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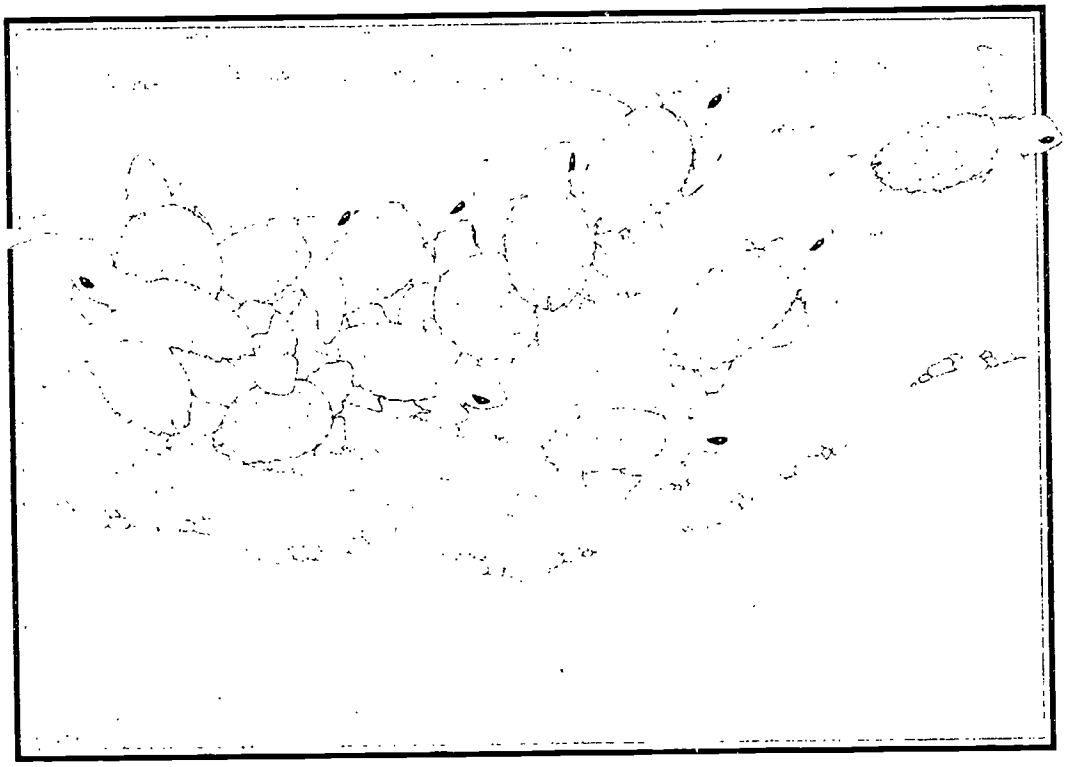
ABSTRACT

This activity guide, developed to provide hands-on environmental education activities geared to Hammocks Beach State Park in North Carolina, is targeted for grades 6, 7, and 8 and meets curriculum objectives of the standard course of study established by the North Carolina Department of Public Instruction. Three types of activities are included: pre-visit, on-site, and post-visit. The on-site activity is conducted at the park, while pre- and post-visit activities are designed for the classroom. Major concepts included are: animal adaptations, sea turtle life cycle, endangered species, natural and human threats to species, and resource management. Includes an introduction to reptiles, a vocabulary list, scheduling worksheet, parental permission form, North Carolina Parks and Recreation program evaluation, and information about Jones Lake State Park. Appendices contain a sea turtle fact sheet, a Loggerhead sea turtle fact sheets, and sea turtle conservation information. (MKR)

SEA TURTLE



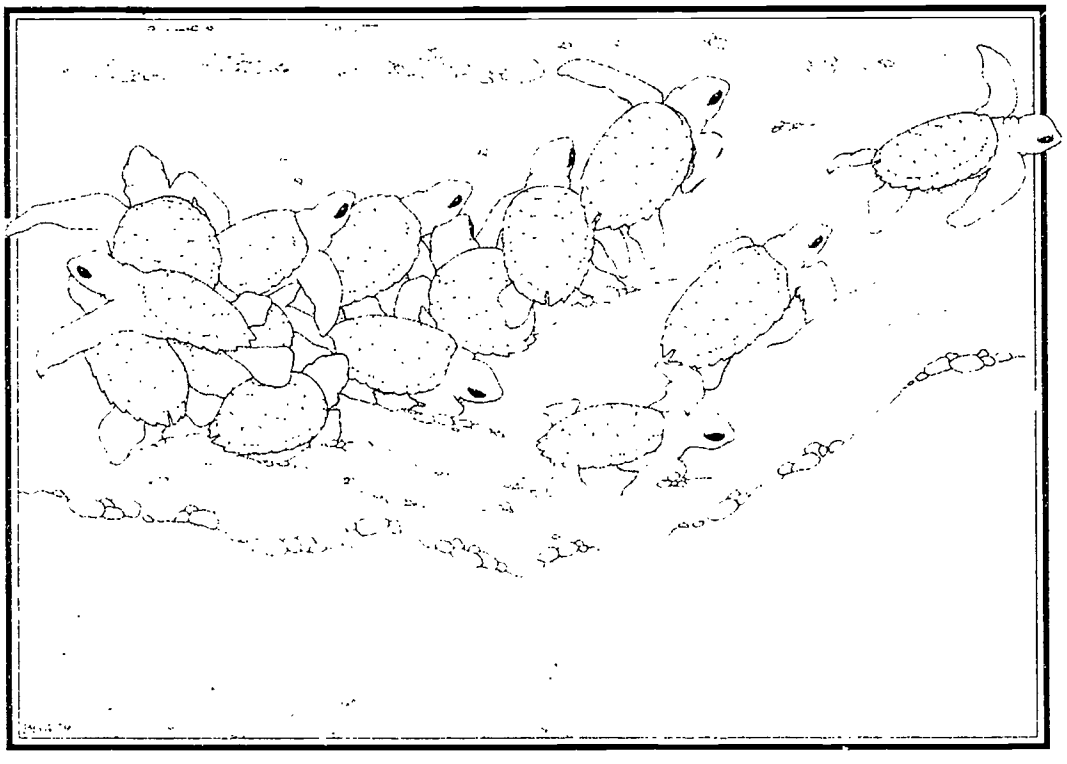
T R E K

Hammocks Beach State Park

An Environmental Education Learning Experience

Designed for Grades 6 - 8

SEA TURTLE



T R E K

Hammocks Beach State Park

An Environmental Education Learning Experience

Designed for Grades 6 - 8

"Christopher Columbus sailed past a group of three islands in 1503 and called them Las Tortugas because of the prevalence of green turtles, which he called "the most valuable reptile in the world."

Jack Rudloe
Time of the Turtle

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CP&L

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This Environmental Education Learning Experience
was developed by

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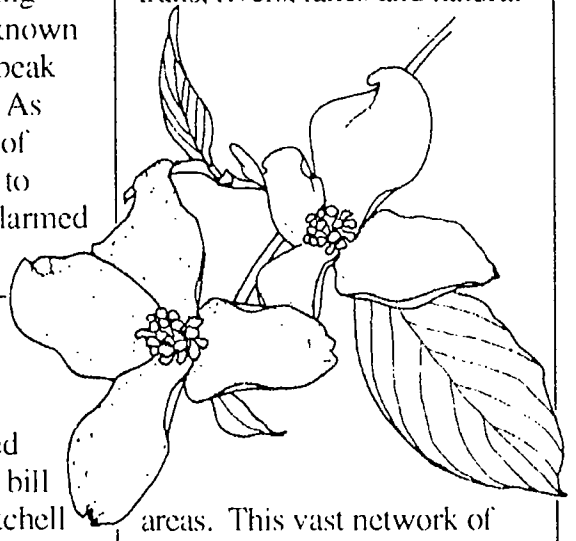
Table of Contents

Introduction to the North Carolina State Parks System

Preserving and protecting North Carolina's natural resources is actually a relatively new idea. The seeds of the conservation movement were planted early in the 20th century when citizens were alerted to the devastation of Mount Mitchell. Logging was destroying a well-known landmark - the highest peak east of the Mississippi. As the magnificent forests of this mile-high peak fell to the lumbermen's axe, alarmed citizens began to voice their objections. Governor Locke Craig joined them in their efforts to save Mount Mitchell. Together they convinced the legislature to pass a bill establishing Mount Mitchell as the first state park of North Carolina. That was in 1915.

The North Carolina State Parks System has now been established for more than three quarters of a century. What started out as one small plot of public land has grown into 59 properties across the state, including parks, recreation areas, trails, rivers, lakes and natural areas. This vast network of land boasts some of the most beautiful scenery in the world and offers endless recreation opportunities. But our state parks system offers much more than scenery and recreation. Our lands and waters contain unique and valuable archaeological, geological and biological resources that are important parts of our natural heritage.



As one of North Carolina's principal conservation agencies, the Division of Parks and Recreation is responsible for the more than 125,000 acres that make up our state parks system. The Division manages these resources for the safe enjoyment of the public and protects and preserves them as a part of the heritage we will pass on to generations to come.

An important component of our stewardship of these lands is education. Through our interpretation and environmental education services, the Division of Parks and Recreation strives to offer enlightening programs which lead to an understanding and appreciation of our natural resources. The goal of our environmental education program is to generate an awareness in all individuals which cultivates responsible stewardship of the earth.

For more information contact:

N.C. Division of Parks and Recreation
P.O. Box 27687
Raleigh, NC 27611-7687
919/ 733-4181

Introduction to Hammocks Beach State Park

Hammocks Beach State Park is located on Bear Island, an 892 acre barrier island, with 33 acres on the mainland. The island is three and one-half miles long and less than a mile wide, bordered by the Atlantic Ocean to the south and by salt marshes, estuarine creeks and the Intracoastal Waterway to the north. Bogue Inlet lies at the northeast end of the island, while Bear Inlet lies to the southwest.

Bear Island may be reached by park ferry, Memorial Day through Labor Day; however, private boats can access the island throughout the year. The park office and ferry dock are located on the mainland in Swansboro, off of NC Highway 24. The 2.5 mile ferry ride takes about 25 minutes. From the island ferry dock, a half-mile walk crosses the island to the beach. Natural history exhibits are available on the island to enhance environmental education programs.

On the island, shrub thickets and maritime forests create a wilderness environment, yet in places it's easy to imagine you're in a desert, with large expanses of sand. Sea water has not washed over the island in recent years, thus large dunes and ridges dominate the landscape. Migrating sand, carried by the wind, often buries portions of the maritime forest.

Program Options:

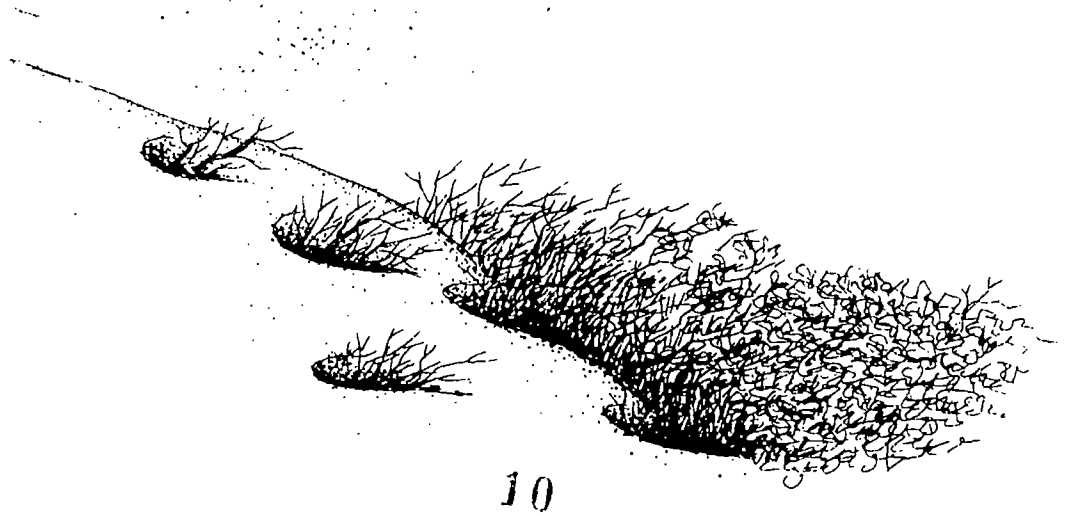
The variety of coastal environments found at Hammocks Beach State Park provide an unequalled classroom for teaching the processes of coastal ecology, geology, estuaries, wetlands and cultural history. Bear Island is an important nesting site for threatened loggerhead sea turtles. Programs on these and other topics are available by request.

Scheduling a Trip:

To make a reservation, call the park office and complete a copy of the scheduling worksheet in the activity packet, on page 9.1. Provide this information to the park at least one month in advance of your arrival. Hammocks Beach State Park will make every effort to accommodate persons with disabilities.

NOTE: Bear Island may be reached by the park ferry. School groups can schedule programs on the island from April 15 through October 15. A small fee is charged for the ferry.

In the summer and on hot days, the sun and sand can be very hot. Please wear shoes, hats and sunscreen. Water is available at the bathhouse.



Before the Trip:

1. Visit the park without the participants prior to the scheduled group trip. This will give you a chance to become familiar with facilities and park staff, and provide you the opportunity to identify potential problems.

2. Discuss behavior expectations with adult leaders and participants when planning the trip. Discuss the park rules listed. Emphasize safety.

3. Inform the group about ticks, poison ivy, chiggers and biting flies. Discuss the need to use insect repellent.

4. Inform your group of the need to dress appropriately for the season. Walking shoes are suggested for all seasons. The weather can be very hot and humid from late spring through early fall. Sunscreen and hats are advised.

5. Have everyone wear a name tag. For safety, please color-code them (for groups) and establish a buddy system.

6. *Group leaders are responsible for obtaining a consent form from each participant including a listing of any health considerations and medical needs.* These forms are available in the activity packet on page 9.2.

7. If your group plans to collect any plants, animals or minerals within the park, a Research Activity Permit is required. Contact the park to obtain a permit application.

8. *If you will be late or need to cancel your trip, please notify the park as far ahead as possible.*

9. Remember to allow for the time it takes to ride the ferry, walk to the beach, and return, when scheduling a trip.

While at the Park:

Please obey the following rules:

1. To help you get the most out of the experience and increase the chance of observing wildlife, be as quiet as possible while in the park.

2. During the ferry ride, everyone should remain seated.

3. On hikes, walk behind the leader at all times. Stay on the trails. Running is not permitted.

4. All plants and animals within the park are protected. Breaking plants and harming animals are prohibited in all state parks. This allows future visitors the same opportunity to enjoy our natural resources.

5. Picnic in designated picnic areas only. Help keep the park clean and natural; do not litter.

6. Swim only in the designated area when lifeguards are on duty. The ocean is a dangerous body of water, with hazardous drop-offs and currents. Please advise your group on specific safety precautions.

7. In case of accident or emergency, contact park staff immediately.

Following the Trip:

1. Complete the post-visit activity in the Environmental Education Learning Experience packet.

2. Build upon the field experience and encourage participants to seek answers to questions and problems encountered at the park.

3. Relate the experience to classroom activities and curriculum through reports, projects, demonstrations, displays and presentations.

4. Give tests or evaluations, if appropriate, to determine if students have gained the desired information from the experience.

5. File a written evaluation of the experience with the park. Evaluation forms are available in the activity packet on page 9.3. We appreciate your comments.

Park Information:

Hammocks Beach State Park
1572 Hammocks Beach Road
Swansboro, NC 28584
Tel: (910) 326-4881
Fax: (910) 326-2060

Office Hours:

Monday - Friday
8:00 a.m. - 5:00 p.m.

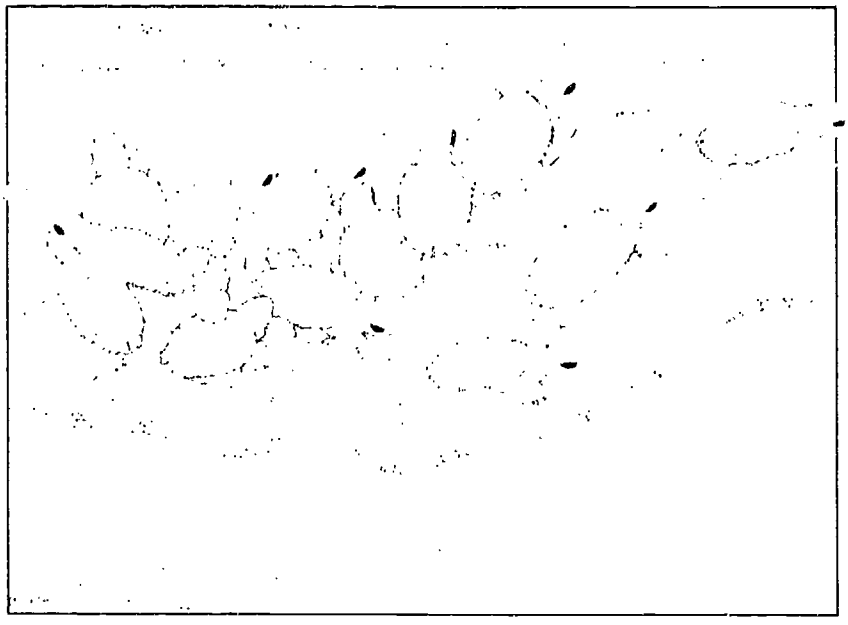
Weekends

May-Sep	8:00 a.m. - 5:00 p.m.
Oct-Apr	8:00 a.m. - 9:00 a.m.
	5:00 p.m. - 6:00 p.m.

Hours of Operation:

Jun-Aug	8:00 a.m. - 7:00 p.m.
Sep-May	8:00 a.m. - 6:00 p.m.

Introduction to the Activity Packet for Hammocks Beach State Park



The Environmental Education Learning Experience, *Sea Turtle Trek*, was developed to provide environmental education through a series of hands-on activities geared to Hammocks Beach State Park. This educator's activity packet, designed to be implemented in the sixth to eighth grades, meets curriculum objectives of the standard course of study established by the North Carolina Department of Public Instruction. However, these activities may be adapted to other grades as well. The packet includes three types of activities:

1) pre-visit activity
2) on-site activity
3) post-visit activity

The on-site activity will be conducted at the park, while pre-visit and post-visit activities are designed for the classroom. These activities may be performed independently or in a series to build upon students' newly gained knowledge and experiences.

The Environmental Education Learning Experience, *Sea Turtle Trek*, will expose students to the following major concepts:

- **Animal adaptation**
- **Sea turtle life cycle**
- **Endangered species**
- **Natural and human threats to species**
- **Resource management**

The first occurrence of a vocabulary word used in these activities is indicated in **bold type**. Definitions are listed in the back of the activity packet. A list of the reference materials used in developing the activities follows the vocabulary list.

This document was designed to be reproduced, in part or entirety, for use in North Carolina classrooms. If you wish to photocopy or adapt it for other uses, please credit the N.C. Division of Parks and Recreation.

Special Considerations

On-site activities may require hiking which could expose the participants to hot, humid conditions and full sunlight. Participants should be protected from exposure to sunlight by wearing hats and sunscreen. They are reminded to drink plenty of fluids.

Accessibility to some of these areas may be difficult for persons with special needs.

All field trips to Bear Island will require a ferry ride and nominal fee.

Introduction to Reptiles

Reptiles are categorized as **vertebrates**, animals with backbones. They have evolved from amphibians and have the following characteristics: the ability to breathe air; little or no control of their body temperature (ecotherms); **scales** or **scutes** which protect the animals' skin; and the ability to lay eggs (oviparous) on land or, in a few cases, give live births (viviparous). Reptiles generally continue to grow throughout their entire lives, never reaching a maximum limit in size.

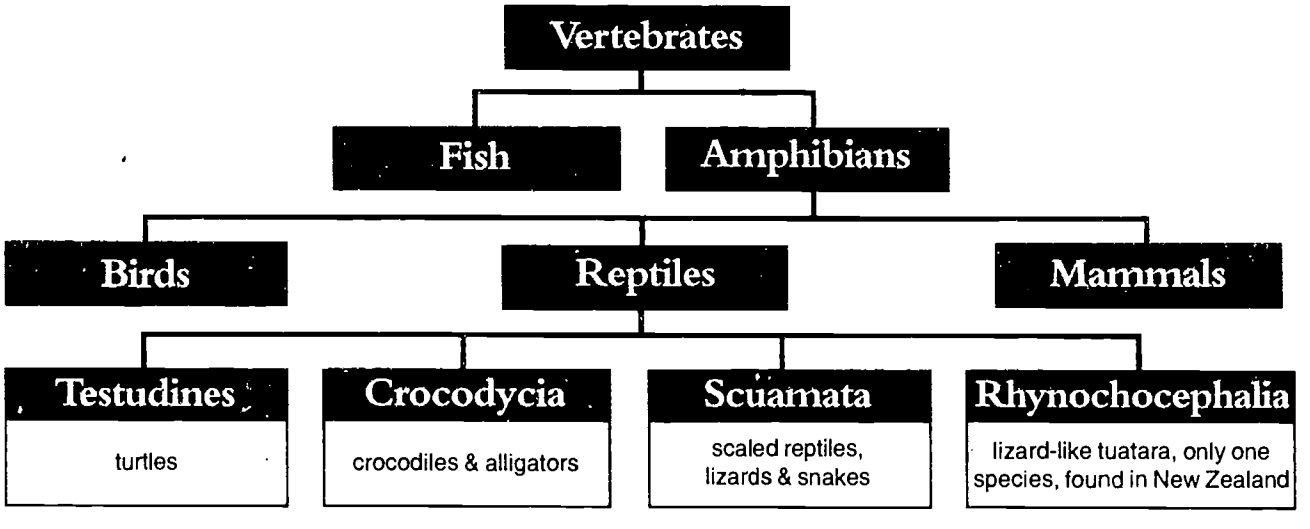
The class Reptilia, to which all reptiles belong, includes turtles, lizards, snakes and alligators. Individual "groups" of reptiles have evolved for over 250 million years. Each has adapted to a specific habitat. Reptiles were the first vertebrates to escape, for the most part, dependency on water. Sea turtles have reversed the evolutionary move from sea to land, returning to a dependency on marine environments; only the females revisit the land, and that is to lay their eggs, then return to the sea once more. (Amphibians, often mistaken for reptiles, differ most obviously from reptiles in that they are restricted to the confines of a moist environment at some time in their life cycles.) At one time, reptiles were able to occupy not only land and water, but also the air. Dinosaurs are often considered to have been members of the class Reptilia. Today worldwide, there are approximately 5000 species of reptiles.

These members of the animal kingdom are a poorly understood group of creatures. **Herpetologists**, scientists who study reptiles, are trying to change this.

Reptiles occupy **habitats** that are highly vulnerable to destruction from human intervention. Most reptiles are found in warmer regions or temperate climates of the world, due to their inability to control their body temperature. Therefore, temperature is the limiting factor in their distribution. Often, reptiles are dormant in cold conditions.

As a group, reptiles have a diverse diet. Nearly all are predatory **carnivores**. Yet some are **omnivorous**, eating both animals and plants or **herbivorous**, strictly vegetarian.

In this environmental education learning experience, you will study about a specific group of reptiles–sea turtles. Hammocks Beach State Park provides a suitable habitat for these reptiles to complete an important part of their life cycles. As you study more about sea turtles, refer back to this information to help you understand more about these unique creatures.



Activity Summary

The following outline provides a brief summary of each activity, the major concepts introduced and the objectives met by completion of the activity.

I. Pre-Visit Activity

#1 A Sea Turtle Tale (page 3.1.1)

From a story about loggerhead sea turtles, students will learn the vocabulary words they will need during on-site activities. Students will complete a word search and fill in a worksheet to re-enforce the words.

Major Concepts:

- Sea turtle life history
- Resource management

Objectives:

- Name the most common sea turtle that nests on North Carolina's beaches.
- Explain two aspects of the park's resource management program.
- Learn 10 new vocabulary words by recalling them from a story.
- Describe the life cycle of a loggerhead sea turtle.

II. On-Site Activity

#1 Lost Habitat (page 4.1.1)

Learn about natural and human threats causing sea turtles to decline in numbers. Students will complete a worksheet on threats to sea turtle survival and be introduced to resource management efforts to protect them.

Major Concepts:

- Habitat
- Resource Management

Objectives:

- Describe six threats to loggerhead sea turtles.
- Describe two resource management efforts by park personnel to protect loggerhead sea turtle nesting habitat.
- Explain how Hammocks Beach State Park is a sea turtle sanctuary.

III. Post-Visit Activity

#1 Sea Turtle Trek (page 5.1.1)

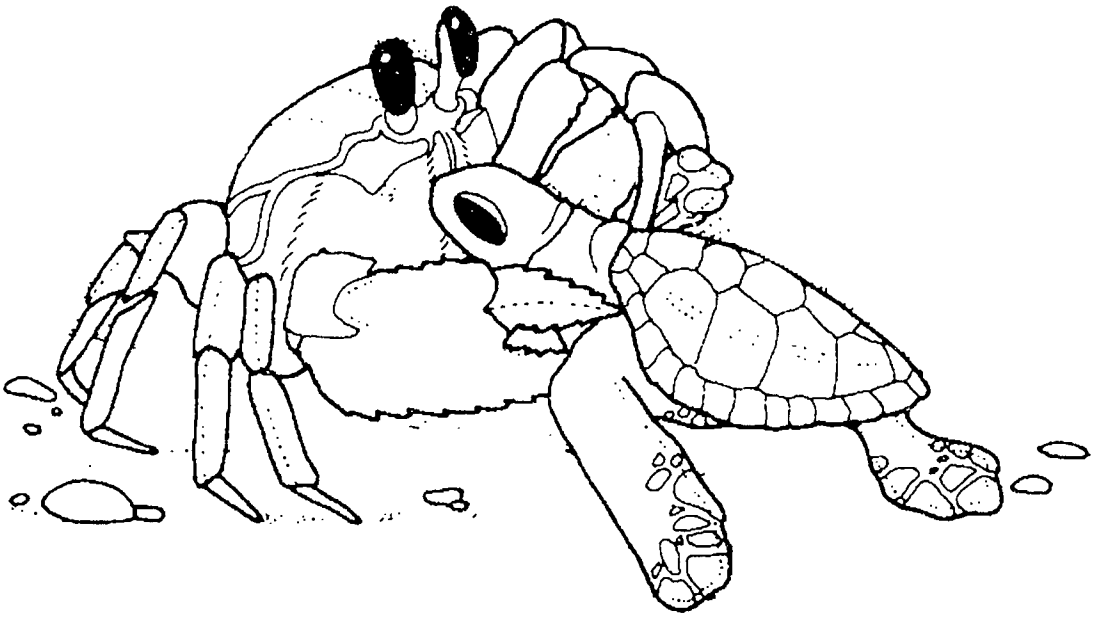
This activity has two parts. In Part I, the students will play a game which takes them through the life cycle of sea turtles, including threats to survival. They must successfully answer sea turtle natural history questions to complete the game. In Part Two, the students will track a turtle through a maze, from hatchling to adult.

Major Concepts:

- Life cycle
- Natural threats to sea turtle survival
- Human threats to sea turtle survival

Objectives:

- Describe the life cycle of the loggerhead sea turtle.
- Explain the low rate of hatchling survival.
- List three natural threats to sea turtle survival.
- List three human-created threats to sea turtle survival.



Pre-Visit Activity #1 — A Sea Turtle Tale

Curriculum Objectives:
Grade 6
- Communications Skills: reading, vocabulary and viewing comprehension, study skills using environmental sources
- Science: ecology, how science helps us
- Social Studies: gather, organize and analyze information

Grade 7
- Communications Skills: reading, vocabulary and viewing comprehension, study skills using environmental sources
- Science: characteristics of animals, organization and variety of living things, interaction of people and the environment, earth science
- Social Studies: gather, organize and analyze information, know the importance of natural resources

Grade 8
- Communications Skills: reading, vocabulary and viewing comprehension, study skills using environmental sources
- Science: adaptations, ecology

Location: Classroom

Group Size: 30 or less

Estimated Time: 30 minutes

Appropriate Season: Any

Materials:
Provided by educator:
Per student: "Sea Turtle Jargon" worksheet, "Turtle Encounter" story

Major Concepts:
- Sea turtle life history
- Resource management

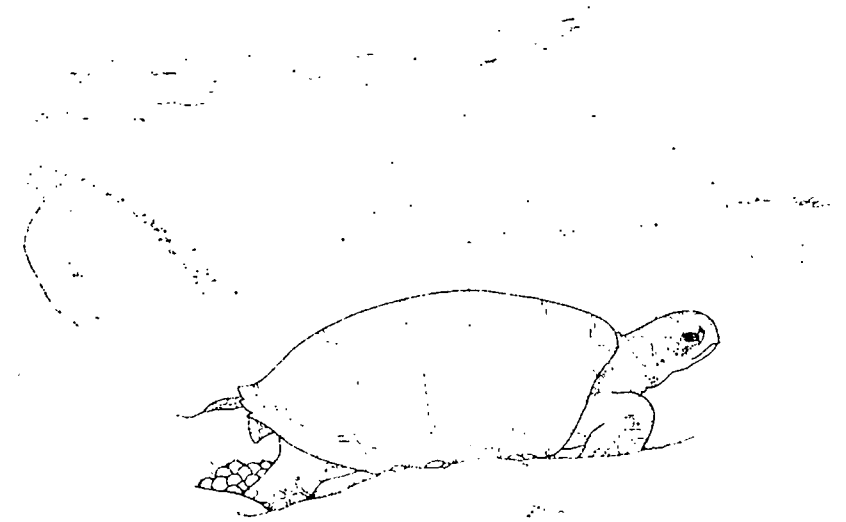
Objectives:
- Name the most common sea turtle that nests on North Carolina's beaches.
- Explain two aspects of the park's resource management program.
- Learn 10 new vocabulary words by recalling them from a story.
- Describe the life cycle of a loggerhead sea turtle.

Educator's Information:

In this activity, the loggerhead sea turtle's natural history will be used to introduce students to new terminology and basic vocabulary words which will be used throughout this Environmental Education Learning Experience. For loggerhead sea turtle information, see Appendix 2.

Instructions:

1. Photocopy the Turtle Encounter story and Sea Turtle Jargon worksheet, one copy per student.
2. Hand out the story and have the students read it.
3. Hand out the worksheet and have the students complete it.
4. Review the worksheet with the students to reinforce the new vocabulary.

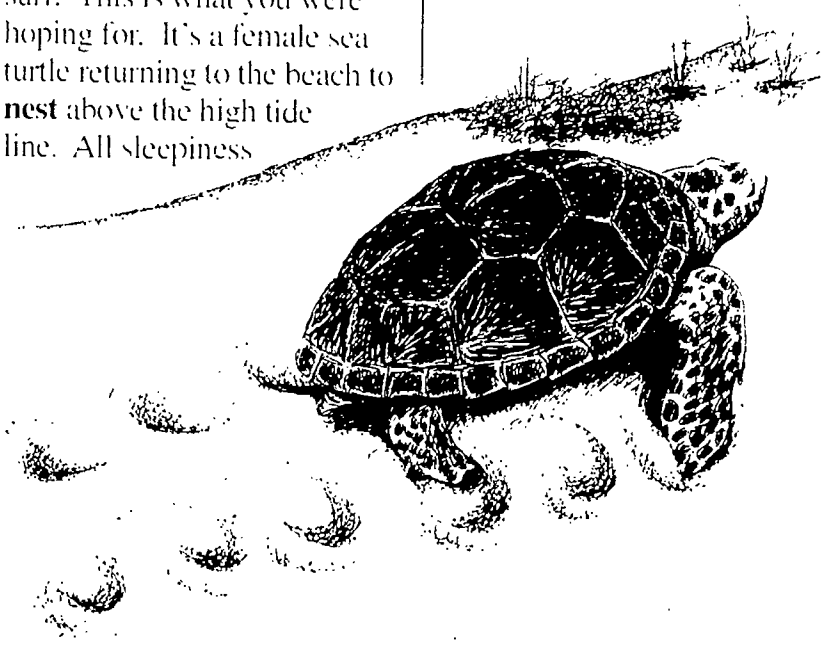


Turtle Encounter

A slight breeze is blowing from the south, causing the sea oats to rustle in the dunes. The black sky seems to emphasize the brilliance of the many stars visible to the naked eye; among them, the constellation Hercules can be seen high in the summer sky to the east. But you're not here to look at stars. You scan the surf, resisting the hypnotic effects of the constant motion and gentle pounding of the surf which could put anyone to sleep. It's 10:15 p.m. As if trying to help keep you awake, a mosquito occasionally lights on your ear, distracting your focus from the waves.

Suddenly, you think you see a dark object down the **beach** several hundred yards. By the red beam of the ranger's special flashlight you see it's a **loggerhead** sea turtle, methodically crawling out of the surf. This is what you were hoping for. It's a female sea turtle returning to the beach to **nest** above the high tide line. All sleepiness forgotten, you quietly watch as the turtle makes its way onto the beach. It is important not to use white lights and to remain still, as any noise and movement may frighten her back into the water. You know this because the park ranger with you gave a program on loggerhead sea turtles prior to bringing your group out to the beach.

The large, reddish-brown loggerhead turtle, you recall from the program, weighs between 200 and 350 pounds. Its name comes from its large head, which always extends out from its shell. The shell, or **carapace**, measures about three feet in length. In comparison, a huge **leatherback** sea turtle can weigh about 1300 pounds and measure six feet in length.



The park ranger showed you many pictures of loggerhead turtles as part of the **resource management** activities at the park. Every turtle that nests at the park is photographed and marked with a tag. Records of tagged turtles are kept, to monitor them from year to year. The ranger also explained that the park is a **sanctuary** for the loggerhead sea turtle and other animals and plants, making it a safe, protected place to nest and live.

You know from the ranger's talk that the loggerhead has a **range** which is worldwide within **temperate** and subtropical waters. Nesting occurs from May to September in the northern hemisphere. In North America, most nests are found in Florida. The major nesting sites in North Carolina are found on barrier islands, such as Bear Island, buffering the coast.

The tracks, or **crawl**, made by a nesting loggerhead sea turtle can be distinguished by the pattern of alternate flipper marks found from the surf to the dune line and back.

You sit and watch in quiet amazement as she uses her rear **flippers** to dig a pear shaped cavity in which she lays her **eggs**. The ranger said she will probably lay a **clutch** of about 120 ping-pong ball shaped eggs, and that if conditions are right, you might see tears run

down the turtles cheeks, washing sand from her eyes. She's not sad; these tears help remove excess salt from her body.

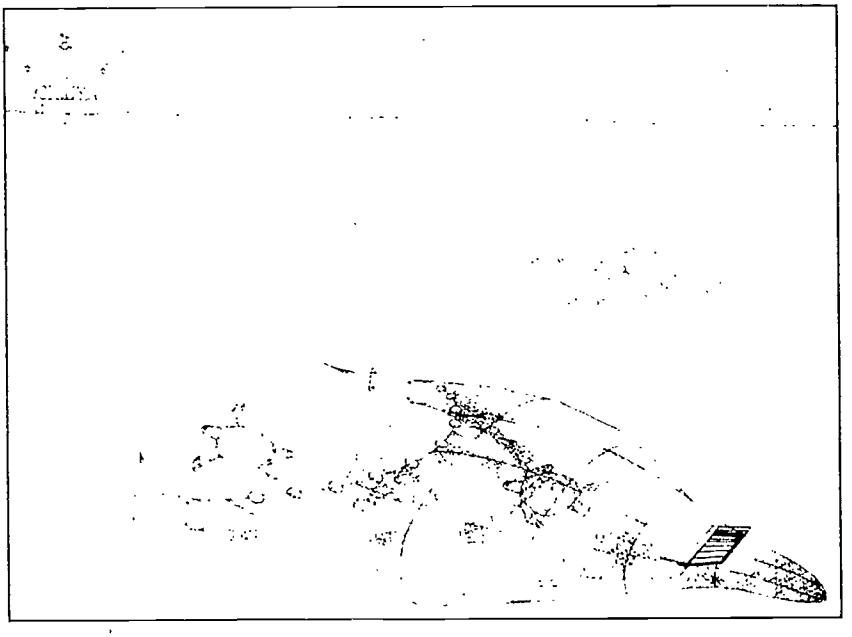
You remember that the ranger said, the eggs will incubate for a period of approximately 60 days in the nest. Unfortunately, many bad things may happen to the nest. A summer storm could wash over it or raccoons might find the nest and eat the eggs.

The **hatchlings**, each two inches long, will emerge from the nest all at once to reduce the number of deaths from **predators**, such as **ghost crabs**. They will know the direction of the ocean because it's the brightest place visible from the starlight reflecting off the water, and they will instinctively move toward the area with the most light. Many turtles don't make it to the ocean as they are attracted to bright light from recent development on or near our beaches.

Not many of the hatchlings will make it through the first year, as several will be eaten by gulls and fish. Some may be caught in fishing nets or tangled in trash. It's estimated that 11,000 sea turtles drown each year in shrimp nets along the Atlantic and Gulf coasts. To save turtles from drowning, shrimp trawlers must use a **turtle excluder device (TED)** to reduce the number of deaths. This device permits the sea turtles to escape the nets through a trap door. All these threats have caused the **reptile** to become a **threatened** species.

Although you're not aware of time passing, the whole process takes about one-and-a-half hours. Before returning to the sea, she uses her flippers to push sand into the nest to fill the hole and disguise its location. After covering her nest, the turtle slowly lumbers down to the surf, covered with sand from her nest building activities. As she lumbers away, the ranger reminds you that she may return again to lay several more nests this summer.

It's 11:45 p.m. You have just experienced one of nature's wonders. Once more, all you hear the gentle roll of the surf. The wind slowly dies down. A mosquito buzzes your ear, and reminds you it's time for you to return to your own home.



Sea Turtle Jargon

Instructions:
List below all the words shown in bold in the story. Find each of the words in the word search puzzle. Words may appear diagonally, horizontally and vertically. Fill in the sentences on the following page with the appropriate words.

O E T C A R A P A C E G T C H R R T O W F G W P
B J Q E L U O A D G J L X V N M E E Z K H F S O
A D G J L U H F S Q E T U O P I Y P P Y C B M N
P C Z Q Z E T T B T M M N B V C C L U T C H G F
L B U T E Q Q W E E T Y U I O P A G U I I H J R
P R E S O U R C E M A N A G E M E N T J L L N Y
R K O A J I C H U P Y X F T D R S E C W Q E E O
F Q Y F C T D C U E I B V E P W G H H Q O A I K
R E U R Y H L A K R J D H D G M Z N X N C T V J
N P Z O X I C U V A B T N R M E L W K Q J H H L
E M A N S B D B F T X E Z K J Q P W O E I E U O
G P A N F L I P P E R S I C H A N G E L I R G G
G H O S T C R A B S I E O W R A N G E T G B F G
S M N B V C X Z L K J H G F D S T P O I U A T E
N A L E K D J F J G H Z M X N C R C W L P C O R
W R G H S J D K S L A Z M X N C B V H Q O K I H
U A U R T T G H B C V M F J R I O E L L M C N E
P N M N B V C X Z P R E D A T O R S D F I H J A
I G P O I U Y T R E W A L K T H R E A T E N E D
S A N C T U A R Y U I O W A S D F G H J K L G N
V C X Z L K J H G F D S A L O I U Y T R E W Q S

1. The most common species of sea turtle found in waters off North Carolina is the _____. Its name comes from this species' large head. Another sea turtle occasionally seen in this area is the _____.

2. In North America, sea turtles nest on a sandy _____. Nesting activity is easily recognized by the _____ in the sand. Human disturbances such as beach front development, excessive off-road vehicle use, artificial lighting and seawalls can lead to a drastic reduction in nesting sea turtles.

3. Loggerhead sea turtles lay ping-pong ball sized _____.

4. The _____, or mass of eggs, laid by a female loggerhead sea turtle averages 120 in North Carolina.

5. _____ are one of the primary _____ of young sea turtles as they leave the nest and scramble towards the ocean.

6. Due to the many predators on both land and sea, very few _____ survive to become adult sea turtles. Some scientists estimate as few as 1 in 10,000 make it to adulthood.

7. Sea turtles are a type of _____.

8. Loggerhead sea turtles have a _____ which is worldwide in the _____ and subtropical waters.

9. Female turtles may _____ several times during one summer but may wait two or three years before nesting again.

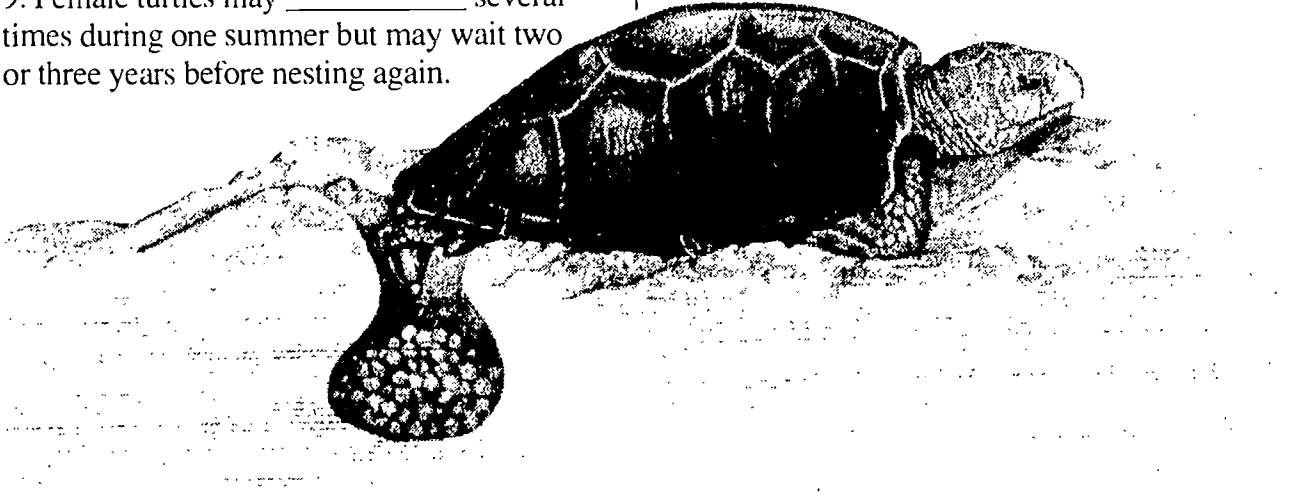
10. Female loggerheads dig a nest in the sand by using their rear _____ to scoop out a pear shaped hole averaging 12 - 18 inches deep. They deposit their eggs and then cover the nest with sand before returning to the ocean.

11. The _____ is a section of netting or a cage-like device placed inside a shrimp trawl that causes large objects, such as sea turtles or jellyfish, to be forced up through a trap door and out of the shrimp net. Scientists believe that if these were used throughout the southeastern U.S. shrimp fishery, a major cause of death of adult sea turtles would be eliminated. (It is estimated that up to 11,000 sea turtles drown each year in shrimp nets along the Atlantic and Gulf Coasts.)

12. The loggerhead shell, or _____, is reddish brown in color and can be approximately 38 inches in length.

13. Park rangers, scientists and other researchers use _____ _____ to learn more about the sea turtles and protect their habitat. They believe the more we know about this _____ species the more likely we are to be able to protect and save it.

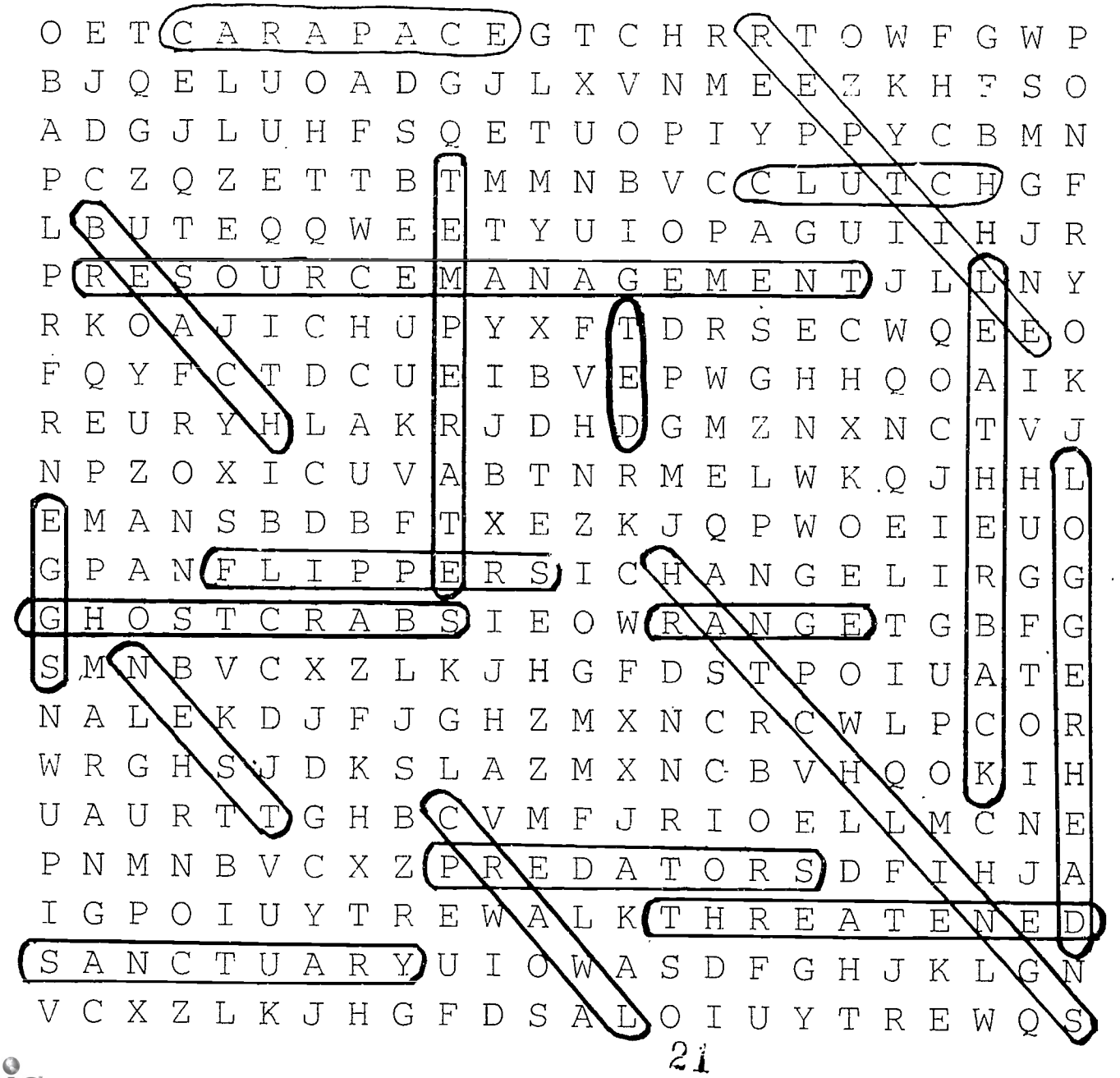
14. Hammocks Beach is a _____, where sea turtles are protected from hunting and molestation.



Sea Turtle Jargon Answer Sheet

Instructions:
List below all the words shown in bold in the story. Find each of the words in the word search puzzle. Words may appear diagonally, horizontally and vertically. Fill in the sentences with the appropriate words.

Beach
Carapace
Clutch
Eggs
Flippers
Ghost Crabs
Hatchlings
Leatherback
Loggerhead
Nest
Predators
Range
Reptile
Resource Management
Sanctuary
TED
Temperate
Threatened
Crawl



1. The most common species of sea turtle found in waters off North Carolina is the loggerhead. Its name comes from this species' large head. Another sea turtle occasionally seen in this area is the leatherback.

2. In North America, sea turtles nest on a sandy beach. Nesting activity is easily recognized by the crawl in the sand. Human disturbances such as beach front development, excessive off-road vehicle use, artificial lighting, and seawalls can lead to a drastic reduction in nesting sea turtles.

3. Loggerhead sea turtles lay ping-pong ball sized eggs.

4. The clutch, or mass of eggs, laid by a female loggerhead sea turtle averages 120 in North Carolina.

5. Ghost crabs are one of the primary predators of young sea turtles as they leave the nest and scramble towards the ocean.

6. Due to the many predators on both land and sea, very few hatchlings survive to become adult sea turtles. Some scientists estimate as few as 1 in 10,000 make it to adulthood.

7. Sea turtles are a type of reptile.

8. Loggerhead sea turtles have a range which is worldwide in the temperate and subtropical waters.

9. Female turtles may nest several times during one summer but may wait two or three years before nesting again.

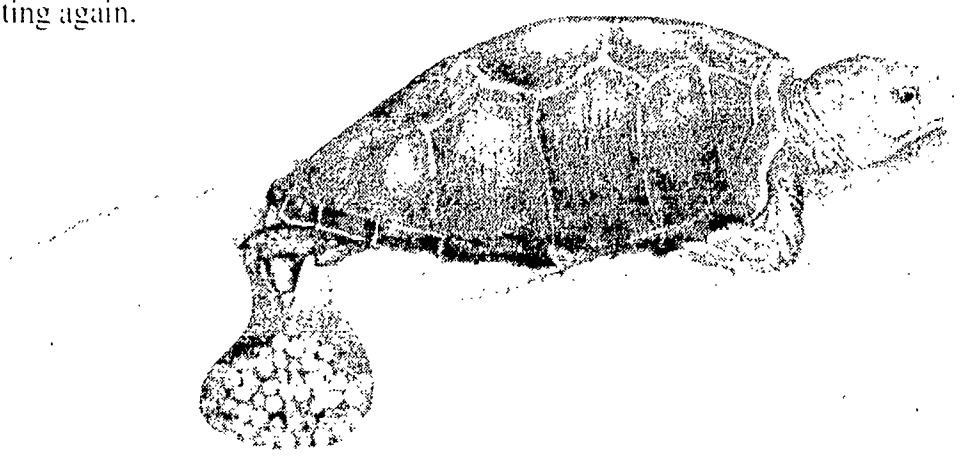
10. Female loggerheads dig a nest in the sand by using their rear flippers to scoop out a pear shaped hole averaging 12 - 18 inches deep. They deposit their eggs and then cover the nest with sand before returning to the ocean.

11. The TED is a section of netting or a cage-like device placed inside a shrimp trawl that causes large objects, such as sea turtles or jellyfish, to be forced up through a trap door and out of the shrimp net. Scientists believe that if these were used throughout the southeastern U.S. shrimp fishery, a major cause of death of adult sea turtles would be eliminated. (It is estimated that up to 11,000 sea turtles drown each year in shrimp nets along the Atlantic and Gulf Coasts.)

12. The Loggerhead shell or carapace is reddish brown in color and can be approximately 38 inches in length.

13. Park rangers, scientists and other researchers use resource management to learn more about the sea turtles and protect their habitat. They believe the more we know about this threatened species the more likely we are to be able to protect and save it.

14. Hammocks Beach is a sanctuary, where sea turtles are protected from hunting and molestation.



On-Site Activity #1 — Lost Habitat

Curriculum Objectives:
Grade 6
- Communication Skills: listening, reading, vocabulary and viewing comprehension, writing, speaking techniques
- Guidance: competency and skill for interacting with others, variety and complexity of occupations
- Science: ecology, how science helps us
- Social Science: gather, organize and analyze information, draw conclusions

Grade 7
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Guidance: being responsible in a group, develop an awareness of alternative points of view
- Science: characteristics of animals, interaction of people and the environment, earth science
- Social Science: gather, organize and analyze information, draw conclusions, know the importance of natural resources

Grade 8
- Communication Skills: listening, reading, vocabulary and viewing comprehension, speaking techniques
- Science: science and its relationship to human endeavors, adaptation, ecology
- Social Science: gather, organize and analyze information, draw conclusions

Location: Open beach

Group Size:
Class size, divided into groups of four students

Estimated Time: 30 minutes

Appropriate Season:
April 15 - October 15
(Island trips)

Materials:
Provided by park: Wire used to protect nest site, red flashlight
Provided by educator: "Loggerhead Sea Turtle Fact Sheet" Appendix 2, worksheet and clipboards (one per student or group)
Provided by student: pencil

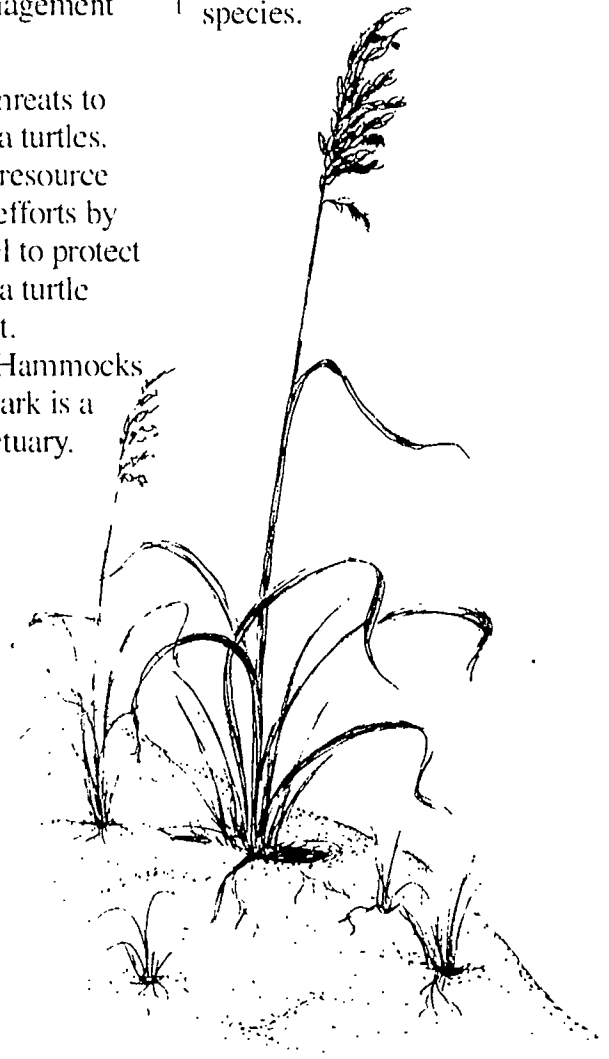
Major Concepts:
- Habitat
- Resource management

Objectives:
- Describe six threats to loggerhead sea turtles.
- Describe two resource management efforts by park personnel to protect loggerhead sea turtle nesting habitat.
- Explain how Hammocks Beach State Park is a sea turtle sanctuary.

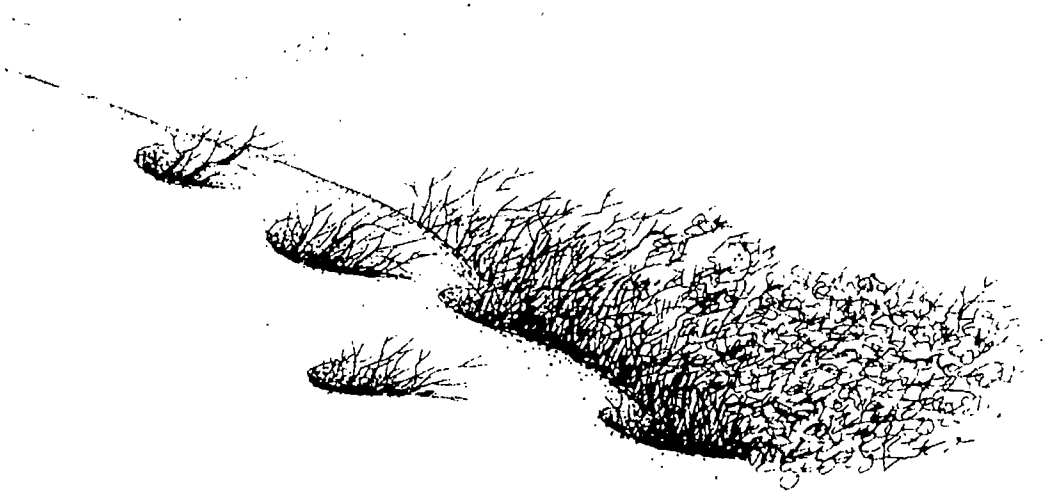
Educator's Information:

This activity is designed to introduce the students to the sea turtle's nesting habitat. To prepare for this, please read the Sea Turtle and Loggerhead Sea Turtle fact sheets in the Appendices.

Through a visit to Hammocks Beach State Park, the students will learn about the many hazards sea turtles face and how loss of habitat contributes to sea turtles becoming threatened and endangered species.



Student's Information



Sea turtle survival is directly affected by human activity and has been since the earliest coastal occupation by humans. Coastal Native Americans, as well as early European sailors, harvested sea turtles and their eggs for food. The Spanish at one time looked forward to the "**arribada**." This was the mass arrival of Kemp's (Atlantic) Ridley sea turtles to their **nesting** beaches. Because the turtles all arrived together, the adult females and their eggs were easy **prey**. More recently, sea turtles have been harvested and illegally poached to produce products such as jewelry, trinkets, ornamental items and leather goods. In many countries of the world it is still legal to harvest sea turtle meat and eggs as a food source.

Many activities and conditions near the open beach area can reduce the chances of a sea turtle nesting, a **clutch** developing or a **hatchling** reaching the ocean. Coastal development, vehicle and human traffic, lighting, pollution, poaching, turtle products and commercial fishing each have a negative impact on sea turtle survival.

Coastal development has deteriorated nesting habitat and commercial fishing has caused many turtles to drown in nets. Discarded plastics and other debris generated by irresponsible humans have caused turtles to suffocate when these are ingested. Increased human activities can only lead the sea turtles closer to extinction unless humankind takes responsibility to reduce these hazards. Responsibility begins with education, research and **resource management**.

Instructions:

1. Prior to visiting the park, have the students read the Student's Information and the Loggerhead Sea Turtle Fact Sheet (Appendix 2).

2. Divide the class into groups of four students. Discuss the location of the nest sites turtles might choose.

3. Have the students walk from the surf zone to the dune line while discussing how a several hundred pound reptile, adapted for swimming, has to lumber from the ocean to find a suitable **nesting** location. If possible, have the students pretend to be a turtle and crawl up the beach like a turtle in search of a nest site. Have each group find what they think would be a suitable nesting location and mark it.

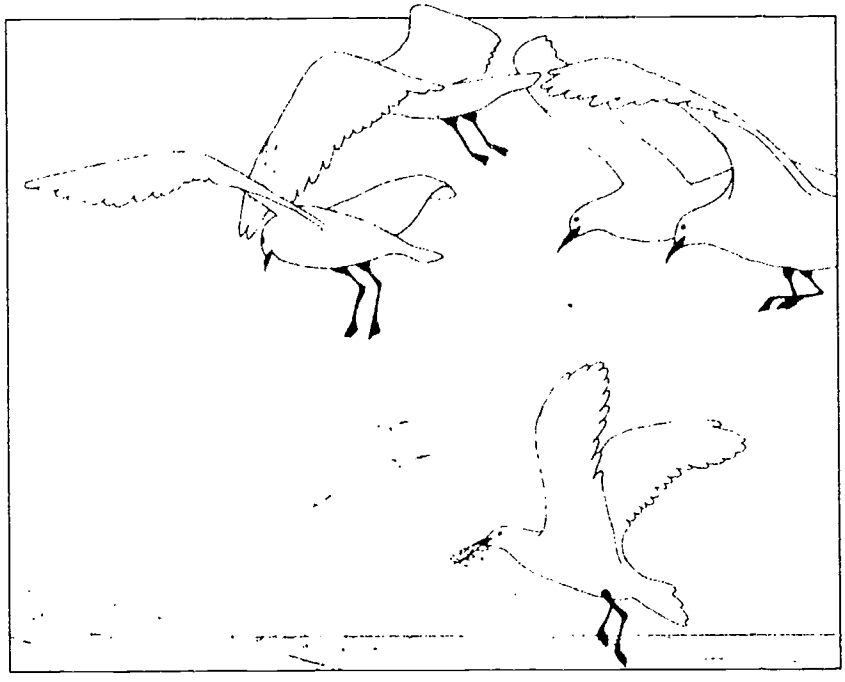
4. After the student groups have marked their "nests," reassemble the class. Have each group present their nest site and describe why they selected that particular site. Discuss the locations where loggerhead sea turtles typically nest.

Be sure to mention that turtles often return to the same beach or coastal area year after year. (Remember, the females will not come back yearly because they do not nest every year. However, the males might come back yearly; scientists do not know for sure since the males never come up on the beach and are, therefore, very hard to monitor.) These turtles might have been imprinted to that beach as a **hatchling**, or they might focus on geologic features such as shoals, rocks or currents.

Sea turtles tend to nest between the mean high tide and the top of the primary dune. The location is also affected by the consistency of the sand, amount of vegetation and disturbance to the beach area, by such things as vehicles, people, lights and buildings. Given all these considerations, have the students re-evaluate their group's nesting site and place the wire mesh over their final nest location.

5. Hand out the "Sea Turtle Threats" worksheet. After the students complete their worksheets, re-gather the group and lead a discussion on the possible threats listed on the worksheet. Discuss the solutions the students created to deal with the problems.

6. Discuss what **resource management** is. Tell the class only trained resource managers with a valid permit from the North Carolina Wildlife Resources Commission can work with turtle nests and turtles. Why do you suppose that's so? (Because these are **threatened** and **endangered species**. The researchers must be trained to ensure they properly manage the turtles for maximum survival.) Be sure to mention that one of the most important resource management efforts that can be done for sea turtles is to create **sanctuaries** of beach and water areas. These sanctuaries, such as Hammocks Beach State Park, provide protected **habitat** for the sea turtles.



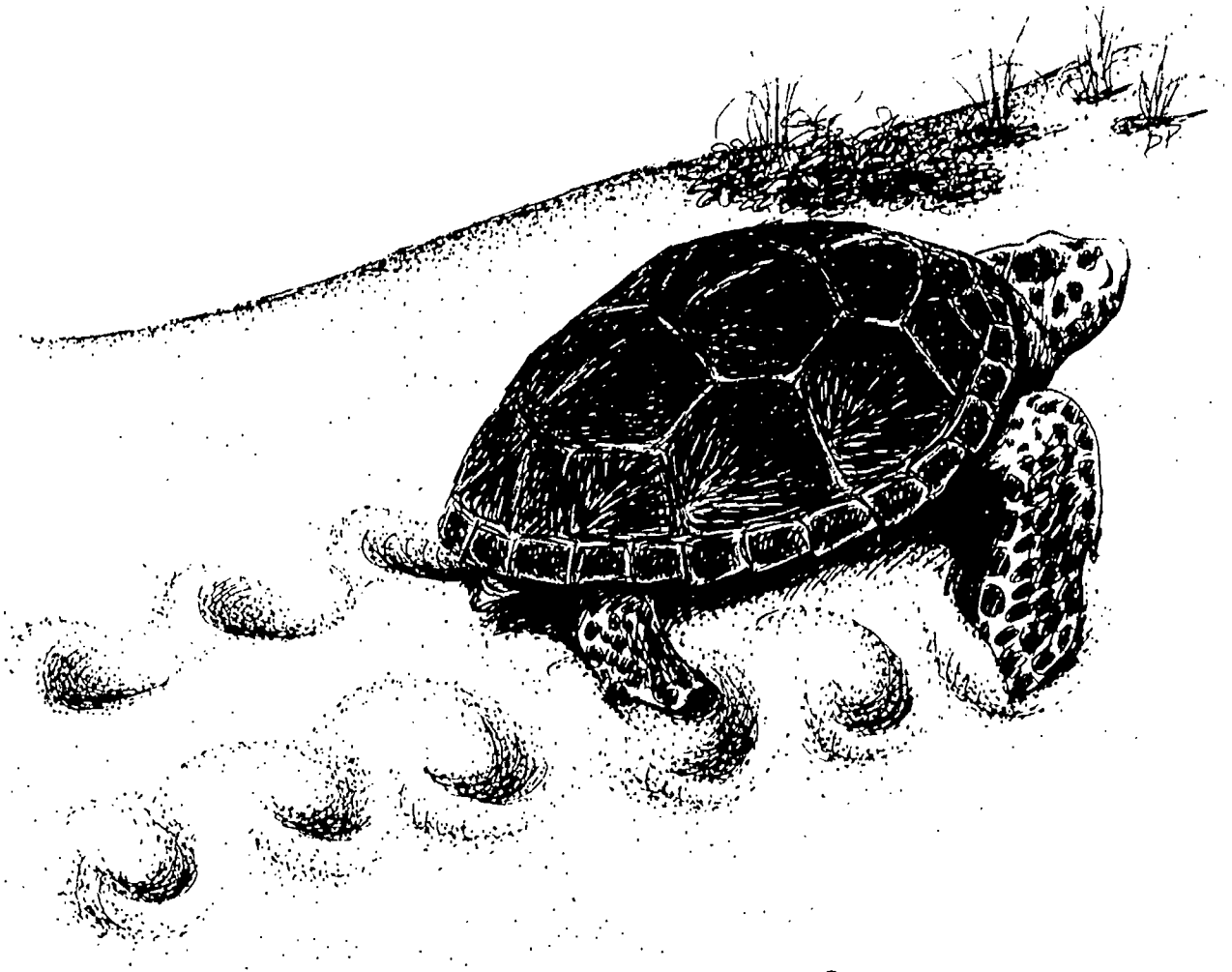
7. Finally, lead a discussion on the resource management tools used to protect sea turtles. Discuss the use of a red flashlight to find turtles on the beach. (Sea turtles do not easily see the wavelength transmitted by a red light.) Describe how to tag/measure a turtle so you can hope to monitor it from nesting season to nesting season. Do you suppose many male turtles are ever tagged? (No, since male turtles do not come up on the beaches.) Discuss how the information is used to learn more about a sea turtle's natural history. Show the class how the wire mesh is used to cover the nest and explain why predators cannot dig through the wire. In extreme cases, it is necessary to relocate a nest. This would include a nest laid below the high tide line, areas threatened by storm tides, nearby vegetation's roots and erosion. The relocation must be done within the first 6-12 hours after laying to be effective. Did any group's nest need to be relocated?

Remember, by law only a trained person is permitted to perform these activities. Have the students return their papers so no litter is left on the beach.

Suggested Extensions:

1. Take the class on a visit to one of the three North Carolina Aquariums to view living sea turtles. (Note: You should call in advance to have the admission fee waived.)

2. Ask for a student to volunteer to take photographs during the on-site visit. As a post-visit activity, assign students to create a bulletin board display showing what they have learned.



Sea Turtle Threats Worksheet

Threats:	...Which affect sea turtles at Hammocks Beach	... Which affect sea turtles in the ocean	...Which would affect sea turtles if the beach were developed with houses and hotels	Natural threats	Human-made threats	Possible solutions
Street lights near the nest causing light pollution						
Development of beach front property						
Water pollution						
Predation by ghost crabs						
Predation by raccoons						
Trawling without TEDs						
Storms causing washovers through the dunes						
Vehicle traffic on the beach						
Poaching for illegal trade of turtle meat and shell for jewelry						
Nest damage by roots of the dunes plants						
Predation by sharks						
Others						

Will your solution create any problems or affect other animals? _____

_____

_____

Are your solutions realistic? Answer yes/no and why. _____

_____

_____

Sea Turtle Threats Answer Sheet

Threats:	... Which affect sea turtles at Hammocks Beach	... Which affect sea turtles in the ocean	...Which would affect sea turtles if the beach were developed with houses and hotels	Natural threats	Human-made threats	Possible solutions
Street lights near the nest causing light pollution			✔		✔	Turn lights off during hatching season; put shields on lights; use sensor lights
Development of beach front property			✔		✔	Stop development of actual beach front areas; set aside certain areas for no development
Water pollution	✔	✔	✔		✔	Stop dumping trash into ocean, stop ghost nets, stop erosion and pollution in the watershed
Predation by ghost crabs	✔			✔		Protect the nests w/ screens
Predation by raccoons	✔			✔		Protect the nests w/ screens
Trawling without TEDs	✔	✔			✔	Use TEDs; shorten the time nets can be in the water
Storms causing washovers through the dunes	✔			✔		Have a trained resource manager move nests to higher ground if they look like they might be threatened with washover
Vehicle traffic on the beach			✔		✔	Ban vehicles from the beach during nesting season
Poaching for illegal trade of turtle meat and shell for jewelry		✔			✔	Do more conservation education to teach why poaching is bad; increase penalties; increase patrolling
Nest damage by roots of the dunes plants	✔			✔		Have a trained resource manager move the nest to a more appropriate location
Predation by sharks	✔	✔		✔		
Others		ghost nets	pollution and trash on the beach			Educate people not to dump trash, nets, etc

Will your solution create any problems or affect other animals?

Are your solutions realistic? Answer yes/no and why.

April 1994

4.1.6

Hammocks Beach State Park, NC

Post-Visit Activity #1 — Sea Turtle Trek

Curriculum Objectives:
Grade 6
- Communication Skills: listening, reading, vocabulary and viewing comprehension, study skills using environmental sources
- Guidance: competency and skill for interacting with others
- Healthful Living: environmental health, how people affect the environment
- Science: ecology

Grade 7
- Communication Skills: listening, reading, vocabulary and viewing comprehension, study skills using environmental sources
- Guidance: being responsible in a group
- Science: characteristics of animals, organization and variety of living things, animal communities, interaction of people and the environment
- Social Studies: know the importance of natural resources

Grade 8
- Communication Skills: listening, reading, vocabulary and viewing comprehension, study skills using environmental sources
- Science: adaptation, ecology

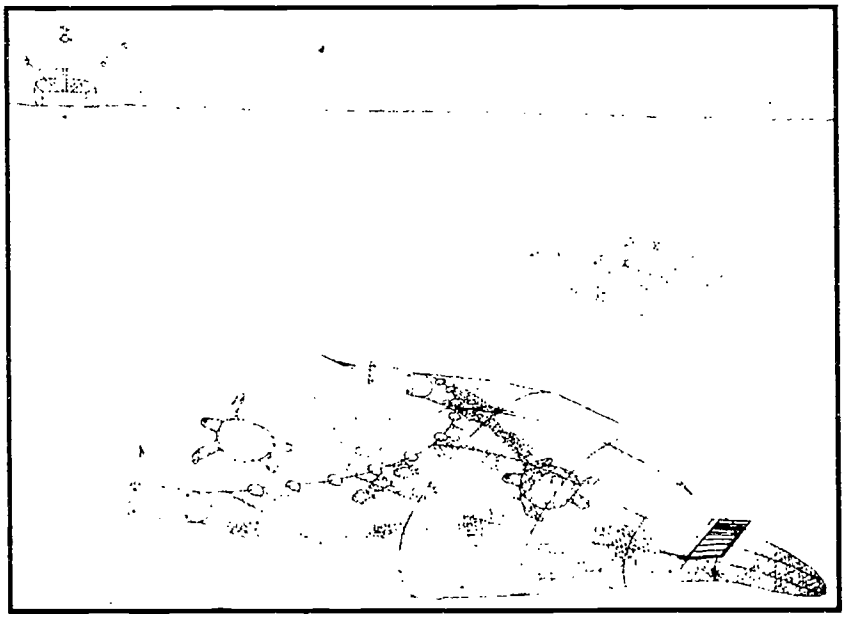
Location: Classroom

Group Size: Class size

Estimated Time: 40 minutes

Appropriate Season: Any

Materials:
Provided by the educator:
Part I:
Per student: Student's Information, 1 game token (can be anything small, such as a small shell)
Per group: One game board (assemble by taping, gluing or laminating the game to cardboard), 1 set of "Turtle Tip" cards, 1 die
Part II:
Per student: "A Maze of Threats," pencil



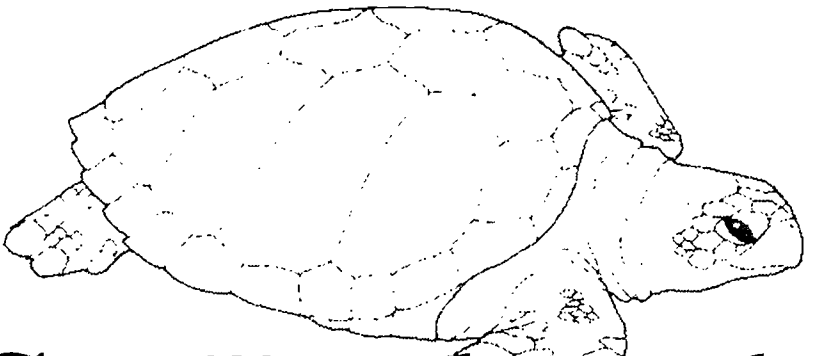
Major Concepts:
- Life cycle
- Natural threats to sea turtle survival
- Human threats to sea turtle survival

Objectives:
- Describe the life cycle of the loggerhead sea turtle.
- Explain the low rate of hatchling survival.
- List three natural threats to sea turtle survival.
- List three human-created threats to sea turtle survival.

Educator's Information:

This activity focuses on the natural and human threats sea turtles encounter during their life cycles. Before beginning the activity, please read Appendix 3, Sea Turtle Conservation.

In Part I, the students will read about sea turtles, then play the game of sea turtle survival, "Sea Turtle Trek." In Part II, the students will complete a maze, helping the hatchlings make it to adulthood.



Sea Turtle Trek

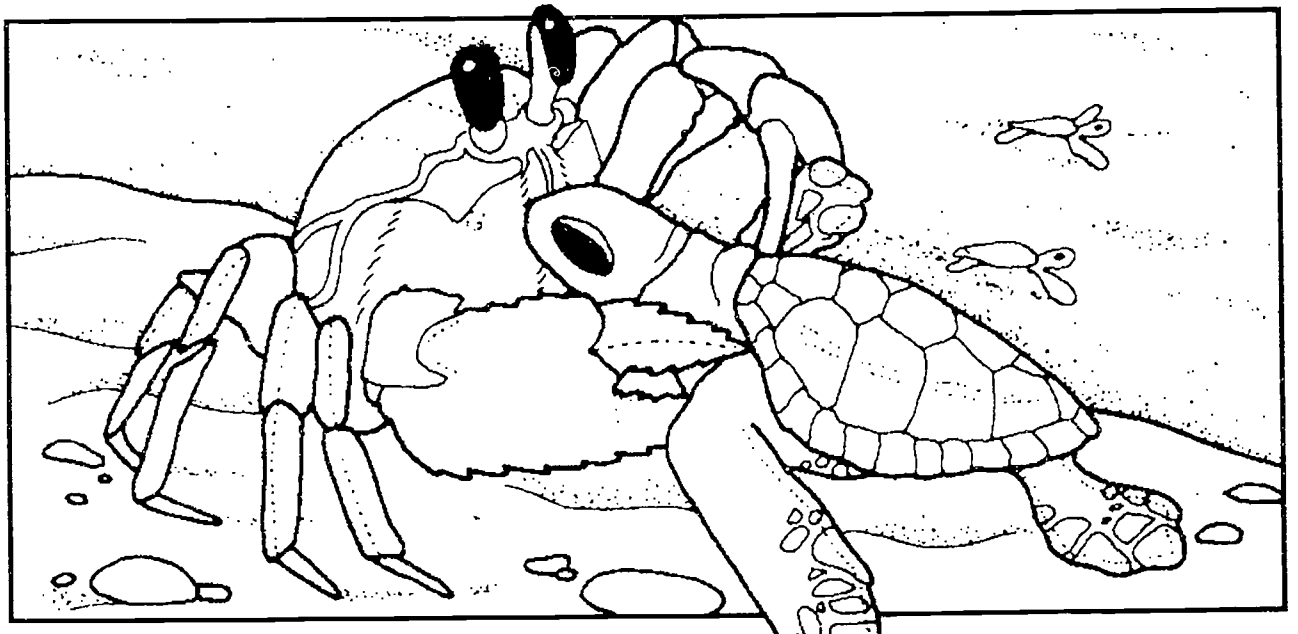
Sea turtles are **reptiles** that spend almost their entire life cycles in the seas and oceans of the world. There are seven species worldwide. Of the seven, five of them, the leatherback, loggerhead, green, Kemp's Ridley (or Atlantic Ridley) and hawksbill, can be found in the Atlantic Ocean. The most common **nesting** turtle in North Carolina is the loggerhead, which grows to a weight of between 200 and 350 pounds when mature. The largest sea turtle, however, is the leatherback, which can weigh as much as 1300 pounds.

Sea turtles have special characteristics or **adaptations** that enable them to better survive in their ocean environment. For example, they consume the salty sea water that surrounds them and rid themselves of excess salt by tearing. Instead of having feet for crawling, like the smaller fresh-water turtles that we sometimes see on land, they have **flippers** for swimming. Sea turtles, like all reptiles, have lungs instead of gills like fish, so they cannot breathe underwater. However, they can stay underwater for several hours, by holding in the air that they breathe when they surface.

Unlike some other turtles, sea turtles can't pull inside of their shells for protection. Their head and flippers stay extended, making them more vulnerable to **predators** such as fish, sharks and killer whales. Fortunately, once they reach maturity, due to their large body size and thick, streamlined shells, they have very few natural enemies.

Sea turtles are **omnivorous**, which means that they eat both plants and animals. Some of the things they eat include **jellyfish**, crabs, sea weed and mollusks (sea shell animals). Sea turtles don't have teeth. Instead, they have a horny covering of the jaw called a **beak**. They have such powerful jaws that they can actually crush the shells of **crustaceans** in order to get at the meat inside the shell.

Loggerheads they nest on beaches in temperate and subtropical waters. In North Carolina they nest between the months of May and September. The females crawl ashore at night to lay their eggs. They usually crawl to the dune base, beyond the reach of high tide



water and then dig a hole in the sand that is approximately 18 inches deep. The female then deposits, on the average, 120 eggs. She then covers the hole with sand and crawls back to the ocean. She does not incubate the eggs.

After approximately 60 days, the eggs hatch and the **hatchlings** emerge from the sand. The temperature of the sand will determine whether the turtles turn out as males or females. Lower sand temperatures tend to produce more males, while higher temperatures tend to produce more females. Hatchlings orient themselves toward the brightest light which, hopefully, is the ocean reflecting the stars and moon. If there are artificial lights shining on the beach, some of the turtles might crawl in the wrong direction and never make it to the water. Once the hatchlings emerge from the nest, they have to get past the ghost crabs that live on the beach, as well as sea gulls and other birds that might try to prey upon them.

Herpetologists believe that sea turtles spend the first year or so of their lives at the surface of the water, floating in clumps of seaweed. The seaweed provides them with food and shelter. Because they are so small when first hatched, they are very vulnerable to predators in the early stages of life and many don't reach adulthood. In fact, many researchers believe that only 1 in 10,000 eggs laid will produce a turtle that reaches maturity.

Sea turtles have been in existence for over 150 million years, yet, in recent times their numbers have rapidly declined. This decline is a result of human activities that have affected, and continue to affect, turtle populations, such as development along the coast which reduces suitable nesting **habitat**, pollution of our oceans and the taking of turtles for food, jewelry and souvenirs. In addition, many sea turtles have been caught in fishing nets. Because the turtles are unable to come to the surface to breathe when they are in the net, they drown if not released quickly enough. A **Turtle Excluder Device (TED)** has been developed to be installed in fishermen's nets to help solve this problem. This device acts as a trap door to push the turtle out of the net after it gets caught. Hopefully, the more these devices are used, the more turtles will be saved. There are other efforts underway to protect sea turtles as well, including the passage of laws in the United States to help protect sea turtles.

As you play the following game, think about the many natural and human threats facing these unique reptiles.

Instructions:

Part I:

Have the students read the Student's Information. Separate the class into groups of five students and supply each group with a Sea Turtle Trek game set. Review Appendix 3, Sea Turltle Conservation and the instructions with the students. Allow the groups 15 minutes to play the game. After the game(s) ends, lead the class in a discussion on how difficult it was for a **hatchling** to survive. Is this true for real hatchling sea turtles? (Yes)

Rules for the Sea Turtle Trek game:

1. To decide who goes first, each player should roll the die once. The player who rolls the highest number starts the game. The person to his or her right plays next.

2. Each player should put his or her token on the space marked start.

3. The first player rolls the die and moves his or her token the number of spaces the die indicates. When a player lands on a space, they must follow the instructions that are written on the space.

4. If the space is a "Turtle Tip," then the player is asked a question from the "Turtle Tip" cards. The player to the left draws the top card from the stack. She or he reads it aloud for the player to answer. If correct, the player rolls again; if not, the player must wait until her or his next turn to again attempt to correctly answer the next "Turtle Tip" question. A correct answer must be given before that player can advance.

5. After the first player rolls once and moves, the rest of the players go, one at a time.

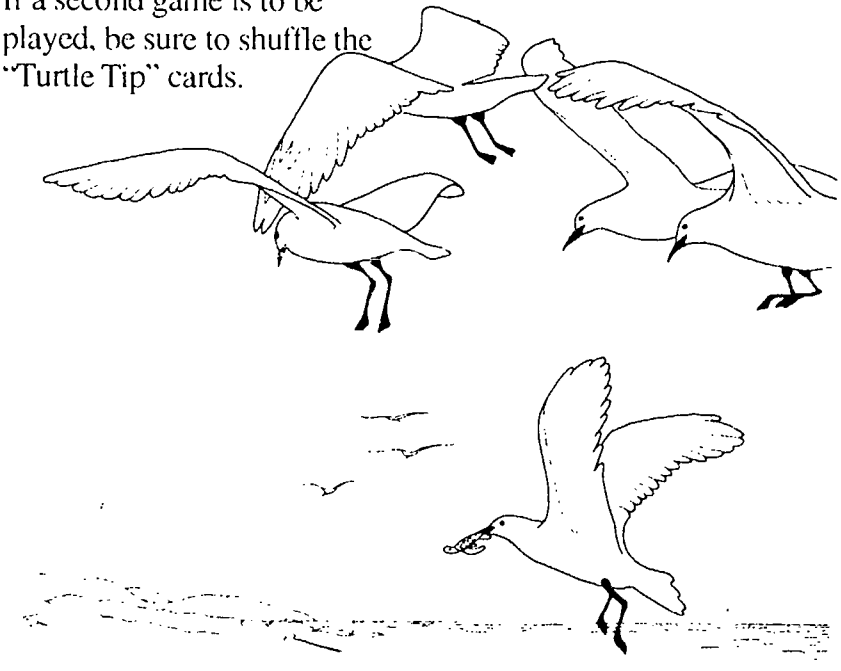
6. Play the game until one player reaches the end. To win, the player must accurately answer the final "Turtle Tip." If a second game is to be played, be sure to shuffle the "Turtle Tip" cards.

Instructions:

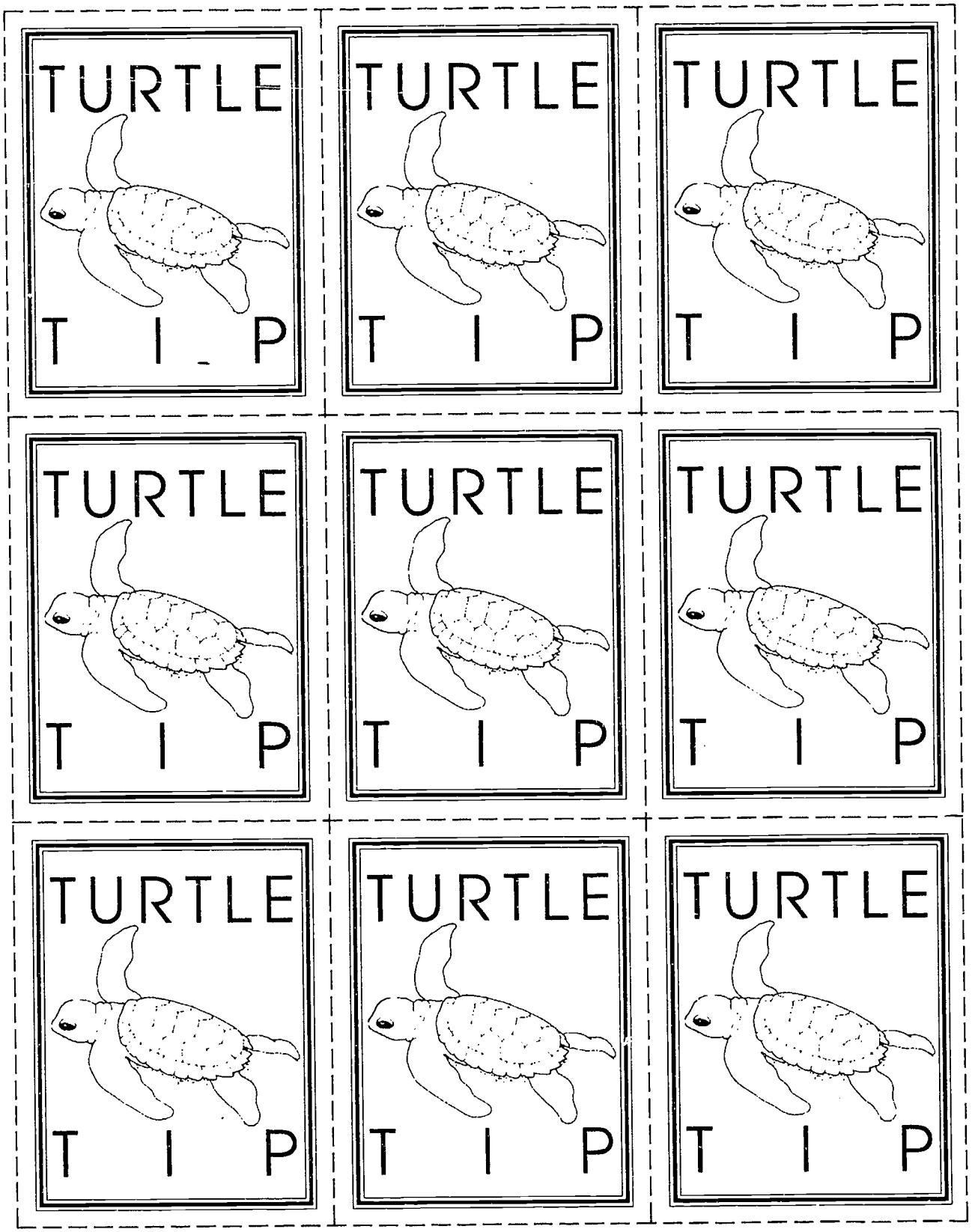
Part II:

Give each student a copy of "A Maze of Threats." Allow five to ten minutes for the students to complete the maze. When all the students are done, discuss with them how each of these threats affect real sea turtles. Then ask them to list any suggestions they have on how to reduce these threats. Ask them to try to think of specific things they could do which might help sea turtles.

(Note: If any of the students' suggestions are feasible for individual students or for your class as a whole to do, we encourage you to follow up on them and share what you are doing with the park staff.)



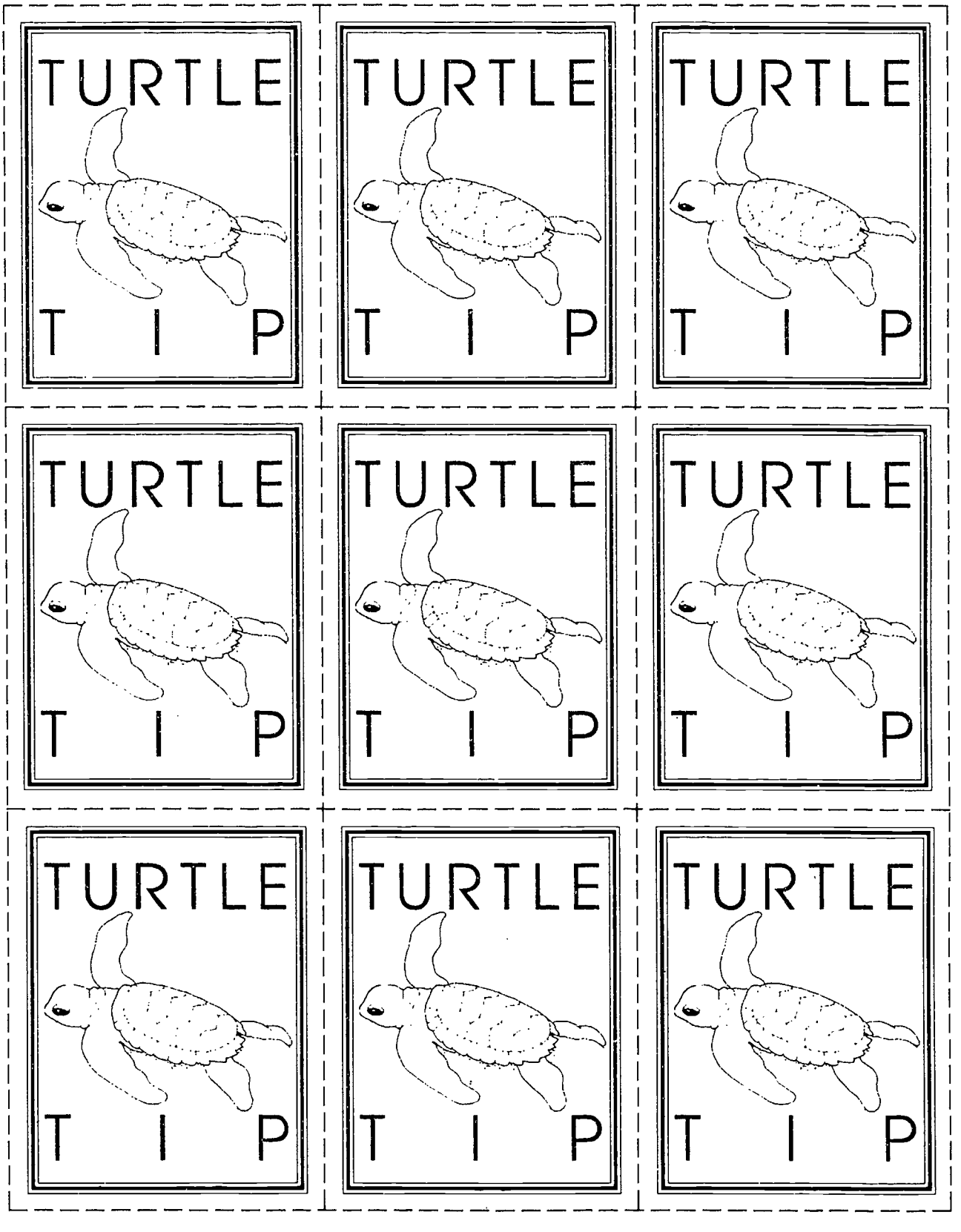
Turtle Tip Cards



Turtle Tip Cards

How many types of sea turtles are possibly found off the North Carolina coast, in the Atlantic Ocean? ANSWER: Five	What is the largest sea turtle in the Atlantic Ocean? ANSWER: Leatherback	Do sea turtles have gills or lungs? ANSWER: Lungs
What is the most common nesting sea turtle in North Carolina? ANSWER: Loggerhead	A sea turtle is a(n) — A. Insect B. Amphibian C. Reptile D. Mammal ANSWER: C	What do sea turtles drink? ANSWER: Sea water
Adult loggerhead sea turtles at maturity weigh about ? A. 50 - 75 lbs. B. 200 - 350 lbs. C. 1000 -2000 lbs. D. 1500 - 2000 lbs. ANSWER: B	True or False: Sea turtles can breath underwater. ANSWER: False	How do sea turtles rid themselves of excess salt in their bodies? ANSWER: By shedding tears

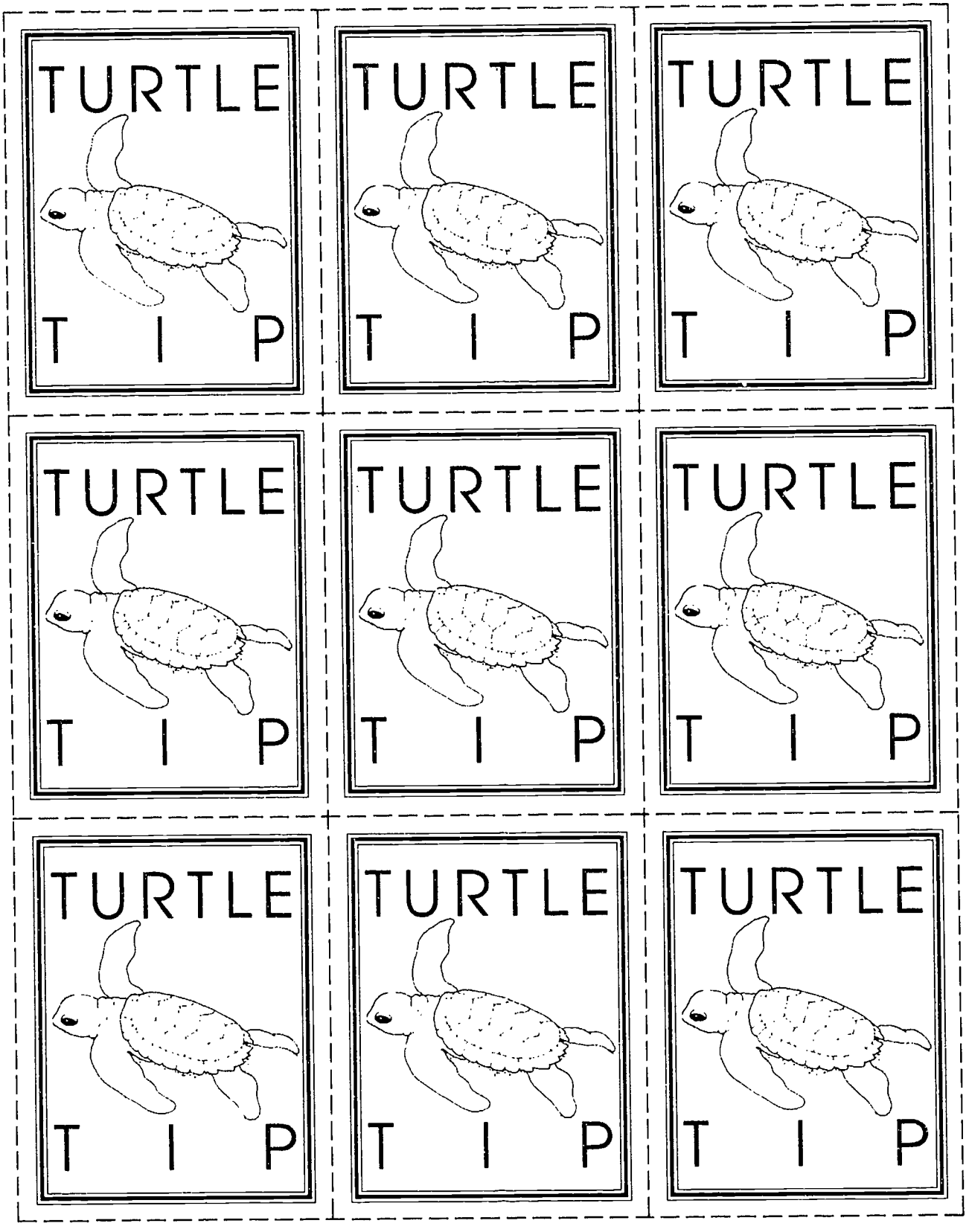
Turtle Tip Cards



Turtle Tip Cards

True or False: A sea turtle can pull its head into its shell for protection? ANSWER: False	Loggerhead sea turtles are: A. Herbivores (eat only plants) B. Carnivores (eat only animals) C. Omnivores (eat both plants and animals) ANSWER: C	True or False: Sea turtles nest in the winter in North Carolina? ANSWER: False
Where do sea turtles sleep? A. On the beach or sand dunes B. Under rocks on the ocean floor or floating at the waters surface C. In the forest behind the sand dunes D. In the "Turtle View" Condominiums ANSWER: B	Which of the following is NOT a food source for sea turtles? A. Jellyfish B. Acorns C. Seaweed D. Small crabs ANSWER: B	When do loggerhead sea turtles nest? A. At night B. During the day C. Only during the full moon D. Only after a storm ANSWER: A
Instead of teeth, sea turtles have? A. Gums B. Incisors and molars C. Canines D. A beak ANSWER: D	Which of the following is NOT a predator of sea turtles? A. Ghost crabs B. Humans C. Butterflies D. Sharks E. Sea gulls ANSWER: C	True or False: A female sea turtle will lay an average of 120 eggs per nest. ANSWER: True

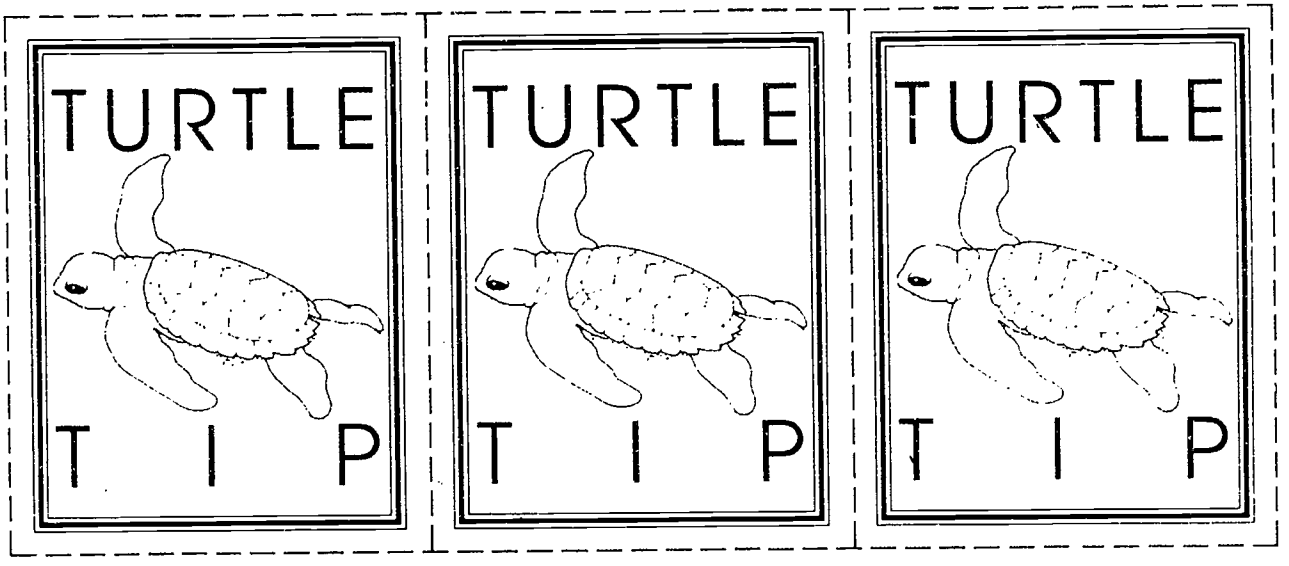
Turtle Tip Cards



Turtle Tip Cards

Sea turtles lay their eggs on: A. The ocean floor B. Sandy beaches C. Coral reefs D. Fishing piers ANSWER: B	True or False: Female sea turtles incubate their eggs. ANSWER: False	Where is it thought hatchling sea turtles spend the first year of their life? A. Floating in seaweed mats at the surface of the water B. Buried under the mud on the ocean floor C. In the sand dunes ANSWER: A
Sea turtle eggs usually hatch after approximately: A. 2 days B. 10 days C. 60 days D. 1 year ANSWER: C	Could lights shining on the beach cause hatchling sea turtles to crawl in the wrong direction, away from the ocean? ANSWER: Yes	Approximately how many sea turtle hatchlings make it to adulthood? A. Every one B. One in ten C. One in one hundred D. One in ten thousand ANSWER: D
What determines whether a sea turtle will hatch out as a male or a female? ANSWER: Temperature of sand	Does moonlight reflecting on the ocean attract sea turtle hatchlings to the ocean? ANSWER: Yes	Does development along the coast reduce good nesting habitat? ANSWER: Yes

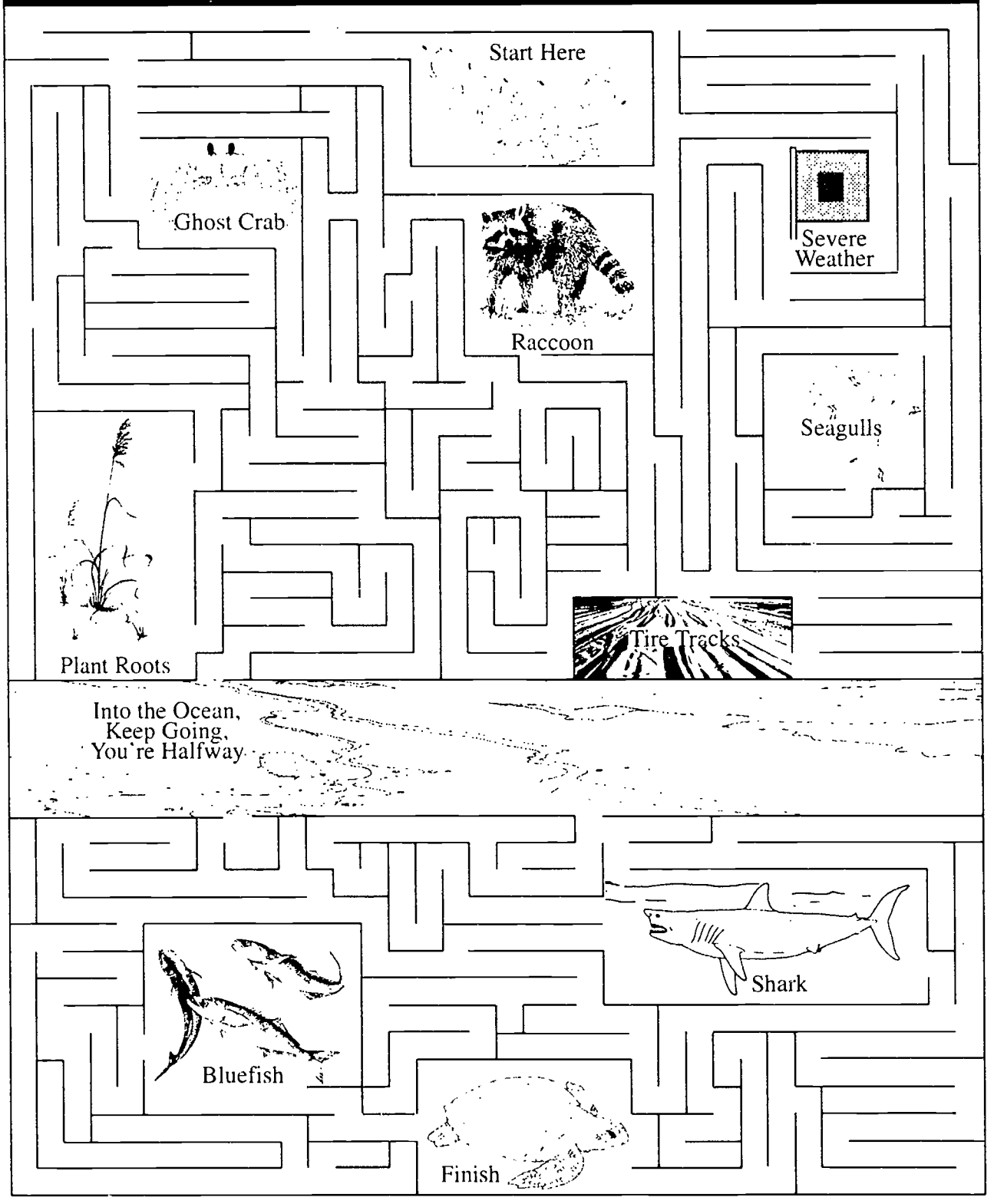
Turtle Tip Cards



Turtle Tip Cards

Which of the following has a positive effect on sea turtles? A. Pollution in the ocean B. Nets without turtle excluder devices C. Coastal development D. Undeveloped beaches ANSWER: D	Do laws protect sea turtles in the U.S.? ANSWER: Yes	What is the name of the device that allows sea turtles to escape from shrimp trawler nets? ANSWER: Turtle Excluder Device

A Maze of Threats



Start at the top of the maze as a hatchling and finish at the bottom as an adult sea turtle. Watch out for hazards along the way!

VOCABULARY

Adaptation - The trait or characteristic developed by the process of an organism making adjustments to life in a particular environment.

Arribada - Spanish for 'arrival,' it refers to the mass arrival of Kemp's Ridley sea turtles at their nesting beach, at which time they are easy prey for commercial slaughter.

Barnacle - A cone-shaped saltwater crustacean that attaches itself to the shells of sea turtles and other hard surfaces.

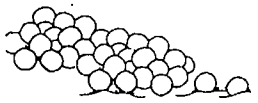
Beach - A smooth stretch of sand or pebbles along the shore of the ocean.

Beak - The horny covering of the jaws, in turtles consisting of a single plate over each jaw surface.

Carapace - The top part of the turtle's shell, usually covered by "scutes" or plates.

Carnivore - A meat eating animal.

Clutch - A group of eggs laid in a single nest.



Cold-blooded - Having a body temperature that varies with the external environment, ecotherms.

Conservation - The protection and management of natural resources.

Crawl - The tracks a sea turtle makes; the act of a turtle moving on the beach.

Crustacean - A usually aquatic animal having no backbone and having two pairs of antennae, such as lobsters, crabs and barnacles.

Endangered Species - A plant or animal likely to become extinct within the foreseeable future.

Extinct Species - A plant or animal no longer in existence.

Flipper - A broad flat limb. The front and rear flippers of sea turtles contain well developed muscles for long distance water travel.

Geographic Coordinate System - The method used to determine locations on a map and a system of grids made from lines of longitude and latitude.

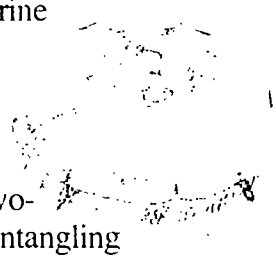
Habitat - The place where an animal lives, and finds food and water, shelter and space. The place where a plant has the soil, nutrients, water and weather it needs.

Hatchling - A newly hatched sea turtle.

Herbivore - An animal that eats only plants.

Herpetologist - A scientist who specializes in the study of reptiles and amphibians.

Jellyfish - A floating marine invertebrate which is almost 90% water. Characteristically, a gelatinous, translucent body, known to be carnivorous and opportunistic, entangling any prey that comes in contact with its tentacles.



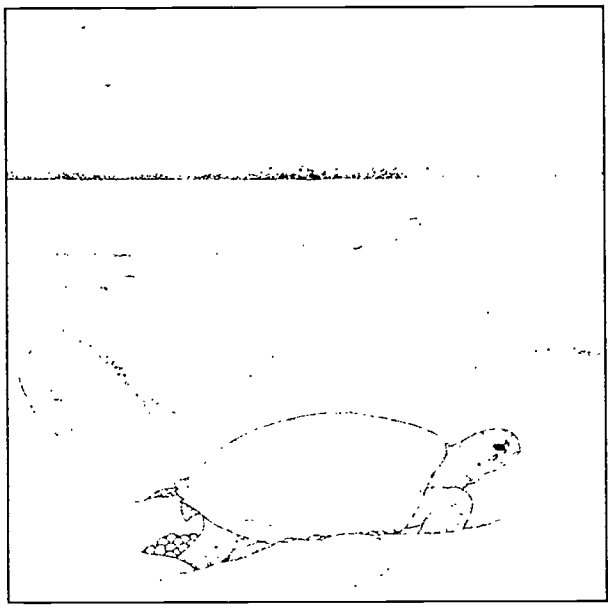
Keratin - A strong, fibrous protein that is the basic substance of nails, hair, hoofs, scutes and beaks.

Latitude - The distance measured in degrees, minutes and seconds, north or south of the equator.

Leatherback - Largest of the sea turtles, the soft shelled leatherback lacks an outer shell or scutes; it can grow to more than six feet long and weigh up to 1300 pounds.

Longitude - The distance measured in degrees, minutes and seconds, east or west of the prime meridian (0 degrees longitude) at Greenwich, England.

Migrate - To move from one region or climate to another for food or breeding.



Nesting - The process of depositing eggs in a nest. Sea turtles deposit their eggs in a bell shaped hole they dig in the sand.

Omnivore - An animal that eats both animals (meat) and plants.

Plastron - The bottom part of the turtle's shell.

Predator - An animal that hunts another animal.

Prey - An animal hunted for food.

Range - The geographical region in which a plant or animal normally lives or grows.

Reptile - Any of various cold-blooded, usually egg-laying vertebrates having an external covering of scales and breathing by means of lungs, such as: snakes, lizards, crocodile and turtles.

Resource Management - The practices, such as sea turtle monitoring, which are designed to improve the habitat and survival of wildlife and/or plant communities.

Sanctuary - A refuge or safe haven where all forms of wildlife are offered protection.

Scales - Small, platelike structures forming the external covering of fishes, reptiles and certain mammals.

Scutes - Horny plates that cover the bones of a turtle's shell, except in leatherback sea turtles.

Temperate Zone - Either of two middle latitude zones of the earth, the North Temperate Zone and the South Temperate Zone lying between 23 1/2 degrees and 66 1/2 degrees latitude north and south.

Threatened Species - Plants or animals likely to become endangered within the foreseeable future.

Turtle Excluder Device (TED) - A device placed near the back of a trawlers net. TED's use a series of slanted bars and a trap door that allows turtles an escape from the net.

Vertebrates - Animals having backbones.

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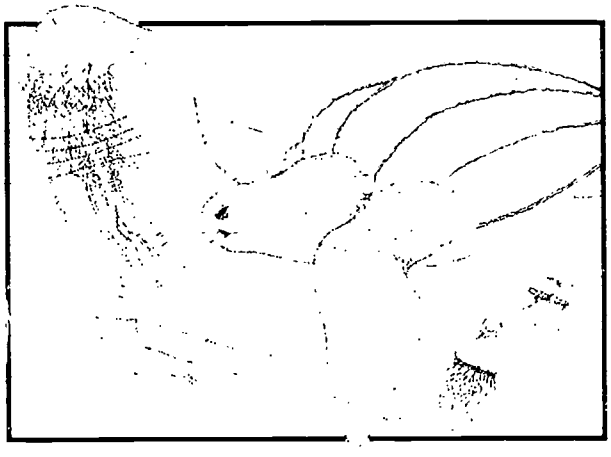
Appendix 1 Sea Turtle Fact Sheet

Sea turtles inhabited the earth over 150 million years ago and today only eight species of these ocean dwelling **reptiles** remain. Some scientists believe there are only seven. Once marsh dwelling animals, they evolved and adapted for life in the sea, the female returning to shore only to lay her eggs. Sea turtles are found throughout the world in tropic to **temperate** oceans. On occasions they might travel into cooler regions. Most species, migrate through international and territorial waters, going from feeding to **nesting** grounds.

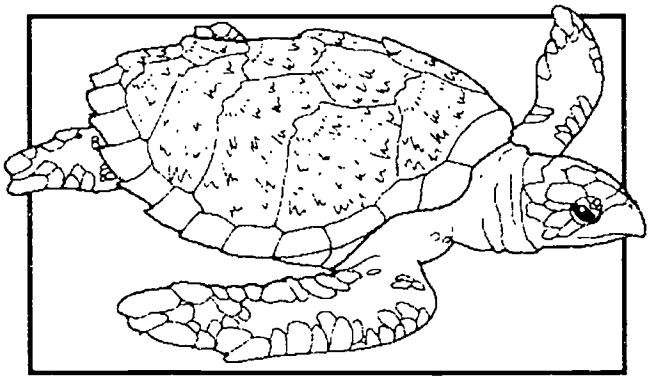
Generally, the only time sea turtles leave the protective **habitat** of the ocean is when the female lumbers ashore to nest. Under the cover of darkness, the female drags her large body toward an area usually above the high tide line. She digs a hole with her rear flippers and deposits more than 100 eggs. While laying, she sheds tears which wash the sand from her eyes. She covers the eggs and returns to the ocean leaving the future **hatchlings** to fend for themselves. After an incubation period of 50-80 days, the young turtles break out of their shells and rest until a time, several nights later, when they scramble out of the sand. Guided by the reflective light of the horizon, they race to the ocean they have never seen. Once reaching the sea, little is known about their movement and fate until, when mature, the females come ashore to nest. It is estimated that only 1 in 10,000 survives to adulthood.

By 1990 all species of sea turtles were severely depleted. Three of these species, leatherback, Kemp's Ridley (or Atlantic Ridley) and hawksbill, appear on the U. S. **Endangered Species** List. The loggerhead and green are classified as **threatened**. Loggerhead, leatherback, hawksbill, Kemp's Ridley and green sea turtles are found within the Atlantic Ocean off the coast of North Carolina. The olive Ridley is generally found in the Pacific, Indian Oceans and in the southern and eastern regions of the Atlantic. The black turtle is thought to be either a separate species or a variety of the green turtle, and the flatback is found off the coast of Australia.

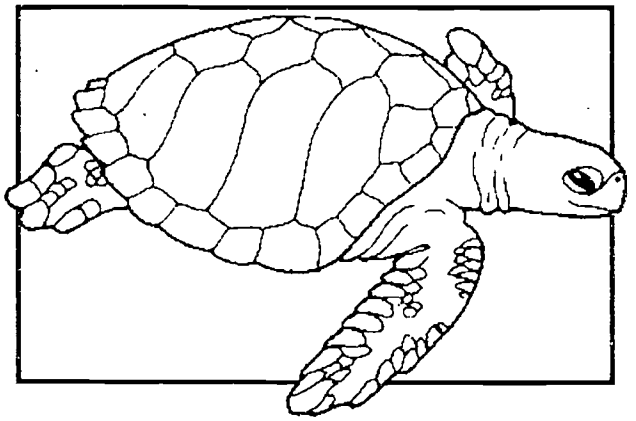
The **leatherback** (Dermochelys coriacea) is the largest of all turtles, weighing 1,300 pounds or more, while reaching lengths of six feet. Major taxonomic differences place the



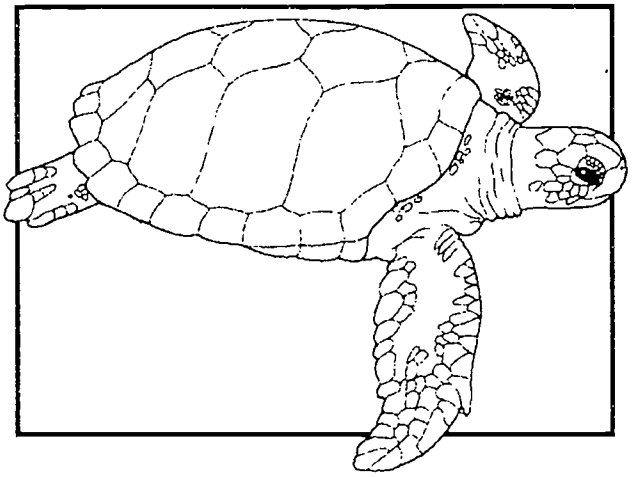
leatherback in a separate family from all other marine turtles. Unlike other species, the leatherback lacks an outer shell or scutes; their soft shell is characterized by seven long ridges. Their flippers are clawless. They inhabit both the tropic waters of South America and cooler **latitudes** of Nova Scotia. The leatherback's diet consists entirely of **jellyfish**.



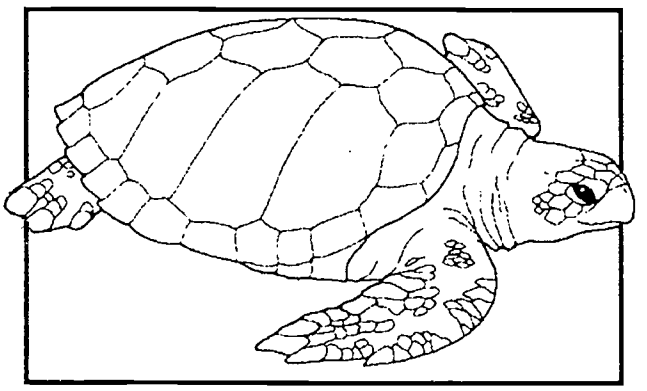
The **hawksbill** (Eretmochelys imbricata), is a small sea turtle, commonly 110 lbs., with a narrow birdlike **beak** for which it is named. Inhabiting coastal waters around coral reefs, the hawksbill is **omnivorous,** consuming jellyfish, sponges, **crustaceans** and sea grasses. Their colored shell, highly valued for jewelry, is the most serious threat to this species' continued survival.



The **Kemp's Ridley** (Lepidochelys kempi), also called the Atlantic Ridley, is the most severely depleted of the sea turtles. A small sea turtle weighing up to 100 lbs., the Kemp's has a gray circular shell. Although only one nesting site remains, Kemp's are found throughout the Gulf of Mexico and along some Atlantic coasts. The females of this species arrive at their nesting beach together *en masse* in what are called "arribidas," (Spanish for 'arrivals'). Although their nesting beach in Mexico is now fully protected, past "arribidas" provided an easy opportunity for large commercial slaughters which have resulted in their present low numbers.



The **green sea turtle** (Chelonia mydas), is so named for the color of its fat and may weigh over 300 lbs. It has an oval olive-brown **carapace** with darker streaks. Greens have been found as far north as New England and south to Argentina. Nesting occur along the Western Caribbean coast and in Surinam. Green turtles are predominantly **herbivorous**, feeding on seaweed and sea grasses.



The **loggerhead** (Caretta caretta), has a heart shaped brown carapace, a large head (10 - 12" long) and a hard horny beak. The loggerhead can grow to three feet and weigh more than 300 pounds. Although a highly migratory animal, Florida continues to be one of their more important nesting grounds. Primarily **carnivorous**, loggerheads feed on mollusks, crabs, fish and jellyfish. More than 99 percent of the nesting sea turtles in North Carolina are loggerheads.

Appendix 2 Loggerhead Sea Turtle Fact Sheet

COMMON NAME	Loggerhead, Lanternback
SCIENTIFIC NAME	Caretta caretta
STATUS	Designated as threatened on both the Federal Fish & Wildlife and North Carolina Endangered Species lists.
DISTRIBUTION	Loggerhead sea turtles are found world-wide in temperate to sub-tropical waters.
DESCRIPTION	Loggerhead sea turtles are named for their large head. They are brown to reddish brown in color. Adults generally weigh 200-300 pounds and have carapaces (shells) 36 to 42 inches long. Newly hatched sea turtles have carapace about 2 inches long. It is unknown how long sea turtles live, although it is believed they typically live 80-100 years.
BEHAVIOR/ADAPTATIONS	Loggerhead sea turtles are well adapted to life at sea, with long flippers and special glands so they can drink salt water. They are relatively slow swimmers but will put on a burst of speed when threatened. The largest natural threats to them are sharks and killer whales. Sea turtles nest on the beach. Generally they return to that same beach to nest when they reach sexual maturity (4 to 40 years).
LIFE HISTORY	Loggerhead sea turtles are omnivorous, eating mollusks, crabs, jelly-fish, seaweed, shrimp and algae. They spend most of their time in coastal waters, however they have been seen as far as 500 miles out at sea. Prior to the nesting season of May-June in North Carolina, the males and females gather offshore for their mating rituals. After mating, the female is able to store the viable sperm for the rest of the mating season, allowing her to nest 1-6 times and still have fertile eggs. When she is ready to nest, she crawls up the beach at night past the high tide line, digs a nest and deposits an average of 120 ping pong ball sized eggs before covering the nest over and returning to the sea. The baby sea turtles hatch about 55-80 days later, and at dusk they leave the nest, crawl rapidly to the surf and swim to get caught in currents which will carry them away from shore.

Threats to Survival

Adult loggerhead sea turtles have few natural predators except for sharks and killer whales. On land, hatchlings are eaten by raccoons, ghost crabs, sea gulls, fox and other animals. Although these animals will sometimes wipe out a nest, the largest threat to all sea turtles is that from humans. Throughout much of the world sea turtles are not protected. From egg to adulthood, the turtles are collected for food, aphrodisiacs and trinkets (tortoise shell jewelry, stuffed turtles, knick-knacks, etc.). All along the coast sea turtles are caught in commercial fishing nets (some 11-12,000 turtles die this way each year), discarded plastics, discarded fishing nets and lines, and other forms of pollution. Each year more and more beach fronts are developed, destroying the sea turtles' nesting beaches. All of this is causing the loggerhead sea turtle population to remain in jeopardy.

Conservation work is presently being done to promote public education and research which will hopefully help us better protect this important animal.

Fun Facts

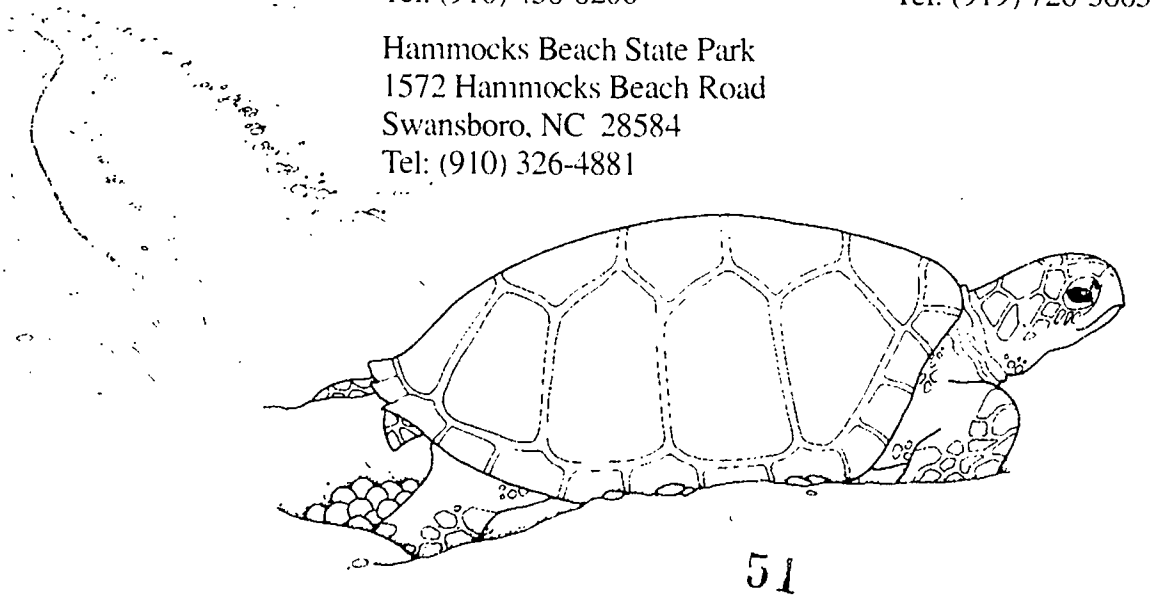
Loggerhead sea turtles are non-vocal. They have excellent eyesight under water, although they are near-sighted on land. They have an excellent sense of smell. Sea turtles have evolved over a very long period of time, at least 150 million years (humans have been around less than 1 million years)! It is estimated that 1 in 10,000 sea turtles survives from hatching to sexual maturity. A sea turtle's sex is determined by the incubation temperature of the sand around the clutch (cooler temperatures make more males, warmer temperatures make more females).

For more information about loggerhead sea turtles and what is being done in North Carolina State Parks contact:

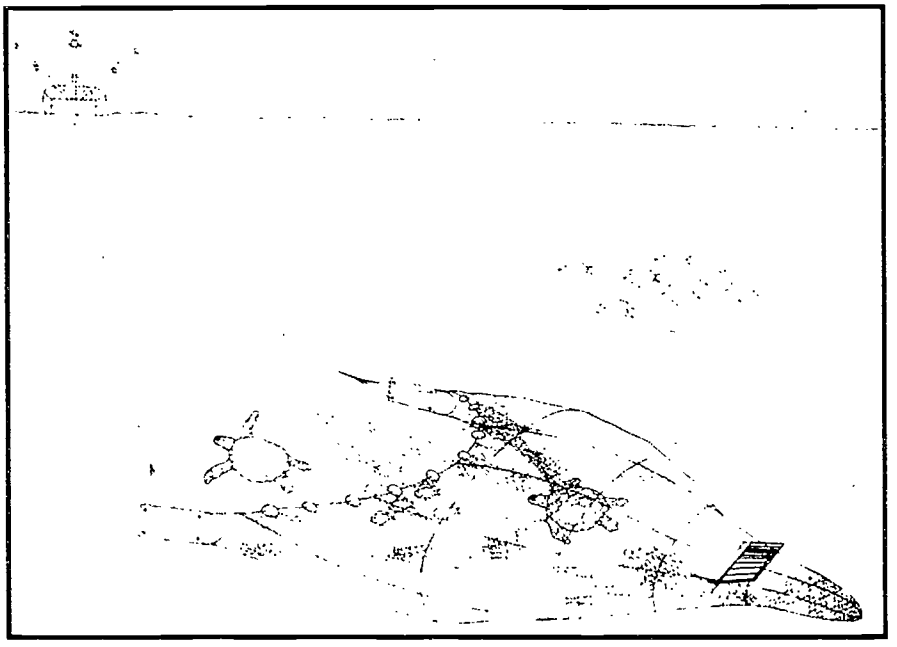
Fort Fisher State Recreation Area
Post Office Box 475
Carolina Beach, NC 28428
Tel: (910) 458-8206

Fort Macon State Park
P. O. Box 127
Atlantic Beach, NC 28512
Tel: (919) 726-3665

Hammocks Beach State Park
1572 Hammocks Beach Road
Swansboro, NC 28584
Tel: (910) 326-4881



Appendix 3 Sea Turtle Conservation



In 1947, Archie Carr, a highly noted turtle biologist, estimated that 40,000 female Kemp's Ridleys nested on one beach in a single day. All other species have shown similar rapid population declines. While fully protected in the U.S. under the Endangered Species Act (which fines offenders), sea turtles are not afforded this protective status throughout their range. It is a shallow victory to protect nest sites from poachers in Florida only to have these same turtles legally slaughtered in another country. Despite U.S. protection, regulations and efforts, no population of sea turtle has shown a significant increase in number. Commercial exploitation, accidental (incidental) drowning in shrimp nets and habitat destruction of nesting sites pose continued threats to the sea turtle's survival.

Commercial Exploitation

Throughout their range, sea turtles suffer exploitation at the hands of people during their entire life cycles. Adults are harpooned or speared from the water, or flipped over on their backs while attempting to nest. The meat (especially from the green) is a prized delicacy, flippers are used for leather products, cartilage is used in turtle soup, and the shell, predominantly from the hawksbill, is used for tortoise shell jewelry. Nests are plundered for eggs and eaten locally or exported to other markets. Even hatchlings, while racing to the protective custody of the ocean, are caught and molded in plastic for paper weights and other "curio" items. International trade in such turtle products, whether legal or illegal, continues to be a lucrative venture, thus the slaughter continues.

Incidental

In 1981, it was estimated that over 12,600 turtles in the U.S. alone died as a result of shrimping operations. The turtles are caught during trawling operations, are unable to surface for air, and drown.

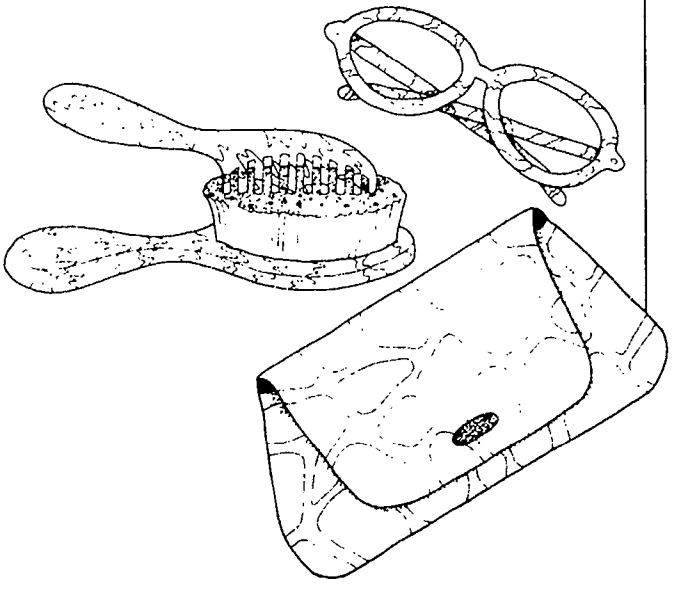
The National Marine Fisheries Service (NMFS) has developed a device 97% effective in releasing sea turtles caught during shrimping operations. The Turtle Excluder Device (TED) is installed inside and just forward of the end of the net. Turtles swimming through the net strike a deflector panel which forces them up and out of a trap door. Furthermore, tests performed by NMFS have shown that the use of the TED increases shrimp take by 7% and discards unwanted fish, jellyfish and seaweed with improved fuel efficiency.

Another problem is the ingestion of plastic that has been discarded by people. The plastic (sandwich, potato chip and garbage bags), presumed by the turtles to be jellyfish, becomes clogged in their intestines. One turtle had ingested enough plastic to cover an area 9 feet by 12 feet. It is estimated that almost half of

the oceanic turtles are affected by the plastic. Most dead turtles have consumed enough plastic to have contributed to their demise.

Habitat Destruction/Alteration

Commercial and private development of shorelines has greatly reduced suitable nesting areas that are safe from salt water intrusion. Nests may also be subjected to foot traffic, automobile traffic and poachers. If the eggs survive, the street and building lights may disorient the hatchlings, attracting them to a brighter light source and away from the surf. An estimated 6,000 hatchlings died in 1992 in Melbourne, Florida, as they attempted to cross the highway and were crushed by automobiles.



What Conservation Agencies Are Doing

Greenpeace has worked closely with the wider Caribbean Sea Turtle Conservation Network (WIDECAST). Consisting of a team of scientists and conservationists, WIDECAST is producing a recovery plan for each of 38 nations throughout the sea turtle range. Together, they are working toward national and international laws for conservation, eliminating trade in sea turtle products, implementing nesting beach management and curbing petroleum impacts.

Working in cooperation with the National Marine Fisheries Service, conservationists are traveling to shrimping ports to encourage voluntary use of the TED. Greenpeace is acting as a mediator between government and shrimpers to expand the use of this device on a global scale. Volunteers have formulated beach patrols to monitor and diminish threats posed by salt water intrusion and human related activity.

Conservationists discourage the private and commercial shoreline development that encroaches upon nesting areas and encourage the use of light diffusion devices on nesting beaches, so as not to distract females from nesting or disorient hatchlings upon emergence.

What You Can Do

Educate your friends and relatives about these unique reptiles. Report all nesting attempts and nests for protection. Do not disturb nesting females. Never discard anything, especially plastic, in the water as it may be mistaken for food or jellyfish. Discourage building on the coast line and the many lights associated with beach development. Do not buy turtle products while in other countries. Support organizations that are actively working to protect sea turtles.

SCHEDULING WORKSHEET

For office use only:
Date request received_____ Request received by_____

1) Name of group (school) _____

2) Contact person _____ _____
name phone (work) (home)

_____
address

3) Day/date/time of requested program _____

4) Program desired and program length _____

5) Meeting place _____

6) Time of arrival at park _____ Time of departure from park _____

7) Number of students _____ Age range (grade) _____
(Note: A maximum of 30 participants is recommended.)

8) Number of chaperones _____
(Note: One adult for every 10 students is recommended.)

9) Areas of special emphasis _____

10) Special considerations of group (e.g. allergies, health concerns, physical limitations)_____
_____

11) Have you or your group participated in park programs before? If yes, please indicate previous programs attended: _____
_____

12) Are parental permission forms required? _____ If yes, please use the Parental Permission form on page 9.2.

I, _____, have read the entire Environmental Education Learning Experience and understand and agree to all the conditions within it.

Return to: Hammocks Beach State Park
1572 Hammocks Beach Road
Swansboro, NC 28584

Fax #: (910) 326-2060

PARENTAL PERMISSION FORM

Dear Parent:

Your child will soon be involved in an exciting learning adventure - an environmental education experience at **Hammocks Beach State Park**. Studies have shown that such "hands-on" learning programs improve children's attitudes and performance in a broad range of school subjects.

In order to make your child's visit to "nature's classroom" as safe as possible we ask that you provide the following information and sign at the bottom. Please note that insects, poison ivy and other potential risks are a natural part of any outdoor setting. We advise that children bring appropriate clothing (long pants, rain gear, sturdy shoes) for their planned activities.

Child's name _____

Does your child:

- Have an allergy to bee stings or insect bites?_____
  If so, please have them bring their medication and stress that they, or the group leader, be able to administer it.

- Have other allergies? _____

- Have any other health problems we should be aware of?_____
  _____

- In case of an emergency, I give permission for my child to be treated by the attending physician. I understand that I would be notified as soon as possible.

_____ _____
Parent's signature date

Parent's name _____ Home phone _____
(please print) Work phone _____

Family Physician's name _____ phone _____

Alternate Emergency Contact

Name_____ phone _____

NORTH CAROLINA PARKS & RECREATION
PROGRAM EVALUATION

Please take a few moments to evaluate the program(s) you received. This will help us improve our service to you in the future.

1. Program title(s) _____ Date _____

   Program leader(s) _____

2. What part of the program(s) did you find the most interesting and useful? _____

   _____

3. What part(s) did you find the least interesting and useful? _____

   _____

4. What can we do to improve the program(s)? _____

   _____

   _____

5. General comments _____

   _____

   _____

   _____

LEADERS OF SCHOOL GROUPS AND OTHER ORGANIZED YOUTH GROUPS
PLEASE ANSWER THESE ADDITIONAL QUESTIONS:

6. Group (school) name _____

7. Did the program(s) meet the stated objectives or curriculum needs? _____

   If not, why? _____

   _____

Please return the completed form to park staff. Thank you.

Hammocks Beach State Park
1572 Hammocks Beach Road
Swansboro, NC 28584
Fax # (910) 326-2060