

Table D-4. Quick Reference for Conducting Nesting Surveys & Related Activities

ACTIVITY	PROPER METHODOLOGY
Conduct nesting surveys for conservation:	<ol style="list-style-type: none"> 1. Walk the beach along/seaward of most recent high tide line. 2. When a fresh crawl is located, identify which track is emerging from water and which is returning to water. 3. Determine what species of turtle made the crawl. 4. Determine if the crawl was a nesting or non-nesting emergence. 5. Document nest, mark nest, and/or relocate nest (only when required for conservation purposes). 6. Obliterate section of upper track (NOT NEST SITE) by sweeping feet over track or crossing over track with survey vehicle.
Identify which track is emerging from water and which track is returning to water:	<ol style="list-style-type: none"> 1. As a turtle crawls forward, sand is pushed back with each flipper stroke. 2. If one track is shorter, it is the emerging (incoming) track. 3. If the tracks overlap, the returning (outgoing) track will be on top.
Determine if the crawl was made by a loggerhead turtle:	<ol style="list-style-type: none"> 1. Alternating gait observed in tracks. 2. No tail drag mark. 3. Track width range = 70-124 cm (27.6-48.8 in) with a mean of 94 cm (37 in).
Determine if the crawl was made by a green turtle:	<ol style="list-style-type: none"> 1. Simultaneous limb movement. 2. Central tail drag mark (solid or broken line). 3. Track width range = 95-144 cm (37.4-56.7 in) with a mean of 119 cm (44.8 in).
Determine if the crawl was made by a leatherback turtle:	<ol style="list-style-type: none"> 1. Simultaneous limb movement. 2. Central tail drag mark (solid or broken line). 3. Track width range = 175-214 cm (68.9-84.3 in) with a mean of 196 cm (77.2 in). 4. Track path sometimes circles or is sinusoidal (s-shaped).
Determine if the crawl was a loggerhead turtle nest:	<ol style="list-style-type: none"> 1. Follow the emerging (incoming) track of the turtle. 2. Look for secondary body pit and/or escarpment. 3. Look for sand misted or thrown over the emerging track.
Determine if the crawl was a loggerhead turtle non-nesting emergence:	<ol style="list-style-type: none"> 1. Follow the emerging (incoming) track of the turtle. 2. Look for very little or no sand disturbed other than tracks. 3. Look for a back stop with sand pushed back (not thrown) over emerging tracks, typically between two mounds of sand piled by the front flippers during the construction of the primary body pit. 4. Look for sand disturbed from digging efforts, but with the crawl exiting the disturbed area and continuing toward the dune before turning toward the ocean. 5. Look for sand disturbed from digging efforts, but with a smooth-walled or abandoned/open egg chamber.

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Determine if the crawl was a green turtle nest:	<ol style="list-style-type: none"> 1. Follow the emerging (incoming) track of the turtle. 2. Look for sand thrown into a mound covering more than 78 in of the emerging track. 3. Look for a deep (20-50 cm or 7.8-19.7 in) secondary body pit with an escarpment.
Determine if the crawl was a green turtle non-nesting emergence:	<ol style="list-style-type: none"> 1. Follow the emerging (incoming) track of the turtle. 2. Look for very little or no sand disturbed other than the tracks. 3. Look for a body pit smaller than 20-50 cm (7.8-19.7 in) with little or no escarpment.
Determine if the crawl was a leatherback turtle nest:	<ol style="list-style-type: none"> 1. Crawl covers >4 square meters with sand thrown in multiple directions.
Determine if the crawl was a leatherback turtle non-nesting emergence:	<ol style="list-style-type: none"> 1. Crawl covers <4 square meters and minimal thrown sand is observed.
Approximating the clutch location the morning after deposition:	<ol style="list-style-type: none"> 1. Follow the emerging (incoming) track of the turtle. 2. If a loggerhead nest (see previous page), often the clutch can be approximated ~2' into the disturbed area. 3. If a green nest (see previous page), often the clutch can be approximated ~3' back from the escarpment created by covering activities. 4. If a leatherback nest (see above), often the clutch can be approximated ~4.5' back from the escarpment created by covering activities.
Precisely locating the clutch location the morning after deposition:	<ol style="list-style-type: none"> 1. Follow the emerging (incoming) track of the turtle. 2. Gently & systematically dig by hand, focusing efforts in the center of the mound of sand created by turtle. Probe with fingers only – DO NOT USE SHOVELS OR ANY OTHER TOOLS TO DIG OR PROBE. 3. Once the top of the clutch is located, re-bury it with moist sand and gently pat sand surface with hand. 4. Replace dry sand over the clutch to the depth present before you began, placing a temporary marker over (but not into) the clutch site.
Marking the nest site to determine hatchling success:	<ol style="list-style-type: none"> 1. Either approximately or precisely locate the clutch location of a fresh nest. 2. Measure and record the exact distance from the approximate or precise clutch location to two separate marking stakes on the dune that are aligned so that they are directly oriented toward the location of the clutch. 3. An additional stake may be driven deeply & hidden from view a measured distance landward (i.e. not on the nesting beach) of the first two stakes. 4. Nest-identifying information (including species & date of deposition) should be recorded on at least one of the stakes.

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Marking the nest site to protect clutch from hazardous activities (i.e. beach cleaning, vehicular traffic, or construction):	<ol style="list-style-type: none"> 1. Visually inspect the site to determine if a nest exists. If you are unsure if eggs were deposited, mark the area as a nest. 2. An area of at least 3’ radius centered on the approximate clutch location (or the entire disturbed area where digging has occurred, if greater than 3’) should be delineated with stakes. Surveyor’s ribbon and nest signs may be placed on stakes, as well. 3. For construction permits, approximate the location of the clutch and use stakes to mark off an area of at least 3’ radius centered on the approximate clutch location. Be sure to refer to the individual project monitoring requirements to ensure that the proper amount of area has been staked off. 4. An additional stake should be placed a measured distance from the approximate clutch location at the base of the dune or seawall. 5. Nest-identifying information should be recorded on at least one of the stakes.
Protect nests with self-releasing screen/cage:	<ol style="list-style-type: none"> 1. The methodology described to “Protect nests with restraining cage” or the methodology described below may be used for this activity. 2. Find the precise location of the egg chamber (see previous page) and place a temporary marker in the sand above the clutch (DO NOT INSERT MARKER INTO THE EGG CHAMBER). Level the sand. 3. Using a 4’ x 4’ cage made of no smaller than 2” high x 4” long mesh welded wire, center the cage over the egg chamber and trace the edges of the cage in the sand. 4. Remove the cage or screen, then by hand remove ~2” of surface sand from the 4’ x 4’ square. 5. Remove the temporary marker and replace the cage or screen over the clutch, making sure that 4” openings of mesh are parallel to sand. 6. Secure the four corners of the screen/cage using stakes driven in at an angle away from the egg chamber. 7. Replace the removed sand on top of the screen.
Protect nests with restraining cage:	<ol style="list-style-type: none"> 1. Find the precise location of the egg chamber (see previous page) and place a temporary marker in the sand above the clutch (DO NOT INSERT MARKER INTO THE EGG CHAMBER). Level the sand. 2. Using a cage with mesh smaller than 2” x 4”, center the cage over the egg chamber and trace the edges of the cage in the sand. 3. Remove the cage and temporary marker. 4. Dig a 1’ deep trench along the tracing of the edges of the cage. 5. Place the cage into the trench and fill the trench with sand, making sure that the sand over the egg chamber and around the cage is at the original level. 6. Cage must be checked twice nightly (once between 11 p.m. and 1 a.m., and once between 5 a.m. and 7 a.m.), starting 45 days after the eggs were deposited. 7. Hatchlings found within the cage at night should be immediately released at an appropriate site and allowed to crawl to the water. Hatchlings found within the cage during daytime hours should be released according to guidelines set forth on page 2-16.

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Relocating nests:	<ol style="list-style-type: none"> 1. Find the precise location of the egg chamber (see previous page) by digging by hand and probing with fingers only (DO NOT USE SHOVELS OR ANY OTHER TOOLS TO DIG OR PROBE). 2. After locating the egg chamber, place a 2”– 3” layer of moist sand from around the top eggs into the bottom of a rigid container. 3. Individual eggs should be gently lifted from the chamber without rotating the eggs in any direction and avoid abrupt movements. 4. When all eggs are in the container, cover them with a layer of moist sand. Measure the depth of the nest cavity. 5. Determine a suitable nearby location on the beach, above high tide level and not in dense vegetation. 6. Dig, by hand, a new nest cavity (of the same depth as the original egg chamber) with a spherical bottom and a neck that is narrower than the bottom by 2”– 4”. 7. Place the eggs into the new chamber without rotating the eggs in any direction and avoiding abrupt movements. 8. Once all eggs have been transferred into the new egg chamber, cover them with the moist sand that was excavated from the original egg cavity. Place additional moist sand above the eggs to the level of surrounding moist sand and pat gently with hand. Replace dry sand over the area to the depth present before you began. 9. ALL NESTS MUST BE TRANSFERRED TO THE NEW LOCATION BY 9 A.M. THE MORNING FOLLOWING DEPOSITION ONLY.
Conducting nest inventory:	<ol style="list-style-type: none"> 1. Nests may be evaluated 3 days after the first hatchling emergence or 70 days after nest deposition (80 days in the case of a leatherback) or if the nest was frequently inundated or overwashed, whichever arrives first. 2. Dig into the nest chamber by hand (DO NOT USE SHOVELS OR ANY OTHER TOOLS TO DIG OR PROBE) until eggs or eggshells are reached. If more than one live hatchling is encountered before reaching any eggs or eggshells, cover the egg chamber with moist sand. Wait at least 24 hours before attempting to excavate again. 3. Remove the contents of the nest, piling them on sand or in a tray. 4. Separate the contents into: hatched eggs (empty eggshells > 50% complete, disregard smaller pieces), live hatchlings, dead hatchlings, pipped eggs with live hatchlings, pipped eggs with dead hatchlings, and unhatched eggs. 5. Determine number of hatched eggs by counting eggshells (an eggshell >50% complete = 1 egg, disregard smaller pieces) and subtracting the number live and dead hatchlings from the total number of empty eggshells. 6. Determine and separately record the number of pipped eggs with live hatchlings, pipped eggs with dead hatchlings, and unhatched eggs. 7. Determine the total number of eggs present by adding together the hatched eggs, all pipped eggs, and the unhatched eggs.

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Hatchling rescue and release:	<ol style="list-style-type: none"> 1. Hatchlings found during darkness should be released immediately. 2. If <5 hatchlings are found disoriented or at the bottom of inventoried nests during daylight hours, they may be released on the beach immediately (no later than 9 a.m.). 3. Hatchlings that must be held until the following night should be placed in rigid containers lined with damp sand, and loosely covered with a lid or towel to provide a dark environment. 4. When releasing hatchlings, place them on the beach and allow them to crawl to the water on their own. DO NOT USE ARTIFICIAL LIGHT SOURCES DURING HATCHLING RELEASES. 5. If a hatchling requires assistance in reaching the water, it may be moved closer to the water’s edge or placed in the shallow water and allowed to swim off on its own. 6. If a hatchling is weak or injured and needs to be held for more than 2-3 days, contact FWC to arrange to transfer it to an authorized rehabilitation facility.