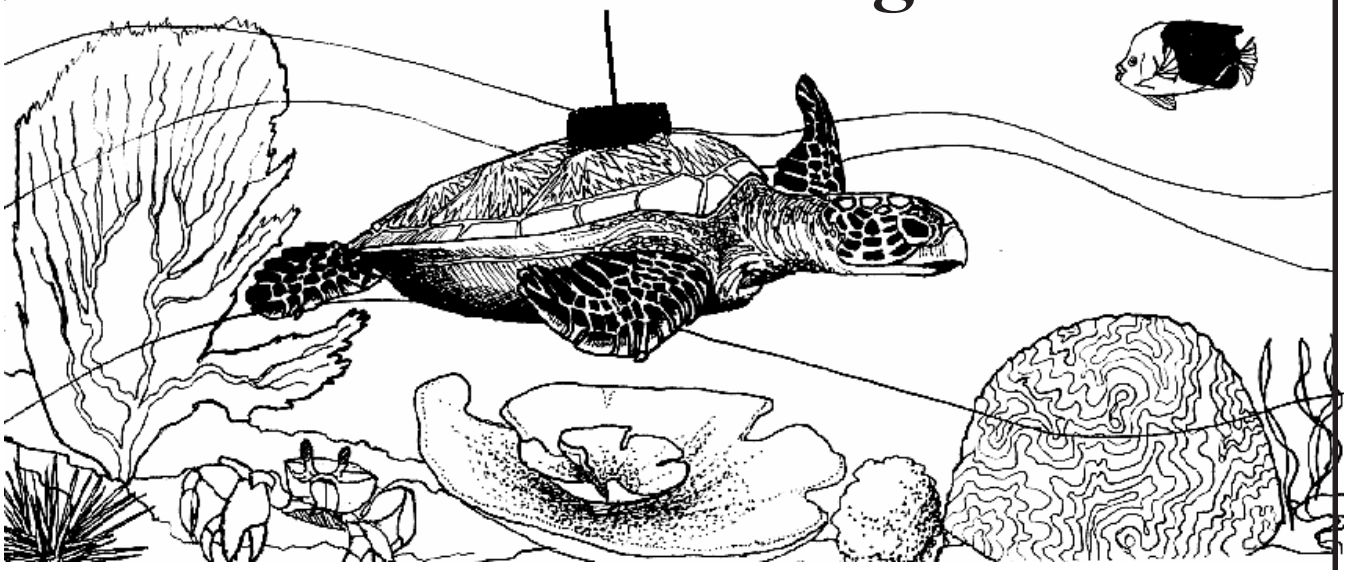
Sea Turtle Migration-Tracking & Coastal Habitat Education Program



An Educator's Guide

with information about sea turtle natural history, coastal habitat ecology, high technology research and conservation efforts to protect sea turtles and their habitats.

Prepared by

SEA TURTLE SURVIVAL LEAGUE

A program of Caribbean Conservation Corp.

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Acknowledgments

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Special thanks go to CCC staff and volunteers for helping gather information and materials for this booklet. Brief excerpts from "Florida's Sea Turtles," a booklet produced by Florida Power and Light Company, were used in this booklet.

We especially want to thank Gayle Nelson Evans for help with developing and writing the lesson plans and activities, Dr. Arthur J. Lewis for providing comments on the educational curriculum portion of this booklet, Dr. Anne Meylen (Florida Marine Research Institute) and Paul Tritaik (U.S. Fish and Wildlife Service) for providing comments on the sea turtle and coastal habitat portions of the booklet, Dr. Llew Ehrhart (University of Central Florida), Barbara Schroeder (National Marine Fisheries Service), Sandy MacPherson (United States Fish and Wildlife Service), Dave Nelson (Waterways Experimental Station, U.S. Army Corps of Engineers), Wallace Nickols (University of Arizona), Emma Hickerson (Flower Garden Banks National Marine Sanctuary, National Oceanic and Atmospheric Administration) and Sally Murphy (South Carolina Department of Natural Resources) for allowing data from their satellite-tracking research on sea turtles to be made available to the public on the STSL's web page.

Edited by Daniel Evans & David Godfrey

THIRD EDITION

Most artwork in this Guide was hand-drawn by Deirdre Hyde. Several images were created by Dan Evans, David Godfrey, Susan Marynowski, Jeanne Mortimer, Amy Breeze, Caroline Reiners and Gayle Evans. The sea turtle size comparison on Page 7 was adapted from one prepared by Earth Island Institute. The coastal community diagram on Page 21 was adapted from one prepared by the Environmentally
Endangered Lands Program of Brevard county.

TO: Educators
FROM: Daniel Evans, Outreach Coordinator
RE: Your Educator's Guide

I am pleased to provide you with a free copy of the Sea Turtle Survival League's Educator's Guide, which was developed for participants in the Sea Turtle Migration-Tracking Education Program. This edition of the Guide can be used as a reference to teach sea turtle biology, coastal ecology and marine conservation.

The Sea Turtle Survival League is now offering a special Classroom Adoption Kit for a donation of only $20!!! This is a new reduced membership rate especailly for educators! The Classroom Adoption Kit includes a certificate of adoption with your class' name, the name of the turtle, a color image of the turtle and background information about the turtle. You will also receive a sea turtle fact sheet, satellite tracking background information sheet, a colorful sea turtle poster and a subscription to our quarterly newsletter, the *Velador.*

I invite you and your students to get involved with helping sea turtles survive and taking a personal interest in sea turtle conservation by "adopting" a sea turtle. The Adopt-A-Turtle program is a way to support the vital work of the Sea Turtle Survival League, so please consider adopting a turtle for your class or making a donation on behalf of your class so the Sea Turtle Survival League can continue to make a difference! You can fill out and mail in the form at the back of this Guide or you can call us at 1-800-678-7853 or visit our web site at http://www.cccturtle.org/class_adopt.htm.

In the Guide, you will find everything you need, from background material to lesson plans, to begin teaching your students about sea turtle biology, navigation and migration, the threats sea turtles face and what must be done to protect them, as well as new material on coastal ecology and protection. You can access the Sea Turtle Survival League's web site (http://www.cccturtle.org) to find maps showing the satellite-tracked migration of endangered sea turtles and photos of a satellite transmitter being attached to a sea turtle (follow the "Sea Turtle Tracking Education Program" link). There are also self grading quizzes with questions about both sea turtles and coastal habitats, video clips, and educational puzzles and games (follow the "Learn About Sea Turtles" link). You will also find an electronic Bulletin Board where your students can post questions to researchers and our staff. If you do not have access to the World Wide Web, you can send written questions to me at the address below. Researchers and staff will do their best to answer all questions submitted.

At the back of the Educator's Guide is an Evaluation Form we hope you will complete and return. You will also find a form you can use to order more Guides, Adopt-A-Turtle or order other educational materials. Thanks for your interest in sea turtles and we hope you enjoy the program!

Daniel R Evans

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A Word To Educators

Sea turtles are some of the most mysterious and time-honored creatures on earth. The Sea Turtle Survival League (STSL), through its educational programs and conservation initiatives, is helping ensure the gentle sea turtle remains a wild and thriving part of the natural landscape.

The most serious threats to sea turtle survival are directly caused by the actions of people. The same is true for many animal species now listed as endangered or threatened. It is also true that as humans we have the unique ability to learn about how we are affecting the world around us and to change our behavior accordingly. Education is the key.

The Sea Turtle & Coastal Habitat Education Program (Program) is designed to capture the interest of young minds in issues surrounding sea turtles, coastal habitats and cutting edge research techniques. This Program can harness their interest, and in the process, teach them about sea turtle biology, coastal habitat ecology, the threats both sea turtles and coastal habitats face, how they can get involved in conservation and take personal responsibility for their actions through the activities, lesson plans and a host of related scientific and geographic topics.

This Educator's Guide will provide the background information you need to incorporate the Program into your classroom activities. The Guide is designed so you can easily photocopy each section for use as a handout, and we have included ideas for classroom activities, lesson plans and worksheets for both primary and secondary levels. You will find activities that incorporate art, math, geography, political science, writing and biology.

A portion of this Program allows students to actually watch the movements of sea turtles on the Internet, but this Guide can help you teach students about sea turtles even if you don't have access to the World Wide Web at school. Through our Web Site (**http://www.cccturtle.org**), you can view maps depicting the migratory movements of sea turtles tracked by satellite. At time of printing, September 1999, the movements of ten turtles are being shown on regularly updated maps. The Web Site also provides Action Alerts to inform kids about the most current issues affecting sea turtles or coastal habitats and how they can personally get involved. Researchers and the STSL will respond to questions and comments posted to an electronic bulletin board on the Web Site by your students.

As a way for students to take a personal interest in one of the satellite-tracked turtles, and as a way to support sea turtle conservation, we invite your class to "adopt" a turtle. Several classes will likely adopt each of the satellite tracked turtles, whose names have already been given. If you want to be the sole adoptive class of a green turtle and name the turtle yourselves, you can choose to adopt one we have tagged while nesting in Costa Rica. You can use the form on Page 42 of this Guide or order right from our Web Page.

This is the second edition of the Florida Educator's Guide. As you use it in the classroom, we encourage you to take note of any ideas you have about how we can improve its usefulness. An Evaluation Form can be found at the end of the Guide, which we hope you will complete and return to us with your ideas.

CARIBBEAN CONSERVATION CORPORATION & SEA TURTLE SURVIVAL LEAGUE

A Brief History and Summary of Activities

Caribbean Conservation Corporation (CCC) was founded in 1959 to support the work of world-renowned naturalist and sea turtle biologist Dr. Archie Carr. Dr. Carr's ability to communicate his enthusiasm for the natural world in award-winning prose inspired the formation of this organization, now going into its fourth decade. Dedicated to upholding Archie's ideals, CCC's mission is to protect endangered sea turtles and their habitats through research, education, advocacy and protection of natural areas.

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In the early 1950s, Archie became fascinated with the enigmatic and little-known sea turtle. He searched throughout the Caribbean for clues to their life history and biology. His wanderings took him to the black sand beach of Tortuguero, a remote 22-mile beach on the northeast coast of Costa Rica. Archie quickly realized that Tortuguero ("place of turtles" in Spanish) was a globally important nesting beach for green turtles.

But while the turtles were coming up on the beach in large numbers, so were the poachers. The turtles were being killed and their freshly laid eggs were taken. Archie knew that this rookery would soon be hunted to extinction, just as had happened to many others in the Caribbean.

When Archie's now-classic book, *The Windward Road*, was published in 1956, he had no way of knowing the impact his reflections would have on Caribbean sea turtles. He called the book "just a compulsive recounting of the things I saw and pondered." But something about his stories of these magnificent creatures and their fight for survival deeply touched Joshua B. Powers, a New York publisher's representative. *The Windward Road* so moved Powers to try to help save the sea turtles that he sent copies of the book to 20 friends with an invitation to join a new organization, the Brotherhood of the Green Turtle.

Under the guidance of John H. Phipps, Archie's longtime friend and benefactor, the Brotherhood incorporated as Caribbean Conservation Corporation in 1959. In the decades to follow, CCC, through its research and conservation initiatives, very likely saved the Caribbean green turtle from immediate extinction.

The organization's primary focus was to support Archie's groundbreaking research in Tortuguero, where he was applying metal tags to nesting green turtles to learn about their reproductive behavior and migratory patterns. Archie and CCC set up a makeshift research station to study the nesting green turtle population. Every year, Archie, his family, students and trusted CCC colleagues would make this rustic outpost their summer home. With a fickle generator and cold running water their only luxuries, they set out to learn what they could about the turtles.

The Green Turtle Tagging and Monitoring Program was revealing astonishing facts about sea turtles. In fact, much of what is known about their life history was revealed in this study. During his 28-year tenure as CCC's Technical Director, Archie diligently studied the turtles and advocated for their protection. He became the world's leading authority on their life history and biology. He wrote hundreds of articles, research papers and eleven books on natural history.

Archie passed away in 1987, but the research he began is still being carried out by CCC, and has become the longest ongoing research of its kind in the world.

In 1993, CCC established the Sea Turtle Survival League (STSL), a network of experts, conservationists and members, in an effort to begin addressing the threats facing marine turtles in the United States. The STSL has quickly become a well-respected entity that works tirelessly on behalf of sea turtles by educating the public, teachers, policy-makers and the media about the threats turtles face and how best to protect them.

Today, Caribbean Conservation Corporation and its Sea Turtle Survival League are regarded as leaders in the international effort to conserve sea turtles. Archie Carr's ideals and mission still guide the organization as it strives to ensure a future for marine turtles on the planet.

All of the projects currently sponsored by CCC come under one of the following program initiatives:

Tortuguero Biological Field Station

The stronghold of CCC's Caribbean operations and the cornerstone of our research activities, Tortuguero, Costa Rica, is the site of our ongoing Turtle Tagging and Monitoring Program. Begun by our founding director Archie Carr in 1954, this world-famous research has spawned hundreds of studies and scientific papers.

In 1994, CCC opened the new John H. Phipps Biological Field Station and H. Clay Frick Natural History Visitors Center in Tortuguero. The station houses ever-growing numbers of researchers studying the area's diverse species and ecosystems. The Visitors Center, which houses displays and programs on sea turtle biology and natural history, educates the 40,000 tourists who come to Tortuguero every year. The Station represents the fulfillment of Archie Carr's vision to preserve the surrounding ecologically diverse area through a year-round scientific presence.

Not only does CCC carry out a variety of research initiatives in the region, it offers people around the world the opportunity to join CCC in Tortuguero as a Research Participant in either the Sea Turtle Programs or the Tropical Bird Program.

Sea Turtle Survival League

The Sea Turtle Survival League (STSL) is the United States-based education, advocacy and membership arm of the CCC. The STSL regularly provides testimony to Congress, federal agencies and state officials on issues affecting sea turtles and their habitat. The League closely monitors numerous issues related to the survival of sea turtles and informs conservationists, the media and STSL members about steps that should be taken to ensure sea turtle survival. Through educational initiatives, such as the Florida Sea Turtle and Coastal Habitat Education Program, the STSL is reaching the public, especially children, with accurate and timely information that will help them become informed about sea turtle conservation.

Multi-National Collaboration

Because sea turtles are so migratory, protecting them requires a multi-national effort. The three Central American countries of Nicaragua, Panama and Costa Rica have especially rich turtle resources and harbor critical feeding and nesting habitat. Unfortunately, sea turtles in these regions face enormous pressures from growing coastal populations and high levels of turtle hunting and egg poaching.

CCC envisions a cooperative effort by the three neighboring countries in which coastal refuges and protected areas would be linked into a "blueway" protecting important foraging, mating and nesting areas for sea turtles. This cooperative effort, dubbed the Tripartite Agreement, is on the horizon, and Caribbean Conservation is actively working to make it a reality.

Sea Turtles:

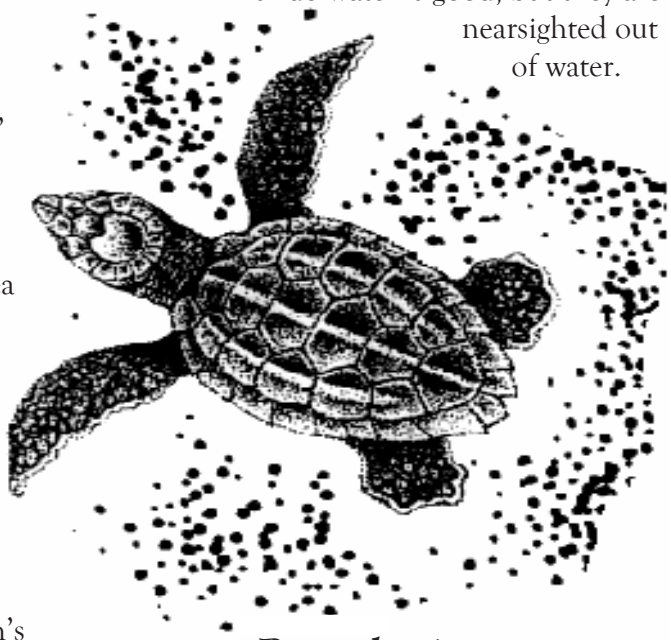
A Brief Overview

Sea turtles are large, air-breathing reptiles that inhabit tropical and subtropical seas throughout the world. Their streamlined bodies and large flippers make them remarkably adapted to life at sea. However, sea turtles maintain close ties to land. Females must come ashore to lay their eggs in the sand; therefore, all sea turtles begin their lives as tiny hatchlings on land.

Research on marine turtles has uncovered many facts about these ancient creatures. Most of this research has been focused on nesting females and hatchlings emerging from the nest, largely because they are the easiest to find and study. Thousands of sea turtles around the world have been tagged to help collect information about their growth rates, reproductive cycles and migration routes. After decades of studying sea turtles, much has been learned. However, many mysteries still remain. New technologies, such as satellite telemetry, are allowing scientists to monitor turtles throughout their range. The information gathered through satellite-tracking should answer many questions and help conservation groups like the Sea Turtle Survival League develop better strategies for protecting sea turtles.

Turtles and Humans

Sea turtles have long fascinated people and have figured prominently in the mythology and folklore of many cultures. In the Miskito Cays off the eastern coast of Nicaragua, the story of a kind "Turtle Mother," still lingers. Unfortunately, the spiritual significance of sea turtles has not saved them from being exploited for both food and for profit. Millions of sea turtles once roamed the earth's oceans, but now only a fraction remain.



General Description

Each species of sea turtle looks and behaves distinctly, but they do have several common characteristics. Their shells consist of an upper part (carapace) and a lower section (plastron). Hard scales (or scutes) cover all but the leatherback turtle, and the number and arrangement of these scutes can be used to determine the species. They do not have teeth, but their jaws have modified "beaks" suited to their particular diet. They do not have visible ears but have eardrums covered by skin. They hear best at low frequencies, and their sense of smell is excellent. Their vision underwater is good, but they are nearsighted out of water.

Reproduction

Only females come ashore to nest; males rarely return to land after crawling into the sea as hatchlings. Most females return to nest on the beach where they were born (natal beach). Nesting seasons occur at different times around the world. In the U.S., nesting occurs from April through October. Most females nest at least twice during each mating season; some may nest up to ten times in a season. A female will not nest in consecutive years, typically skipping one or two years before returning.

Growth & Development

Researchers do not yet know how long baby turtles spend in the open sea, or exactly where they go. It is theorized that they spend their earliest, most vulnerable years floating around the sea in giant beds of sargasso weeds, where they do little more than eat and grow. Once turtles reach dinner-plate size, they appear at feeding grounds in nearshore waters. They grow slowly and take between 15 and 50 years to reach reproductive maturity, depending on the species. There is no way to determine the age of a sea turtle from its physical appearance. It is theorized that some species can live more than 100 years.

Status of the Species

The earliest known sea turtle fossils are about 110 million years old. In groups too numerous to count, they once navigated throughout the world's oceans. But in just the past 100 years, demand for turtle meat, eggs, skin and colorful shells has reduced their numbers. Destruction of feeding and nesting habitats and pollution of the world's oceans are all taking a serious toll on remaining sea turtle populations. Many breeding populations have already become extinct, and entire species are being wiped out. There could be a time in the near future when sea turtles are just an oddity found only in aquariums and natural history museums — unless action is taken today.

What is Extinction and Why Should You Care If Sea Turtles Go Extinct?

A plant or animal becomes extinct when the last living individual of its species dies, causing it to vanish from the earth forever. If there is ever a time when the last green turtle on earth dies, then never again will this magnificent creature grace our world.

Species have been going extinct for millions of years; it is a natural part of the evolutionary process. For example, most of the species that existed during the time of dinosaurs have perished. Many probably went extinct because of sudden geological or climatic changes – possibly because of a large volcanic eruption or because of a giant meteor hitting the earth.

Today, however, species are going extinct because of abrupt changes brought about by humans. Habitat destruction, pollution and overconsumption are causing species to decline at a rate never before seen in history. This loss of species is eroding the diversity of life on earth, and a loss of diversity can make all life vulnerable.

Much can be learned about the condition of the planet's environment by looking at sea turtles. They have existed for over 100 million years, and they travel throughout the world's oceans. Suddenly, however, they are struggling to survive – largely because of things people are doing to the planet's oceans and beaches. But what does this mean for the human species?

It is possible that a world in which sea turtles cannot survive may soon become a world in which humans struggle to survive. If, however, we learn from our mistakes and begin changing our behavior, there is still time to save sea turtles from extinction. In the process, we will be saving one of the earth's most mysterious and time-honored creatures. We might just be saving ourselves too.

How You Can Help

There are many things each of us can do to help sea turtles survive. First, we must remember that we share the oceans and the beaches with many other species. Second, become informed about the things that are killing sea turtles or destroying their habitat. Elected officials and other leaders are making decision on issues that affect sea turtles almost every day. As an informed citizen, you have the power to influence the outcome of these issues by making your voice heard. Third, take personal responsibility for your actions. By simply reducing the amount of plastic garbage, using biodegradable chemicals and not leaving trash on the beach when you leave, you can help save sea turtles and protect Florida's coastal habitats.

Sea Turtles:

Differences Between the Species

Sea Turtle Names

Each sea turtle has both a scientific name and a common name. The scientific name identifies the genus and species, and the common name typically describes some characteristic of the turtle's body. The **loggerhead**, for example, gets its name from its exceptionally large head. The **hawksbill** turtle gets its name because its narrow head and large beak make it look like a hawk. The **Australian flatback** gets its name because its shell is very flat. The **leatherback** is the only sea turtle without a hard shell. It is named leatherback because its shell is made of a layer of thin, tough, rubbery skin that looks like leather.

Other turtles are named for colors on their bodies. The shell of the **black turtle** is dark gray or black, and the shell of the **olive ridley** is olive green. The **green turtle** is a little bit trickier. You might think the shell of a green turtle would be green, but it's not. It can have a black, gray, or brown shell. The green turtle is actually named for the green color of the fat under its shell.

Last but not least is the **Kemp's ridley**. This turtle's first name, "Kemp's," was given to it because a man named Richard Kemp helped discover and study the turtle. The second part of its name is a mystery. No one is sure why it is called "ridley." Some think turtle researcher Dr. Archie Carr was the one who named it "ridley." The name "ridley" might be short for the word "riddle" or "riddler." The ridley would have gotten that name because it was like a riddle to researchers. It was hard for them to figure out where the turtle came from and what its breeding habits were.

Appearance

Sea turtles come in many different sizes, shapes and colors. The olive ridley is usually less than 100 pounds, while the leatherback typically ranges from 650 to 1,300 pounds! The upper shell, or carapace, of each sea turtle species ranges in length, color, shape and arrangement of scales.

What They Eat

Different species of sea turtles like to eat different kinds of food. Sea turtles have mouths and jaws that are specially formed to help them eat the foods they like.

The **hawksbill** has a narrow head and jaws shaped like a beak. This allows the hawksbill to get food from crevices in coral reefs. They eat sponges, anemones, squid and shrimp.

Loggerheads are primarily carnivorous and feed mostly on shellfish that live on the bottom of the ocean. They eat horseshoe crabs, clams, mussels, and other invertebrates. Their powerful jaw muscles help them easily crush the shellfish.

Kemp's ridleys and **olive ridleys** are also carnivorous. Like loggerheads, the ridleys have powerful jaws that help them crush and grind crabs, clams, mussels, and shrimp. They also like to eat fish, sea urchins, squid and jellyfish.

Unlike loggerheads, Kemp's ridleys, and olive ridleys, **leatherbacks** have delicate, scissor-like jaws. Their jaws would be damaged by anything other than a diet of soft-bodied animals. Leatherbacks feed almost exclusively on jellyfish.

The diets of **green turtles** and **black turtles** change significantly during their lives. Young green and black turtles eat a variety of food. Their diets may include worms, young crustaceans and insects, as well as grasses and algae.

When green turtles reach 8 to 10 inches in length, their diets change. Adult green and black turtles are the only sea turtles that are strictly herbivorous. They mostly eat sea grass and algae. Their jaws are finely serrated which aids them in tearing vegetation. The

Australian flatback apparently eats sea cucumbers, jellyfish, mollusks, prawns, bryozoans, and other invertebrates, as well as seaweed.

Habitat Preferences

Each species of sea turtle eats, sleeps, mates and swims in distinctly different areas. Sometimes their habitats overlap, but for the most part they each have different preferences.

Loggerheads can be found in temperate and subtropical waters throughout most of the world. Adults usually stay close to mainland shores. They prefer to feed in coastal bays and estuaries, as well as in the shallow water along the continental shelves of the Atlantic, Pacific and Indian Oceans. Loggerheads inhabit an enormous range from north to south. In the western hemisphere they are found as far north as Newfoundland and as far south as Argentina.

Green turtles are found in all temperate and tropical waters, including those near Central America, the Bahamas, and the U.S. They mainly stay near the coastline and around islands. **Black turtles** are found along the west coasts of North, Central and South America, from central Baja California to Peru. They mostly live in bays and protected shores. Rarely are they observed in the open ocean.

Hawksbills are considered the most tropical of all sea turtles. They are typically found around coastal reefs, rocky areas, estuaries and lagoons of the tropical and subtropical Atlantic, Pacific and Indian Oceans.

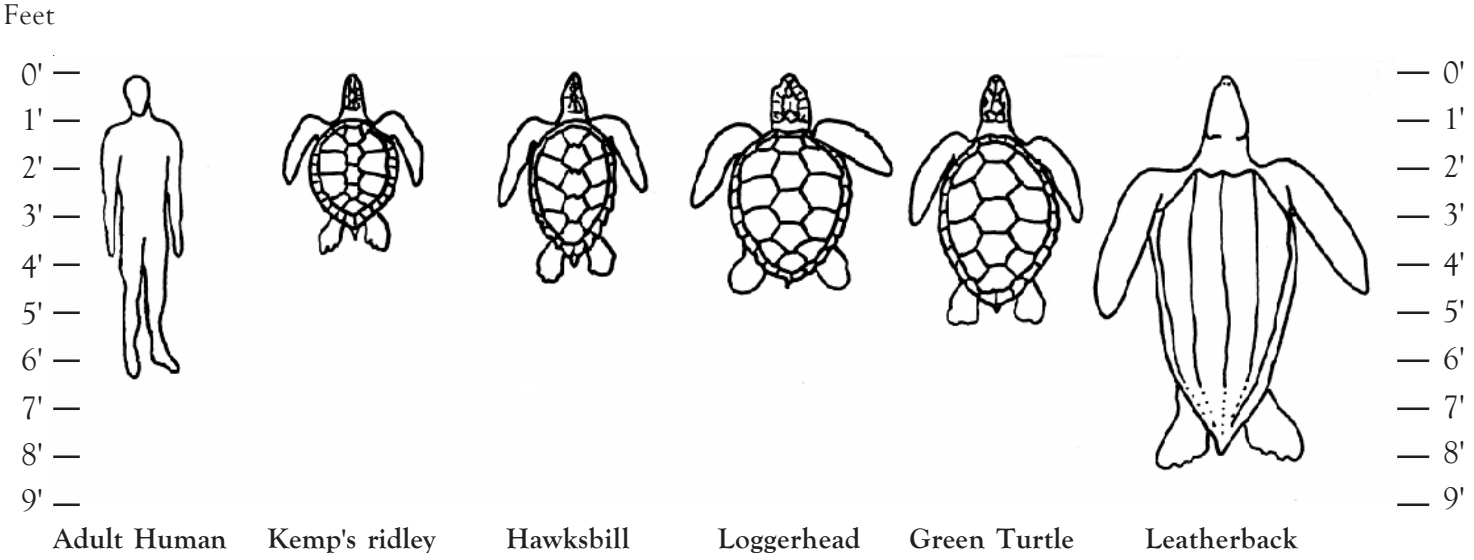
The range of the adult **Kemp's ridley** is mostly limited to the Gulf of Mexico. Juveniles range between tropical and temperate coastal areas of the northwest Atlantic Ocean and can be found up and down the east coast of the United States. They prefer shallow areas with sandy and muddy bottoms.

Olive ridleys live in tropical regions of the Pacific, Indian and Atlantic Oceans. They typically forage off shore in surface waters or dive to depths of 500 feet (150 m) to feed on bottom dwelling crustaceans.

Flatbacks have the most restricted range of all sea turtle species. Their range is limited to the coastal waters of the northwestern, northern and northeastern regions of Australia. Flatbacks do not venture beyond Australia's continental shelf; they prefer turbid inshore waters and bays.

Leatherbacks are the most widely distributed of all sea turtles. They are primarily found in the open ocean, as far north as Alaska and as far south as the southern tip of Africa. Leatherbacks are known to be active in water below 40 degrees Fahrenheit, the only reptile known to remain active at such a low temperature.

Sea Turtles Found in U.S. Waters ~ A Size Comparison



Sea Turtles:

The Five Species Found in U.S. Waters

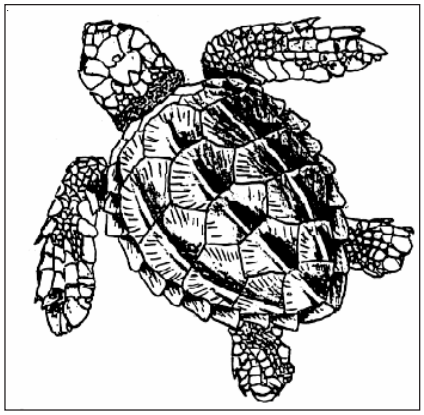
Most scientists recognize seven living species of sea turtles, which are grouped into six genera. The five species regularly found in U.S. waters are described below:

Loggerhead

(*Caretta caretta*)

Of all the sea turtles that nest in the United States, the loggerhead is the one seen most often. While all other species found near the U.S. coastline are listed as endangered, the loggerhead is classified as threatened. This means loggerheads are more numerous than the other species, but they are still in danger of extinction.

Adult loggerheads weigh up to 350 pounds and have a reddish-brown carapace (upper shell) and a dull brown to yellow plastron (lower shell). Fully grown, a loggerhead's carapace is typically 32 to 41 inches long (82-105cm).



Loggerhead hatchling

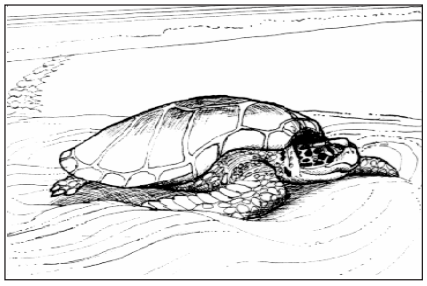
Loggerheads lay eggs at intervals of 2, 3, or more years. Nesting season runs from May through September in the U.S. They lay 4 to 7 nests per season, approximately 14 days apart. The average number of eggs in each clutch ranges from 100 to 126, and the eggs incubate for about 60 days. Loggerhead nesting is concentrated in two main areas of the world – at Masirah Island, Oman, in the middle east and on the coast of the southeastern United States. The Masirah Island's annual nesting population is about 30,000 females, while up to 25,000 loggerheads nest in the southeast U.S. each year. The majority of nesting in the southeast U.S. takes place on Florida's Atlantic coast between the inlet at Cape Canaveral and Sebastian Inlet, especially within the Archie Carr National Wildlife Refuge.

Green turtle

(*Chelonia mydas*)

Green turtles are an endangered species around the world, but they still nest in significant numbers on the east coast of Florida. They are easily distinguished from other sea turtles because they have a single pair of scales in front of their eyes rather than two pairs as other sea turtles have. The green turtle is the largest of the Cheloniidae family. Female green turtles that nest in Florida average more than three feet in carapace length, and average about 300 pounds in weight. The largest green turtle ever found was 5 feet in length and 871 pounds.

Green turtles nest at intervals of 2, 3, or more years. They lay an average of 3 to 5 egg clutches, with about 12 days between each nesting. There are an average of 115 eggs per clutch and they incubate for about 60 days. Nesting season runs from June through October in the U.S. The largest nesting site in the western hemisphere is at Tortuguero, Costa Rica.



Green turtle nesting

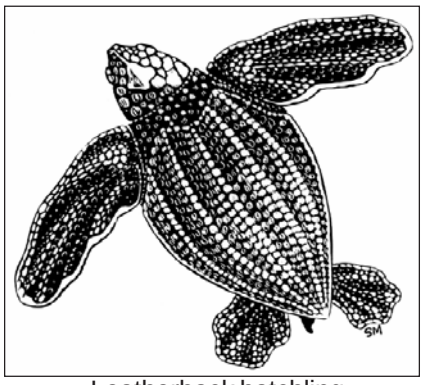
Leatherback

(*Dermochelys coriacea*)

Leatherbacks are also endangered, but a few nest on the east coast of Florida each year. The leatherback is the champion of sea turtles. This species grows the largest, dives the deepest, and travels the farthest of all sea turtles. Mature leath-erbacks typically reach about 4 to 8 feet in length and

weigh from 650 to 1,300 pounds. The largest leatherback ever recorded was almost 10 feet (3 m) from the tip of its beak to the tip of its tail and weighed in at 2,019 pounds (916 kg). The leatherback is the only sea turtle that lacks a hard shell. It is named for its large, elongated shell which is composed of a layer of thin, tough, rubbery skin, strengthened by thousands of tiny bone plates. Seven narrow ridges run down the length of the carapace, which is typically black with many white spots. The lower shell is whitish to black and marked by 5 ridges. The body of a leatherback is barrel shaped, tapering at the rear to a blunt point. With this streamlined body shape and the powerful front flippers, a leatherback can swim thousands of miles over open ocean and against fast currents.

Leatherbacks feed almost exclusively on jellyfish. It is remarkable that this large,



Leatherback hatchling

active animal can survive on a diet of jellyfish, which are composed mostly of water and appear to be a poor source of nutrients. Young leatherbacks in captivity can eat twice their weight in jellyfish each day.

Leatherbacks approach coastal waters only during breeding season. Nesting occurs throughout the Caribbean, on the northern coast of South America, the Pacific coast of Central America, and on the east coast of Florida. Nesting season runs from March through July. Leatherbacks nest every 2 to 3 years, laying 6 to 9 egg clutches in a nesting season. Each clutch contains approximately 80 fertilized eggs the size of billiard balls and 30 smaller, unfertilized eggs. There is an average of 10 days between nestings. The eggs incubate for approximately 65 days.

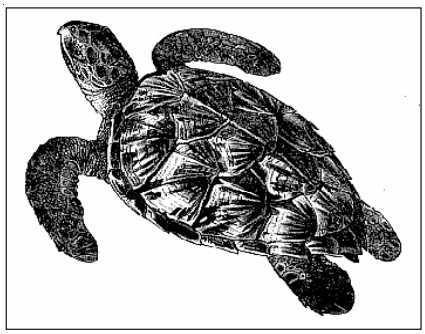
Hawksbill

(*Eretmochelys imbricata*)

Hawksbills are endangered in large part because people kill them to get their beautiful shells, which are used to make jewelry and other products. Although they are found in U.S. waters, they rarely nest in North America.

The hawksbill is one of the smaller sea turtles, measuring 30 to 36 inches in carapace length (76-91 cm) and weighing 100 to 150 pounds (40-60 kg).

Hawksbill turtles nest at intervals of 2, 3, or more years. An average of 2 to 4 egg clutches are laid approximately 15 days apart during nesting season. An average of 160 eggs per clutch are laid and they incubate for approximately 60 days. Although they nest on beaches throughout the Caribbean, they are no longer found anywhere in large numbers.



Adult hawksbill

Kemp's ridley

(*Lepidochelys kempii*)

Kemp's ridleys are the most endangered of all sea turtles; they are also the smallest. Adults measure 24 to 28 inches (62-70 cm) in carapace length and weigh between 77 and 100 pounds (35-45 kg). The carapace of adults is olive green and the plastron is yellowish.

Unlike other sea turtles, Kemp's ridleys nest annually. They lay about 2 clutches during each season, about 25 days apart. Each nest contains around 105 eggs, which incubate 55 days. The only major breeding site of the Kemp's ridley is on a small strip of beach at Rancho Nuevo, Mexico. Kemp's ridleys nest in mass synchronized nestings called *arribadas*(Spanish for "arrival").

The arribada of Kemp's ridleys occurs at regular intervals between April and June. In 1942, a Mexican architect filmed an estimated 42,000 ridleys nesting at Rancho Nuevo in one day. During 1995, only 1,429 ridley nests were laid at Rancho Nuevo.

Sea Turtles:

Scientific Classification

The chart below shows the scientific classification of the sea turtles that still exist today.

KINGDOM ..... **Animalia**

PHYLUM ..... **Chordata**

CLASS ..... **Reptilia**

Class Reptilia includes snakes, lizards, crocodiles, and turtles. Reptiles are ectothermic (cold-blooded) and are vertebrates (have a spine). All reptiles have scaly skin, breath air with lungs, and have a three-chambered heart. Most reptiles lay eggs.

ORDER ..... **Testudines**

Order Testudines includes all turtles and tortoises. It is divided into three suborders. Pleurodira includes side-necked turtles, ***Cryptodira*** *includes all other living species of turtles and tortoises, and Amphichelydia includes all extinct species.*

SUBORDER ..... **Cryptodira**

Suborder Cryptodira includes freshwater turtles, snapping turtles, tortoises, soft-shelled turtles, and sea turtles.

FAMILY ..... **Cheloniidae** or **Dermochelyidae**

Sea turtles fall into one of two families. Family Cheloniidae includes sea turtles which have shells covered with scutes (horny plates). Family Dermochelyidae includes only one modern species of sea turtle, the leatherback turtle. Rather than a shell covered with scutes, leatherbacks have leathery skin.

GENUS and SPECIES

Most scientists currently recognize seven living species of sea turtles grouped into six genera. The black sea turtle is considered by some to be an eigth species.

Caretta caretta	***Chelonia mydas***	***Eretmochelys imbricata***	***Lepidochelys kempii***	***Natator depressus***	***Dermochelys coriacea***
loggerhead	green turtle	hawksbill	Kemp's ridley	Australian flatback	leatherback
	&		&		
	mydas agassizi black turtle		***olivacea*** olive ridley		

Sea Turtles:

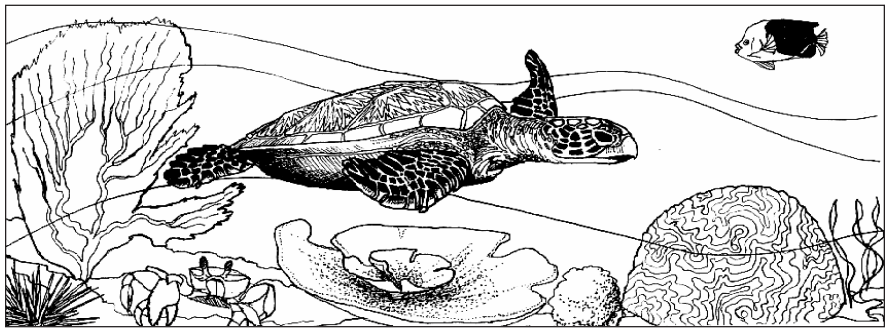
Behavior Patterns

Sea turtles are generally solitary creatures that remain submerged for much of the time they are at sea, which makes them extremely difficult to study. They rarely interact with one another outside of courtship and mating. Ridleys, however, do come together in massive groups during their arribadas. But even when large numbers of turtles gather on feeding grounds or during migration, there is little behavioral exchange among individuals. Because of the difficulty in studying marine turtles in the open ocean, there are a great many things still unknown about their behavior. Decades of research, however, including observations at sea, have produced useful insights into daily activities and behaviors such as courtship, mating and nesting.

Daily Activities

Sea turtles are known to feed and rest off and on during a typical day. During the nesting season, research conducted in the southeast United States has shown that loggerheads follow regular patterns between the nesting beach and offshore reefs and other rocky structures. It is presumed that mating and/or feeding occur at these offshore areas. Sea turtles may migrate hundreds or even thousands of miles during their migations.

Sea turtles can sleep at the surface while in deep water or on the bottom wedged under rocks in nearshore waters. Many divers have seen green turtles sleeping under ledges in reefs and rocks. Hatchlings typically sleep floating on the surface, and they usually have their front flippers folded back over the top of their backs.

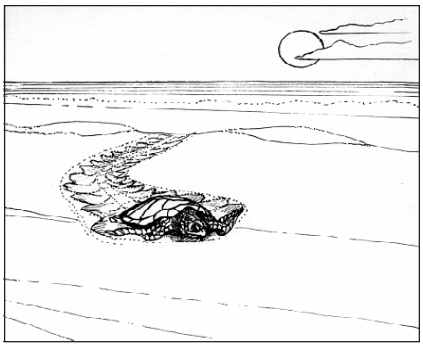


Courtship & Mating

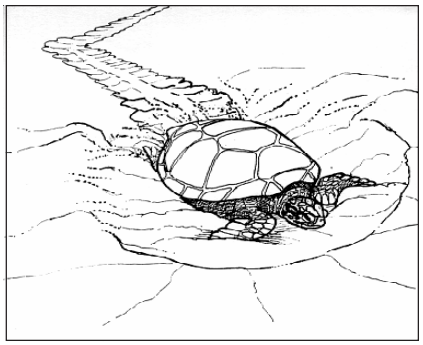
Courtship and mating for most sea turtles is believed to occur during a limited "receptive" period prior to the female's first nesting emergence. Afterwards, only females come ashore to nest; males almost never return to land once they leave the sand of their natal beach. During mating season, males may court a female by nuzzling her head or by gently biting the back of her neck and rear flippers. If the female does not flee, the male attaches himself to the back of the female's shell by gripping her top shell with claws in his front flippers. He then folds his long tail under her shell to copulate. Females observed on the nesting beach after recently mating often have scratched shells and may be bleeding from where the males were hooked to their shells.

Copulation can take place either on the surface or under water. Sometimes several males will compete for females and may even fight each other. Observers of sea turtle mating have reported very aggressive behavior by both the males and females.

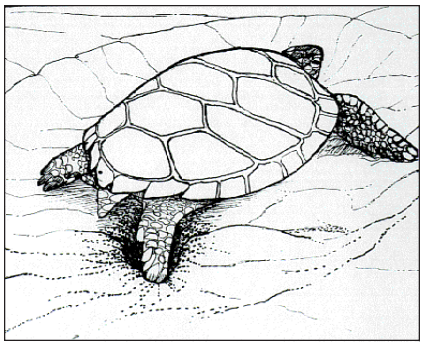
Females may mate with several males just prior to nesting season and store the sperm for several months. When she finally lays her eggs, they will have been fertilized by a variety of males. This behavior may help keep genetic diversity high



Step 1: Crawling to a suitable nesting site



Step 2: Digging the body pit



Step 3: Digging the egg chamber

in the population.

Nesting, Incubation and Emergence

Very little is known about why sea turtles nest on some beaches and not on others. In Florida, loggerheads nest by the thousands on the central east coast, while identical looking beaches to the north see far fewer loggerheads. This nesting distribution may reflect conditions that existed centuries ago, when temperature, beach profiles or the lack of predation made some areas preferable to sea turtles.

Today, humans are affecting the places where sea turtles nest. Beach erosion caused by coastal armoring and navigational inlets, artificial lighting and beach renourishment are all impacting once pristine beaches. These changes will likely have lasting effects on future nesting patterns. The more we understand about how, where and when sea turtles nest, the better we will be able to protect their nesting habitat.

Beach Selection

Most females return faithfully to the same beach each time they are ready to nest. Not only do they appear on the same beach, they often emerge within a few hundred yards of where they last nested.

Nesting Behavior

Only the females nest, and it occurs most often at night. The female crawls out of the ocean, pausing frequently as if carefully scoping out her spot. Sometimes she will crawl out of the ocean, but for unknown reasons decide not to nest. This is a "false crawl," and it can happen naturally or be caused by artificial lighting or the presence of people on the beach.

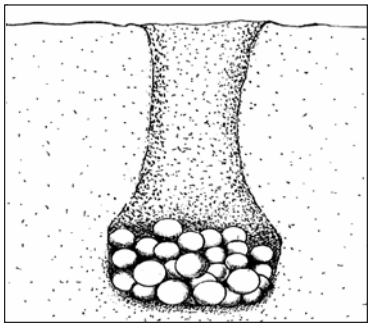
Most females nest at least twice during the nesting season, although individuals of some species may nest only once and others more than ten times. Sea turtles are generally slow and awkward on land, and nesting is exhausting work.

Constructing the Nest

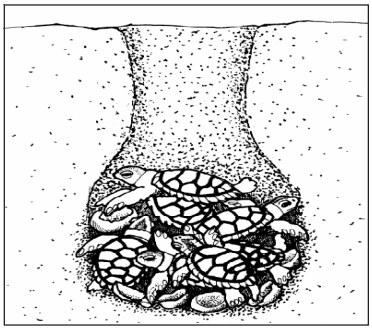
The female turtle crawls to a dry part of the beach and begins to flings away loose sand with her flippers. She then constructs a "body pit" by digging with her flippers and rotating her body. After completing the body pit, she digs an egg cavity using her cupped rear flippers as shovels. The egg cavity is shaped roughly like a tear drop and is usually tilted slightly.

Laying and Burying the Eggs

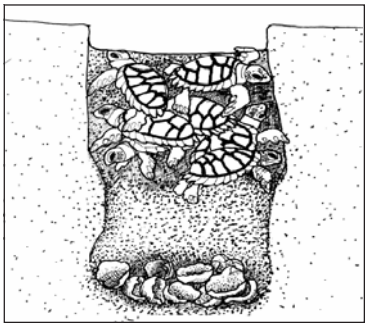
When the turtle has finished digging the egg chamber, she begins to lay eggs. Two or three eggs drop out at a time, with mucus being secreted throughout egg-laying. The average size of a clutch ranges from about 80



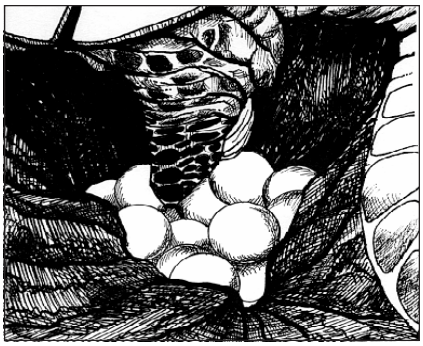
Eggs incubating in the nest.



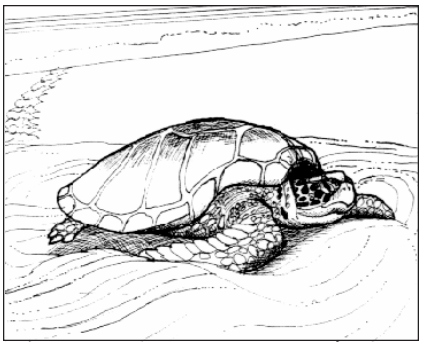
Hatchlings begin breaking out of shells.



Hatchlings work their way to top of nest.



Step 4: Laying the eggs



Step 5: Burying and disguising the nest

to 120 eggs, depending on the species. Because the eggs are flexible, they do not break as they fall into the chamber. This flexibility also allows both the female and the nest to hold more eggs.

Nesting sea turtles appear to shed tears, but the turtle is just secreting salt that accumulates in her body.

Many people believe that while laying her eggs a sea turtles goes into a trance from which she cannot be disturbed. This is not entirely true. A sea turtle is least likely to abandon nesting when she is laying her eggs, but some turtles will abort the process if they are harassed or feel they are in danger. For this reason, it is important that sea turtles are never disturbed during nesting.

Once all the eggs are in the chamber, the mother turtle uses her rear flippers to push sand over the top of the egg cavity. Gradually, she packs the sand down over the top. She then begins using her front flippers to refill the body pit and disguise the nest. By throwing sand in all directions, it is much harder for predators to find the eggs. After the nest is thoroughly concealed, the female crawls back to the sea to rest before nesting again later that season or before beginning her migration back to her feeding ground. Once a female has left her nest, she never returns to tend it.

Incubation

Incubation takes about 60 days, but since the temperature of the sand governs the speed at which the embryos develop, the hatching period can cover a broad range. Essentially, the hotter the sand surrounding the nest, the faster the embryos will develop. Cooler sand has a tendency to produce more males, with warmer sand producing a higher ratio of females.

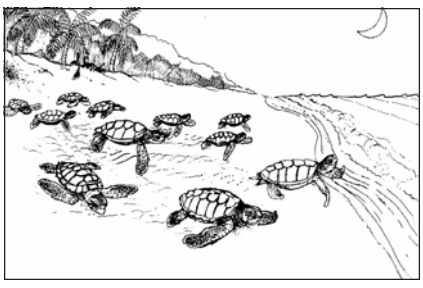
Emerging from the Nest

Unlike baby alligators, which are liberated from their nest by their mother, sea turtle hatchlings must do it all themselves. To break open their shells, hatchlings use a sharp, temporary egg-tooth, called a "caruncle." The caruncle is an extension of the upper jaw that falls off soon after birth.

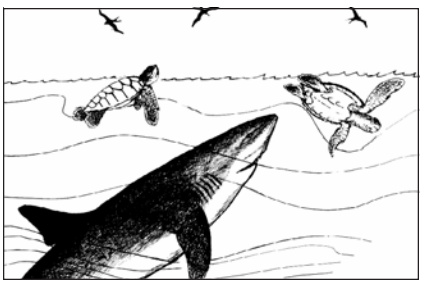
Digging out of the nest is a group effort that can take several days. Hatchlings usually emerge from their nest at night or during a rainstorm when temperatures are cooler. Once they decide to burst out, they erupt from the nest cavity as a group. The little turtles orient themselves to the brightest horizon, and then dash toward the sea. If they don't make it to the ocean quickly, many hatchlings will die of dehydration in the sun or be caught by predators like birds and crabs.

Once in the water, they typically swim several miles off shore, where they are caught in currents and seaweed that may carry them for years before returning to nearshore waters.

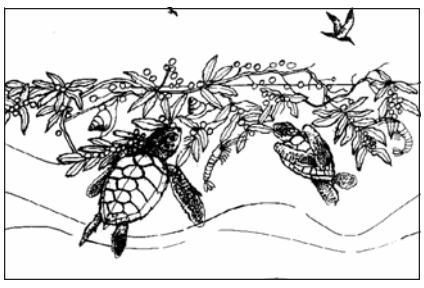
There are many obstacles for hatchlings in the open ocean. Sharks, big fish and circling birds all eat baby turtles, and they die after accidentally eating tar balls and plastic garbage. The obstacles are so numerous for baby turtles that only about one in 1,000 survives to adulthood.



Hatchlings erupt and head for water.



Many animals eat hatchlings in the ocean.



Hatchlings eat and drift in sargasso weed.

Sea Turtles:

Migration and Navigation Abilities

Migration

The ability of a sea turtle to migrate hundreds (and occasionally thousands) of miles from its feeding ground to its nesting beach is one of the most remarkable acts in the animal kingdom. That adult females return faithfully to nest on the very beach where they were born makes the feat even more amazing.

Research into where and how sea turtles migrate has been a focus of scientists for decades. The information collected is vital to the development of conservation strategies for the species.

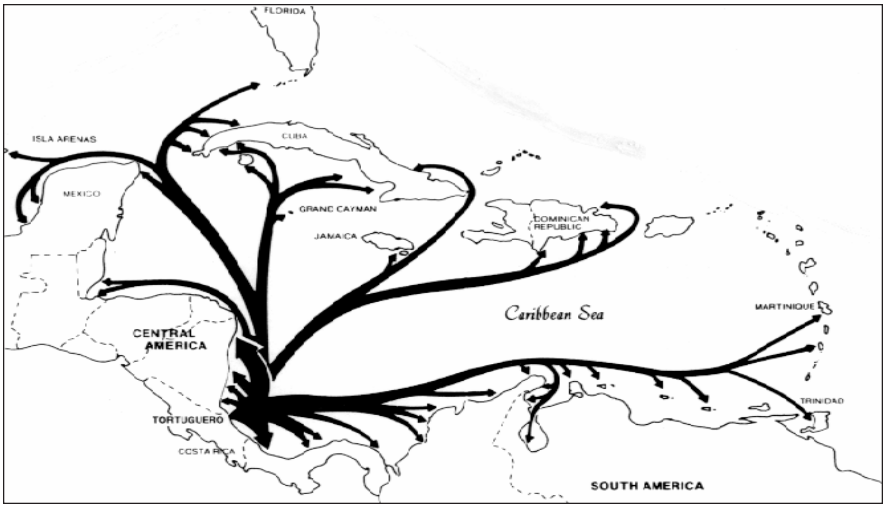
We now know that sea turtles undergo migration throughout their lives, beginning with the first frenzied swim as a hatchling. During its first critical 48 hours, a hatchling must travel from the beach to a place in the ocean where it is relatively safe from predators and where it can find food. Many hatchlings in the Atlantic and Caribbean make their way into Gulfstream currents, which are filled with floating sargassum weed. There the young turtles find an ample food supply and few predators. After several years of floating around the Atlantic, these young turtles are big enough to venture back into nearshore waters.

Sea turtles typically spend their juvenile years eating and growing in nearshore habitats. Once they reach adulthood and sexual maturity, it is believed that they migrate to a new feeding ground. It is in this primary feeding area where adult turtles probably remain throughout their lives, except during breeding season. When it is their time to mate and nest, both males and females leave their feeding grounds and migrate to the nesting beach. This periodic migration will continue throughout their lives.

Navigation

In the open ocean, sea turtles encounter strong currents; they have only modest vision; they can only raise their heads several inches out of the water; and there are often no visible landmarks. Even with these limitations, sea turtles regularly navigate long distances to find the same tiny stretch of nesting beach. How they do it is one of the greatest mysteries in the animal kingdom, and finding an answer has been the focus of generations of researchers.

One promising new theory on how sea turtles navigate suggests that they can detect both the angle and intensity of the Earth's magnetic field. Using these two characteristics, a sea turtle may be able to determine its latitude and longitude, enabling it to navigate virtually anywhere. Early experiments seem to prove that sea turtles have the ability to detect magnetic fields. Whether they actually use this ability to navigate is the next theory being investigated.



Caribbean Conservation Corporation has been tagging green turtles that nest at Tortuguero, Costa Rica, for over three decades. Tag recoveries from different parts of the Caribbean show some of the places where these turtles migrate after nesting.

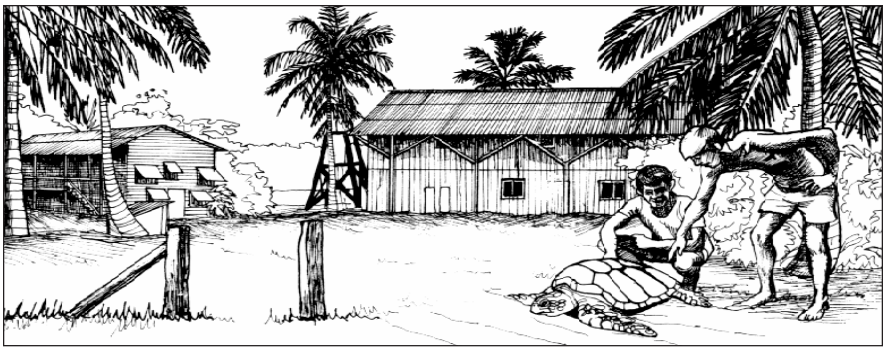
Studying Migration

The migratory nature of sea turtles creates a number of challenges for those working to fully understand and protect these creatures. In particular, to adequately protect sea turtles in all their habitats, we must know where these habitats are, how the turtles behave while there, and what routes the turtles take to migrate between them.

Most sea turtle research has been carried out on nesting beaches — and for very logical reasons. These areas are easier for researchers to access, and what occurs on the nesting beach (production of new sea turtles) is extremely important to the species' survival. Conservation efforts are also most easily directed at nesting beaches.

However, of all the places where sea turtles travel throughout their life cycle, the least amount of time is spent on the nesting beach. More than 90% of a sea turtle's life is spent in the water — feeding, mating, migrating and doing whatever else a sea turtle does when no one is watching. Consequently, the threats faced by sea turtles in the ocean present the greatest challenges to conservationists. To fully protect sea turtles throughout their range, more must be known about their migratory patterns and their behavior in the water.

Several methods are used by researchers to determine where sea turtles move. One of the simplest methods involves placing a small, harmless metal tag on one of the turtle's flippers when she comes ashore to nest. Each tag includes a coded number and a message asking people to return the tag to a certain address if it is found. When people return a tag, they get a small reward and are asked where the turtle was encountered. In this way, researchers gradually learn about the many places to which turtles migrate.



One of the first groups to start tagging sea turtles was the Caribbean Conservation Corporation, under the leadership of Dr. Archie Carr. CCC began tagging green turtles on the nesting beach at Tortuguero, Costa Rica, in the early 1950s, and this important research continues to this day.

In the case of turtles nesting at Tortuguero, Costa Rica, tag returns make it clear that turtles nesting there disperse to feeding areas throughout the Caribbean. A large portion of them go to the Miskito Coast of Nicaragua. Efforts are now focused on limiting the number of turtles killed there for food.

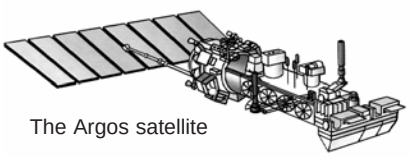
The use of flipper tags has provided vital information, but it still leaves many questions unanswered.

Satellite Telemetry

Researchers have recently begun utilizing satellites to track sea turtles in the open ocean. First, a Sony Walkman-sized transmitter is attached to the back of an adult or juvenile sea turtle. The transmitter is attached directly to the turtle's carapace, behind the head, where the unit's small flexible antenna can break the surface to transmit when the turtle comes up to breathe. A passing Argos satellite receives the information and transmits it back to researchers on Earth. After 8-10 months, the transmitter stops working and eventually falls safely off the turtle.

Using computer mapping programs, researchers can then see where the turtles migrate, what routes they travel and how fast they generally swim. If the map a researcher is using has enough detail, it is also possible to determine the habitat characteristics at the turtle's location.

After monitoring a number of turtles in a specific population, researchers gradually learn where that population's major feeding grounds are located and what threats they may be facing at sea. This information allows conservationists to focus efforts on the most important areas.



The Argos satellite

Sea Turtles:

Threats to their Survival

Each year thousands of hatchling turtles emerge from their nests along the southeastern coast of the United States and enter the Atlantic ocean. Sadly, only an estimated one in 1,000 to 10,000 will survive to adulthood. The natural obstacles faced by young and adult sea turtles are staggering, but it is the increasing threats caused by humans that are driving them to extinction. Today, all sea turtles found in U.S. waters are federally listed as endangered, except for the loggerhead, which is listed as threatened.

Natural Threats

In nature, sea turtles face a host of life and death obstacles to their survival. Predators such as raccoons, crabs and ants raid eggs and hatchlings still in the nest. Once they emerge, hatchlings make bite-sized meals for birds, crabs and a host of predators in the ocean. After reaching adulthood, sea turtles are relatively immune to predation, except for the occasional shark attack. These natural threats, however, are not the reasons sea turtle populations have plummeted toward extinction. To understand what really threatens sea turtle survival, we must look at the actions of humans.

Human-Caused Threats

In many cultures around the world, people still harvest sea turtle eggs for food. Most countries forbid the taking of eggs, but enforcement is lax. Poaching is rampant, and the eggs can often be found for sale in local markets. In these same areas, adult sea turtles are harvested for their meat. Turtle products, such as jewelry made from hawksbill shells, also create a direct threat to sea turtles. Lack of information about sea turtles leads many Americans to unwittingly support the international trade in these endangered species. Buying and selling turtle products within the U.S. is strictly prohibited by law, but turtle shell jewelry and souvenirs are the most frequent contraband seized by customs officials from tourists returning from the Caribbean.

Indirect threats are harder to quantify, but it is likely that they are causing the greatest harm to sea turtle survival.

Commercial Fishing

The waters of the Gulf of Mexico and west Atlantic coast are a major habitat for turtles, but are also the main shrimping grounds in the U.S. Each year, thousands of turtles become entangled in fishing nets and drown. Worldwide, shrimp

The killing of sea turtles for meat is still a significant problem in many Caribbean countries.

trawling probably accounts for the incidental death of more juvenile and adult sea turtles than any other source. At one time, as many as 55,000 sea turtles were killed each year in shrimp nets in the southeastern United States alone. Today, all U.S. shrimpers are required to put Turtle Excluder Devices (TEDs) in their trawl nets. Unfortunately, not all fishermen comply with the law, and sea turtles continue to drown in shrimp nets.

Ingestion of Debris and Plastic

Thousands of sea turtles die from eating or becoming entangled in nondegradable debris each year, including packing bands, balloons, pellets, bottles, vinyl films, tar balls, and styrofoam. Trash, particularly plastic bags thrown overboard from boats or dumped near beaches and swept out to sea, is eaten by turtles and becomes a deadly meal. Leatherbacks especially, cannot distinguish between floating jellyfish — a main component of their diet — and floating plastic bags.

Artificial Lighting

Nesting turtles once had no trouble finding a quiet, dark beach on which to nest, but now they must compete with tourists, businesses and coastal residents for use of the beach. U.S. beaches are rapidly being lined with seaside condominiums, houses and hotels. Lights from these developments discourage females from nesting and cause hatchlings to become disoriented and wander inland, where they often die of dehydration or predation.

Coastal Armoring

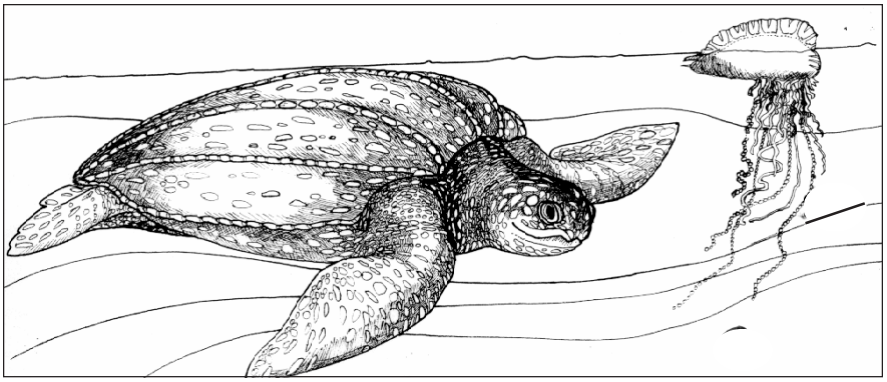
Coastal armoring includes structures such as sea walls, rock revetments and sandbags that are installed in an attempt to protect beachfront property from erosion. These structures often block female turtles from reaching suitable nesting habitat and accelerate erosion down the beach. Armoring is especially problematic along the east coast of Florida, where beach development is occurring in the very places where sea turtles come to nest by the thousands.

Beach Nourishment

Beach nourishment consists of pumping, trucking or otherwise depositing sand on a beach to replace what has been lost to erosion. While beach nourishment is often preferable to armoring, it too can negatively impact sea turtles. If the sand is too compacted for turtles to nest in or if the sand imported is drastically different from native beach sediments, it can affect nest-site selection, digging behavior, incubation temperature and the moisture content of nests. If renourishment is allowed to proceed during nesting season, nests can also be buried far beneath the surface or run over by heavy machinery.

Pollution

Pollution can have serious impacts on both sea turtles and the food they eat. New research suggests that a disease now killing many sea turtles (fibropapillomas) may be linked to pollution in the oceans and in nearshore waters. When pollution kills aquatic plant and animal life, it also takes away the food sea turtles eat. Oil spills, urban runoff of chemicals, including fertilizers and petroleum, all contribute to water pollution.



Leatherbacks feed on jellyfish, but can die by eating discarded plastic bags.

It may seem that the threats to sea turtles are almost too big to overcome, but they are not. Through personal actions, such as making sure that oil, paints and other toxic chemicals are disposed of properly, reducing the amount of fertilizer and chemicals used on lawns, participating in plastic recycling programs and teaching others about what they can do help are all ways to make a difference.

Sea Turtles:

Conservation Strategies

To truly protect sea turtles around the world, many different countries and cultures must cooperate and share responsibility. International laws and agreements, research, and the work of dedicated organizations and individuals each must play a part. Long-term protection of sea turtles also means developing solutions that reduce reliance on management methods requiring direct human involvement – such as moving nests or raising hatchlings in captivity. If sea turtles cannot survive and reproduce on their own, without help from humans, then they are doomed.

Feeding and nesting grounds must be protected, and a public wildlife conservation ethic must be fostered that can withstand gaps in government regulations, pressure from private interests, and changes in the political climate.

National Laws

Sea turtles are given legal protection in the United States and its waters under the **Endangered Species Act (ESA)**. The ESA lists the hawksbill, leatherback, Kemp's ridley and green turtle as endangered; and lists the loggerhead as threatened. This designation makes it illegal to harm, harass or kill any sea turtles, hatchlings or their eggs. It is also illegal to import, sell, or transport turtles or their products. In the United States, the National Marine Fisheries Service has jurisdiction over sea turtles in the water, while the U.S. Fish and Wildlife Service is responsible for them on land. Other countries have their own conservation laws and regulations that apply to sea turtles.

International Agreements

Some regulations affecting sea turtles are global in scope. The "Convention on International Trade in Endangered Species" (CITES) controls international trade in endangered and threatened species. Sea turtles are covered under Appendix I of this agreement and receive protection from international trade by all countries that have signed the treaty.

State and Local Protection

In many states where sea turtles nest, state laws have been passed to protect the species. These laws meet or exceed the requirements of the ESA. In Florida for instance, the Marine Turtle Protection Act was passed giving state agencies the power to enforce regulations protecting turtles and their habitat.

Some local governments have passed regulations to eliminate or control artificial beachfront lighting, which is known to deter females from nesting and disorient hatchlings.

Conservation Goals

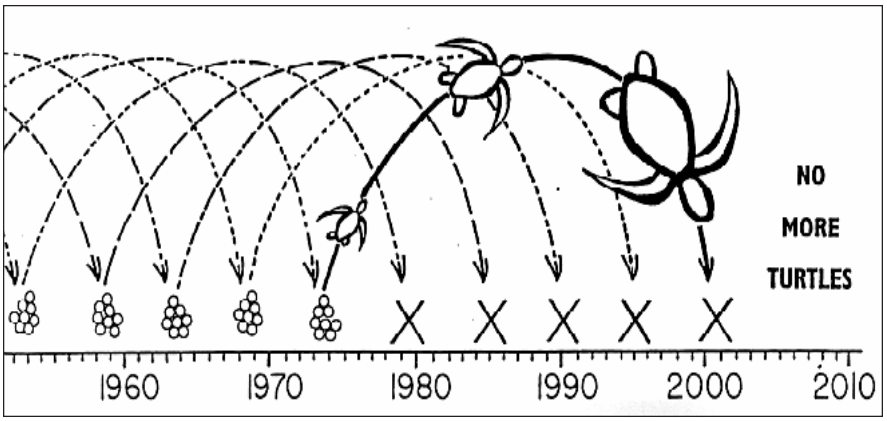
The threats facing sea turtles are numerous and, for the most part, humans are the problem. For those of us trying to protect sea turtles, it is a mixed blessing that so many threats are human-caused. On one hand, it is very hard to change human behavior. On the other hand, at least there is hope for eliminating threats. If sea turtles were going extinct because of geological or climatic changes, there would be very little we could do to help.

Some immediate goals for protecting sea turtles include:

* Crack down on illegal international trade in sea turtles and their products by enforcing laws and agreements.
* Decrease the turtle deaths caused by commercial fishing through enforcement of **Turtle Excluder Device (TED)** and gill net regulations.
* Protect nesting beaches by establishing parks and refuges or through regulations combined with public education initiatives.
* Eliminate disturbances at nesting beaches by decreasing artificial lighting, halting

beach armoring, regulating beach nourishment and limiting the impacts of people on the beach.

* Enforce national and international laws to minimize the dumping of pollutants and solid waste into the ocean and nearshore waters.
* Continue research and monitoring activities so that the population can be monitored and conservation efforts can be focussed where they are most needed.
* Increase public awareness and community participation in sea turtle conservation through educational programs such as this one.



As sea turtles continue to be killed around the world by poachers on the nesting beach, in commercial fishing nets or by pollution, it is very difficult to explain the severe consequences this has on the species when the numbers of nesting turtles seems to remain stable in areas. This visual aid, prepared by Dr. Jeanne Mortimer, is helpful in explaining how the complete harvesting of nesting females in a particular population (which is happening now in some parts of the world) may actually take decades to manifest itself on the nesting beach in reduced numbers of nesting adults. While there may seem to be a never-ending supply of adult turtles to harvest, at some point there will be no more maturing new generations of sea turtles to replace those that have been killed. And once these too have been slaughtered, the population will crash suddenly.

What to Do If You Encounter a Nesting Sea Turtle

In Florida and other states where sea turtles nest, turtle watches are conducted by trained and permitted individuals. The goal is to educate people about sea turtles through direct contact, without disturbing the turtles. If you are interested in going on a turtle walk, you can call Sea Turtle Survival League at (352) 373-6441 for a list of guides near you. Sometimes people encounter sea turtles on their own while walking on the beach at night during nesting season. If this happens to you, here are some simple rules to follow:

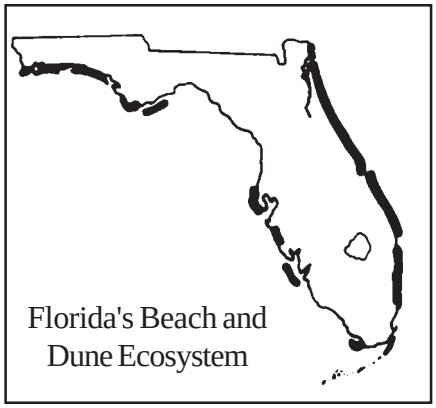
* *Do not walk on the beach with a flashlight or shine a light in the sea turtle's face. The light may cause the female to abort the nesting process, or other sea turtles nearby may be discouraged from nesting if there are lights on the beach.*

* *Do not take pictures using flashes. This high-intensity light can be even more disturbing than the flashlights.*
* *Stay clear and out of sight of the turtle until she begins laying eggs, otherwise you may scare her back into the sea.*
* *For your safety, stay away from the turtle's head. Sea turtles, especially loggerheads, have very strong jaws and can harm you if provoked.*
* *Do not handle the eggs or put any foreign objects into the nest. You can introduce bacteria or injure the eggs.*
* *Do not handle or ride the sea turtle. In addition to being illegal, you may injure the turtle or cause her to leave without finishing nesting.*
* *Do not disturb tracks left by turtles. Researchers sometimes use the tracks to identify the type of turtles that nested and to find and mark the nests.*
* *Do enjoy the experience and remember it for the rest of your life.*

Coastal Habitats:

Florida's Coastal Communities

Containing nearly 1,200 miles of diverse coastline covering several climate zones and including mangrove forest, lagoon, salt marsh, maritime hammock, barrier island, coastal strand and tropical key communities, Florida is a very unique state. The coastal communities are home to a wide variety of plant and animal species, including many endangered and threatened species. The beach and dune ecosystem is the most common coastal habitat, covering approximately two-thirds of Florida's coastline.



Florida's Beach and Dune Ecosystem

Native Species

Native animal species use the beach and dune ecosystem all year long as a source of shelter and food or as a nesting site during the summer. Resident animal species, such as beach mice, ghost crabs, sand fleas, racoons and several species of birds have adapted to survive in the harsh heat and drought conditions all year long. Migratory species only use the beach during certain seasons. Three species of sea turtles regularly use Florida's beaches as summer nesting habitat, while many species of shore birds use the beach as over-wintering habitat.

Native plants species, such as sea oats, beach cordgrass, dune sunflower and railroad vine, are saltwater and heat tolerant enabling them to survive long periods of dryness. Many native beach and dune plant species help to protect and stabilize beach dunes during storms with deep and multilayered root systems that help hold the soil and sand intact. If soil is eroded away during a storm, the newly exposed roots often form a root wall in front of the exposed dune. These roots act as a sand trap, catching sand in the roots and eventually helping to rebuild and stabilize the dune.

Beach Dynamics

Beach and dune systems, especially barrier islands, are active and are constantly being shaped by erosion (removal of sand from a beach), storms, accretion (addition of sand to a beach) and the natural drift of sand along the coast. Beach erosion and accretion are caused by ocean currents, wave action and changes in the sea level. Over the past century, a portion of Florida's beaches have been lost due to a gradual one-foot increase in the sea level.

With an ever-changing environment, beach and dune species have adapted over time to specialized roles, connecting the survival of animal species with the survival of plant species and the condition of the habitat.

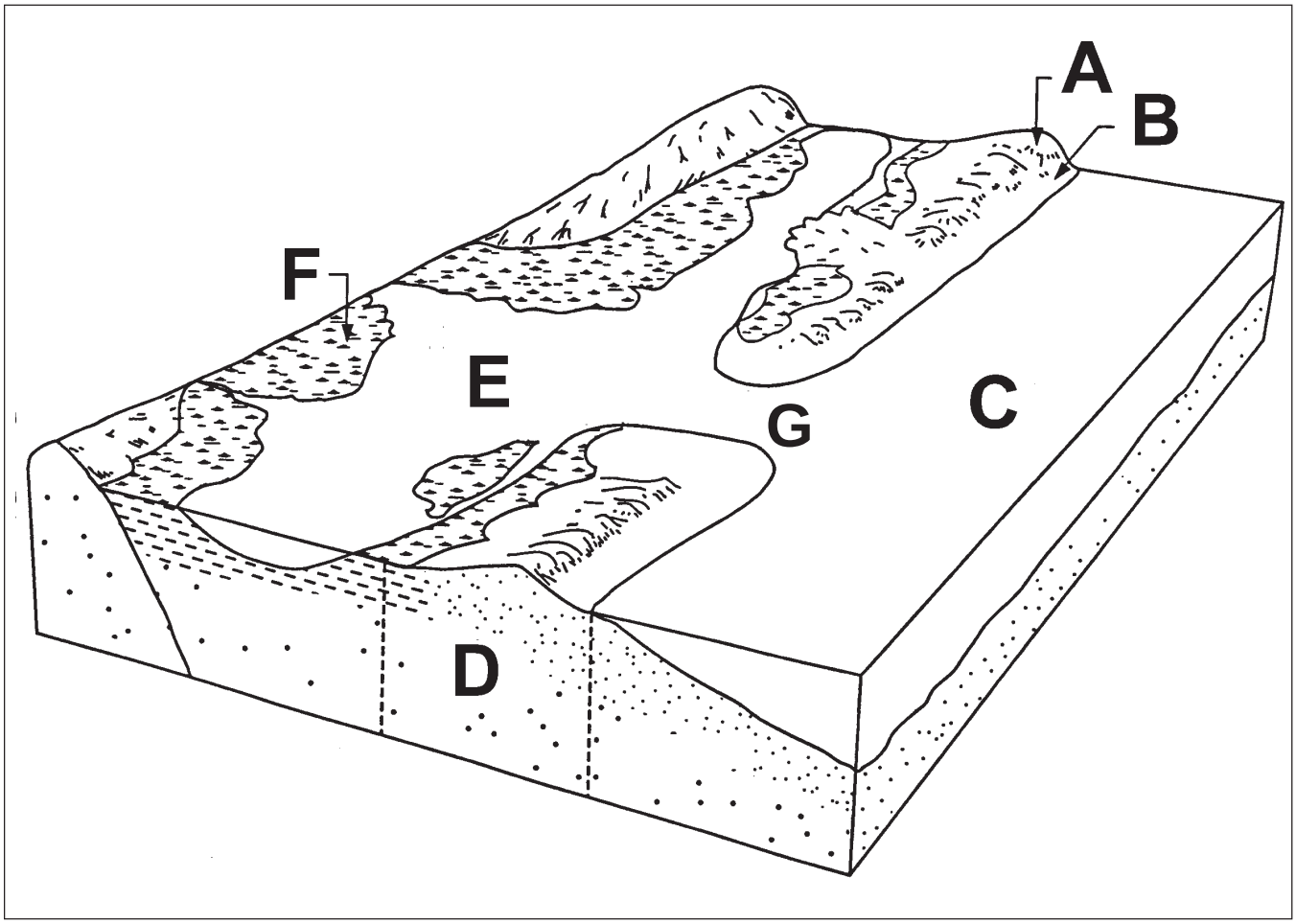
Longshore drift (the perpetual movement of sand along a coastline) and coastal winds constantly move sand along the shore, while storm events help build or erode the sand. During hurricanes and major storms, sand is removed from a beach and deposited off shore, forming sandbars. In contrast, the gentler waves shift the sand from the offshore sandbars back onto the beach. All of these forces interact to determine the slope, shape and size of a particular beach.

Beach Communities

There are three very important communities found in the beach and dune ecosystem: coastal strand, maritime hammock and barrier islands.

Coastal Strand

The coastal strand is a thin strip of fragile, woody vegetation that lies between the beach and the maritime hammock. This community is found only along



Coastal ecosystems can be a complex of several coastal communities. This diagram depicts the locations of the communities found on and around a barrier island. Maritime Hammocks and Coastal Strands (A) provide a stable soil for woody vegetation. Dunes (B) provide habitat for many species of plants and animals. Near Shore Waters (C) support a wide varity of fish and invertebrates in the shallow, sandy water. Barrier Islands (D) are formed by shifting sands that build up over time and support other communities. Lagoons (E) are areas where fresh and salt water mix. Salt Marshes (F) are areas of vegetation that are periodically flooded and are found on barrier islands and the mainland. The inlet (G) provides a tidal flow of water between the lagoon and ocean.

the east coast of Florida and provides a dense growth of native plants such as palmetto, sand live oak and Spanish palms. This dense vegetation is the perfect place for the southeastern beach mouse, gopher tortoise, indigo snake and other rare and endangered species.

Coastal strand habitat once formed a continuous band up and down the coast, but it is now vanishing quickly due to coastal development. In addition, introduced species (such as house cats) are wiping out beach mice and coastal birds. The coastal strand is now severely fragmented, leading to the loss of several local beach mouse populations.

The Archie Carr National Wildlife Refuge, Sebastian Inlet State Park and Canaveral National Seashore contain some of the last individuals of the southeastern beach mouse, as well as remnants of the coastal strand habitat upon which they depend.

Maritime Hammock

The maritime hammock community is found just inland from the coastal strand. This community becomes established on older dunes that are stable enough to support the growth of trees. Plant species include live oak, cabbage palms, wild coffee, coral bean and several species of ferns.

The maritime hammock provides habitat for many species of animals including tree frogs, squirrels, scrub jays, blue-tailed skinks and both resident and migratory song birds. Unfortu-

nately, these areas are well-suited for development because of the stable, well-drained soil, leading to the rapid decline of maritime hammock habitat.

Besides their ecological importance, many maritime hammocks contain shell mounds, or middens, left by Florida's original human inhabitants and provide an important archeological link to Florida's history.

Barrier Islands

Barrier islands make up more than 700 miles of Florida's coastline. They are naturally formed by shifting sands that build upon an existing sandbar to eventually form an island. The sand that has accumulated above the water surface becomes the home for the drifting seeds of beach plants. As the seeds grow and develop, their roots stabilize the soil, allowing the development of coastal strand and maritime hammock communities. Barrier islands support more than 35 species of plants and animals that are listed as either rare, threatened or endangered.

Barrier islands are greatly affected by the forces of wind and waves and are constantly moving towards or away from the mainland. Because barrier islands provide mainland protection from hurricanes and large storms by absorbing the impact of waves and storm water over flow, entire barrier islands can be severely reshaped or completely destroyed by a major storm.

Brackish Communities

Lagoons lie between barrier islands and the mainland, while estuaries are found directly on the coast and are open to the near shore area. Estuaries and lagoons are areas where saltwater oceans and freshwater rivers mix together, forming brackish water. Because lagoons receive some protection from a barrier island, they have less tidal flow and more standing water, while estuaries have strong tidal flows and little standing water. Lagoons and estuaries are very important because they support a diversity of plants and wildlife.

The most impressive example of a lagoon in Florida is the 156-mile-long Indian River Lagoon. This area is adjacent to the Archie Carr National Wildlife Refuge and is an important feeding area for juvenile sea turtles. Unfortunately, marine pollution has caused the health of the lagoon to deteriorate, and wildlife and plant abundance has decreased. There are numerous efforts now underway to restore the health of the Indian River Lagoon.

Salt Marshes

Salt marshes contain mostly tall grassy plants that are periodically flooded by ocean tides. The plant cover differs within the marsh according to small changes in elevation.

Marshes help stabilize sediments and buffer inland areas from storms. These communities are also very biologically diverse, supporting a wide variety of species ranging from fish to oysters. Salt marshes are also important feeding areas for wading birds, such as herons and egrets. The species that live in salt marshes have adapted to sudden changes in water level, water and air temperatures and oxygen levels in the water.

What about Sea Grass Beds?

Florida has 1.5 million acres of sea grass beds. These beds are important feeding and breeding habitats for many marine species, including sea turtles.

Unfortunately, sea grass beds have been on the decline since 1940 and more than one-third of the original sea grass around the state has been lost. These areas are declining due to pollution and are being damaged by boat propellers and anchors.

Mangrove Swamps and Forests

Florida has about 500,000 acres of mangrove forests along its coastline. Mangroves receive an abundant supply of fresh water and perform important functions such as filtering out pollution, holding sediments, protecting the shoreline from erosion and providing habitat for a variety of animals.

Mangroves are the most biologically diverse of all the lagoon and estuary communities. They provide habitat for at least 220 fish species, 24 reptile and amphibian species, 18 species of mammal and 181 species of birds. Commercial fishermen also depend on mangroves for the production of lobster, shrimp and snapper. Mangroves can be very susceptible to coastal development and pollution.

Coastal Habitats:

Threats to Coastal Communities

This section describes some of the major threats to Florida's coastal habitat and wildlife. The one thing that all of these threats have in common is that they are primarily caused by humans. While it is disturbing to know that our own actions can have such negative impacts, the fact that we are to blame leaves hope that we can change our behavior to protect the resources we enjoy so much and depend upon.

Development

Rapid coastal development threatens the future of Florida's beach and dune ecosystems. As new houses and condominiums are built on beaches and barrier islands, many fragile and important coastal communities are being lost forever. Unfortunately, as more and more people move into the state, many of them gravitate toward the coastline--resulting in even faster rates of development. The gradual disruption of coastal habitat not only affects the survival of plant and animal species, but also reduces the overall health of coastal ecosystems.

Coastal Armoring

Coastal armoring, such as sea walls, rock revetments and other man-made structures, can negatively affect coastal ecosystems and wildlife by interfering with natural beach shaping forces and disturbing habitat--especially sea turtle nesting habitat. Armoring is built in an effort to slow or prevent the erosion of sand in front of houses or other coastal structures. Unfortunately, sea walls provide only temporary relief from the natural process of erosion and often increase the rate of erosion on adjacent sections of beach. As erosion and sea-level rise puts more coastal structures at risk, armoring will become even more of a problem in Florida.

Inlet Jetties

Inlets provide ocean access for recreational and commercial boats. Jetties, such as those at Sebastian Inlet, are built to stabilize inlets by trapping sand that would otherwise constantly reshape the inlet. Unfortunately, by trapping sand, jetties prevent the natural flow of sand along a coastline--causing the beach on one side of the inlet to erode faster than normal. Sometimes, sand can be "bypassed" around the inlet, but this process is very expensive.

Pollution

Coastal waters and beaches are under constant threat from pollution. Coastal ecosystems, such as lagoons, mangroves and salt marshes, are often polluted by runoff from the mainland. Rivers that empty into these coastal waters carry pollution from inland sources, such as runoff from lawns and farms. Pesticides, fertilizers, oil spills and sewage plant discharges also pollute our coastal waters.

Beach-goers can also pollute coastal ecosystems. Beach driving causes oil and other toxic fluids to accumulate in the sand, eventually reaching the ocean. Litter left by beach visitors is blown into the water and may be eaten by marine animals, including sea turtles. As pollutants accumulate over time, our oceans may eventually no longer be able to support the plants and animals that depend on them to survive.

Exotic Vegetation

Non-native, or exotic, vegetation has invaded many coastal areas. Most exotic species were introduced by humans as ornamental plants for landscaping. Invasive coastal species, such as Australian pine, melaleuca and Brazilian pepper, out-compete Florida's native plants, such as sea oats, sea grape and dune grass, degrading the quality of wildlife habitat. Invasion of the coast by species that are less effective at stabilizing dunes also leads to increased beach erosion.

Coastal Habitats:

Protecting Beach and Dune Ecosystems

As Florida's human population continues to grow and urban development spreads across the state, it becomes more and more important to protect the remaining undeveloped areas of the beach and dune ecosystem and its diversity of communities, plants and animals. The creation of state and federal protected areas through the purchase of undeveloped land is an important step in the conservation and survival of Florida's threatened and endangered species, including sea turtles. One of the most important sea turtle nesting habitats in the world is being protected by the Archie Carr National Wildlife Refuge, a cooperative effort between federal, state and county agencies and several private organizations.

Archie Carr National Wildlife Refuge

Refuge History

The Archie Carr National Wildlife Refuge was designated by Congress in 1989 to protect one of the most important sea turtle nesting sites in the world.

Long stretches of quiet, undisturbed sandy beaches, with little or no artificial light, are essential to the reproductive success and survival of sea turtles. This fact is recognized in sea turtle recovery plans developed by the U.S. Fish and Wildlife Service (USFWS), which call for purchasing and protecting the best remaining nesting beaches.

In North America, sea turtles primarily nest from North Carolina through Florida, with more than 90% occurring in Florida. Within that range is the Archie Carr National Wildlife Refuge, a 20.5-mile stretch of beach between Melbourne Beach and Wabasso, along Florida's east central coast. The refuge attracts more nesting, threatened loggerhead turtles than virtually anyplace else on earth. These Brevard and Indian River County beaches also attract more nesting green turtles, an endangered species, than anyplace in the continental United States. Even the endangered leatherback occasionally climbs up these beaches to deposit her eggs in the sand. Protection of these beaches is essential to the survival of loggerheads and green turtles in North America.

To preserve this globally important nesting ground, the USFWS is in the process of acquiring the remaining undeveloped lands between Melbourne Beach and Wabasso. The state of Florida, Brevard and Indian River counties, the private Mellon Foundation and the USFWS are each contributing money in the effort to buy land from willing sellers within the proposed refuge boundary. By mid-1996, more than $60 million had been spent to purchase 4.7 miles of beachfront out of 9.3 miles targeted for acquisition.

How Was the Refuge Named?

The idea to establish a national wildlife refuge to protect sea turtles began in the late 1980s as a direct result of the work of world-renowned ecologist Dr. Archie Carr. When Congress approved the refuge proposal, it was decided to name the refuge in honor of Dr. Carr's contributions to the understanding and conservation of sea turtles.

Dr. Carr was a zoology professor at the University of Florida, and his ability to translate science into literature brought international attention to the plight of sea turtles. Dr. Carr helped found the Caribbean Conservation Corporation (CCC) to conduct research, education and advocacy on behalf of sea turtles; he wrote 11 books and more than 120 scientific articles about sea turtles and their habitats before his death in 1987. Through its Sea Turtle Survival League program, CCC is today helping enhance, protect

and promote the Archie Carr National Wildlife Refuge.

Sea Turtles and Other Coastal Wildlife in the Refuge

Thorough scientific studies of sea turtle nesting activity along the beaches of the refuge have continued each nesting season for almost a decade. Studies by Dr. Llewellyn Ehrhart, University of Central Florida, confirm the global importance of the refuge to loggerheads and green turtles.

During recent nesting seasons, which run from May to October each year, between 16,000 and 20,000 loggerhead nests were counted in the refuge. Nesting like this makes the refuge the most productive nesting site for loggerheads in the Western Hemisphere, and possibly in the world. Each season, between 200 and more than 1,000 green turtle nests are counted in the refuge. A few rare leatherbacks also nest there each year.

The refuge provides habitat for other threatened and endangered species, such as the Florida scrub jay, gopher tortoise, beach mouse and numerous plant species by supporting coastal strand, maritime hammock and barrier island communities.

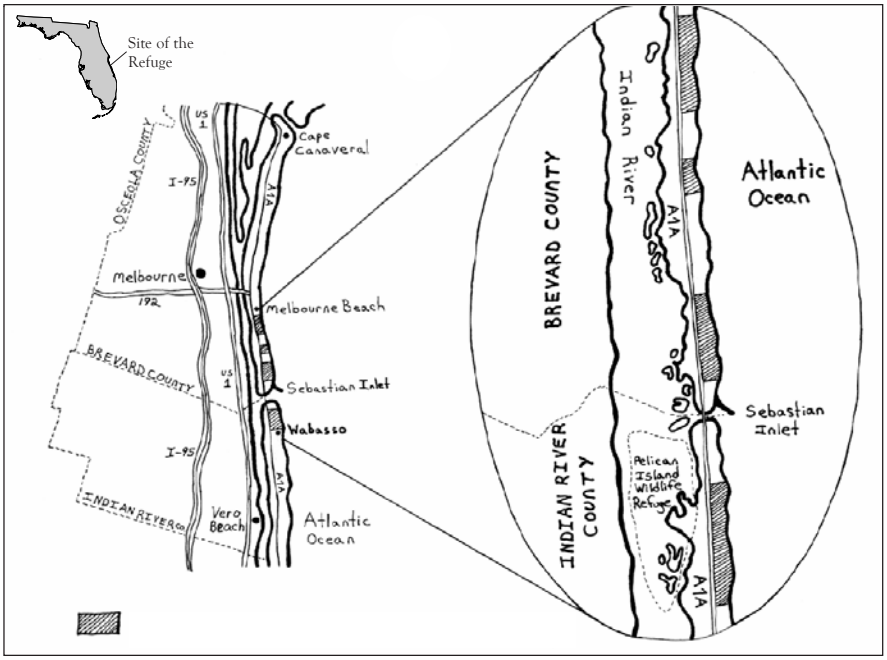
A Wildlife Refuge at Risk

The Archie Carr Refuge represents the nation's most significant land acquisition effort to protect the world's populations of marine turtles. Unfortunately, rapid coastal development in Brevard and Indian River counties continue to threaten the future effectiveness of the refuge. Supporters of the refuge work towards acquiring the best remaining parcels of undeveloped land. Unfortunately, funds available for land acquisition, especially from the federal level, are scarce.

Successful completion of the Archie Carr National Wildlife Refuge depends on an increase in funding for land acquisition efforts and wide public support for the refuge. Since the dedication of the refuge by Congress, the financial contributions of local and state governments and private, nonprofit organizations has surpassed the federal commitment. Scientists, conservationists and land managers consider completion of the acquisition phase of the refuge as the most essential step.

How the Sea Turtle Survival League is helping the Refuge

The Sea Turtle Survival League (STSL) engages in education, research and advocacy designed to protect, promote and enhance the globally important sea turtle nesting beaches of the Archie Carr National Wildlife Refuge. Educational programs target the media, the public and schools with information about the importance of the area and the threats it faces. Increased awareness is helping raise public support for land acquisition funding. Through advocacy, the STSL works with decision-makers to ensure that sea turtles and their habitat receive the greatest level of protection. The Sea Turtle Survival League supports and publicizes research in the refuge, including nesting surveys and tracking of green turtle migratory patterns.



Getting Involved:

What You Can Do To Get Involved

Adopt-A-Turtle to Support Sea Turtle Conservation

Have the class take a personal interest in one of the satellite-tagged turtles or a turtle tagged in Costa Rica. The $25 donation directly supports sea turtle conservation. See the Order Form for details.

Reduce the Amount of Plastic Garbage You Produce

Have each class member bring in all the plastic trash collected at home in a 24-hour period. Discuss the amount all the students in the school might produce in a day; the whole city; the state; the nation. As a class, discuss how people can get through each day using less plastic and where to recycle plastic – then agree to do it.

Tell People How Helium Balloons Harm Sea Turtles

Helium-filled balloons are frequently released into the sky to celebrate events. Like plastic trash, helium balloons end up in the ocean, especially when released near the coast. Sea turtles mistakenly eat the balloons and die. Ask groups planning a ballon release to consider another attention getter.

Write a Letter to the Editor of Your Local Newspaper

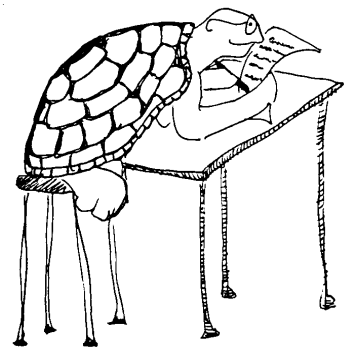
Find out how to submit a "Letter to the Editor" to your local paper. Have students write letters that inform your community about the plight of sea turtles and other marine wildlife. You might even let people know about this program. If you live near the coast, ask people to do their part to protect nesting turtles and hatchlings by turning off beachfront lights during nesting season or opposing the use of coastal armoring.

Write Letters to or Call Your Elected Officials

There are a number of ongoing issues affecting sea turtles or their habitats that are being debated by the State Legislature. First, discuss the layout of a letter with students (*see the adjacent article for tips on writing to politicians*). Next, have students write or call in support or opposition to a particular issue. STSL can provide information on current issues.

Reduce the Amount of Chemicals You Use

Many people use chemicals and fertilizers on their lawns and gardens. Used motor oil and paints are deadly to plants and animals if not disposed of correctly. Many of these chemicals get washed into coastal lagoons and wash up on beaches. Have the class find biodegrad-able lawn and garden products and facilities that properly dispose of toxic chemicals.



Tips for Writing Letters to Decision-Makers

1) Original letters count most. Express your views in your own words and, if possible, include a personal experience in your letter.

2) Address one issue at a time and be brief. One page is perfect, but you could go to two. Legible handwritten letters are fine.

3) Your first sentence should state where you live, especially if you are a constituent of the elected official to whom you are writing.

4) The first paragraph should explain why you are writing and what you want the person to do.

5) Ask for a response. For example: "I look forward to hearing how you will vote."

6) Be polite in the letter and thank the reader for considering your views.

7) Remember, when elected officials receive enough letters about a particular issue, their opinions can be influenced.

Classroom Resources:

Activity Ideas

The following activity ideas are offered to help you use the information in this Guide in your classroom. We have tried to include activities that incorporate art, math, geography, political science, writing and biology. These activities can easily be modified for any grade level by adjusting the amount of detail.

Draw the Five Species of Sea Turtles Found in U.S. Waters

Using the descriptions of the different species of sea turtles that begins on page 4, try to draw a relatively accurate picture of each type of turtle. You can then visit the Sea Turtle Survival League web page and look in the section called "General information about sea turtles" to compare your drawings to actual pictures of the different species.

Compare Your Weight to That of a Sea Turtle

The average weights of the different sea turtle species are given on Pages 6 and 7. Bring a weight scale to class and start weighing students one by one -- keeping track of the cumulative weight. See how many students it takes to add up to the weight of a green turtle, leatherback or a Kemp's ridley. You can do the same sort of thing for length too.

Guess Where the Turtles Being Tracked are Heading

Using the information presented throughout this Guide, try to guess where the turtles now being satellite tracked may be headed and how long it may take them to get there. You can post your guesses on the web page bulletin board. Here are a few useful clues:

Clue #1: In past years, researchers have marked many threatened loggerhead turtles in the Archie Carr Refuge with numbered flipper tags. These tags have been recovered in areas such as the Gulf of Mexico, Florida Bay, the Bahamas and Cuba.

Clue #2: Green turtles are herbivores, meaning they only eat plants. Their feeding grounds will be areas with lots of algae and sea grasses.

Clue #3: The average swimming rate of migrating green turtles in Hawaii has been documented at about 30 miles per day. Turtles nesting in Florida should be able to keep pace with that figure. Also, remember that satellite tagged female turtles will not return to nest for at least 2-3 years, so they have plenty of time to visit distant places before reaching their primary feeding ground.

Create A Mythological Story About Sea Turtles

As described in "A Brief Overview: Turtles and Humans," sea turtles have long played a part in the mythology of many cultures. Mythological stories are often used by cultures to answer some of life's difficult questions. For instance, many Native American tribes believed the world began on the back of a giant turtle. For this exercise, you and your class can try to create your own mythological story about sea turtles. In the process, try to incorporate some of the facts contained in this guide, such as the fact that sea turtles travel all around the world's oceans. You could also try to come up with a mythological story to explain the role sea turtles are now playing in teaching humans about how we are treating the earth.

Create a Sea Turtle Display for the Whole School to See

Use materials such as newspapers, papier mache and paint to create an educational display. It could focus on some of the threats sea turtles and coastal habitats face. You could even turn your classroom into a marine or coastal habitat! If you do create one, we would love to see a picture of the final product.

Prepare a Report on Sea Turtle Protection

Decisions about how to protect sea turtles are made at many different government levels. Divide the class into 5 groups. Each group represents a different level of government; International, Federal, State, County or City. The group is responsible for making recommendations to protect sea turtles in their jurisdiction. Using the Educator's Guide, web sites and the library have the groups write and present (with visual aids) a report with information on how to protect sea turtles, who should be involved in the process and who should implement the plan.

Use Latitude & Longitude to Plot the Turtle Locations

Download the blank migration map from the STSL web page and print it. It has latitude and longitude marks on the sides. Next, look at the maps showing the turtles' current locations and "estimate" the latitude and longitude of the most recent marks (or use data points if available, for some sea turtles we are not able to include the actual data points on the web page).

Then give those numbers to the class and have them plot the turtles' locations on the map you downloaded. *If you do not have the ability to download and print the map, you can use any map showing latitude and longitude or you can call the Sea Turtle Survival League to request a blank copy for a small fee.*

Conduct a Mock Public Hearing Before Making a Decision on a Controversial Issue Affecting Sea Turtles

Appoint five students to serve as county commissioners for a coastal county in Florida. The commission is meeting to hear from the public before deciding whether to approve the construction of a large new fishing pier. The only place the pier can be built is on a section of beach where thousands of sea turtles nest each summer. Divide the rest of the class into two groups – one that supports the pier because they want a place to fish and one opposed to the pier because they are concerned it will harm turtles and interfere with nesting. Have the two sides make short statements to the commission supporting their position, then let the commission make a vote.

Here are some possible decisions they might choose from:

A. Do not allow the pier to be built.

B. Approve the construction of the pier.

C. Approve the pier, but place a number of restrictions on how it can be built and when it can be used. In this case, they would need to describe the restrictions.

Note: *Remind the commissioners that governmental decisions are often very complex, and politicians must balance their own beliefs and interests with the varied interests and concerns of the public they represent.*

Discuss the Role Different Countries Must Play in Protecting Sea Turtles

Sea turtles that nest in the southeast U.S. travel all over the Atlantic, the Gulf of Mexico and the Caribbean. It is important that we protect them while they are here, but other countries must play a role when the turtles are in their waters. Which countries would need to help protect a loggerhead that nests in Florida and returns to the Caribbean coast of Panama to feed the rest of the year?

Watch the migration of the sea turtles on the Internet and discuss the name of the water bodies they travel through. Have students list the different countries they pass by (if they happen to leave U.S. waters).

Discuss the Threats the Satellite Tagged Turtles are Facing

These adult sea turtles are traveling in the open ocean right now. As they travel to wherever their feeding areas are located, what are some of the human-caused threats they may be facing? What, if anything, can be done to eliminate these threats?

What Would a Sea Turtle Say to People

Have students imagine they are a sea turtle that has been asked to give a speech to leaders of countries around the world. As a sea turtle, what would you want these people to know? Give the speech to the class.

Classroom Resources:

Attitude Assessment

Grade Levels: 7 - 12

Goal of the Activity:
The goal of this attitude assessment is to discover the attitude of the students about issues related to sea turtles. These questions do not have a right or wrong answer and can be used to initiate a class discussion on any of the different topics presented in the activity. You may add or subtract questions to make this activity more appropriate to sea turtle and coastal habitat issues in your area.

Post Activity Discussion:
It is important to remember that there are no right or wrong answers to these questions, but that certain answers benefit and help protect sea turtles and their nesting habitat. Lead your class through each question and ask for volunteers to comment on each question and the impacts or benefits the described actions might have on the survival of sea turtles. Students should not have to give their personal opinion but should get involved in talking about the issues. Discussion could focus around how the "general public" might responded to each question and why. You can also include how students might change their own attitude or the attitude of others. This activity can be used a second time at the end of the unit to evaluate if the students attitudes changed as a result of learning about sea turtles and their habitats.

The list of questions are provided on page 29 so that you can copy the page to hand out to your students.

Cooperative Learning Activity: Sea Turtle Sizes

Grade Levels: 6 - 10

Student Objectives:
This cooperative learning activity is designed as an introduction to the different species of sea turtles found in Florida waters. Along the way, students will learn to work together and learn some interesting facts about the life history of each sea turtle species; at the same time they will be improving their skills in working together. After working through this activity, each student will be able to:
1. Describe at least one fun fact
2. Explain ways humans are a threat to sea turtles
3. Compare the diets of the different sea turtles
3. Differentiate between sea turtle species based on size

Goal of the Activity:
The goal is to get students to arrange the species of sea turtles in order of size and then assign sizes (in feet) to each species. All cards are necessary to complete the activity, so groups must have six students, or some students must take more than one card. The problems to be solved are stated on two separate cards. The sea turtle cards are provided as a list of species found in Florida waters to help the students organize the group's thoughts.

Attitude Assesment

For each question circle one of the following choices: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) or Strongly Disagree (SD).

1. When my family goes on vacation to the beach, we would always turn off all unnecessary lights after dark.	SA	A	U	D	SD
2. If I were scuba diving or snorkeling and saw a sea turtle, it would be fun to hang on to it and take a ride.	SA	A	U	D	SD
3. If I saw a nesting sea turtle at night, I would want to get close as I can so that I could take some pictures.	SA	A	U	D	SD
4. If a family cannot afford to buy food, it is okay for them to take an adult sea turtle for food (to eat).	SA	A	U	D	SD
5. If I owned a house on the beach, it would be okay to build a sea wall to protect it from hurricanes and beach erosion.	SA	A	U	D	SD
6. Releasing hundreds of helium balloons at a celebration should not be allowed since some may fall into the ocean and be eaten by sea turtles.	SA	A	U	D	SD
7. On a beach where there are several sea turtle nests, it would be okay to take the eggs from one nest to sell if you really needed the money.	SA	A	U	D	SD
8. Pollution is not really a big problem in the oceans because they are so big and cover such a large portion of the earth's surface.	SA	A	U	D	SD
9. I prefer drive-on beaches so that I don't have to carry all my things across the sand.	SA	A	U	D	SD
10. When visiting the beach, I would never walk off the board-walk or path onto the dune.	SA	A	U	D	SD
11. One of the best things about staying at the beach is the ocean view from a beach front hotel.	SA	A	U	D	SD

Sea Turtle Sizes

The Kemp's ridley is the rarest of all the sea turtles.

The most common species in Florida is approximately 4 feet long.

Share this information with your group members to solve your problem.

Sea Turtle Sizes

The Green turtle is approximately 1.5 feet longer than the Kemp's ridley.

Solve this: Once you have arranged the sea turtle species in order by size, figure out the average size in feet for each species.

Sea Turtle Sizes

One of the reasons that Green turtles are endangered is that they continue to be hunted for their meat and eggs.

The average human adult male is 6 feet tall; that is 2 feet shorter than the largest sea turtle.

Sea Turtle Sizes

The rarest sea turtle averages 3.5 feet long.

The Loggerhead, the most common species in Florida, has powerful jaws to crush the heavy shelled clams, crabs and other shelled animals on which it feeds.

The Hawksbill eats invertebrates. It is especially fond of sponges.

Sea Turtle Sizes

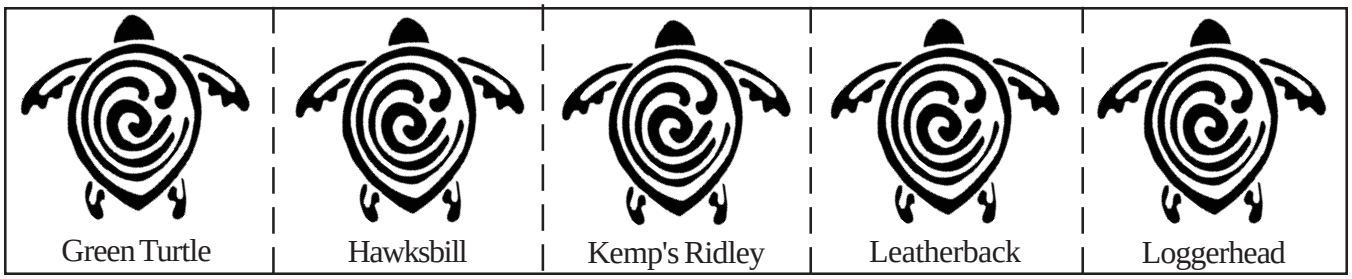
The species that averages 4.5 feet long has been hunted to the brink of extinction for its beautiful shell. This species of sea turtle eats mostly sponges and other invertebrates.

An adult Leatherback can grow to 8 feet long.

Sea Turtle Sizes

The Leatherback is the largest and most active of the sea turtles. They travel thousands of miles, dive thousands of feet deep and venture into much colder water than any other kind of sea turtle.

Here is your group's problem: Arrange the 5 species of sea turtles found in Florida waters in order from smallest to largest.



Classroom Resources:

Sea Turtle-Pictionary

Grade Levels: 6 - 12

Student Objectives:
This game uses words and concepts related to sea turtles, coastal habitats, threats to sea turtles and their habitats and conservation to develop skills in understanding issues through visualization and diagrams. This activity would be useful as a review of previously introduced materials.

Rules:
The rules are based on the game Pictonary™. Using the list of words and concepts provided below, write each word/concept on a set of cards. Divide the class in half. Distribute to each half of the class a set of cards (stacked face down), drawing paper (scrap paper works great!), pencils and a timer. The students in each half should divide into teams of 3 to 4 students.

Playing the Game:
Play begins with one student from a team selecting the top card from the stack. That student has one minute to draw the word/concept, while the remaining students in the same team try to correctly identify the word/concept. Drawings cannot include letters or numbers. If the team members successfully guess the word or concept, they are awarded one point and may select the next card or pass the turn to the team on • f the left. If the team is unsuccessful, play goes to the team on the left. One student from that team would pick the top card from the stack and have one minute to draw the word/concept on the card. The games continues until one team scores 10 points and wins the game.

Feel free to add or subtract words and concepts based on the grade level.

Words and Concepts for use in Sea Turtle-Pictionary:

Beach Lights
Beach (or Dune)
Beach Mouse
Coastal Strand
Congress
Conservation
Coral Reef
Development
Endangered Species
Endangered Species Act
Entanglement
Fibropapillomas
Green Sea Turtle
Gulf Stream
Hatchlings
Hawksbill Sea Turtle
Helium Balloon
Kemp's Ridley Sea Turtle
Leatherback Sea Turtle
Letter Writing
Longshore Drift
Loggerhead Sea Turtle
Maritime Hammock
Migration
Pier
Plastic
Poacher
Pollution
Predation
Protected Area
Refuge
Sandbar
Sargassum
Satellite Transmitter
Sea Turtle Nest
Sea Grass
Sea Wall
Sea Turtle Eggs
Sea Turtle Research
Shrimp Net
Storm Event
Threatened Species
Turtle Walk
Turtle Excluder Device

Classroom Resources:

Sea Turtle Quiz

Time to test your knowledge about sea turtles. In the first section, try to fill in the blank with the best answer. Answer true or false to the statements in the second section. If you need a little help, you should be able to find all the answers somewhere in the Sea Turtle Survival League home page (http:www.ccccturtle.org). The information can also be found in the Educator's Guide. *Answers to each question are printed upside down at the bottom of this page.*

Fill In The Blank

1) A species becomes _____ when there are no more of them alive left on Earth.
2) Sea turtles are not mammals, rather they are large, air-breathing _____ that live mostly in the ocean.
3) The smallest and most endangered of all sea turtles is the _____ _____ .
4) Only adult female sea turtles lay eggs, and to build their nests they must return to _____ .
5) The _____ turtle gets its name because its mouth is shaped like a beak.
6) Leatherback turtles sometimes choke and die after eating discarded _____, which they mistakenly eat because they look like jellyfish.
7) Most sea turtle nesting in the United States takes place in the state of _____.
8) Sea turtles are known to _____ hundreds or thousands of miles from their main feeding areas to where they mate and nest.
9) A _____ _____ is when a female sea turtle crawls out of the ocean to lay a nest, but for some reason decides not to and returns to sea.
10) When hatchlings emerge from their nest, they usually head straight for the water, but sometimes they head the wrong way because they are confused by artificial _____ .
11) Nesting sea turtles often look like they are crying, but actually tears are just turtles' way of releasing _____.
12) Fishermen trying to catch_____ sometimes accidentally capture sea turtles in their nets, which can drown and kill the turtles.
13) By installing a " _____ _____ device" in their nets, fishermen can help turtles escape from their nets.
14) The federal law that makes it illegal to harm, harass or kill sea turtles, their eggs or hatchlings is called the_____ _____ ____ .
15) Sea turtles face many threats to their survival, but most of these are caused by the activities of _____ .

Circle True or False

16) Scientists are using satellites to track the migration of sea turtles. T F
17) More green turtles nest in the Archie Carr National Wildlife Refuge than any other place in North America. T F
18) Coastal armoring is built on the beach to help sea turtles nest. T F
19) If you encounter a sea turtle nesting, you should shine light on the beach to help the turtle see. T F
20) Hatchling turtles grow up very fast, and they begin to reproduce in about five years. T F
21) People can help save sea turtles by changing their behavior. T F

Answers (No cheating): 1) extinct, 2) reptiles, 3) Kemp's ridley, 4) land, 5) hawksbill, 6) plastic, 7) Florida, 8) migrate, 9) false crawl, 10) light, 11) salt, 12) shrimp, 13) turtle excluder, 14) Endangered Species Act, 15) humans or people, 16) T, 17) T, 18) F, 19) F, 20) F, 21) T

Classroom Resources:

Coastal Habitat Quiz

Now time to test your knowledge about sea turtles. In the first section, select the correct answer. Fill in the missing habitat types second section. If you need a little help, you should be able to find all the answers somewhere in the Sea Turtle Survival League home page (http:www.cccturtle.org). The information can also be found in the Educator's Guide. *Answers to each question are printed upside down at the bottom of this page.*

Multiple Choice

1) The Archie Carr National Wildlife Refuge on the Eastern Coast of Florida is considered the most productive:

A) loggerhead nesting site in the western hemisphere
B) leatherback nesting site in the world
C) hawksbill turtle nesting site in Florida
D) green turtle nesting Site in the western hemisphere

2) This coastal vegetation community has become severely fragmented and is the most uncommon coastal vegetation community in Florida:

A) dune
B) condominiums
C) coastal strand
D) beach

3) When houses and other human structures are built on barrier islands, this:

A) reduces the amount of habitat for native species
B) increases the overall stability of the dune system
C) increases the overall health of the coastal community
D) reduces the effectiveness of a barrier island to protect the mainland from hurricanes
E) A and D
F) C and D
G) A and B

4) Salt water marshes and mangrove swamps are a vital part of the coastal community because:

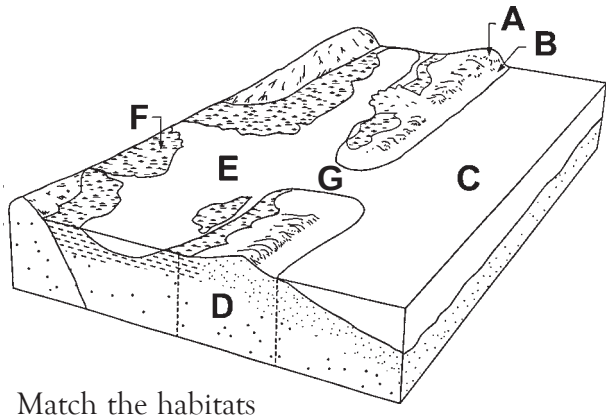
A) they help filter pollutants out of the water
B) provide deep water feeding areas
C) stabilize sediments
D) A and B
E) A and C

5) Which of the following is NOT a threat to sea turtle nesting habitat?

A) removal of native dune vegetation
B) human development
C) planting native dune vegetation
D) sea walls

6) The perpetual movement of sand along a coastline Is called:

A) a rip tide
B) longshore drift
C) a storm event
D) upshore drift



7) Match the habitats listed below with the correct letter on the diagram:

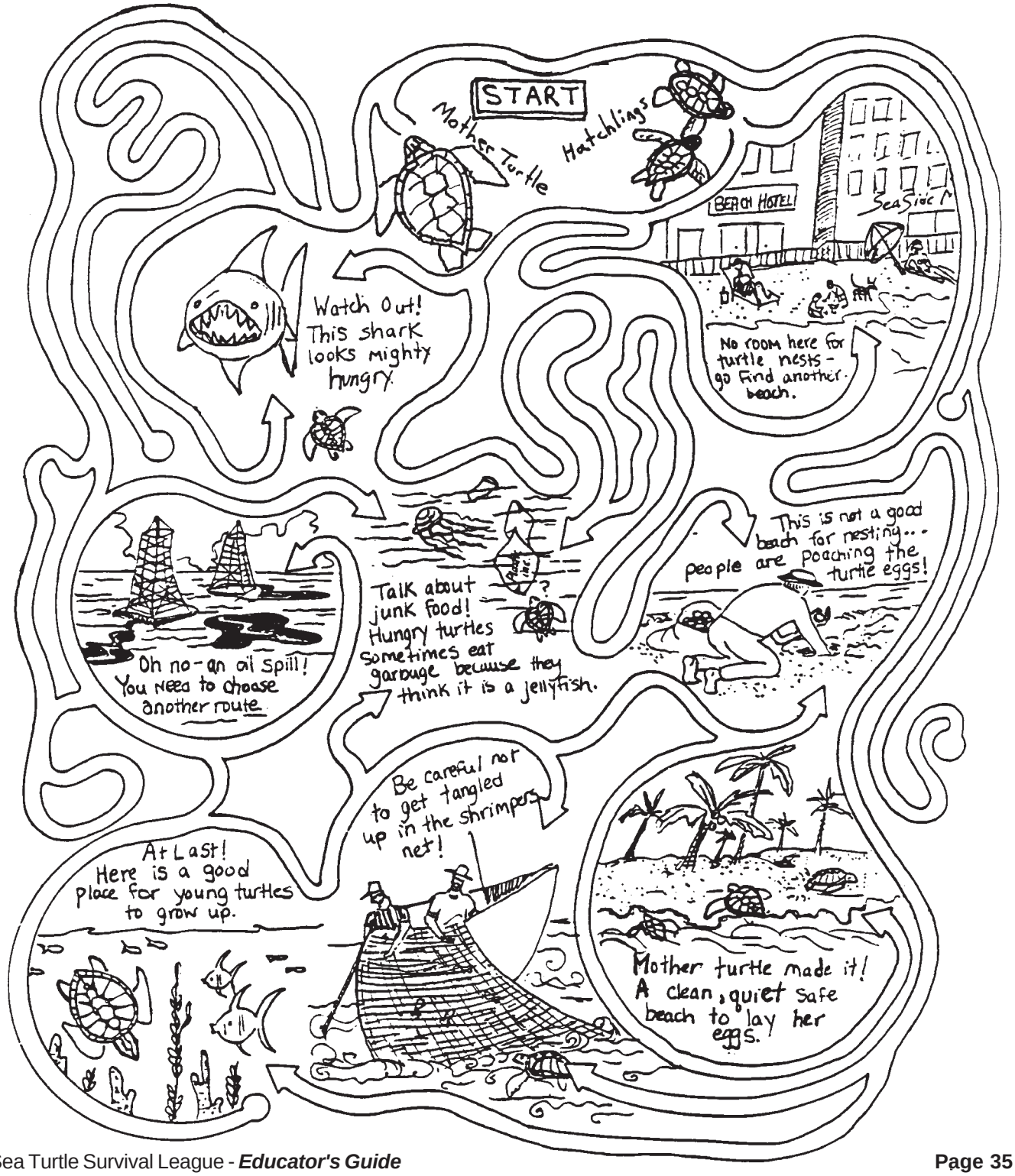
Barrier island ____ Near shore ____
Dune ____ Salt marsh ____
Lagoon ____

Answers (No cheating): 1) A, 2) C, 3) E, 4) E, 5) C, 6) B, 7) Barrier Island - D, Near Shore - C, Dune - B, Salt Marsh - F, Lagoon - E

Classroom Resources:

Worksheet #1

See if you can help the mother turtle and her hatchlings find their way to suitable habitat. The hatchlings must make it to a healthy ocean habitat with plenty of food. The adult female turtle is trying to find a dark, quiet nesting beach on which to build a nest. Beware of all the potential threats that can keep them from reaching their destinations.



Classroom Resources:

Worksheet #2

Time to add a little color to this sea turtle's life. Use crayons, markers or colored pencils to color in this tropical reef however you see fit. While you are at it, see if you can name all the different kinds of sea life shown in this picture.

Can you say "TURTLE?" Sure you can! But can you say it in 9 other languages? Look at the two lists below and try matching each of the 10 different languages on the right with a word that means "turtle" in that language from the list on the left. (The answers are printed upside down underneath.) When you finish, try saying "turtle" in all 10 languages. *This list developed by the National Turtle and Tortoise Society.*

"Turtle"		The Language	
Omslaan	Tortur	Vietnamese	Norwegian
Con rua	Havskilpadde	Indonesian	Gaelic (Ireland)
Tortue	Penyu	Spanish	Dutch
Schildkrote	Tartaruga	Italian	German
Tortuga	Turtle	English	French

Dutch-Omslaan; French-Tortue; Gaelic (Ireland)-Tortur; German-Schildkrote; Indonesian-Penyu; Italian-Tararuga; Norwegian-Havskilpadde; Spanish-Tortuga; Vietnamese-Con rua

Classroom Resources:

Worksheet #3

Hey! See if you can find the words listed to the right in the WORDSEARCH below. The words can go up, down, across, diagonally or backward. Once you find all the words, see if you can explain what each has to do with sea turtles and efforts to protect them. If you don't know, ask your teacher or visit the Sea Turtle Survival League web page on the internet to try to find an answer. The web page address is http:www.cccturtle.org.

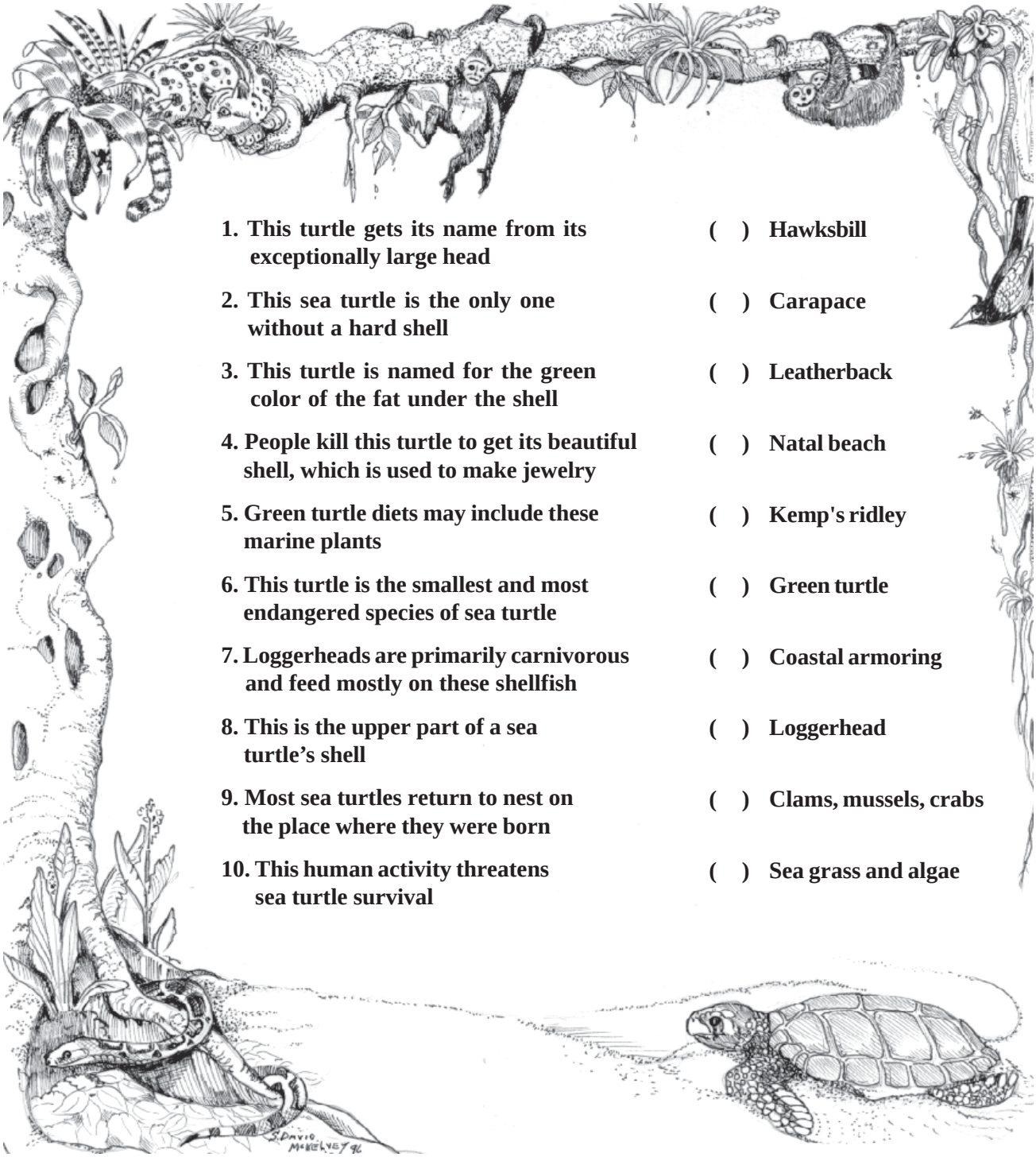
Crabs	Leatherback
Endangered	Plastic
Nest	Pollution
Turtle Excluder	Habitat
Beach	Sea Wall
Lights	Shrimp Nets
Hatchlings	Migrate
Satellite	Loggerhead

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

Classroom Resources:

Worksheet #4

Sea Turtles Facts: For each term on the right, write in the correct number of the description on the left.



1. This turtle gets its name from its exceptionally large head	**( ) Hawksbill**
2. This sea turtle is the only one without a hard shell	**( ) Carapace**
3. This turtle is named for the green color of the fat under the shell	**( ) Leatherback**
4. People kill this turtle to get its beautiful shell, which is used to make jewelry	**( ) Natal beach**
5. Green turtle diets may include these marine plants	**( ) Kemp's ridley**
6. This turtle is the smallest and most endangered species of sea turtle	**( ) Green turtle**
7. Loggerheads are primarily carnivorous and feed mostly on these shellfish	**( ) Coastal armoring**
8. This is the upper part of a sea turtle's shell	**( ) Loggerhead**
9. Most sea turtles return to nest on the place where they were born	**( ) Clams, mussels, crabs**
10. This human activity threatens sea turtle survival	**( ) Sea grass and algae**

(1) Loggerhead; (2) Leatherback; (3) Green turtle; (4) Hawksbill; (5) Sea grass and algae; (6) Kemp's ridley; (7) Clams, mussels, crabs; (8) Carapace; (9) Natal beach; (10) Coastal armoring

Glossary of Terms:

Accretion - the addition of sand to a beach by a gradual, natural process.

Arribada - Spanish for "arrival," used to refer to the mass, synchronized emergence of nesting sea turtles.

Artificial Lighting - Light created by human-made sources, such as lamp posts and porch lights.

Beach Renourishment - the addition of sand to a beach by humans to replace sand lost through erosion.

Body Pit - the upper part of a turtle nest where the turtle removes the surface layers of sand before digging the egg chamber.

Brackish - somewhat salty water usually found in marshes, lagoons and estuaries along the coast.

Carapace - the dorsal or upper portion of a turtle's shell.

Carnivore - an organism that eats only other animals.

Caruncle - a temporary, sharp egg-tooth on hatchlings used to tear open the egg shell.

Clutch - a nest of eggs.

Coastal Armoring - anything built along a beach to protect structures from beach erosion.

Community - a group of animal and plant species that live in the same area and interact with each other through food chains and other interrelationships.

Convention on International Trade in Endangered Species (CITES) - agreement to control the international trade of endangered and threatened species.

Crustacean - organisms such as lobsters, shrimp and crabs that have hard outer shells, jointed limbs and usually live underwater and have gills.

Ecosystem - a system made up of biological communities and the physical and chemical environment.

Egg Chamber (Cavity) - the part of a turtle nest where the eggs incubate.

Endangered Species - an organism that is in danger of becoming extinct.

Endangered Species Act (ESA) - a law that protects endangered and threatened species in the United States of America.

Erosion - the removal of sand from a beach by either a gradual process or during a storm event.

Estuary - an area where fresh water and salt water mix with a strong tidal flow and little standing water.

Exotic Species - species that are introduced into an area where they are not naturally occuring.

Extinct - when the last living individual of a species dies, causing the species to no longer exist.

False Crawl - term used to describe when a turtle crawls onto the beach but does not nest.

Fibropapillomas - a disease that casues cauliflower-like tumors to grow on sea turtles and other animals.

Habitat - a place where a plant or animal naturally lives.

Herbivore - an organism that eats only plants.

Incubate - process during which eggs develop into hatchings.

Lagoon - an area where fresh water and salt water mix with a weak tidal flow and standing water.

Latitude - distance in degrees north or south of the equator.

Longitude - distance in degrees east or west on the Earth's axis.

Longshore Drift - the perpetual or constant movement of sand along a coastline.

Magnetic Field - a region in which there is a magnetic force, found in the materials of the earth's crust.

Middens - a garbage heap, usually referring to ancient mounds of artifacts, bones and discarded shells.

Migration - the act of moving from one place to another.

Natal Beach - the beach where a sea turtle was born.

Native Species - species that are indigenous or belong to an area.

Nest - the structure made for laying and incubating eggs.

Plastron - the lower or ventral portion of a turtle's shell.

Poach - to hunt illegally.

Predator - an organism that lives by capturing and feeding on other animals or their eggs

Pristine - an area that is untouched or unspoiled.

Satellite Telemetry - technology that uses a radio transmitter to transmits signal to satellites orbiting the Earth.

Scutes - the hard scales covering a turtle's shell.

Storm Event - a disturbance, usually having strong winds, rain, thunder and lighting.

Threatened Species - an organism that may become endangered.

Turtle Excluder Devices (TEDs) - a device attached to a shrimp net to allow sea turtles and other large organisms to escape from the net while allowing shrimp to be caught.

Catalogue of Educational Materials About Sea Turtles

(Use order form on the facing page.)

Educational Books:

Additional Educator's Guides - Printed version of the Sea Turtle Survival League's Educator's Guide, with extensive information about sea turtles and the threats they face, plus classroom activity ideas and worksheets, is available in mass quantities. **$4.00 each**

Into the Sea - by Brenda Guiberson. This beautifully ilustrated book follows the life cycle of a sea turtle from hatchling to adulthood. Children are sure to enjoy this powerful nature story. **$18.95**

Sea Turtles - by Jeff Ripple. Written for the general reader, this book profiles every species of sea turtle. It also includes information on their life cycle, how they navigate, who their predators are, what human threats exist and where conservation efforts are being made worldwide. Contains more than 60 spectacular photographs! **$19.95**

Sea Turtles (Our Wild World) - by Lorraine A. Jay. Teaches nature conservation and makes learning about animals fun. A durable softcover format that includes color photos and illustrations. If a child wants to know about sea turtles, this is the book to own. All seven species are described and pictured. Many mysteries of sea turtles are explained in the text and "Fun Facts." The accompanying illustrations and photographs are excellent. Ideal for children 8-12. **$9.95**

Books by Archie Carr, the founding Director of CCC. Renowned for his knowledge of sea turtle biology, ecology and natural history, Dr. Carr had a rare gift for translating his immense storehouse of knowledge into eloquent, award-winning prose.

The Windward Road - **$19.95**
Ulendo: Travels of a Naturalist in and out of Africa - **$19.95**
High Jungles and Low - **$19.95**
Naturalist in Florida: A Celebration of Eden - **$19.95**

Audio/Visual Aids:

Sea Turtles of the World Poster - This poster, by artist Deirdre Hyde, is a colorful depiction of the seven species of sea turtles found world wide, plus the Pacific green (aka Black Turtle). Great for sea turtle enthusists and educators! **$11.95**

Tales of the Green Turtle - This 27-minute video includes interview with Dr. Archie Carr and discusses CCC's 42-year-old Tortuguero green turtle monitoring program. **$14.95**

Sea Turtle Slide Show - Fifteen color slides of sea turtles, their nesting behavior, and threats they face. Comes with descriptive text and accompanying turtle information. **$34.95**

*** Prices include shipping and handling within the United States.**

Sea Turtle Adoption and Educational Materials Order Form

Sea turtles have navigated the world's oceans for more than 100 million years. Today, all sea turtle species are in danger of extinction. Caribbean Conservation Corporation and its Sea Turtle Survival League invite you to join us in our efforts to study and save these ancient and mysterious creatures. You and your class can turn your convictions about protecting sea turtles into direct action. When you "Adopt" an endangered turtle you will be investing in the future of all marine turtles -- one turtle at a time. You and your class will receive a framable Adoption Certificate that includes a photo and background information about your turtle. You will also receive a colorful logo decal and a one-year subscription to our informative newsletter, the *Velador*, and four quarterly issues of *Turtle Tides*, our insert for children.

Name: _____

School or Institution: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Country (*If other than U.S.*): _____

Phone Number: _____

Enter the name you would like to appear on the Adoption Certificate where it states "Adopted by":

_____

_____

Educators Cost for Adopting a Sea Turtle for your class is ONLY $20.00! Higher donations welcome.

CHOOSE WHICH TYPE OF TURTLE YOU WANT TO ADOPT

Satellite Turtle - The movements of the satellite tagged sea turtles can be observed on the Sea Turtle Survival League web page at (http://www.cccturtle.org).
Please check the web site for the names of the sea turtles currently being tracked through our site. Once you have decided on the turtle you would like to adopt, please write in the name in the space below.
Enter the name of the turtle: _____

Name Your Own Turtle - If you choose this type of turtle, you will be adopting an endangered green turtle that was tagged by researchers with Caribbean Conservation Corporation on the beach at Tortuguero, Costa Rica. You will be the sole adoptive parent of one particular turtle, about which you will receive information, and you get to name the turtle yourself.
(Enter the name you would like to give your turtle): _____

☐ My Check is enclosed. (Payable to **Sea Turtle Survival League**)

☐ Please charge my credit card. **M/C VISA**

Acct. # _____ Exp. Date _____

Signature _____

Return this entire page to: **Sea Turtle Survival League**
4424 NW 13th Street, Suite A-1, Gainesville, FL 32609
If paying with a credit card, you can call or fax in your order.
Call (800) 678-7853 or Fax (352) 375-2449

Item Name	Quantity	Price
Any additional donation		
Florida residents - Add 7% sales tax		
TOTAL		

Educator's Guide Evaluation Form

Where did you hear about the Sea Turtle and Coastal Habitat Education Program?

_____

Were you able to access the Sea Turtle Survival League home page? Yes No

Which did you utilize more? (Circle one) Home Page Printed Guide Used Both the Same

Did you copy any of the Educator's Guide to hand out to students? Yes No

On a scale of 1-10, how useful was this Educator's Guide in helping you teach your students about sea turtles (with 10 being most useful)? 1 2 3 4 5 6 7 8 9 10

On a scale of 1-10, how useful was the Home Page in helping you teach your students about sea turtles (with 10 being most useful)? 1 2 3 4 5 6 7 8 9 10 N/A

Was your class able to access the maps showing the turtles' migration? Yes No

What was your impression and that of your students toward the maps and the information presented on the home page? _____

_____

What was your general impression of this Educator's Guide? _____

_____

Do you have any suggestions for improving either the Educator's Guide, the Web Page or the education program in general?_____

_____

_____

Do you think your students gained a better appreciation for sea turtles and the threats they face due to this program? Yes No

Do you think your students gained a better appreciation for coastal habitats and the threats they face due to this program? Yes No

Do you have any suggestions for classroom activities that we can include in future editions of this Guide?

_____

_____

_____

Thank You For Helping Us Continue To Improve This Guide!
Return your evluation form for a free sea turtle poster, while supplies last!

Please clip or copy this page and return it to: STSL, 4424 NW 13th Street, Ste. A-1, Gainesville, FL 32609

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"People tend to think of the productions of the sea as without limit,
as fed by the limitless energy of the sun
falling on the five-sevenths of the earth's surface that the oceans are.
But this comforting thought does not apply to sea turtles.
Huge nesting colonies of sea turtles have been wiped out before-
in Florida, in the Bahamas and all about the Caribbean.
The dependence on wild shore for nesting,
combined with the heavy natural predation on eggs and hatchlings
deprives sea turtles of the resilience that many pelagic fishes have.
Turtle food comes mainly from the bottom in the shallow fringes of the sea,
and turtles require peace on the seashore to breed successfully.
Sea turtle populations are small; and as man increases everywhere, they grow smaller."

~Dr. Archie Carr, "So Excellent A Fishe"

Sea turtles remain some of the most mysterious
and time-honored creatures on earth.
The Sea Turtle Survival League,
through its conservation initiatives
and education programs,
is helping ensure the gentle sea turtle
remains a wild and thriving part of the natural landscape.

CARIBBEAN CONSERVATION CORPORATION

Caribbean Conservation Corporation's
Sea Turtle Survival League
4424 NW 13th Street, Suite A-1
Gainesville, FL 32609
(352) 373-6441
Fax: (352) 375-2449
E-mail: ccc@cccturtle.org
Web Page: www.cccturtle.org

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