessive foot traffic, and bright lights (i.e. camera flash).
- All data for the stranding form should be collected and finalized prior to arrival of each turtle at a rehabilitation facility (Fig. 86).
- Animals held out of water should be kept on padding (i.e. mats or towels) to prevent any further decrease in core body temperature or plastron scraping.
- Avoid covering hypothermic turtles with towels or blankets; covers will insulate the animal and create a barrier from warm room temperatures. Room temperatures should remain between 60°F (15.5°C) and 70°F (21°C).



**Fig. 87.** Sea turtles held in small pools.

### **Rehabilitation Facilities**

Cold stunned sea turtles that have been stabilized and fully documented will be transferred from temporary holding facilities to rehabilitation facilities. Rehabilitation facilities serve as the primary location for the recovery of cold stunned sea turtles, and are responsible for medically determining when those sea turtles are cleared for release. Rehabilitation facilities must meet all conditions detailed in *Care and Maintenance Requirements* (see *Standard Permit Conditions for Care and Maintenance of Captive Sea Turtles*).

General guidelines for rehabilitation facilities:

- Turtles should be warmed as gradually as possible
- Once turtles appear responsive, they should be placed into a holding tank with water and monitored to make sure they are able to swim and breathe. If this is not possible, small pools may be used; however, do not keep turtles out of water longer than 5 days (Fig. 87)
- Animals held out of water for an extended period of time may require application of water-based eye lubricant to prevent their eyes from drying.
- Holding tank water temperature should be maintained between 60°F (15.5°C) and 65°F (18°C). Prior to release, tank temperatures should be adjusted to release site temperatures in order to acclimate the turtles.
- If no tank filtration is available, water should be changed daily.
- Disinfect areas where animals have been maintained out of water to prevent transmission of disease to healthy animals.
- An updated inventory of animals held at rehabilitation facilities should be maintained. Transfers and deaths should be documented and reported to the STSSN Coordinator.
- Rehabilitation facilities will coordinate with the Texas STSSN Coordinator and permitting authorities to determine when and where to release turtles. Turtles should be released as soon as they are medically cleared and weather permits. Releases should occur no later than two weeks after a cold stunning event. Turtles will be released into Gulf of Mexico surf waters as soon as those waters are 54°F (12°C) or warmer, with a forecast of warming temperatures. Releases should be held away from passes to inshore waters to deter turtles from quickly self-repatriating to inshore waters where they could become cold stunned again that winter. Long-term holding is not advisable for otherwise healthy turtles, and rehabilitation tank space needs to be cleared for more seriously injured turtles and turtles found during subsequent hypothermic events. Consult with the Texas STSSN Coordinator for additional recommendations and information prior to release of turtles.

### Fibropapilloma

Green turtles were first documented with fibropapillomatosis along the Texas coast in 2010. Fibropapillomas emerge as “cauliflower textured warts” thought to be caused by a herpes virus (Fig 88). These growths, or tumors, may affect all “soft” portions of a turtle’s body. Tumors primarily grow on the skin, but can also appear on the carapace and plastron, inside the mouth, on the eyes, and on internal organs.

All animals exhibiting signs of fibropapilloma tumors (FP) should be quarantined to specific tanks and/or holding areas. These areas should receive restricted access and all possible measures should be in place (i.e. foot bath upon exit, tools such as calipers and nets marked for FP use only) in order to prevent any possible transmission. Note that some rehabilitation facilities do not admit FP turtles for care, and FP turtles will need to be transferred to other rehabilitation facilities that are equipped to accommodate FP turtles. A complete evaluation of tumor quantity, location, and surface texture, using the ordinal scale methodology, should be documented using the Fibropapillomatosis section on the STSSN stranding form (see Appendix E and Appendix K).

Thoroughly photograph the ventral and dorsal views of FP turtles and collect close up shots of the head and eyes. Ideally, separate crews and tools will be used to document FP versus non-FP turtles. If this is not possible, when processing turtles with FP, personnel should change gloves and clean tools in a diluted chlorine solution between processing of animals.



**Fig. 88.** Fibropapilloma tumor on the eye of a green turtle.



## **APPENDIX A: Nesting Activity Form**

**See following page**

TEXAS DATA SHEET FOR SEA TURTLE TRACKS AND NESTS

FOR OFFICE USE ONLY:

TEXAS CLUTCH NUMBER: \_\_\_\_\_  
PROJECT ID: \_\_\_\_\_

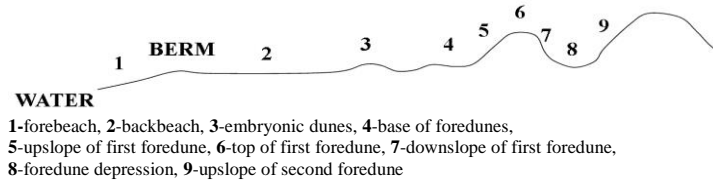
SPECIES: \_\_\_\_\_  
PROJECT LOCATION: \_\_\_\_\_

General Information

Date detected: \_\_\_\_\_ Time detected: \_\_\_\_\_ am/pm Which found:  Nest  
Found by: \_\_\_\_\_ (turtle patroller, beach worker or visitor) (check one)  False crawl  
First investigated by: \_\_\_\_\_  Unknown (tracks ended in soft sand)  
Specific location: \_\_\_\_\_ Turtle seen by (circle): visitor - patroller - responder  
Photos Taken?  Yes  No

Tracks

Flipper impressions:  alternate  opposite  
Width of Tracks: \_\_\_\_\_ cm  
Estimated age of tracks (if no female present): \_\_\_\_\_  
Topographical feature at end of tracks or at nest site (circle)



WATER

1-forebeach, 2-backbeach, 3-embryonic dunes, 4-base of foredunes,  
5-upslope of first foredune, 6-top of first foredune, 7-downslope of first foredune,  
8-foredune depression, 9-upslope of second foredune

Nest Not Found (Record GPS of the Highest Point of Tracks)

Track GPS (dd.ddddd°): N \_\_\_\_\_ °, W \_\_\_\_\_ °

Nest Found (For Egg Collector Use Only)

Nest GPS (dd.ddddd°): N \_\_\_\_\_ °, W \_\_\_\_\_ °  
Date and time eggs excavated: \_\_\_\_\_  
Eggs excavated by: \_\_\_\_\_  
Eggs transported by: \_\_\_\_\_

Total number of eggs at nest excavation: \_\_\_\_\_  
# of tiny eggs \_\_\_\_\_  
# of "normal size" eggs \_\_\_\_\_  
# of broken eggs \_\_\_\_\_  
Describe any conjoined or otherwise abnormal eggs: \_\_\_\_\_

Eggs Incubated (check one):

- Incubation Facility
- Corral
- In-situ

Date & time eggs placed in incubation facility/corral: \_\_\_\_\_  
Placed in incubation facility/corral by: \_\_\_\_\_  
Temperature datalogger placed in nest?  Yes  No  
Datalogger ID #: \_\_\_\_\_  
Temperature probe placed in nest?  Yes  No

Additional remarks, comments, data, or sketches on tracks, turtle, nest site on back of form?  Yes  No

Notify immediately, fax, and mail originals to:

Dr. Donna Shaver, Padre Island National Seashore  
P.O. Box 181300, Corpus Christi, TX 78480-1300  
Office (361) 949-8173 ext. 226; fax (361) 949-9134

Turtle Information

Turtle Not Seen

Action when first encountered turtle (circle):  
emerging - digging - laying - covering - returning to sea

Orientation of turtle when laying eggs:  
(12 o'clock facing inland, 6 o'clock facing towards sea): \_\_\_\_\_

Scanned for PIT Tag?  Yes  No

**\*APPLY ALL TAGS TO LEFT FLIPPERS IN TEXAS**  
(if applied, attach sticker)

Left Front: \_\_\_\_\_  Present  
 Applied

Right Front: \_\_\_\_\_  Present  
 Applied

Checked for Metal Tags?  Yes  No

**\*APPLY ALL TAGS TO LEFT FLIPPERS IN TEXAS**

Left Front: \_\_\_\_\_  Present  Applied  
Right Front: \_\_\_\_\_  Present  Applied  
Left Rear: \_\_\_\_\_  Present  Applied  
Right Rear: \_\_\_\_\_  Present  Applied

Metal Tag Scars (list location, describe): \_\_\_\_\_

Took Biopsy-tissue Sample?  Yes  No

CARAPACE MEASUREMENTS:

Using calipers (SLCL)

Straight length (NOTCH-TIP): \_\_\_\_\_ cm  
Minimum length (NOTCH-NOTCH): \_\_\_\_\_ cm  
Straight width (Widest Point): \_\_\_\_\_ cm

Using non-metal measuring tape (CCL)

Curved length (NOTCH-TIP): \_\_\_\_\_ cm  
Minimum length (NOTCH-NOTCH): \_\_\_\_\_ cm  
Curved width (Widest Point): \_\_\_\_\_ cm

Was carapace scrubbed?  Yes  No

Checked for Living Tag?  Yes  No

Location if present: \_\_\_\_\_

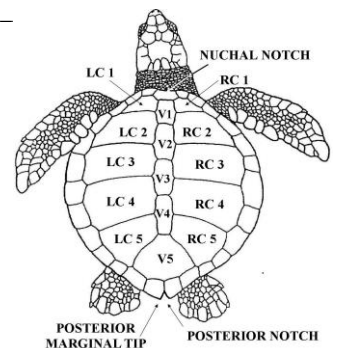
Scanned for Coded Wire Tag (CWT)?  Yes  No

If CWT present, which flipper:  left front  right front

Transmitter ID # \_\_\_\_\_  
 Present  Applied

Record living tag and deformity locations  
(mark, describe, photograph):

LC = left costal  
V = vertebral  
RC = right costal



## APPENDIX B: Detection of Internal Coded Wire Tags

### GENERAL INFORMATION AND PREPARATION

At least two people are required to properly examine a sea turtle for the presence of an internal wire tag. The second person is required to immobilize the flipper during examination. All persons involved in detecting wire tags must remove all watches and jewelry from hands and arms. Metal belt buckles, some rims of eye glasses and sunglasses, barrettes, earrings, and necklaces might cause interference with the magnetometer.

### TEST PROCEDURES FOR MAGNETIC WAND (MAGNETOMETER)

1. Turn on the magnetometer and test the unit by passing it over metal with a known magnetic content (Fig. 89). A loud audible beep should be heard. Some magnetometers also have a red LED light which illuminates when metal is detected. If no beep is heard when passed over a magnetized metal source, the magnetometer is either not turned on or is malfunctioning. Replace batteries if necessary. Proceed only when the magnetometer passes the test procedure.

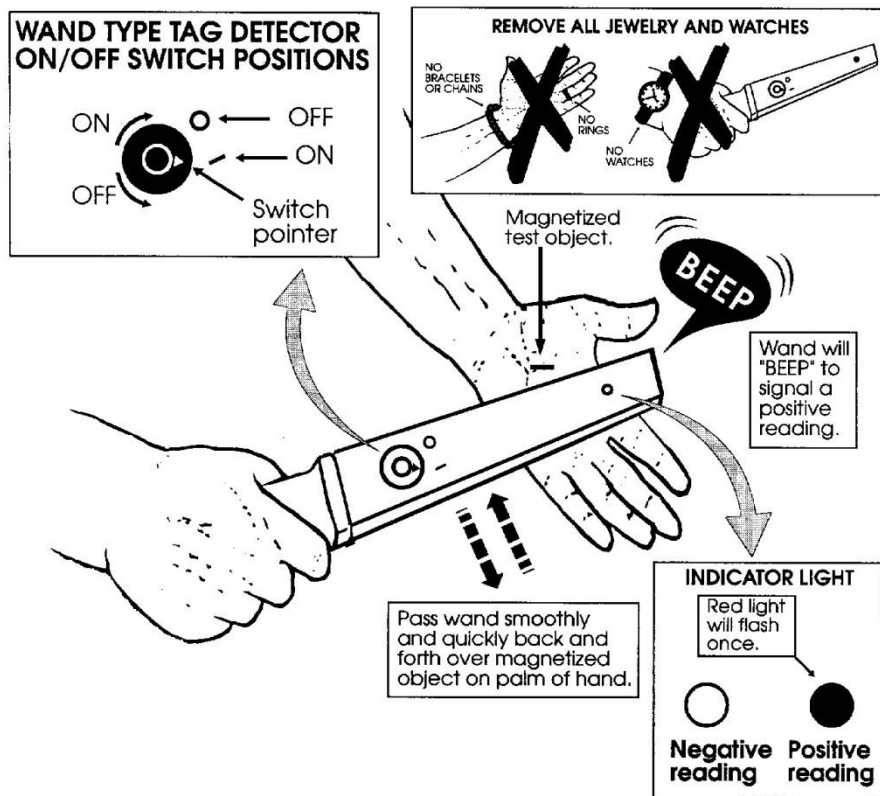


Fig. 89. Testing magnetometer prior to initiating tag detection.



## TAG DETECTION

2. Starting at the leading flipper edge closest to the body, pass the wand over the surface of the flipper. Keep the magnetometer perpendicular to the leading edge of the flipper (Fig. 90). Try to get the wand as close to the flipper as possible without touching it.
3. Move the wand quickly but smoothly from one end of flipper to the other. Each pass should take about 1 second from one end of the flipper to the other. The wand requires movement to detect a tag. Holding the wand stationary over a position or very slow movement may not detect a tag. Scan each surface of both flippers at least 3 times: from the body to the flipper tip, from the flipper tip to the body, and from the body to the flipper tip.

## IF NO TAG IS DETECTED

4. If no tag is detected after examining both surfaces of the front flippers, then a magnet needs to be passed over the flippers in an attempt to magnetize an un-magnetized coded wire tag (Fig. 91). Pass a magnet over both surfaces of the front flippers to magnetize any wire tag that might be present. The magnet should be passed in only one direction in parallel sweeps from the leading edge of the flipper towards the trailing edge. Each sweep of the magnet should slightly overlap the previous sweep to ensure complete coverage of the entire flipper surface.

\*Note: The coded wire tag holds the magnetic charge in a polar orientation. Running a magnet in any direction other than as directed may shift the polar orientation. This shift has the potential to result in negative readings caused by failure to magnetize a coded wire tag or completely un-magnetizing a previously magnetized tag.

5. After re-magnetizing the flipper, scan the flipper with the wand following the directions above.



**Fig. 90.** Proper magnetometer positioning over a flipper for coded wire tag detection (NOAA Fisheries Photo).



**Fig. 91.** Magnetizing a previously non-magnetized coded wire tag (NOAA Fisheries Photo).

#### IF A SUSPECTED TAG IS DETECTED

6. If the wand beeps during an examination of a flipper attempt to locate the exact location of the metal source. Carefully re-pass the wand over the suspected tag site and ensure that consistent multiple readings can be made. Make sure that the wand is not bouncing off the flipper surface causing false positive readings.
7. If consistent multiple readings are made, carefully re-check the area under and around the flipper with the wand to make sure that there are no metal sources that might be giving a false positive reading. Scan the flipper with a PIT tag reader to determine if the beep was caused by a PIT tag. Also, carefully examine the flipper surface to make sure that there is no sign of visible embedded metal such as a fish hook.
8. If the source of the beep is determined to be from a coded wire tag, the tag location must be recorded on the nesting form. Please describe location in reference to the front claw or shoulder, drawing a diagram if necessary.

Techniques adapted from: Northwest Marine Technology, Inc. Handheld "Wand" Detector Operating Instructions. Shaw Island, Washington, USA.

## APPENDIX C: Nest Handling Equipment

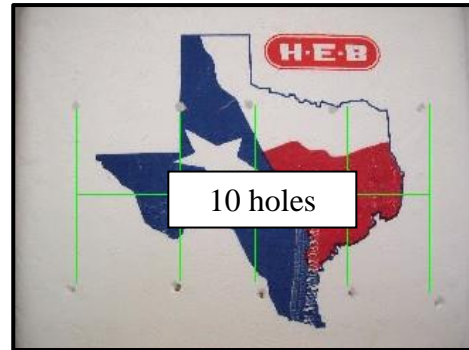
### Incubation Boxes

You will need:

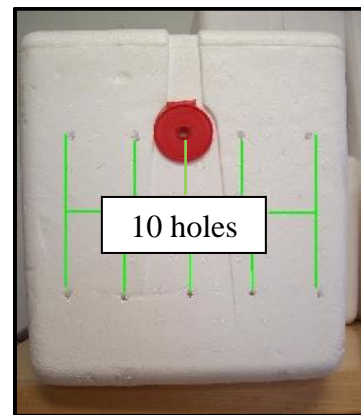
- Styrofoam coolers
- Electric drill
- 3/16 inch drill bit
- Ivory dish soap (white) and new bottle brush

Directions:

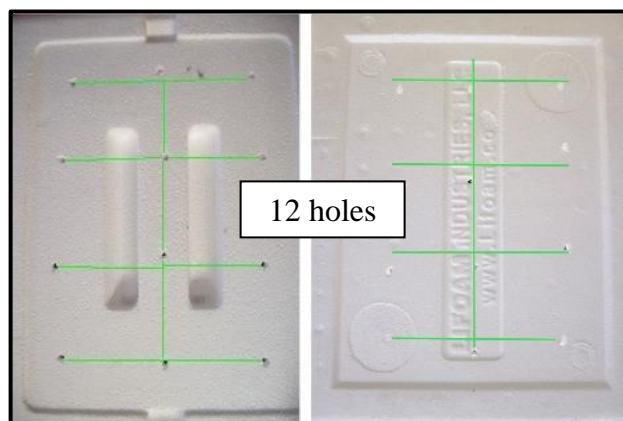
1. Fill boxes with water and allow to soak overnight.
2. Pour out water and allow to air dry (do not leave boxes outside overnight to dry).
3. Remove plastic handles and clips if they are present (handles are not sturdy enough to lift the box filled with sand).
4. Drill holes in boxes using 3/16 inch drill bit
  - Drill 10 holes (two rows of 5 holes) on each 14 inch wide side of the box (Fig. 92)
  - Drill 10 holes (two rows of 5 holes) on each 11 inch wide side of the box (Fig. 93)
  - Drill 12 holes (three rows of 4 holes) on the lid and the bottom of the box (Fig. 94)
5. Scrub boxes using Ivory dish soap with a clean brush dedicated to this use only, then rinse well
6. Allow boxes to air dry (do not leave boxes outside overnight to dry)
7. Store boxes in a dry, climate controlled area



**Fig. 92.** Broad side of the box.



**Fig. 93.** Short side of the box.



**Fig. 94.** Top/lid (left) and bottom (right) of box.



## Egg Carriers

For each carrier you will need:

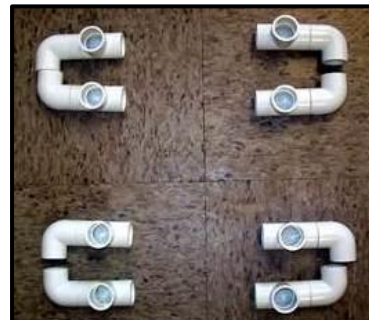
- Tape measure
- PVC pipe cutters/shears
- PVC cement
- Sharpie
- Large Zip Ties
- Hammer
- Sandpaper
- $\frac{3}{4}$  inch PVC Tee Joints (8)
- $\frac{3}{4}$  inch PVC 90° Elbow Joints (8)
- 1 inch sections of  $\frac{3}{4}$  inch PVC (8)
- 10.5 inch sections of  $\frac{3}{4}$  inch PVC (4)
- 12 inch sections of  $\frac{3}{4}$  inch PVC (4)
- 14.5 inch sections of  $\frac{3}{4}$  inch PVC (4)
- 35 inch rubber bungees (4)
- 8 inch bungees (2)

Directions:

1. Measure, mark, and cut PVC pipe to required lengths (see dimensions above)
2. Construct top and bottom corners of carriers using 8 tee joints, 8 elbow joints, and 8 one inch PVC sections
  - Apply PVC cement to the inside of one tee joint and insert the 1 inch PVC section  $\frac{1}{2}$  inches deep
  - Repeat so all tee joints have the 1 inch section in place
  - Apply PVC cement to the inside of one elbow joint
  - Depress/hammer the elbow joint onto the tee joint (Fig. 95) making sure elbow joints are flush with the ground and tee joints are perpendicular (Ninety degree angles are crucial or the carrier will not sit flush). Elbow joints should be fastened to the tee joints so the elbow form a box shape (Fig. 96). Repeat until you have eight corners.

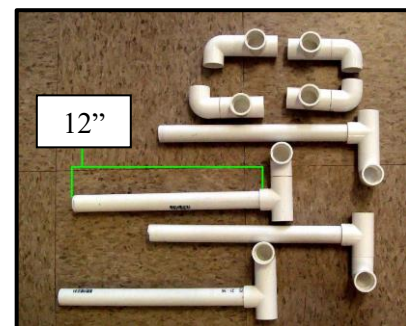


**Fig. 95.** Construction of carrier corners.



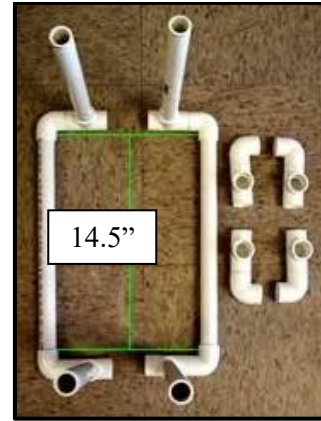
**Fig. 96.** Completed carrier corners.

3. Construct carrier support posts using the constructed corners and the four 12 inch PVC sections
  - Apply PVC cement to the inside of the opening perpendicular to the ground on one of the tee joint corners
  - Depress/hammer a 12 inch PVC section into the opening perpendicular to the ground. Repeat for each 12 inch section, totaling four carrier support posts (Fig. 97)
4. Begin construction of the carrier base using two 14.5” PVC sections



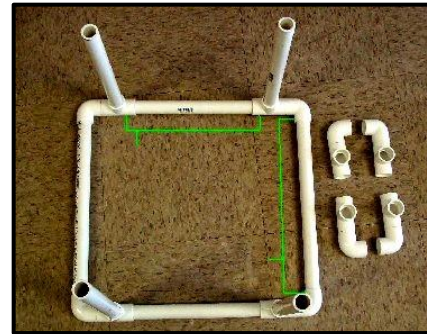
**Fig. 97.** Carrier support posts.

- Apply PVC cement to the inside of the open elbow joint in one of the carrier support posts
- Depress/hammer a 14.5" PVC section into the elbow joint (Fig. 98)
- Obtain the opposing support post and apply PVC cement to the inside of the open elbow joint
- Depress/hammer the other end of the 14.5" PVC section into the open elbow joint
- Ensure that all parts are flush with the ground, especially the carrier support posts with the open tee joints
- Repeat the steps for the other side of the carrier base



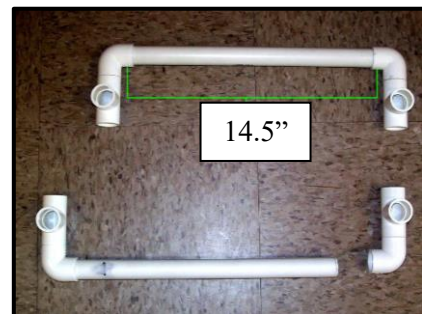
**Fig. 98.** Parts for the base.

5. Complete the construction of the carrier base using two 10.5" PVC sections
  - Apply PVC cement to the inside of the two open tee joints on the carrier support posts
  - Depress/hammer the one 10.5" PVC section into each open tee joint
  - Apply PVC cement to the two remaining open tee joints on the carrier support posts
  - Depress/hammer the other half of the carrier base into the open tee joints (Fig. 99)



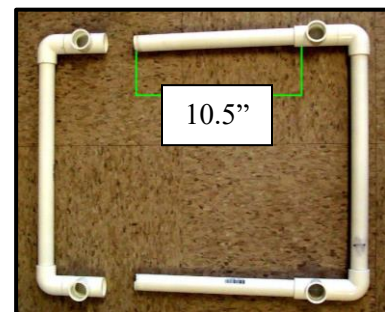
**Fig. 99.** Completed carrier base.

6. Begin construction of the carrier top using four carrier corners and two 14.5" PVC sections.
  - Apply PVC cement to the inside of the open elbow joint in one of the carrier corners
  - Depress/hammer a 14.5" PVC section into the elbow joint. (Fig. 100)
  - Repeat for the remaining 14.5" section and two carrier corners



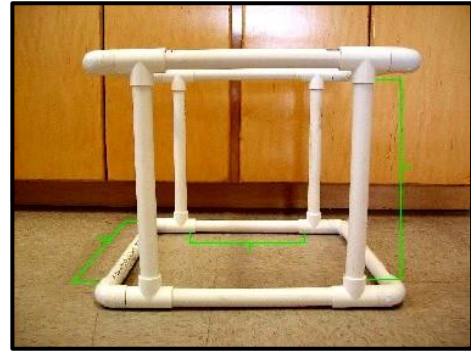
**Fig. 100.** Parts for carrier top.

7. Complete the construction of the carrier top using two 10.5" PVC sections.
  - Apply PVC cement to the inside of the two open tee joints on the 14.5" PVC carrier top sections
  - Depress/hammer the one 10.5" PVC section into each open tee joint parallel to the ground
  - Apply PVC cement to the two remaining open tee joints on the carrier support posts
  - Depress/hammer the other half of the carrier base into the open tee joints (Fig. 101)



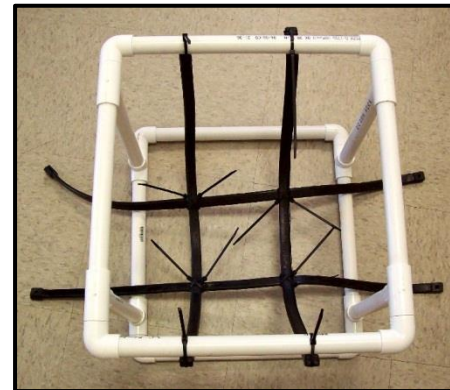
**Fig. 101.** Carrier top sections.

8. Complete the construction of the carrier structure (Fig. 102)
  - Apply PVC cement to the inside of the four open tee joints perpendicular to the ground
  - Ensure the 14.5" & 10.5" carrier top sides mirror the rectangular carrier base
  - Depress/hammer the carrier top to the completed carrier base



**Fig. 102.** Carrier structure.

9. Attach bungee sling using four 35" rubber bungees. Sling should hang approximately 3.5" from the ground.
  - Remove the metal hooks from the bungees
  - Put zip ties through the hole at each end of the bungee (where hook was) and fasten by zipping the tie to the top bar of the carrier frame in the pattern shown (Fig. 103)
  - Secure the 4 spots where the bungees overlap with two zip ties crossing them. Trim all zip ties and file the sharp tie edges left behind.



**Fig. 103.** Bungee grid.

10. Attach the 8" bungee straps to the top of the carrier
  - Hook one bungee (facing up) to the 14.5" side of the carrier top
  - Feed the bungee through the hook and lace a zip tie through the loop at the end of the bungee (Fig. 104)
  - Zip the tie into place and trim excess length
  - Repeat for the second bungee, leaving the opposing side of each bungee free
  - Completed carrier is pictured below (Fig. 105)



**Fig. 104.** Attached bungee strap to carrier top.



**Fig. 105.** Completed carrier and incubation box.

## APPENDIX D: Hatching and Emergence Success Documentation

Determination of incubation success consists of two components: *hatching success* and *emergence success*. Hatching success refers to the number of live and dead hatchlings that have completely left their egg shells. Emergence success is the number of live and dead hatchlings that make it to the beach surface. Two simple mathematical formulas can be used to calculate the hatching success rate and the emergence success rate (See below).

PADRE ISLAND NATIONAL SEASHORE, DIVISION OF SEATURTLE SCIENCE AND RECOVERY

### CLUTCH INFORMATION DATA SHEET

Location:
<input type="checkbox"/> PAIS Facility
<input type="checkbox"/> PAIS Corral
<input type="checkbox"/> SPI Corral
<input type="checkbox"/> <i>In situ</i>

Clutch # \_\_\_\_\_  
 Lay Date: \_\_\_\_\_  
 Hatch Date & Time (All or Part A): \_\_\_\_\_  
 Hatch Date & Time (Part B): \_\_\_\_\_  
 Hatch Date & Time (Part C): \_\_\_\_\_

# Eggs broken pre-incubation: \_\_\_\_\_  
 # Eggs in Clutch (initial): \_\_\_\_\_  
 # Eggs in Clutch (final): \_\_\_\_\_  
 # Eggs Hatched: \_\_\_\_\_  
 % Hatched : \_\_\_\_\_ =  $\frac{\text{\# hatchlings}}{\text{\# eggs}}$

**Corral/*In Situ*:**  
 # Hatchlings on Surface at Time of Excavation\*:  
 \*Hatchlings completely emerged from sand  
 (Part A) # Hatchlings: \_\_\_\_\_ Time: \_\_\_\_\_  
 (Part B) # Hatchlings: \_\_\_\_\_ Time: \_\_\_\_\_  
 (Part C) # Hatchlings: \_\_\_\_\_ Time: \_\_\_\_\_

% Emergence: \_\_\_\_\_ =  $\frac{\text{\# live hatchlings}}{\text{\# eggs}}$   
 # Unhatched eggs: \_\_\_\_\_  
 # Dead Hatchlings\*\* : \_\_\_\_\_  
 # Live Hatchlings Released: \_\_\_\_\_  
 \*\*Hatchlings are individuals that have left their egg shells

**Transfer Information:**

Number	Date	Time	Activity

**Release Information:**

Number	Date	Time	Location	Staff Initials

**Comments:**

$$\text{Hatching success (\%)} = \frac{\text{\#live} + \text{\#dead (emerged from eggshell)}}{\text{\#eggs*}} \times 100$$

$$\text{Emergence success (\%)} = \frac{\text{\#live} + \text{\#dead (emerged onto beach)}}{\text{\#eggs*}} \times 100$$

\*Note that this includes all eggs in the clutch, including eggs found broken at the nest site.



# APPENDIX E: STSSN Stranding Report Form

## SEA TURTLE STRANDING AND SALVAGE NETWORK – STRANDING REPORT

<b>OBSERVER'S NAME / ADDRESS / PHONE</b> First _____ M.I. _____ Last _____ Affiliation _____ Address _____ Area code/Phone number _____	<b>STRANDING DATE :</b> Year 20__ Month __ Day __ Turtle number by day __ __ <hr/> <i>State coordinator must be notified within 24 hrs; this was done by</i> <input type="checkbox"/> phone (361)949-8173 x226 <input type="checkbox"/> email <input type="checkbox"/> fax (361)949-9134
---	---

**SPECIES: (check one)**

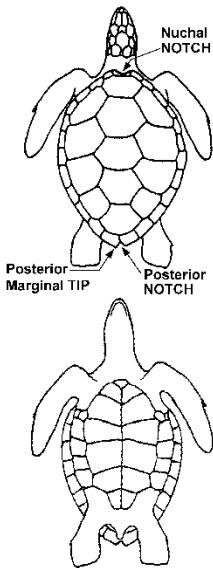
CC = Loggerhead  
 CM = Green  
 DC = Leatherback  
 EI = Hawksbill  
 LK = Kemp's Ridley  
 LO = Olive Ridley  
 UN = Unidentified

**Check Unidentified if not positive. Do Not Guess.**

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

**SEX:**

Undetermined  
 Female  Male  
 Does tail extend beyond carapace?  
 Yes; how far? \_\_\_\_\_ cm / in  
 No  
 How was sex determined?  
 Necropsy  
 Tail length (adult only)



**STRANDING LOCATION:**  Offshore (Atlantic or Gulf beach)  Inshore (bay, river, sound, inlet, etc)

State \_\_\_\_\_ County \_\_\_\_\_

Descriptive location (be specific) \_\_\_\_\_

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_

**CONDITION: (check one)**

0 = Alive  
 1 = Fresh dead  
 2 = Moderately decomposed  
 3 = Severely decomposed  
 4 = Dried carcass  
 5 = Skeleton, bones only

**FINAL DISPOSITION: (check)**

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

*\*If painted, what color?* \_\_\_\_\_

**TAGS: Contact state coordinator before disposing of any tagged animal!**

Checked for flipper tags?  Yes  No

Check all 4 flippers. If found, record tag number(s) / tag location / return address \_\_\_\_\_

PIT tag scan?  Yes  No  
If found, record number / tag location \_\_\_\_\_

Coded wire tag scan?  Yes  No  
If positive response, record location (flipper) \_\_\_\_\_

Checked for living tag?  Yes  No  
If found, record location (scute number & side) \_\_\_\_\_

**CARAPACE MEASUREMENTS: (see drawing)**

**Using Calipers** **Circle unit**

Straight length (NOTCH-TIP) \_\_\_\_\_ cm/in

Minimum length (NOTCH-NOTCH) \_\_\_\_\_ cm/in

Straight width (Widest Point) \_\_\_\_\_ cm/in

**Using non-metal measuring tape** **Circle unit**

Curved length (NOTCH-TIP) \_\_\_\_\_ cm/in

Minimum length (NOTCH-NOTCH) \_\_\_\_\_ cm/in

Curved width (Widest Point) \_\_\_\_\_ cm/in

**Weight**  actual /  est. \_\_\_\_\_ kg / lb

Fibropapillomatosis?  Yes  No  Unk.

FP Grade: \_\_\_/3  Papillary  Smooth

Tumor(s) Involve Eyes?  Left  Right  No

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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**For Administrative Use Only**

State ID: \_\_\_\_\_

**SEA TURTLE STRANDING AND SALVAGE NETWORK – STRANDING REPORT  
(BACK OF FORM)**

**SPECIES IDENTIFICATION**

head	carapace	plastron
2 pairs of prefrontal scales	scutes imbricated (overlapping) 4 lateral scutes	4 inframarginal scutes without pores
<b>Hawksbill - <i>Eretmochelys imbricata</i></b>	4 lateral scutes lower jaw serrated	4 inframarginal scutes without pores
1 pair of prefrontal scales	5 lateral scutes	4 inframarginal scutes with pores
<b>Green turtle - <i>Chelonia mydas</i></b>	6 or more lateral scutes 6 or more vertebral scutes	4 inframarginal scutes with pores
more than 1 pair of prefrontal scales	5 lateral scutes	3 inframarginal scutes without pores
<b>Kemp's ridley - <i>Lepidochelys kempii</i></b>	ridges	no scutes
more than 1 pair of prefrontal scales	no scales	
<b>Olive ridley - <i>Lepidochelys olivacea</i></b>		
more than 1 pair of prefrontal scales		
<b>Loggerhead - <i>Caretta caretta</i></b>		
no scales		
<b>Leatherback - <i>Dermochelys coriacea</i></b>		

*Please use an envelope and mail original form to:*

**DR. DONNA SHAVER**  
**TEXAS STSSN COORDINATOR**  
**PADRE ISLAND NATIONAL SEASHORE**  
**P.O. BOX 181300**  
**CORPUS CHRISTI, TX 78480-1300**

## APPENDIX F: Instructions for Completing STSSN Stranding Report Form

**OBSERVER'S NAME/ADDRESS/PHONE:** This is the person who handled the turtle in the field. Provide an address and phone number where you can be reached in the event we need to contact you for clarification of the reported data.

**STRANDING DATE:** This is the date that the stranded turtle was first reported. If you did not investigate until later date, note that in the remarks section at the bottom of the form. "Turtle Number by Day" is used to keep track of more than one turtle investigated on a single day by the same person. Your first turtle of the day is 01, the second turtle you handle that same day is 02, etc. Notify the Texas STSSN Coordinator within 24 hours of any strandings documented and check the box describing how the coordinator was notified.

**SPECIES:** Use the species identification key on the back of the form to positively determine species. If you are not positive of the species identification, check "Unidentified". Do not guess. Check boxes to indicate if photos were taken and if the Texas STSSN Coordinator verified the species. The Texas STSSN Coordinator may verify species based on photos taken and submitted with the stranding report form.

**SEX AND CATEGORIZING ADULTS:** Check appropriate box(es). Sea turtles cannot be sexed externally until they are mature adults. If the turtle is not adult-sized and the turtle has not been necropsied, check the "Immature/Undetermined" box. Some males may begin to mature at slightly smaller sizes than those listed above and tail length would be documented if it is being used to externally sex a turtle.

<p><u>Adult sizes for sea turtles, smallest to largest:</u> Kemp's ridley: SCL <math>\geq</math> 60 cm Hawksbill: SCL <math>\geq</math> 70 cm Green: SCL <math>\geq</math> 83 cm Loggerhead: SCL <math>\geq</math> 92 cm Leatherback: CCL <math>\geq</math> 130 cm</p>
--

**STRANDING LOCATION:** Check "offshore" if the turtle was found on an ocean beach or "inshore" if the turtle was in a bay, river, sound, inlet, etc. Give a detailed descriptive location of the stranding using a reference point that can be found on a NOAA navigation chart. Local names or landmarks not found on most charts do not help pinpoint a location. Note the name of the island, beach and beach mile markers. Good reference points also include inlets, fishing piers, light houses, water tanks, etc. Latitude/Longitude - if you have a GPS unit or are familiar with latitudes and longitudes and have a navigation chart, include the latitude and longitude of the stranding location in a decimal degree format (DD.DDDD°). If you cannot provide accurate latitudes and longitudes, leave this space blank. It then becomes even more important to provide a location description that can be located on a map.

**CONDITION:** Check the box that best describes the condition at the time of stranding. If the turtle seems intermediate between two stages of decomposition, pick the one that fits best. Fresh dead turtles should have no foul smell. Moderately decomposed turtles smell bad, but skin and scutes are intact or are only beginning to peel and internal organs are still distinguishable. Severely decomposed turtles smell very bad with scutes lifting or gone, skin beginning to peel or liquefy, and

individual organs hard to identify. Dried carcasses are leathery with internal organs completely decomposed.

**FINAL DISPOSITION:** Check the box(es) next to the number that best describes what was done with the stranded animal after it was documented on the beach. Provide additional information regarding any salvaged specimens. For live turtles, record the name of the rehabilitation facility the turtle was brought to.

**TAGS: Contact the Texas STSSN Coordinator before disposing of any tagged animal!!**

- Metal flipper tags - check all flippers on all species and record information; also note if tag scars are present.
- PIT tags - scan front flippers and shoulder areas of all species (see PIT tag scanning protocol for specific scanning instructions).
- Coded wire tag - tags have been placed in front flipper region of some head-started Kemp's ridleys (see coded wire tag scanning protocol for specific scanning instructions) and the rear flippers of some wild stock Kemp's ridley hatchlings released in Mexico during the 1990s. All flippers and associated shoulder and "armpit" areas of all Kemp's ridleys should be salvaged for later scanning if a magnetometer is not available.
- Living tags - check all Kemp's ridley and green turtles for light-colored areas on the dark carapace. Living tags are tissue transplants of the plastron onto the carapace which grow with the turtle and were used to mark some head-started turtles in varying age groups. If you suspect a living tag is present, the entire carcass should be salvaged. In most cases, Kemp's ridleys with living tags were also marked with external flipper tags, PIT tags, and coded wire tags. The Cayman Turtle Farm and Xcaret Eco Archaeological Theme Park have also used living tags on some green turtles to distinguish ages and a few of these turtles have been documented by the STSSN. These turtles may or may not have external flipper tags or tag scars.

**CARAPACE MEASUREMENTS:** Use calipers to obtain straight measurements and a flexible, non-metal measuring tape to obtain curved measurements. Measurement points are noted on drawings on the left side of the form. Circle the units of measurement (centimeters preferred).

**FIBROPAPILLOMATOSIS SECTION:** Check the appropriate box to identify whether the turtle has Fibropapillomatosis. If you are not positively able to determine, check "unknown". Do not guess. Grade the Fibropapilloma tumor load on a scale of 1-3, with 3 being the heaviest tumor load. If the load appears to be between two grades, assign the larger score (i.e. load is between 2 and 3, assign a grade of 3). If ANY of the tumors have ANY degree of papillary texture, check the papillary box. Identify whether the tumor(s) involve the eyes and check the appropriate box.

**REMARKS SECTION:** Mark any wounds/abnormalities on the diagrams on the left side of the form and describe in detail. Use objective statements and observations. Assumptions of potential cause or diagnosis cannot be verified and therefore should not be used. Always note anything unusual about a stranding event.

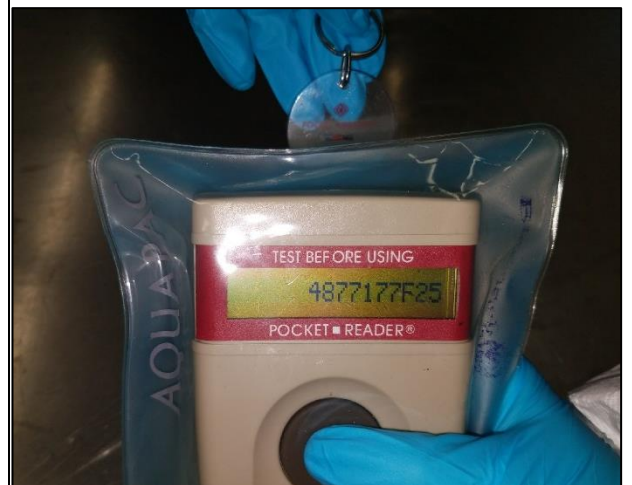
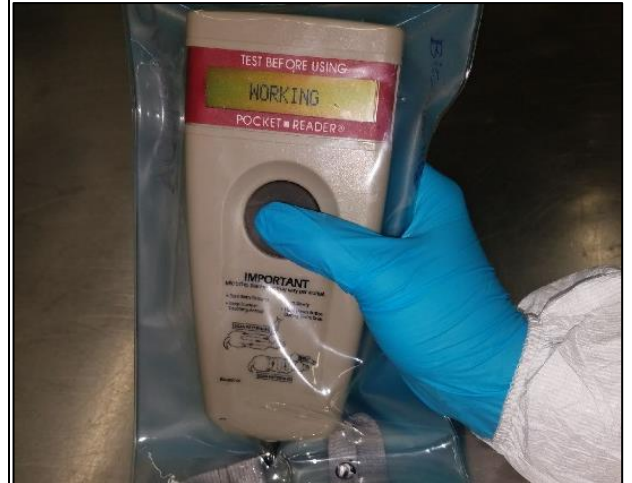


## APPENDIX G: PIT Tag Scanning Procedures

- Check all stranded sea turtles for PIT tags.
- Most PIT tag readers are NOT WATERPROOF and must be kept in a sealed plastic bag at all times during use.
- Always have spare batteries and a screw driver to remove the battery cover.

### TESTING THE PIT TAG READER:

- Before each use, scan a sample tag to verify the PIT tag reader is on and functioning properly. The sample tag is typically encased in plastic or resin and attached to a key ring that is provided with each reader.
- Press and release the button to turn the PIT tag reader on.
- **Press and hold** the button continuously to search for a PIT tag.
- The screen should display “searching” or “working” when functioning properly.
- Pass the reading surface, the upper half of the backside of the reader, over the sample tag at a distance of 1-2”.
- The reader will beep and display the PIT tag ID code on the screen when the PIT tag is detected.
- Release the button and then press it again to clear the PIT tag number from the screen.
- Reader will display “No ID Found” or equivalent language.



### WHERE TO SCAN FOR PIT TAGS:

- Project personnel should scan **ALL AREAS** of the turtle where a PIT tag may have been inserted - dorsal and ventral side of all flippers, including the triceps and pectoral muscles, the neck, and along the inframarginal region of the plastron.



### HOW TO SEARCH FOR A PIT TAG:

- While holding the button on the reader, place it directly on the skin of the turtle. **Slowly** move the reader over the entire area to be scanned in a circular or s-like motion.
- On leatherbacks, you may have to use more pressure on the reader against the skin.
- Use the entire reading surface, the upper half of the backside of the reader, when searching for a PIT tag.
- While scanning the area, tilt the scanner at various angles to improve your chances of detecting a tag. Scan all areas multiple times.
- If a PIT tag is detected, record the identification code exactly as it appears on the scanner display, including any hyphens or periods. Be especially careful with letters and numbers that are easily confused, such as the letter O and the number Ø.
- Immediately notify your state coordinator if a PIT tag is detected and do not dispose of the carcass until given permission to do so since valuable information may be obtained from a tagged individual.
- The state coordinator will contact the Cooperative Marine Turtle Tagging Program at the University of Florida to find out the history of the tagged turtle.



- Continue to scan all areas even if a PIT tag is located, in rare cases, a turtle could have more than one tag.
- If no PIT tag is detected, the reader will display “No ID found” or equivalent language.



#### **PROPER STORAGE OF EQUIPMENT:**

- If using a waterproof bag on the reader, thoroughly clean and disinfect after each use – use warm water and a non-detergent soap. Avoid detergents or chemical solvents on dry bags as they can compromise the water shedding properties and can cause the coating to delaminate.
- Enzyme-based cleansers may be used to remove odors from the bag.
- Store the reader in a dry environment and not in a plastic bag. Condensation will cause permanent, non-warranty covered damage to the circuitry in the reader. If batteries are present, remove during storage.

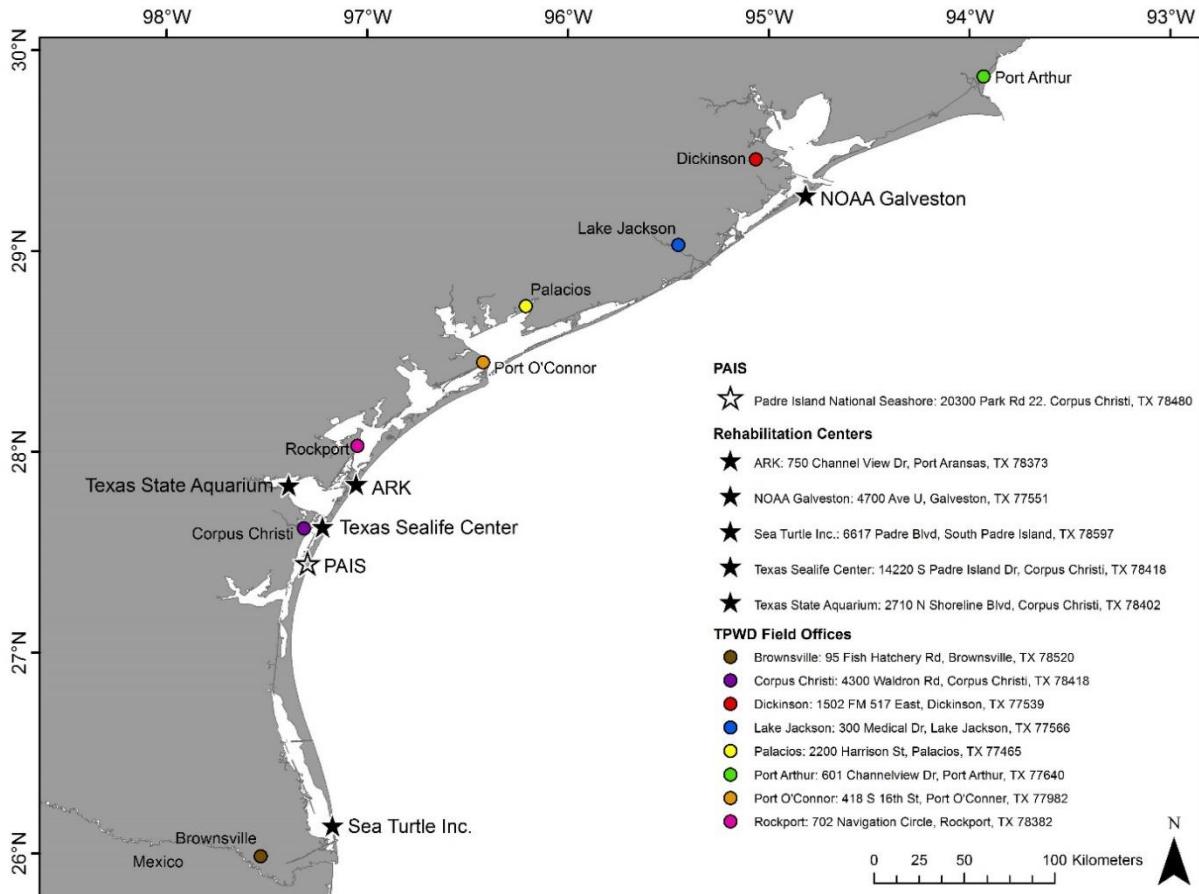
Credit: Lyndsey Howell, NOAA

## **APPENDIX H: Websites Reporting Real-Time Water Temperatures**

- NOAA National Centers for Environmental Information: Water Temperature Table of the Western Gulf of Mexico  
<https://www.nodc.noaa.gov/dsdt/cwtg/wgof.html>
- NOAA Tides and Currents – Physical Oceanographic Real-Time System (PORTS)  
<https://www.co-ops.nos.noaa.gov/ports/index.shtml?port=hg>
- Texas Coastal Ocean Observation Network (TCOON): Map of Active National Ocean Service (NOS) Stations in Texas  
<http://www.cbi.tamucc.edu/TCOON/>



# APPENDIX I: Map of Texas Rehabilitation Facilities



## APPENDIX J: Green Turtle Cold Stunning Data Form

### GREEN TURTLE COLD STUNNING DATA COLLECTION FORM (BATCHED)\*

\*All other species must be documented separately on an individual STSSN form

<b>OBSERVER'S NAME / ADDRESS / PHONE</b> First _____ M.I. _____ Last _____ Affiliation _____ Address _____ Area code/Phone number _____	<b>STRANDING DATE:</b> Year 20__ Month __ Day __ <hr/> State coordinator must be notified within 24 hrs; this was done by: <input type="checkbox"/> phone (361)949-8173 x226 <input type="checkbox"/> email <input type="checkbox"/> fax (361)949-9134
---	--

<b>STRANDING INFORMATION:</b>						
County _____						
Descriptive location (be specific) _____						
Color of ID Band (circle one)    Red            Orange            Yellow Green            Blue            Pink						
White            Lavender            Teal            B/W Checkered            Other ID: _____						

<b>TAGS: Contact state coordinator before disposing of any tagged animal!!</b>  Checked for PIT tags? <input type="checkbox"/> Yes <input type="checkbox"/> No  PIT tags present? <input type="checkbox"/> Yes* <input type="checkbox"/> No <small>*Tagged turtles are to be documented separately on an individual STSSN form.</small>  Photos taken of all turtles? <input type="checkbox"/> Yes <input type="checkbox"/> No	<b>CONDITION AT INTAKE:</b> Number alive: (No FP) # _____ (FP) # _____ Number dead: (No FP) # _____ (FP) # _____ Total # _____
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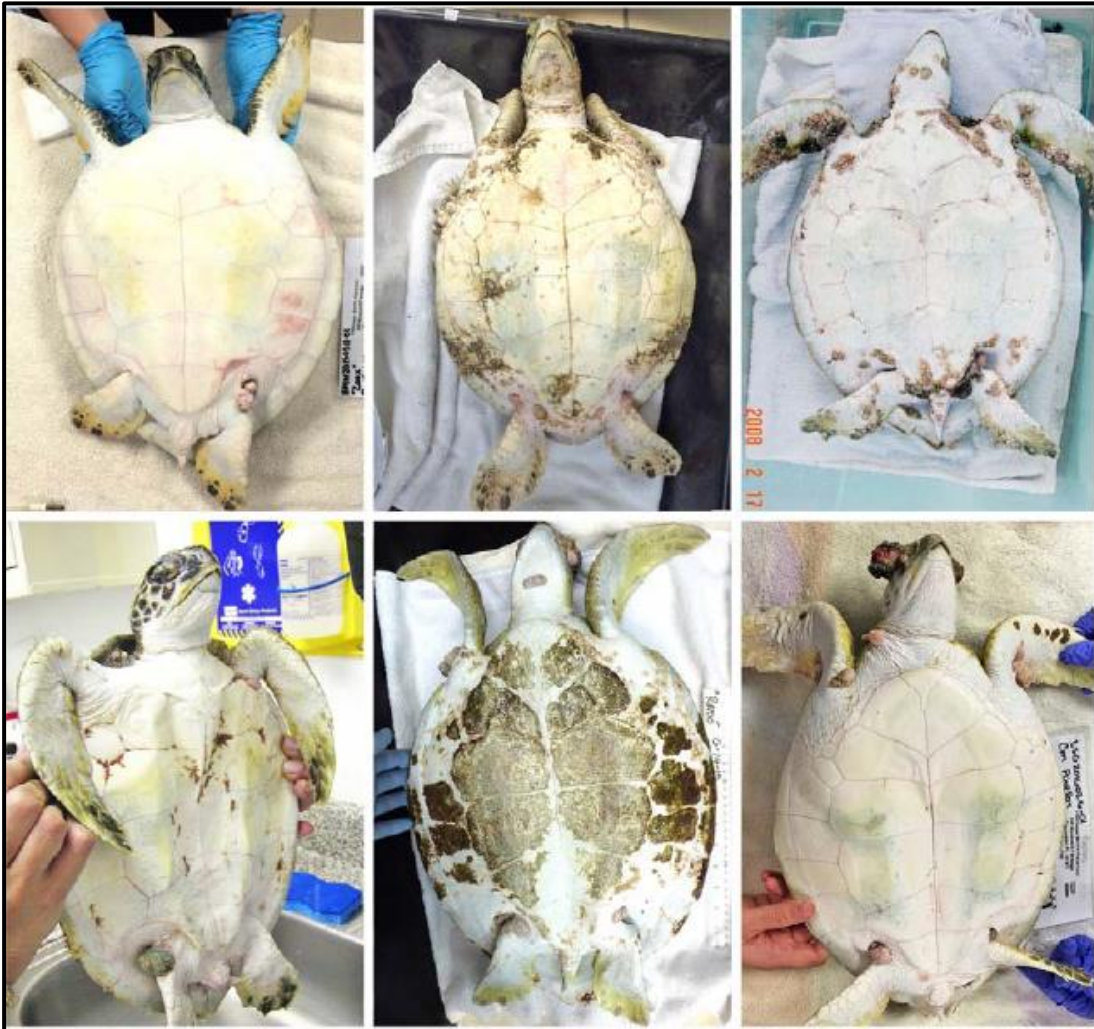
<b>CARAPACE MEASUREMENTS:</b>			
<b>Random Sample of Straight Length (SCL) Measurements (NOTCH-TIP):</b>			
How were Measurements Taken? <input type="checkbox"/> Calipers <input type="checkbox"/> Measuring Tape			
SCL: _____ cm	SCL: _____ cm	SCL: _____ cm	SCL: _____ cm
SCL: _____ cm	SCL: _____ cm	SCL: _____ cm	SCL: _____ cm
SCL: _____ cm	SCL: _____ cm	SCL: _____ cm	SCL: _____ cm
SCL: _____ cm	SCL: _____ cm	SCL: _____ cm	SCL: _____ cm
SCL: _____ cm	SCL: _____ cm	SCL: _____ cm	SCL: _____ cm

<b>FINAL DISPOSITION:</b>
Found alive, taken to rehab # _____
Name of Facility(s) (also note any subsequent transfers): _____
_____
Found alive, but died prior to transport to rehab # _____
Disposition of Carcasses: _____

<b>OTHER NOTES:</b>
_____
_____
_____

## APPENDIX K: Grades for FP Documentation Form

### Grade 1:



Credit: Dr. Brian Stacy, NOAA

**Grade 2:**



Credit: Dr. Brian Stacy, NOAA



**Grade 3:**



Credit: Dr. Brian Stacy, NOAA