APPENDIX J. SEA TURTLE MONITORING PROTOCOLS

Camp Lejeune's sea turtle monitoring program documents field work in four elements: 1) nest protection, 2) tagging of adult turtles, 3) nesting data collection, and 4) determination of hatching success. From mid-May through mid-August, approximately 7.0 mi of Onslow Beach are monitored nightly for sea turtle nesting activity generally spanning from 1 mi. north of the Onslow North Tower to the New River Inlet, (UTM 9358289 to 855823). Nesting activity within the northern portion of the beach, 0.7 miles of Onslow Beach and 3.6 miles of Brown's Island (UTM 935829 to 950833), are monitored by aerial surveys conducted twice a week throughout the nesting season.

NIGHTLY MONITORING PROCEDURES:

Addressing Unauthorized Activity

Technicians arrive on the beach by 2200 each night. Cover the headlights of the truck with the red filters before proceeding onto the beach strand. Access the beach from the SOTG access, the ORRV access, or the North Tower access road.

Once on the beach, the first pass should be run close to the high tide line to determine whether a crawl took place after completing the previous night's survey. The first run of the beach also includes identifying unauthorized ORRVs, temporary artificial lighting or other beach activities that may interfere with turtles. Concurrently, the beach is surveyed for crawls and nesting females. Escort any unauthorized ORRV, with headlights turned off, from the beach referring to the appropriate Base Order. Contact the Game Wardens if the driver is not compliant. Address other problematic activities in a similar manner. Approximately 1.5 hours should be allowed for between each North - South pass.

ENCOUNTERING NESTING ACTIVITY

`Data collection is always secondary to successful nesting…'

When a nesting female is encountered, usually spotted by a "crawl" observed in the trucks path, immediately extinguish the headlights and park the truck at a safe distance from the turtle. Record the time the turtle was first spotted and the mileage north or south of Riseley Pier. Carefully approach the turtle, without lights, to determine whether a nesting attempt is in progress. If the turtle is excavating a nest cavity, there will be enough time for data collection. If she is closing the cavity, you will have to move quickly to gather data after marking the egg cavity. Take extreme care so as not startle her. Crawling turtles are not to be disturbed- our activities should not influence the nesting activity. Continue on the pass or wait quietly at some distance until the turtle is either engaged in egg laying or returning to the surf.

If the turtle begins her return to the surf in an obvious false crawl, determine whether the individual is carrying tags and record any tagging information or identifying characteristics. If the turtle is not carrying tags, attempt to tag her but be prepared to abort the attempt if the activity is obviously stressing the turtle. Using calipers, measure the width of the track at its widest point and record GPS coordinates at the point farthest inland. Do not spend too much time on false crawls as you may miss an actual nest elsewhere on the beach. Keep in mind that the turtle will likely return for another nest attempt or crawl.

If the turtle is in the process of digging a body cavity, she will most likely attempt to nest. Once active egg laying begins, to save time place a marker (3-4' iron re-bar) at least one foot behind the cavity to indicate the position of the nest once covered. An optimal period during which tags can be affixed and measurements can be taken is when the turtle has deposited at least one third of her eggs.

Tagging procedures:

1. Prior to patrolling the beach, clean tags of any residue and place them in a sealed plastic bag.
    2) Apply a disinfectant (i.e. Betadyne) to the tag and fore flipper prior to tagging.
2. The tag is attached to the trailing edge of the fore flipper between the first and second major scales or through the second major scale. Tags are attached snugly to the flipper so that it doesn't extend too far posterior or too close where it may become imbedded. Both of the front flippers are tagged.
3. Once the tag has been attached, check the tip to be sure it has properly cinched: it should overlap the hole by at least 3mm. If the overlap is insufficient, carefully fit the tag back into the applicator and apply greater pressure. If this is still unsatisfactory, remove and apply another tag. Improperly cinched tags may shed quickly.
4. Record tag numbers if the turtle was previously tagged (recapture) and note any evidence of tag scars.

After the turtle has been tagged or existing tag numbers have been recorded, use the calipers and a tape measure to take carapace measurements. Record the curved carapace length (CCL), the straight carapace length (SCL) the curved carapace width (CCW) and the straight carapace width (SCW). Collect GPS coordinates of the nest position and record the width of the crawl.

PROTECTING THE NEST:

After the turtle has left the nest site mark and protect the nest with a wire cage. Use a five sided 48" x 24" cage with a mesh size of 2" x 4". After determining where the cavity is located place a stick or other marker over it to identify its location. Bury the wire cage 3-6" inches into the sand centered over the nest with the cavity marked with a stick. Use the shovel to dig a trench for the sides of the cage to be buried in and cover with sand to ensure predators will not be able to dig under the cage easily. The protective cage will exclude raccoons and most foxes. However, to deter persistent predators, an apron of extra mesh around the cage, or burying the cage deeper should deter them. When ghost crabs become a significant problem, traps can be used to trap them. The traps should be readily available, stored in the truck.

Number each nest and crawl consecutively starting with the first event of the season as #1 with either an "N" for a nest event or an "FC" for a false crawl preceding the number. Affix a metal tag onto the cage with the nest number, number of eggs if known, species, and date laid and place an Endangered Species sign onto the ocean facing side of the cage. Reflective tape should be affixed on cages in the training or ORRV portions of the beach and all cages should have colored flagging tied to the sides or corners to increase visibility.

NEST RELOCATION:

Nest relocation should be performed only when the nest:

- Is laid in the designated military training area from Riseley Pier southward to Onslow South Tower.
- Is laid below the average high tide line where REGULAR inundation will result in embryonic mortality.
- Is laid in an area known to be susceptible to erosion (i.e. just north of the washover flat).
- Is laid under a sloughing escarpment and is subject to being buried too deeply.

How to move a nest:

Do not begin nest relocation until the female has left the site and is crawling back to the surf. Nest relocations must occur no later than 0900 of the morning following the nesting event. Perform the relocation as soon as possible following the turtle's return to the sea.

Excavate the eggs by hand, NOT with a shovel. Wearing clean rubber gloves gently remove the eggs and place them into the egg cartons. Place egg cartons in Styrofoam box and set in the back of the truck. Note how many eggs were retrieved from the nest as well as noting any broken or abnormal eggs.

Relocate nests as close to the original nest sites as possible. For nests laid in the training portion of the beach, nests should be moved north of the Officers Pavilion. Avoid forming clusters of nests. Concentration nests in a small area may attract predators and/or alter sex rations. Nests should be relocated to areas above the high tide line that are relatively free from vegetation to prevent roots from interfering with incubation or emergence.

Excavate the new egg chamber with posthole diggers to the same depth and dimensions of the original nest. Carefully relocate the eggs to the new chamber and then cover them with moist sand excavated from the new nest chamber. Do not allow dry sand to fall into the cavity. Gently pat the surface and smooth the dry sand to a depth similar to what it was prior to excavating the cavity.

Protect and mark the nest location following the steps listed in the nest protection procedures.

Nest Excavation and Analysis:

When to Excavate Nests:

- Hatch success evaluations may only be conducted either 72 hours after the first sign of emergence or 80 days after the eggs were deposited, whichever occurs first. If the nest exhibits a trickle hatch then wait a minimum of 120 hours after the sign of first hatchling emergence before excavating the nests. It is important to allow all hatchlings to emerge naturally before excavating the nest.

- If the nest was subjected to tidal inundation, excessive rainfall, or cool ambient temperatures, wait a minimum of 120 hours or after 90 days of incubation.

- If you encounter live, vigorous hatchlings before reaching eggshells or find a mix of more than 10 live hatchlings and unhatched eggs, quickly cover the egg chamber with moist sand and wait at least 72 hours before excavating again. Opening and closing a nest can increase the chance of detection by predators; take care in replacing all nest contents and sand into the cavity.

How to excavate nest:

- Always wear latex gloves when excavating a nest.

- Carefully and gently dig in to the nest cavity with your hands. Be aware that live hatchlings may still be in the nest cavity.

- Carefully remove nest contents, separate into piles and record the number of:

  - Live Hatchlings (LH)
  - Dead Hatchlings (DH)
  - Unhatched Eggs (UH)
  - Whole Eggshells (>50%) (ES)
  - Pipped eggs w/live hatchlings
  - Pipped eggs w/dead hatchlings

  Notes: Disregard all eggshell pieces (<50%)
  Keep pipped eggs w/live hatchlings shaded.

ENCOUNTERING LIVE HATCHLINGS

- Release all live fully developed hatchlings after dark in an area void of all artificial lights. Allow the hatchlings to crawl to the water to facilitate natal beach imprinting.

- Rebury pipped eggs with live hatchlings and hatchlings with prominent yolk sacs. Wait at least a week before excavating again and adjust totals (add number of whole eggshells to the **ES** total; dead hatchlings that emerged from the egg but did not leave nest to the **DH** total; and live hatchlings that emerged from the egg but did not leave the nest to the **LH** total).

COLD WEATHER HATCHING EVENTS

If an emergence takes place when temperatures are less than 50 degrees F, gather all hatchlings in a container, bring inside and call the Sea Turtle Project Coordinator.

Rut removal: When obstacles are in the path from the nest to the surf, efforts must be taken to remove that obstacle. Tire ruts from ORRVs and military tactical vehicles are included in the definition of an obstacle. Refer to the Volusia County Beach Habitat Conservation Plan (1996) for a detailed discussion of rut removal practices.

1.) At 14 days prior to estimated hatching dates, nests will be surveyed for extent and depth of ruts located in the path from the nest to the surf.
2.) No later than 10 days prior to estimated hatch dates, ruts will be removed and the sand will be smoothed at those nests where multiple ruts are deeper than once inch and longer than one meter.
    - All rut removal will be performed in late afternoon prior to sunset but after recreational vehicles are required to have exited the beach.
    - If ruts are located seaward of the vegetation line, a section of chain-link fence or similar smoothing apparatus will be towed across the approximate path of emerging hatchlings, with a minimum width of 15 meters. At no time will rut removal be conducted within a marked nest area.
    - If rust are located on or near the vegetation line, the ruts will be hand-raked to avoid damage to beach vegetation.
3.) Any holes will be filled and debris removed around those nests due to hatch within a 10-day period.
4.) Daily visits will confirm that no obstacles will impede emerging hatchlings.

How To Report Sea Turtle Strandings:

1.) When on site collect the following information:
    - Date of stranding discovery
    - Species
    - Sex
    - Tagging Information
    - GPS coordinates of stranding location
    - Carapace measurements and weight if possible
    - Description of physical condition including injuries, wounds, or other marks that may indicate a cause of death
    - Digital or Polaroid photo of the turtle
    - Salvage the carcass or parts of the carcass per request of the Sea Turtle Project Coordinator.
2.) Within 24 hours, call the Sea Turtle Project Coordinator to report all strandings. Have all the above information on hand when phoning in a report.
3.) Fill out the Sea Turtle Stranding and Salvage Network Stranding Report.
4.) If it is a live stranding call the Sea Turtle Project Coordinator for handling instructions and consult the Handbook for Sea Turtles in North Carolina for immediate first aid.

INDIVIDUAL NEST RECORD

CRAWL DATE:_____(for all crawls discovered after midnight, enter the date the crawl was found. For all crawls found/reported before midnight, enter the next day's date.

CRAWL TYPE (circle one):FALSE CRAWL SPECIES:
NEST

CRAWL NUMBER:
TREATMENT (circle one): 0 = No treatment 1 = Relocated 2 = Wired in place 3 = Relocated and wired

CRAWL LOCATION:

CRAWL WAS FOUND IN SEA TURTLE NEST MANAGEMENT ZONE

CRAWL LATITUDE_____LONGITUDE_____WAYPOINT#

RELOCATED NEST LOCATION:

REL.SITE LATITUDE_____LONGITUDE_____WAYPOINT#

REASON FOR MOVING NEST

NUMBER OF EGGS RELOCATED:_____ NEST DEPTH_____in./cm.

TRANSPONDER BALL BURIED WITH NEST? Y / N TIME NEST WAS MOVED

NEST DISTURBANCES

Enter "Y" if nest was washed by the tide, enter "N" if nest was not washed by the tide for each day of the incubation period.

Day 1 _____	Day 21_____	Day 41 _____	Day 61 _____	Day 81
Day 2 _____	Day 22_____	Day 42 _____	Day 62 _____	Day 82
Day 3 _____	Day 23 _____	Day 43 _____	Day 63 _____	Day 83
Day 4 _____	Day 24 _____	Day 44 _____	Day 64 _____	Day 84
Day 5 _____	Day 25 _____	Day 45 _____	Day 65 _____	Day 85
Day 6 _____	Day 26 _____	Day 46 _____	Day 66 _____	Day 86
Day 7 _____	Day 27 _____	Day 47 _____	Day 67 _____	Day 87
Day 8 _____	Day 28 _____	Day 48 _____	Day 68 _____	Day 88
Day 9 _____	Day 29 _____	Day 49 _____	Day 69 _____	Day 89
Day 10 _____	Day 30 _____	Day 50 _____	Day 70 _____	Day 90
Day 11 _____	Day 31 _____	Day 51 _____	Day 71	
Day 12_____	Day 32 _____	Day 52 _____	Day 72	
Day 13 _____	Day 33 _____	Day 53 _____	Day 73	
Day 14 _____	Day 34 _____	Day 54 _____	Day 74	
Day 15 _____	Day 35 _____	Day 55 _____	Day 75	
Day 16 _____	Day 36 _____	Day 56 _____	Day 76	
Day 17_____	Day 37 _____	Day 57 _____	Day 77	
Day 18 _____	Day 38 _____	Day 58 _____	Day 78	
Day 19 _____	Day 39 _____	Day 59 _____	Day 79	
Day 20 _____	Day 40 _____	Day 60 _____	Day 80	

TOTAL NUMBER OF DAYS NEST WAS WASHED OVER

Record of nest disturbances that resulted impartial or total loss of eggs or hatchlings, including loss of nest markers, during the incubation period.

Date	**Type of disturbance**	**Comments(include estimated # of lost eggs/hatchlings**

HATCHING/NEST INVENTORY DATA

Date of first hatchling emergence (if first emergence was seen after midnight, record that day's date. If first emergence was seen before midnight, record the next day's date)

Date of last hatchling emergence (if last emergence was seen after midnight, record that day's date, if last emergence was seen before midnight, record the next day's date)

Nest inventory date:_____ Excavated by:

Perform the following steps to assist with the determination of the nest's hatch success:

1. To obtain number of hatched eggs, separate whole eggshells (>50%) from pieces (<50%); only count whole eggshells (each whole eggshell represents one hatched egg): ES =

2. Add together the number of unhatched eggs and pipped eggs with the dead hatchlings to obtain the total number of unhatched eggs: UH =

3. Count the # of dead hatchlings that emerged from eggs but did not leave the nest: DH =

4. Count the # of live hatchlings that emerged from eggs but did not leave the nest, irrespective of their condition. LH =

**If the nest contains live hatchlings that emerged from the egg shell, but did not leave the next cavity or pipped eggs with live hatchlings, see the volunteer handbook for further instructions.*

SEE VOLUNTEER HANDBOOK FOR MORE DETAILED INSTRUCTIONS ON PERFORMING NEXT EXCAVATIONS.

RECORD ANY NEST DISTURBANCES SEEN WHILE PERFORMING THE NEST INVENTORY (e.g., root invasion, fire ant invasion, dead hatchlings that appeared to be trapped by compacted sand, etc.) IN THE NEST DISTURBANCE TABLE ABOVE.

Additional comments (e.g., status of embryos among unhatched eggs, etc):

COOPERATIVE MARINE TURTLE TAGGING PROGRAM
TAGGING DATA FORM

SPECIES:_____ **DATE CAPTURED:** **DATE RELEASED:**

TAG NUMBERS (LIST ALL NUMBERS AND LETTER PREFIXES; CIRCLE TAG NUMBERS ALREADY ON THE TURTLE [="OLD TAGS"]:

LEFT FRONT:_____ **RIGHT FRONT:_____** **LEFT REAR:_____** **RIGHT REAR:_____**

PIT TAG #: _____ **LOCATION OF PIT TAG:_____**

PIT TAG MANUFACTURER:

WAS TURTLE CARRYING TAGS WHEN ENCOUNTERED?:

TAG RETURN ADDRESS:

ORGANIZATION TAGGING AND/OR RELEASING TURTLE (INCLUDE ADDRESS, AREA CODE/PHONE NUMBER, AND EMAIL):

FISH AND WILDLIFE BRANCH, MCB CAMP LEJEUNE, JACKSON VILLE, NC 28542 (910) 451-2148

PROJECT TYPE (CIRCLE ONE):

[NESTING BEACH] [TANGLE NET] [TRAWL NET] [POUND NET] [HAND CATCH][STRANDING][OTHER, DESCRIBE]

IF NESTING BEACH: DID TURTLE NEST?

FACILITY WHERE TURTLE WAS BEING HELD:

DESCRIBE CAPTURE LOCATION. BE SPECIFIC, INCLUDE COUNTRY, STATE, COUNTY AND LAT/LONG IF AVAILABLE.

Onslow Beach , MCB, Camp Lejeune, Jacksonville, Onslow County, NC, USA

DESCRIBE RELEASE LOCATION. BE SPECIFIC, INCLUDE COUNTRY, STATE, COUNTY AND LAT/LONG IF AVAILABLE.

Onslow Beach , MCB, Camp Lejeune, Jacksonville, Onslow County, NC, USA

TURTLE

STRAIGHT CARAPCE LENGTH (SCL NOTCH-TIP): _____CM _____INCHES

STRAIGHT CARAPACE LENGTH (SCL MINIMUM):_____ CM _____INCHES

STRAIGHT CARAPACE WIDTH (SCW): _____ CM _____INCHES

CURVED CARAPACE LENGTH (CCL NOTCH-TIP): _____ CM _____INCHES

CURVED CARAPACE LENGTH (CCL MINIMUM): _____ CM _____INCHES

CURVED CARAPACE LENGTH (CCW): _____ CM _____INCHES

WEIGHT: _____ KG _____LB

TURTLE WAS SCANNED FOR AND/OR INSPECTED FOR: (CIRCLE ALL THAT APPLY):

[TAG SCARS] [MAGNETIC WIRES] [LIVING TAGS] [PIT TAGS-GIVE FREQUENCY & SCANNER MANUFACTURER]

IF FOUND, GIVE LOCATION OF:

TAG SCARS: MAGNETIC WIRES: LIVING TAGS

ADDITIONAL REMARKS OR DATA ON BACK OF YES NO

MAIL COMPLETED FORM TO:

ARCHIE CARR CENTER FOR SEA TURTLE RESEARCH, DEPARTMENT OF ZOOLOGY, PO BOX 118525
UNIVERSITY OF FLORIDA, GAINSVILLE, FL 32611

Protective Cages for Sea Turtle Nests:
Marine Corps Base, Camp Lejeune, NC

- One 100' x 4' roll of 12.5 gauge wire with 2" x 4" mesh should produce 8 cages.
- 2" x 4" mesh should lay with 4" side horizontally
- Eight 48" x 98" pieces should be cut first, followed by sixteen 48" x 26" pieces.
  - 96" lengths should have 1" of open mesh on each end.
  - 24" lengths (sides) should have 2" open mesh on bottom.