



KIAWAH ISLAND TURTLE PATROL

# HATCHING PATROL

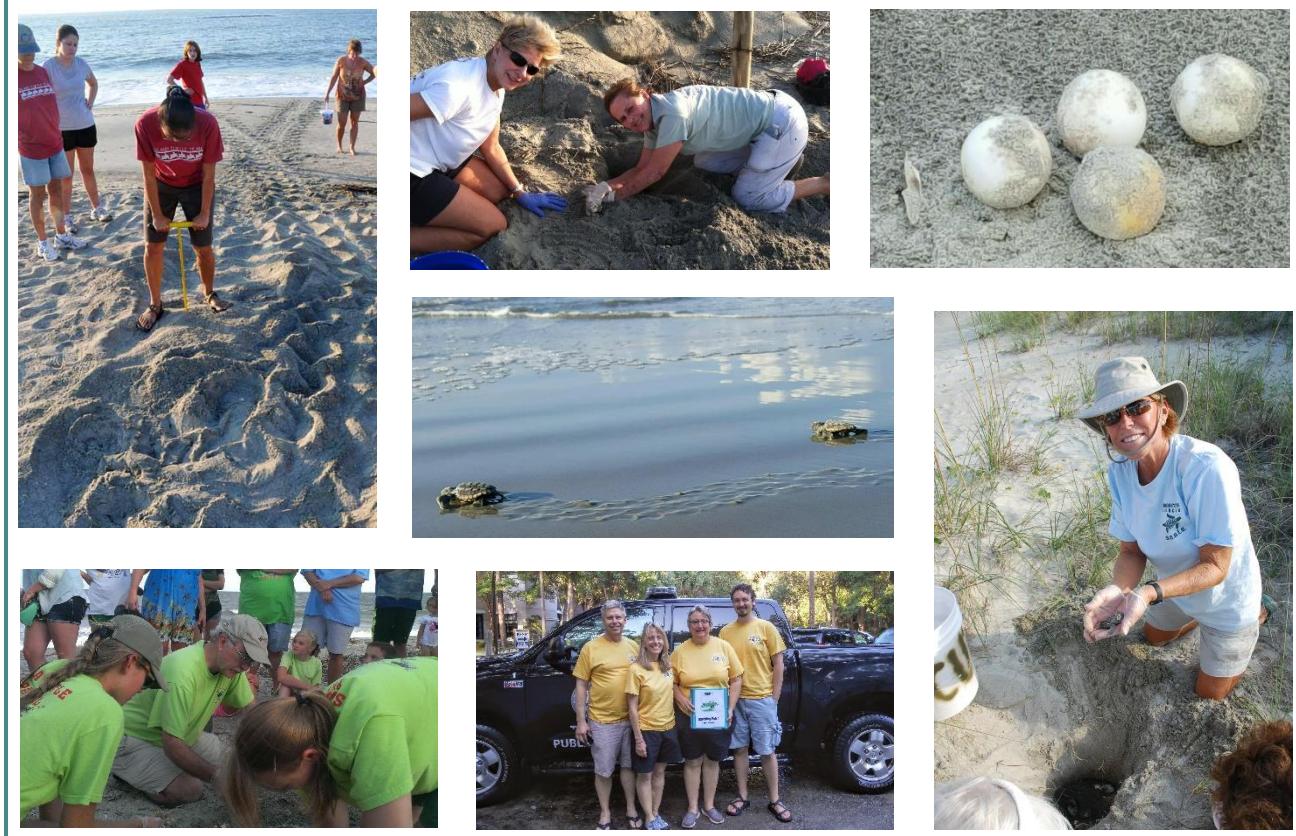


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# WELCOME

## Welcome to the Kiawah Island Turtle Patrol



Sea turtle nest protection on Kiawah has been actively helping and monitoring nests since 1972. We are one of the largest turtle patrol volunteer programs in South Carolina, and we are thrilled to have you join us!

Loggerhead sea turtles are the most common species to nest on Kiawah Island, and have been protected under the Endangered Species Act of 1973 (ESA) since 1978. Nests laid on beaches without a nest protection project have extremely low hatch rates, typically under 10%. With intervention from trained volunteers like you, that number jumps to over 70%. One person can make all the difference, and with your help, we can improve the odds of survival even more. We appreciate your time as part of this effort; know that your work has an observable, positive impact.

This manual provides insight on the tools we use and practices we follow for this patrol, and will help you become a turtle expert before setting foot on the beach. We recognize that your time here is valuable, and we are excited to have you be a part of the patrol!

On behalf of South Carolina's Department of Natural Resources, the Kiawah Island Turtle Patrol, and the turtles who make the journey to and from Kiawah every year, thank you for volunteering with us. We can't do it without you!

## Hatching Patrol Overview



Sea turtle activity, which includes nesting and hatching, takes place from the beginning of May through the end of October. From May 1<sup>st</sup> to August 31<sup>st</sup>, mother turtles make the journey from the ocean to their nesting grounds, and through the end of October, hatchlings will emerge from their nests and make for the ocean. While turtles do not always return to the exact beach where they hatched, they do return to the same general area.

Kiawah Island serves as a vital nesting ground and consists of over 10,000 acres of land and 10 miles of beach. For patrol purposes, Kiawah's beach is divided into eight separate zones, which are defined by marker numbers, typically placed 1/10 mile apart. Each morning, Hatching Patrol teams survey individual zones on foot, while the Nesting Patrol team surveys the entire beach, moving eastward from marker #40. We use marker numbers to help indicate nest locations, as well as to determine which zone the nest is in. This process establishes which Hatching Patrol team is responsible for the nest.

Each Hatching Patrol team is responsible for the zone they are assigned to. Volunteers walk their zone and watch for activity around the turtle nests. Hatched nests are marked and recorded. The patrol surveys the beach every morning to ensure the nests in a specific zone have not been compromised by the elements or predators. As the time gets closer for the eggs to hatch, the patrol looks for signs of emergence. After waiting three days after the first emergence, the patrol examines and catalogs the nest contents.

The goal for both Nesting and Hatching Patrols is to keep everything as natural as possible; for example, when Hatching Patrol releases struggling hatchlings, the patrol places the hatchlings 40 feet away from the ocean's edge so they can still crawl to the water by themselves. The reason why we perform our work this way is to ensure that we have minimal impact on this natural process.

# GENERAL GUIDELINES

All aspects of turtle nest handling require South Carolina Department of Natural Resources (SCDNR) permission. The Project Coordinator holds the permit with a list of authorized activities. All volunteers are required to read the procedures and guidelines and sign a consent form to receive a Letter of Authorization (LOA). Unauthorized disturbing of sea turtles, eggs, nests, or hatchlings is unlawful.

All the procedures in this guide are compliant with SCDNR regulations and should be followed as outlined. Refer to the information below to learn more about some the guidelines you should keep in mind when performing your patrol.

## **Patrol Procedure**



- You must wear your volunteer T-shirt while performing patrol activities to identify yourself as a member of the patrol.
- When you sign the volunteer consent form, you will receive your LOA; you must carry the LOA with you when performing your patrol.
- Only SCDNR-trained volunteers and team members may excavate a nest and handle hatchlings. Unauthorized personnel (including children) are not permitted to undertake any of the turtle nest handling activities.

## **Patrol Times**



- Hatching Patrol surveys are conducted daily, beginning on the day the first nest is marked in your zone, usually in May. Patrols will continue through October, and need to start at first light (not before) so that found hatchlings are not exposed to the heat for too long.
- In case of inclement weather, make every effort to start the patrol as soon as possible. However, do not risk your safety or well-being to perform any of the patrol-related duties. Stay off the beach during a storm event and comply with any evacuation orders.

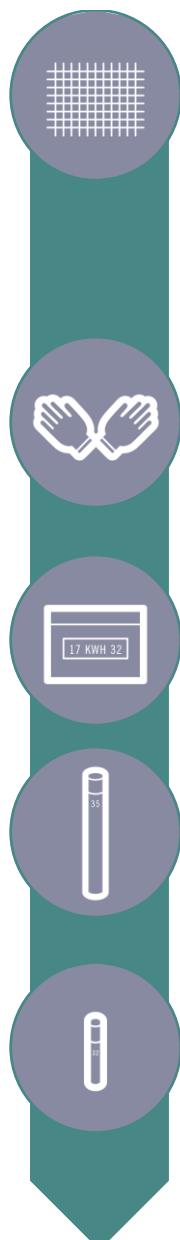
## **Hatching Care**



- The use of flash photography and lights other than infrared is not permitted. There may be other turtles or hatchlings in the area and artificial lights can deter other nesting females or may disorient emergent hatchlings. Chasing ghost crabs at night with lights is also disruptive to the turtles.
- At no time should a nest be dug into to see if the hatchlings are “ready” to emerge. Hatchlings should emerge naturally and must be allowed to crawl to the water on their own to imprint on the beach. It is unlawful to hold a hatchling without a permit.

# EQUIPMENT

In performing the tasks associated with your patrol, you may use the equipment defined below. In the procedures outlined later in this manual, equipment icons will appear next to the tasks they are related to. You may not need or use all the equipment listed here during each patrol, but knowledge of this equipment may be useful.



## Screens

- Mesh screens are used to protect identified nests from predators while allowing hatchlings to crawl through the nest opening.
- The center of the screen is supposed to be placed directly above the nest opening, and screens are secured in the sand using tent pegs.
- Sand that builds up on screens will need to be removed to ensure that hatchlings do not have to dig through extra sand as they emerge from the nest.

## Protective Gloves

- Protective nitrile, latex, or vinyl gloves are required by SCDNR regulations when excavating a nest or handling hatchlings, any part of a turtle, and eggs/egg shells.
- **There are no exceptions for using protective gloves.**

## Specimen Bags

- When a nest has been identified, a specimen (i.e., an intact egg or an egg shell fragment) will be retrieved for genetic testing. Specimens are stored in numbered bags that correspond to the identified nest number.

## Long Stakes

- Numbered long stakes are used to mark identified nests in the order in which they are found.
- These stakes are used in conjunction with red flags to identify nest openings—place red flags at a 90-degree angle to the long stakes.

## Short Stakes

- Numbered short stakes are used to mark suspected nests in the order in which they are found.
- These stakes are used when all signs point to a nest (e.g., body pit, thrown sand, loose vegetation), but a nest cannot be found.
- If an egg chamber cannot be found, you can contact the permit holder about getting a skilled prober out on the beach to look for it.



### Red Flag

- Numbered red flags are used to mark identified nests in addition to long stakes—when a nest has been identified and screened, place a numbered red flag at a 90-degree angle to the long stake to help identify the center of the nest opening.
- The number on the red flag must correspond to the number on the long stake.



### GPS

- Nests that have been identified have their coordinates recorded with a GPS device to ensure that if the nest's physical markers are somehow lost, the patrol can still locate the nest.
- GPS location details are required for data recording on the nest identification cards.



### Nest Identification Cards

- Nest identification cards are used to record the nest location, species, nest number, egg inventory (in the event the nest needs to be moved), and post-hatch nest inventory, as well as any other details or comments related to the nest.
- Abbreviated versions of nest identification cards are also used for recording non-nesting emergences (false crawls).



### Rakes

- Rakes are used to clear turtle tracks that have already been documented; this ensures that other patrols do not duplicate nests or crawls that have already been surveyed.



### Buckets

- Buckets are used either for relocating nests or transporting stragglers (hatchlings that did not make it out on their own); buckets must be lined with sand from the nest to ensure that the eggs do not roll and hatchlings stay moist.

# REQUIRED PAPERWORK

## Nest Identification Cards

As part of identifying nests, Nesting Patrol records crucial nest information on nest identification cards.

- Nest identification cards contain information on the nest number, survey & lay dates, turtle species, GPS coordinates, location information, nest prober name, data recorder name, nest management method, genetic sample information, and any relevant comments.
- If a nest had to be relocated, the total egg count for the nest will also be recorded and the number of eggs moved.

Nesting Patrol will fill out all the information on the front of the card, as well as the relevant information on the back of the card. Hatching Patrol will then use this information when inspecting the nests in their zones. When a fresh hatch has been observed and you prepare to inventory to the nest, a designated data recorder will fill out the Inventory Data section on the back of the card.

Refer to the card (front and back) below for an example of how to fill out the paperwork.

### Front

All the information fields on the front of the nest identification card are filled by Nesting Patrol.

1	Nest # 18	Ref# 8.3	Nest Date 6/1/16	Survey Date 6/1/16	Original Latitude 32.60904	Original Longitude -80.016805
2	Original Location Between Beach Club + Ocean Course					
3	Nest Prober Poindexter	Data Recorder P. Kurzawinski				
4	Activity <input checked="" type="checkbox"/> Nest <input type="checkbox"/> False Crawl Above HTL <input type="checkbox"/> False Crawl Below HTL <input type="checkbox"/> Possible Nest (no eggs) <input type="checkbox"/> Undetected Nest (wild nest)					
5	Species <input checked="" type="checkbox"/> Loggerhead <input type="checkbox"/> Green <input type="checkbox"/> Leatherback <input type="checkbox"/> Kemp's Ridley <input type="checkbox"/> Unknown	Turtle Encountered? Encountered?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Comments (ex. if turtle encountered; record tags, measurements, deformities, etc.)	bad nesting habitat, flat beach + scraped dune.					
REMEMBER TO TAKE A GENETICS SAMPLE! Enter data on back.						
6	Nest Type <input type="checkbox"/> In situ <input checked="" type="checkbox"/> relocated <input type="checkbox"/> hatchery		none	plastic screen	plastic cage	metal screen
			none	silt cloth	runway	streetlight turned off
	Nest Management (circle any that apply)		hatching team	cage	other(record in comments)	
Relocation Data						
Date 6/1/16	Total Eggs Laid by Female 109	Reason tidal	Relocated Latitude 32.60678	Relocated Longitude -80.05405	Location of Relocated Nest 11.5	
Relocation Comments relocated	107 eggs					

1. Nest information, including number, date, beach location using beach markers, and GPS coordinates
2. General nest location on the beach
3. Nest prober and data recorder information
4. Turtle activity and species
5. Nest comments
6. Nest type (*note: in situ means "left as is"*) and management method
7. Nest relocation information
8. Nest relocation comments

## Back

The upper half of the back of the nest identification card is used by Nesting Patrol to record information on egg or hatchling loss before the nest inventory. Nest inventory is conducted by Hatching Patrol, which uses the Inventory Data section on the lower half of the card to record information when evaluating the hatch success rate of a nest. During Hatching Patrol, all the information fields on only the lower half of the back of the nest identification card need to be filled.

Egg/Hatchling Loss Log Before Inventory						
Type (circle one)	Cause		Date	# Dead	Comments	
<b>1</b> <input checked="" type="checkbox"/> Eggs   Hatchlings   Total Nest Loss	Probing		6/1/16	2	1 shell used for DNA study	
Eggs   Hatchlings   Total Nest Loss						
Eggs   Hatchlings   Total Nest Loss						
Was genetics sample taken?	Date	Status of Sample Taken*		Label on Vial	Was sample taken from an already broken egg?	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	6/1/16	<input checked="" type="checkbox"/> Fresh <input type="checkbox"/> Old <input type="checkbox"/> At Inventory	16-KWH-#		<input checked="" type="checkbox"/> Yes (record in loss comments above) <input type="checkbox"/> No (create separate loss log entry above)	
*Fresh= nest 0-3 days old   *Old=nest >3 days old   *At Inventory Preference: 1) Dead hatchling, 2) Unhatched egg shell, 3) Hatched egg shell						
Inventory Data						
First Emergence Date	Inventory Date	Person Responsible for Inventory	Egg shells (>50%).	Unhatched or Pipped Eggs	Dead Hatchlings in Nest	Live Hatchlings in Nest
7/26/16	7/29/16	J. Pezzullo	80	27	0	0
Washover Dates	7/1, 7/2, 7/3, 7/4, 7/5 King Tides					No. Of Washovers
Additional Comments	24" deep but was a rolo					Final Status Unknown? <input type="checkbox"/>

1. Type of loss before the nest inventory, cause, recorded date, number of eggs/hatchlings lost, and additional comments
2. Genetic sample information
3. Nest inventory data, including first observed emergence date, inventory date, person responsible for inventory, egg shells, unhatched or partially hatched (pipped) eggs, dead and live hatchlings in the nest, and number of total washovers
4. Washover dates (when the tide washes over the nest)
5. Additional comments about the nest.

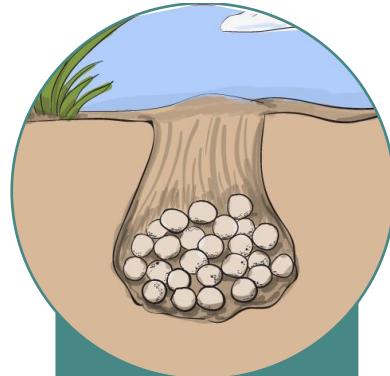
It is essential that the information on the nest identification cards is accurate and complete; each data recorder and Zone leader should review and confirm the information they log for each nest. Once the Hatching Patrol fills out the nest inventory information, the Kiawah data entry person(s) will enter the additional data online using seaturtle.org and keep the cards for future reference.

# ABOUT TURTLES

## Lifecycle

### Nesting

- The lifecycle begins when female turtles come ashore at night through the early morning, using the natural light of the moon and stars to navigate on the beach. Nesting on Kiawah typically lasts from early May to late August.
- After the female has selected a site, she digs her nest with her back flippers until she reaches the maximum depth, about 20 inches beneath the surface. She then deposits her eggs one at a time. A turtle nest can contain anywhere from 100 – 150 eggs.
- Once the mother has finished laying her eggs, she'll cover the nest with all four flippers and return to the sea. Loggerhead turtles are the most common species to nest at Kiawah, and they can lay 4- 7 nests per season, typically about 14 days apart. This entire process takes about 75 minutes.



### Hatching

- Turtle eggs typically incubate for 50 – 60 days, depending on the ambient temperature and rainfall. When an egg hatches, the hatchling stays underground for roughly three days until their shell straightens out and the orifice where the yolk sac was attached is closes. Hatchlings emerge as a group. When this happens, the sand covering the nest looks like it is bubbling and boiling, which is why an emergence of dozens of hatchlings is called a “boil.”
- Hatchlings usually make their way to the surface at night and use natural light reflected off the ocean surf to find their way to the water—artificial lights on the beach or along the shore can confuse hatchlings and lead them in the wrong direction, which is why it is so important to observe “Lights Out for Sea Turtles!”
- The hatchlings must travel across the beach on their own; according to scientific research, this journey helps them orient better to the oncoming waves and imprint on the magnetic field of the Earth, which gives them a sense of direction and allows them to return to their natal region when they mature in 25 – 30 years.

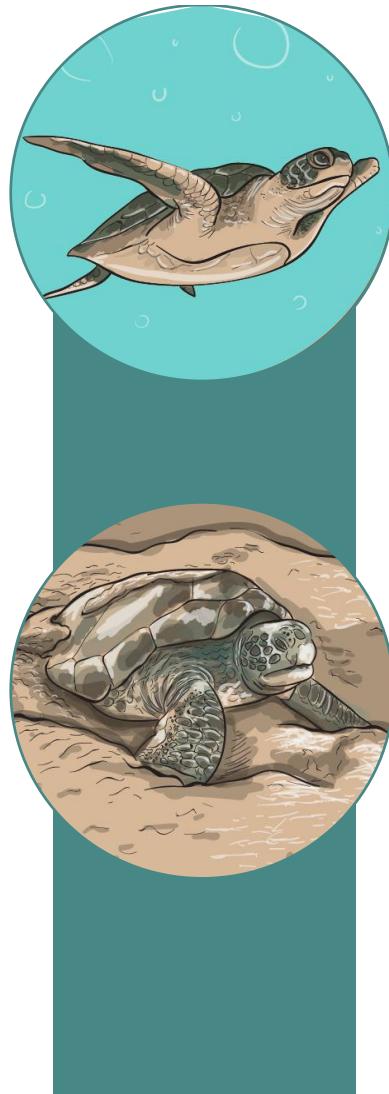


## Growth & Migration

- Once in the ocean, hatchlings swim continuously to reach the Gulf Stream, which they use to drift with the current in the sargassum weed. Here they are protected from predators and have plenty of food to grow as they travel the North Atlantic.
- This period of time is often referred to as the “lost years,” as following sea turtle movements during this phase is difficult. However, towards the end of this period, the survivors will return to the southeast US coast at about six years old to feed and grow for the next 20 years.

## Mating & Return

- As adults, turtles gather to mate off the coast in spring when the water warms on the continental shelf. Mating usually does not take place near the nesting beach, but rather along the migration routes between feeding and breeding grounds.
- After the mating period, the males depart and the females remain offshore while their fertilized eggs develop, after which they will come ashore to lay their nests.
- Tagging studies have shown that females. Recent genetics research and tagging studies have shown that the majority of females return to nest at a preferred beach—the beach where they were hatched—on a two or three-year cycle. Possibly as few as 1 out of 1,000 hatchlings will return to shore as adults to lay their eggs.

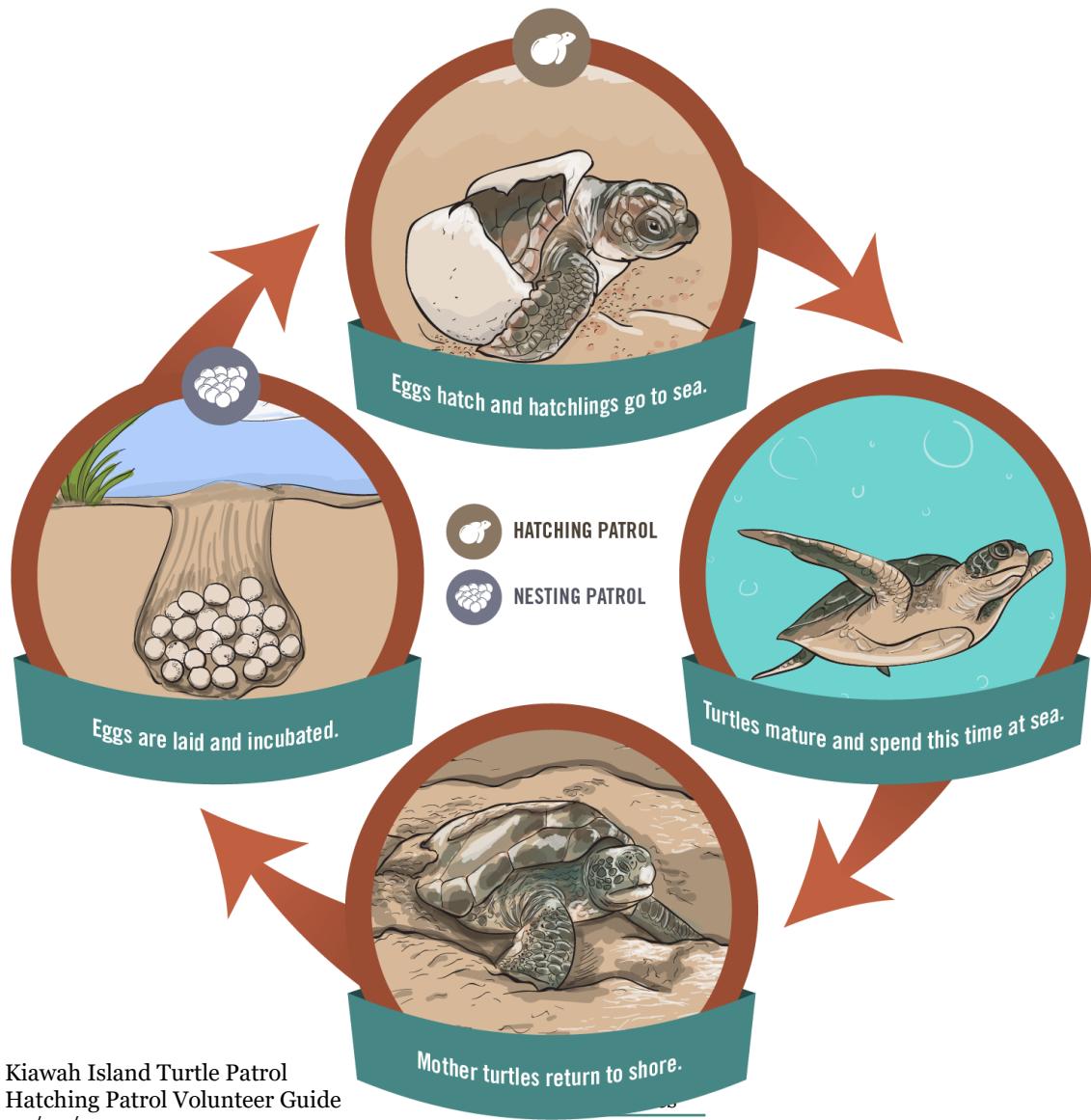


## Where This Patrol Fits In

Within the turtle lifecycle, Hatching Patrol follows the nesting stage. During and after the hatching stage, it is our job to ensure the nests are protected from predators and the elements, to provide the straggler hatchlings with assistance (not interference) as they leave the nest, and to examine and record the post-hatch nest contents.

Sea turtles spend their entire lives in the ocean except when they come ashore to nest and when they leave land upon hatching; on land, sea turtles are vulnerable to human interference and predators such as raccoons, crabs, and even coyotes. While we can't protect nests from all of these dangers—for example, ghost crabs are too small to defend against and are notorious for digging into turtle nests to feast on incubating eggs—we can provide deterrents against some of the larger dangers; the mesh netting we place over nests prevent predators like coyotes and raccoons from digging up nests. Furthermore, it is against the law for humans to disturb nests and harass hatchlings unless they are part of a protection program, such as the Kiawah Island Turtle Patrol. Each beach marker has an DNR sign on it that states this.

In 2016, Kiawah was home to over 390 nests, and our efforts contributed to an average hatch rate of 78.3%; providing protection and marking nests makes a difference.



## Turtle Tracks

Each turtle species leaves distinct tracks in the sand when they come ashore to nest. Loggerheads are the most common turtles that come to Kiawah, although there are three other species that may rarely come ashore here: green, leatherback, and Kemp's ridley. If you notice fresh tracks on the beach, take note of their location and let the Nesting Patrol know about them.

### Loggerhead

- Loggerheads are the most common turtles to nest in the Southeast US region, and are by far the most typical species you'll encounter during your patrol.
- Loggerheads leave staggered tracks in the sand, and you can determine their direction by the direction the sand was pushed back by the flippers.



### Green

- While green turtles and loggerheads are roughly the same size, green turtle tracks are symmetrical, and you can determine their direction by the direction of the tail drag and "poke" in the center of their tracks. Their body pits are deeper and much more sand is mounded up.



### Leatherback

- Like green turtles, leatherback tracks are symmetrical, but they are easy to distinguish due to their large size, which can range from five to seven feet in width. Their egg chambers are deeper.



### Kemp's ridley

- Kemp's ridley turtles are extremely rare, and while they leave staggered tracks like loggerheads, their tracks are much smaller and more spaced out.

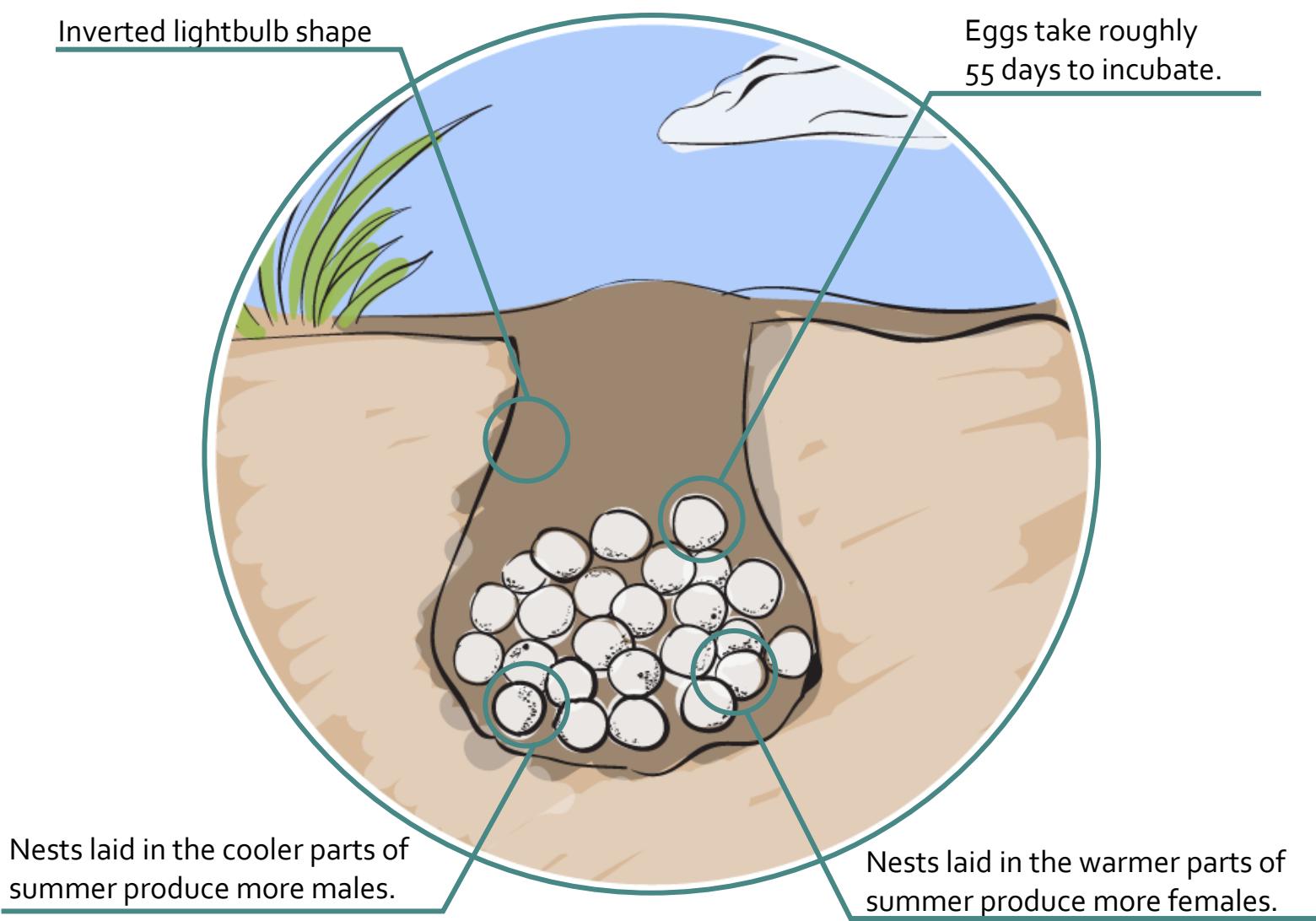


## Turtle Nests

While different turtle species make distinct tracks in the sand, the nest cavities that they leave behind are fairly similar in shape: each egg chamber looks like an inverted lightbulb, with a narrow opening that leads to a larger and more bulbous cavern.

Turtle eggs usually take about 55 days to incubate, although the incubation period is dependent on the species and ambient temperature. Like many reptiles, turtle sex determination is also dependent on temperature; typically, nests laid in early May and August will incubate during cooler nights and are more likely to produce males. Nests laid between late May and July will have shorter and warmer incubation periods and produce females. A good way to remember temperature-dependent sex determination is the phrase "Hot chicks and cool dudes."

In the event a nest needs to be relocated, it is critical to dig the new nest in the same kind of inverted lightbulb shape in order to mimic the natural way that the mother digs her nest, as the shape of the nest helps regulate egg temperature.



# PRE-EMERGENCE PROCEDURES

These procedures are to be conducted during each patrol. Some of the situations to be aware of during the patrol include:

- Sand build up and compaction
- Tidal erosion
- Nest disruptions
- Wild nests

Screens and cages should be checked regularly as part of pre-emergence procedures because stakes and/or screens may become partially or completely dislodged. Self-releasing screens and cages should be checked each morning starting at day 45 of incubation in case some hatchlings become trapped. Remember, exposing hatchlings prematurely by digging into the nest can adversely affect their ability to survive.

## Sand Issues: Build Up and Compaction

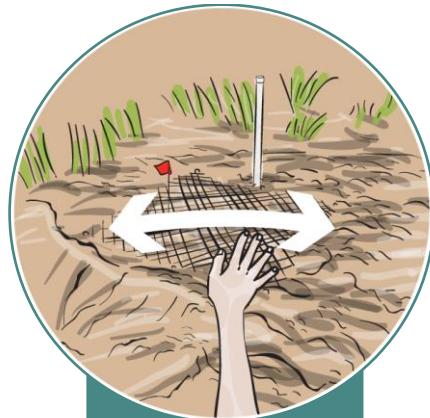
**Build Up:** Sand that accumulates over the nest due to wind or tides may prevent the hatchlings from reaching the surface only with extreme accumulation (over 3 feet). Hatchlings will be trapped if the screen is covered with sand. Remove accumulated sand from the nest every day or simple raise the screen up to always be on the surface.

To remove the sand:

### Step 1: Sweeping Sand Build up from the Screen

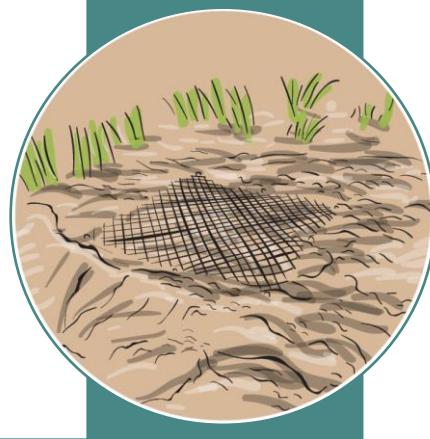
Sweep accumulated sand from the top of the screen using your hands.

Level off discarded sand so there are no piles around the nest.



### Step 2: Raising the Screen

After sweeping off the sand from the top of the screen, you will need to raise the screen to the surface so it is resting on top of the sand again.



**Compaction or Doming:** Rain and tidal over-wash cause the sand over the nest to densely compact. If not softened, a dome of hardened sand forms over the nest and may prevent the hatchlings from breaking through the surface. If you inspect a couple of nests in your zone and don't find a crust of harder sand, then you probably don't have this problem and should not continue to check nests for doming.

However, if you do find instances of doming, use the following rules:

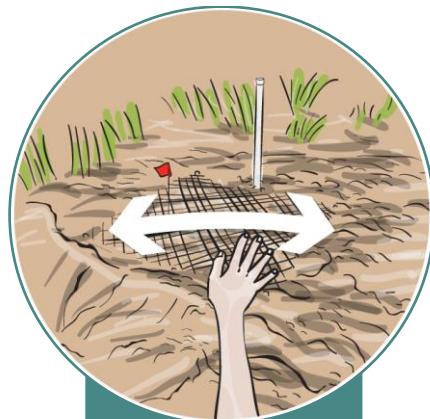
- For nests younger than 40 days old, you can loosen the sand all the way down to the eggs.
- For nests older than 40 days older, you can only loosen the sand to about 6 inches, as you run the risk of encountering live hatchlings.

Incubating nests should not be dug into for any other reason and only in the instances of heavy rain.

To remedy compaction:

#### Step 1: Sweeping Sand Compaction from the Screen

Sweep accumulated sand from the top of the screen using your hands. Level off discarded sand so there are no piles around the nest. Do not pull the screen up through the sand as this increases the nest depth.



#### Step 2: Marking the Center and Removing Screen

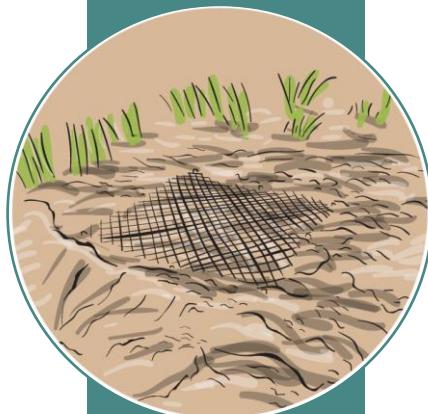
- Mark the location of the center of the nest—the center of the nest should be directly under the center of the screen, although you can also measure a right angle from the red marker flag and the long stake next to the screen—the point of the angle should mark the center of the nest.
- Remove the screen from the two bottom tent pegs by stretching the screen material over the tent peg notch.
- Roll the screen back out of the way while making sure you still have the marker for the center of the nest.



### Step 3: Loosening Sand

- Use straightened fingers to feel around the center marker to identify the circumference of the nest hole.
- Remove the sand from within the circumference and massage it to soften it up. Keep softening the sand until you can reach sand that feels soft and dry.
- Place the loosened sand back into the hole and smooth over the top.

Equipment You Will Need:



### Step 4: Replacing Screen

Replace the screen corners back over the tent pegs.

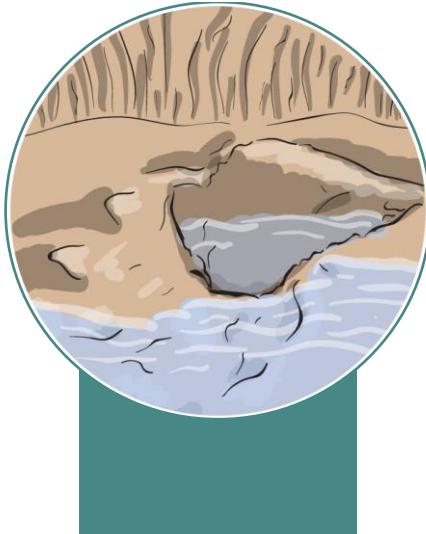
Remember, the center of the screen needs to be placed directly over the egg chamber.

## Water Inundation and Tidal Erosion

If a dune is in danger of being completely eroded away by high tides, the nest on it can be moved to safer areas anytime during incubation with permission from SC DNR.

If a nest appears to be in jeopardy by constantly being over-washed, document the dates on the nest card. Repeated wash overs will reduce the hatch success, but wash overs will not necessarily kill the whole nest—they may actually produce a few males.

Under no circumstances is a nest to be moved without permission.



## Missed Nests

These are nests that have not been identified by the Nesting Patrol as a marked nest with a long or short stake. If you identify a crawl that has not been raked over, mark it with a red flag, note the location, and report this to the Nesting Truck or Zone Captain. If the truck has passed, notify the Patrol Leader so the crawl can be evaluated. Report this nest as a *missed nest*.

Equipment You Will Need:



## Nest Disruption and Depredation

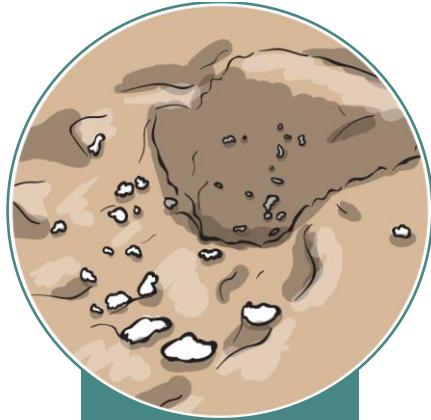
**Nest disruption:** This event occurs when a nest has the potential to be disrupted due to its location, such as at the end of a public boardwalk without a roped off area that people can walk around, or in an area used by beach vehicles, like at trash receptacles or emergency vehicle access roads.

In these situations, immediately inform the Zone Captain. They will notify the Nesting Patrol, who will place additional restraining measure about the nest.

**Depredation:** This occurs when predators, such as coyotes, foxes, raccoons, ghost crabs, fire ants, and birds disturb the nest. Depredation is a part of the natural system and, to a certain extent, compensated for by the high reproductive output of marine turtles. However, predators will sometimes become so proficient at finding and destroying nests that they may threaten all the nests on the beach. There are two types of depredation: complete and partial.

- **Complete Depredation:** A nest is considered completely depredated when all the eggs are destroyed. You are to record event on the nest identification card as a "Total Nest Loss" and no further evaluation is necessary.
  - The nest contents should be reburied within the original nest cavity as research has shown leftover nest contents contribute to the growth of dune plants. Be sure to indicate what type of predator under the Loss log
  - Leave the nest marker in place in the event an animal such as a raccoon digs up the contents. This way the unearthed content will not be confused with a depredated "wild" nest.
- **Partial Depredation:** If a nest is partially depredated, the depredated eggs are to be removed and the remaining eggs are relocated to a new site.
  - Record the nest number, the number of eggs relocated and the number depredated on the nest identification card.
  - Inform your Zone Captain or coordinator. They will coordinate the nest relocation with the Nesting Patrol.

Equipment You Will Need:



# EMERGENCE PROCEDURES

Emergence typically occurs at night and the signs of emergence include hatchling tracks or a large nest “crater”—when turtles emerge from their nest, their journey to the surface displaces the sand in a way that makes the sand look like it is bubbling and boiling, which is why emergences are also called “boils.” A small depression over the nest cavity occurs when the hatchlings leave the egg, but a larger “crater” occurs when hatchlings emerge from the nest. The “crater” has distinct vertical edges where the smaller depression has sloped edges. The hatchlings must then crawl to the water to orient or “imprint” themselves to the beach so they can return to the area when they migrate back to the Southeast US. Some emergence procedures you may perform include: documenting emergence, recovering disoriented hatchlings, reporting wild nests, and safely releasing stragglers.

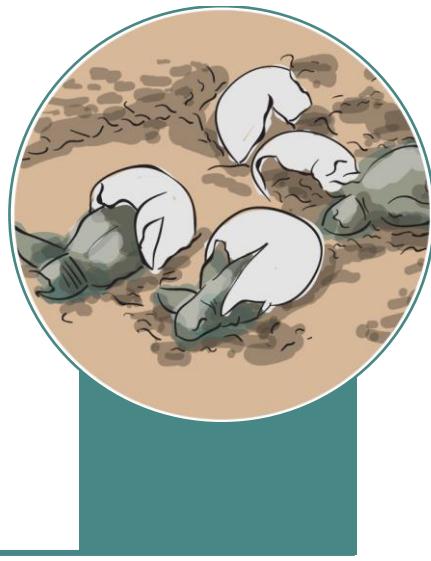
## Documenting Emergence

When hatchling tracks are noted to be coming from a nest, place the numbered red flag right behind the exit hole.

Mark the nest number, location, and emergence date on the Nest Identification Card.

Make sure you are always carrying a disorientation form with you.

## Equipment You Will Need:



## Recovering Disoriented Hatchlings

Hatchlings may become disoriented upon emerging from the nest due to distracting artificial light, or they may become entangled in grasses or brush near the nest in their attempt to reach the water.

- If you see hatchling tracks going away from the ocean, thoroughly check the surrounding area for disoriented or entangled hatchlings.
- Live hatchlings found wandering may be weak and can be relieved by dipping them briefly into a bucket of ocean water.
- After relieving the disoriented hatchlings, place them on damp beach sand a short distance (approximately 10 feet) from the water.
- Fill out a disorientation form and give to your Zone Captain or nesting permit holder ASAP, so the light can be taken care of before nightfall.

Remember, the hatchlings must crawl to the water to orient or "imprint" themselves to the beach

Equipment You Will Need:



## Reporting Wild Nests

You may encounter a wild nest by observing hatchling tracks coming from a nest with no markings in the area.

Place a red flag immediately behind the emergence hole and evaluate after three days. Report this nest as a *wild nest*. Contact the Nest Patrol immediately so they can assign the next nest number and take an accurate location.

This location and approximate lay date may point to a false crawl earlier in the season.

Always collect a genetics sample from these nests at inventory.



### Equipment You Will Need:



## Providing Safe Passage

Emerging hatchlings are at risk from predators and heat on their way to the ocean. Volunteers can cast their shadows on the hatchlings to shield them from the sun and birds. However, they may not place the hatchlings directly into the ocean.



### Equipment You Will Need:



# POST-HATCH EVALUATION

All nests must undergo a Post-Hatch Evaluation. Nest evaluation involves excavating a hatched nest and determining the fate of each egg. It does not require opening any eggs.

All information to be recorded is noted on the Nest Identification Card for each nest. All Hatch Patrol members are authorized to inventory nests. An experienced team member must accompany new volunteers for initial training.

Post-Hatch Evaluations may only be conducted either:

- 70 days after the nest was initially deposited, OR
- 3 additional nights after the first emergence

Digging into the nest before all the hatchlings have emerged is not permitted unless there is a fire ant attack, in which case call your Zone Captain to get long gloves. Digging into a nest prematurely will adversely affect the hatchlings' ability to survive.

## Step 1: Excavating the Nest

To conduct a nest success evaluation, dig straight down into the nest chamber with your hands until you reach eggs or eggshells. Disposable gloves must be worn at all times.

If you encounter any of the following during excavation, you must recover the nest with moist sand and wait 3 days before excavating again:

- Live hatchlings before reaching any eggs or shells
- Many live hatchlings among the egg shells
- Turtles in the process of hatching, or with the egg sack still attached
- Eggs that look white and are firm may contain a well-developed turtle

Keep the nest location marked and continue to watch for an emergence—these turtles may never emerge due to unknown genetic or physiological reasons.

If the hatchlings look different from the species noted on the nest identification card, notify the Zone Captain who will contact the Department of Natural Resources (DNR).

### Equipment You Will Need:



## Step 2: Removing Nest Contents

Carefully remove the contents of the nest and separate them into the following categories:

- Hatched shells – count each eggshell that is more than 50% complete as one hatched egg and disregard the smaller pieces. Be sure all the eggshells are completely separated from each other.
- Unhatched eggs (solid or pipped) – pipped eggs are considered unhatched eggs. An egg is not considered hatched until the hatchling leaves the egg.
- Dead turtles
- Live turtles

Do not count live or dead hatchlings that emerged earlier that were found on the beach, except to enter them on a disorientation form.

Hatchlings found at the bottom of the nest during daylight excavation should be immediately placed in a bucket on a layer of moist sand, covered with a moist towel to shade them from the sun, and released on the beach a short distance (approximately 40 feet) from the water. If they have a deformity you can try to place them closer to the water, but most likely they will need to be placed (gently tossed) beyond the breakers.

If you find live hatchlings in pipped eggs, hatchlings with yolk sacs, or any viable looking eggs, do the following:

- Rebury the contents (dead hatchlings, unhatched non-viable eggs on bottom followed by egg shells) of the hatched nest at the bottom of the egg chamber and cover with a layer of clean moist sand.
- Place the viable eggs and hatchlings on this layer of sand and then add additional clean moist sand over them—wait five additional days to inventory the nest. They should have 10 inches of sand over them.

Be sure to record the findings in the Inventory Data section on the back side of the Nest Identification Card. Be sure to provide information for all the fields to the best of your knowledge, including the number of washovers and the depth of the nest.

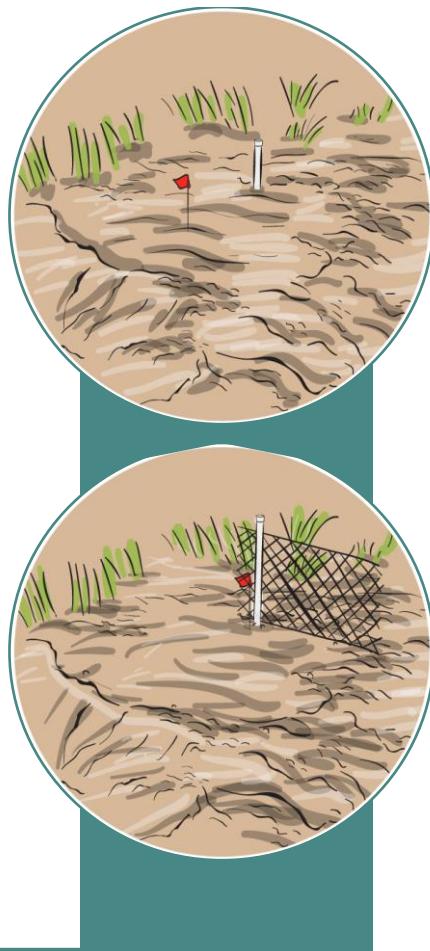
Equipment You Will Need:



### Step 3: Refilling the Excavated Cavity

The nest contents should be reburied within the original nest cavity as research has shown leftover nest contents contribute to the growth of dune plants.

Leave the nest marker in place in the event an animal such as a raccoon digs up the contents. This way the unearthened content will not be confused with a depredated "wild" nest.



### Step 4: Flagging the Site

Remove the red flag from behind the nest hole and place it in front of the numbered stake. This indicates the nest is finished and the nest post can be removed. Set the screen upright behind the nest post with the anchoring stakes close to the post.

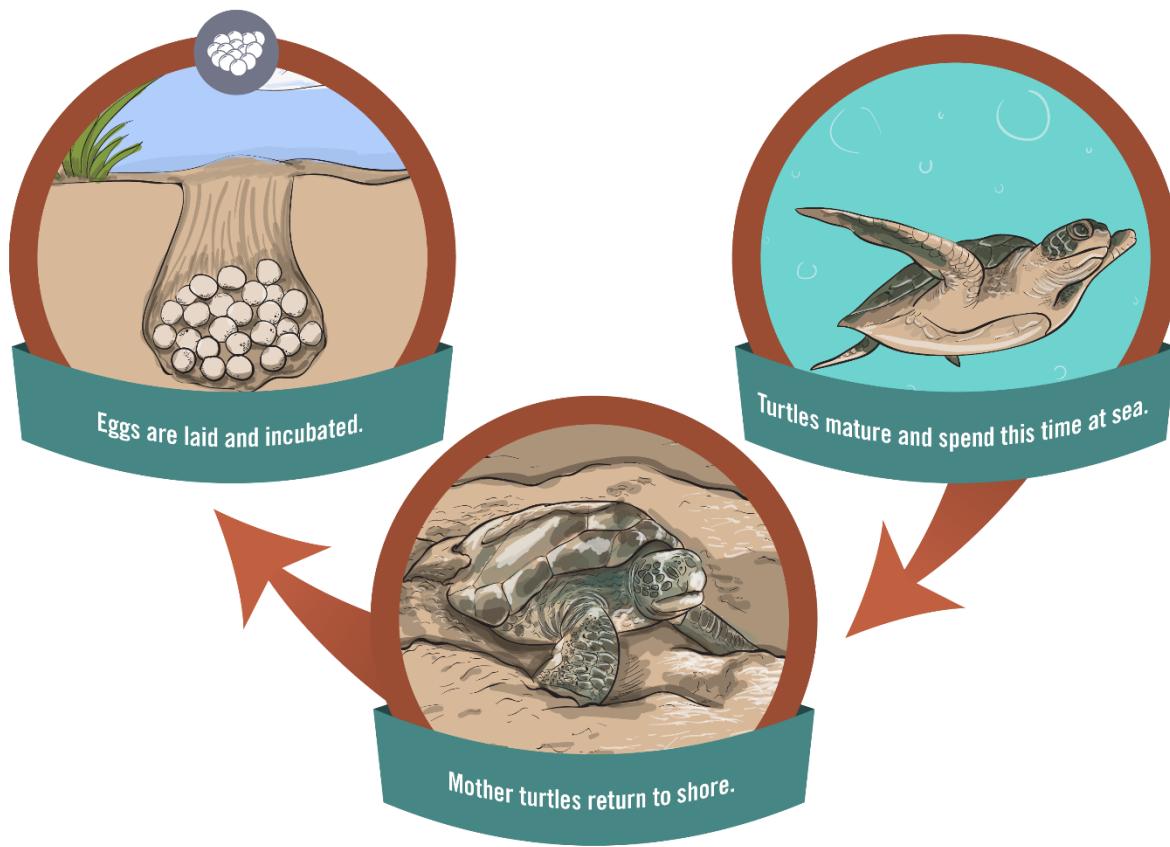
Equipment You Will Need:



## NEXT STEPS

As a member of the Hatching Patrol, your job is safeguarding the nests and reporting any losses and washovers during incubation. The data you collect is very important, especially the emergence date. This data is used for the genetic project and incubation periods. We are closely watching incubation periods as we experience record-breaking high temperatures. During your patrol, you need to stay informed on any new nests in your zones during the season. The data you record for us on the final hatch success rate of each nest helps us evaluate our management techniques.

What you accomplish during your patrol will help to provide the next generation of young turtles the best chances for survival. From here they will mature and potentially return to these same beaches to produce offspring of their own someday.

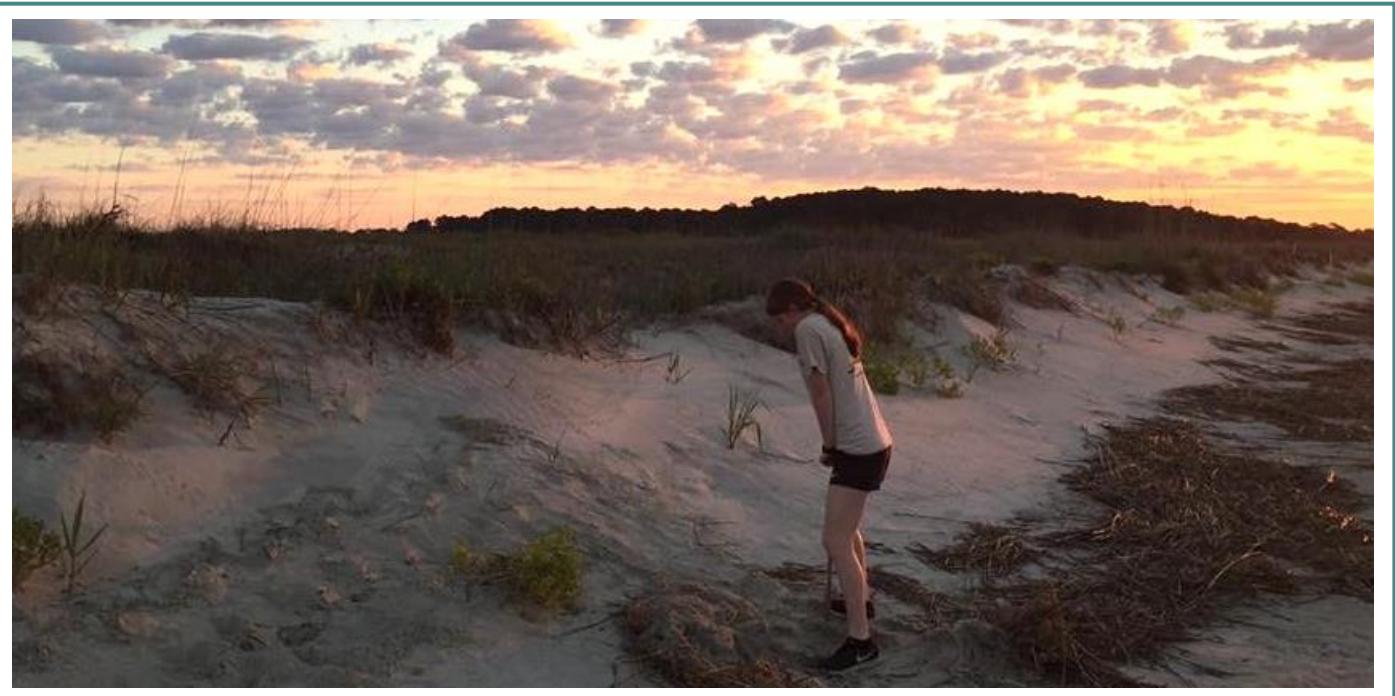


# THANK YOU

We're looking forward to having you join us on the beach and be a part of our team of enthusiastic and devoted volunteers. Kiawah Island is a busy place for turtles once the season starts; in 2016, we recorded nearly 400 nests alone! It's all hands on deck for the turtles, and we can't do our work without the help of dedicated volunteers like you. Your time is your most precious resource, and we sincerely appreciate you using it to help the Kiawah Island Turtle Patrol!

While out on the beach with us, we encourage you to have fun, and we're glad you recognize the importance of protecting turtle nests and ensuring that every new hatchling has a greater chance of making it to the water. If you'd like to learn more about sea turtle conservation and see what kind of impact your efforts have on sea turtles, take a look at [seaturtle.org](http://seaturtle.org).

From all of us on Kiawah Island, human and turtle alike, thank you.



# HATCHING PATROL CHECKLIST

Hatching Patrol is the second patrol of the season to go out on the beach to monitor nests. Our tasks include protecting nests from sand build up and compaction, water erosion, nest disruptions, identifying and reporting wild nests, documenting emergence, recovering disoriented hatchlings, safely releasing stragglers, and conducting the post-hatch evaluations.

When we get on the beach to perform our patrol duties, we need to make sure that we perform our tasks according to SCDNR regulations and Kiawah Island Turtle Patrol practices.

Refer to the following checklist to help keep track of what you need to do as you complete your patrol.

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## **Wear protective gloves when excavating nests and handling hatchlings.**

- Protective gloves must be worn when digging out a nest and handling hatchlings—no exceptions.

## **Remedy sand accumulation or compaction issues with the nests.**

- Sweep accumulated sand from the top of a nest or raise the screen up to the surface.
- Remove the screen and loosen hardened sand if necessary.

## **Be on the lookout for wild nests, nest disruption and depredation, or nests inundated by water or tidal erosion.**

- Report these nests to the Zone Captain.

## **Watch for nest emergence.**

If you encounter a nest emergence:

- Document emergence.
- Recover disoriented hatchlings.
- Safely release struggling or disoriented hatchlings.

## **Conduct a post-hatch evaluation.**

- Excavate the nest by removing all the contents: hatched shells, unhatched shell, live hatchlings, dead hatchlings.

## **Record all the relevant information accurately on the Nest Identification Cards.**

- All the fields on the back of the nest identification card need to be filled during the Post-Hatch Evaluation. The information is used to determine the effectiveness of the turtle nest.

## **Refill and Flag.**

- Bury all the nest contents and place the red flag in front of the numbered stake.