

SEA TURTLES OF THE VIRGIN ISLANDS

SLIDE PRESENTATION
AND
STUDY GUIDE

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INTRODUCTION TO THE GUIDE

This study guide has been provided to serve as a resource of information and suggestions to supplement the Sea Turtles of the Virgin Islands slide presentation. It may be used by the teacher to provide the students with necessary background information prior to viewing the slide show and as a resource manual for follow-up studies.

It is suggested that this slide presentation be shown in grades 5-12, but designation of these grade levels need not be considered permanent. A copy of the script has been provided so the teacher may judge the appropriateness of the slide presentation for their particular class. The study guide materials should also be examined and adapted to the level and specific needs of the students.

The guide is divided into four sections. They are as follows:

I. Background Information:

This section contains a summary of the slide presentation and identifies the vocabulary necessary for the students to understand prior to viewing it. Teachers lacking familiarity with these words or concepts may refer to the glossary in Section IV of this guide.

II. Concepts:

This section contains a synopsis of the major concepts portrayed in the slide show. These concepts should be reinforced in follow-up studies.

III. Follow-up Questions:

These may be used for discussion or testing after viewing the slide presentation.

IV. Additional Resources:

This section contains a glossary of terms, bibliography and any additional information. The bibliography is arranged by subject and provides a listing of resources to be used by the teacher or students seeking further information.

A copy of the slide show script has been inserted after the study guide so that it can be previewed by the teacher.

I. BACKGROUND INFORMATION

A. Introduction

There are seven species of marine turtles that presently inhabit the earth. These include:

Leatherback Sea Turtle (Dermochelys coriacea)
Kemp's Ridley Sea Turtle (Lepidochelys kemp)
Hawksbill Sea Turtle (Eretmochelys inbricata)
Loggerhead Sea Turtle (Caretta caretta)
Green Sea Turtle (Chelonia mydas)
Olive Ridley Sea Turtle (Lepidochelys olivacea)
Flatback Sea Turtle (Chelonia depressa)

Three of these can be commonly found in the Virgin Islands (Leatherback turtle, Hawksbill turtle, Green turtle).

The Leatherback can be distinguished from the other two species of sea turtles in the Virgin Islands by its unique shell and enormous size. They have been known to reach lengths of over six feet and weights of 1,000 or more pounds. Unlike Greens and Hawksbills, Leatherbacks are migrants who come to nest on Sandy Point, St. Croix during their breeding season. Sandy Point is one of the last remaining nesting sites for Leatherbacks in the Atlantic.

Green turtles are second in size to the Leatherbacks. These marine turtles are seen more frequently around shallow bays where they feed on algae and sea grasses. Greens are most commonly used for their meat, and are used in turtle soup.

Hawksbill sea turtles look very much like Greens, but are smaller. Hawksbills can also be distinguished from Greens by their hooked jaw, overlapping plates on the shell, and differing number of scales on the head. Unlike Greens, Hawksbills can be found more frequently around coral reefs. They are widely known for their beautiful shells, from which jewelry and ornaments are made.

All marine turtles mate in the water, but must lay their eggs on land. When that time arrives, the female crawls up the beach to a nest site above the high tide line, digs a pit in the sand and deposits 50 to 200 eggs, covers the nest cavity with sand to protect it from predators, and then returns to the sea.

After approximately two months, the hatchlings emerge from the nest (usually at night) and are guided to the sea by the reflection of the moon on the water. Sometimes hatchlings get disorientated when they follow the lights of civilization or the rising sun. This often leads them away from the water's edge and usually results in their death.

Another major cause of hatchling mortality is predation. On land they are vulnerable to attack from crabs, birds, mongooses and dogs. Once in the water, they risk falling prey to carnivorous fish.

All three species of marine turtles in the Virgin Islands are endangered. The major reasons for this are habitat destruction and overexploitation of sea turtles for their products. The U.S. Congress has recognized the need to protect sea turtles in recent years. Consequently, they are now protected under the Endangered Species Act of 1973.

In the Virgin Islands the Division of Fish and Wildlife is presently studying the distribution, growth rates and reproduction of marine turtles. This information will aid them in future management plans to help these species to survive.

Future management plans include patrolling areas where poaching may be happening, particularly during nesting season. Other plans include the relocation of eggs, which might otherwise be lost, to protected sites and the protection of nests from predators such as man, mongooses and dogs.

Conservation of marine turtles must become the responsibility of everyone if these animals are to survive. If sea turtles are given a chance to repopulate, perhaps there may come a time once again when humans can take what they need from them, within limits, and still coexist with these animals without threatening their existence.

B. Vocabulary (see Glossary)

- Adapted/Adaptation
- Carnivore/Carnivorous
- Coexist/Coexistence
- Endangered
- Migrant/Migration
- Mollusks
- Pelagic
- Predators
- Species
- Terrestrial

II. CONCEPTS

A. Sea turtles are adapted to the marine environment in several ways. It is these adaptations, as well as other characteristics, that make these marine reptiles so interesting. Sea turtles have inhabited the oceans of the world for over 90 billion years and are the only ancient sea reptiles to survive today. This fact indicates that sea turtles are extremely well-adapted to the marine environment.

Sea turtles have streamlined shells. Without this adaptation it would be difficult to propel themselves through water. Furthermore, the streamlined shell reduces the turtle's weight and makes it have a specific gravity similar to that of sea water. Leatherbacks often travel long distances at sea. For this reason they have made further adaptations to living in the water. The normal bony shell of other sea turtles has almost completely disappeared in the Leatherback. This has resulted in reducing the turtle's weight and consequently making swimming easier.

Sea turtles' paddle-shaped flippers are also adapted for rapid, easy swimming. Marine turtles are graceful to watch in the water and are reminiscent of birds in flight.

Turtles take in large amounts of salt from food and sea water when feeding. Like other marine creatures, they have developed the ability to excrete excess salt. In sea turtles it is excreted through special glands beside the tear duct of the eye. This gives rise to the popular story that nesting turtles are crying, either because of the pain (work) involved in nesting, or to keep their eyes free of sand. They actually excrete salt all the time, but this only becomes visible when the turtles are out of the water.

Although when active sea turtles may stay near the surface of the water and breath every few minutes, at night they sleep under the protection of rocks and coral. For this reason they are adapted to holding their breath for long periods of time.

Because sea turtles are adapted to living in the sea, they are slow, clumsy and vulnerable on land. This makes the journey to the nest site from the water's edge both slow and tiresome for the turtle.

B. Identifying the three species of sea turtles in the Virgin Islands:

Shells: Leatherbacks have a distinctive shell. Unlike the Greens and Hawksbills, their carapace (shell) is covered with a tough, black layer of skin which has seven ridges running lengthwise.

Greens and Hawksbills both have plates (scutes) on their shells. Although both species have four costal scutes on either side of the carapace and five in the middle, the costal scutes on Hawksbills overlap.

Interocular plates: Interocular plates (or prefrontal scutes) located on the head can also be used in identification. Leatherbacks have no interocular plates, Greens have one pair, and Hawksbills have two pairs.

Hatchlings: Although Green and Hawksbill hatchlings look very similar, Greens are not common nesters in the Virgin Islands. Leatherback hatchlings can be distinguished from the other two species of marine turtles in the Virgin Islands because they show basically the same features as the adult.

Habitat: Leatherbacks are only seen in the Virgin Islands from April through August where they nest on Sandy Point, St. Croix. They prefer an open ocean habitat and are the only truly pelagic species of the sea turtles.

Hawksbills, on the other hand, remain closer to shore. They are commonly seen in coral reefs. Green turtles can be found more frequently around turtle grass beds in shallow bays.

Miscellaneous: Leatherbacks can be identified by their enormous size.

Hawksbills can also be distinguished from Green sea turtles by their hooked jaw (beak).

C. A major reason for hatchling mortality is disorientation. Many beaches where sea turtles nest have a relatively simple topography with an open stretch of sand backed by trees and vegetation. There is a brightness difference between the open seaward horizon and the darker tree line. Although sea turtles have eyes adapted for underwater vision, and are extremely near sighted on land, they are attracted to the illumination from the open seaward horizon.

Although most hatchlings emerge from the nest cavity at night, some emerge in the daylight hours. Hatchlings that emerge in the daytime are often disorientated by the sunlight and are attracted to it, rather than to the illumination of the seaward horizon.

The lights of civilization can also cause the disorientation of sea turtle hatchlings. For example, Hawksbill hatchlings emerging from their nest sites at Frederiksted, St. Croix have been known to be attracted to baseball park lights on St. Croix rather than to the light of the seaward horizon.

D. Once the hatchlings reach open ocean, they tend to "disappear" for the first year of their lives. This phenomenon is poorly understood as of yet. The turtles' coloration, small size, and agility make oceanic observations difficult. Recent studies suggest, however, that immature sea turtles are dispersed by ocean currents and that they passively drift in mats of seaweed until they are at least a year old. At this stage they have become sufficiently powerful swimmers and can now direct their movements against ocean currents.

E. Humans are sea turtles' greatest enemies. Reduction and destruction of habitat has been a major threat to sea turtle populations in recent years. Development on and near nesting beaches has undoubtedly affected the reproductive success of marine turtle populations.

Oceanic pollution is also thought to be a cause of mortality in sea turtles. Plastic is commonly found in the stomachs of dead sea turtles who have mistaken it for jellyfish. It is thought that this has made the sea turtles less healthy by decreasing absorption from the gut and has eventually become an indirect cause in the turtle's death. One dead Leatherback sea turtle was found with a globule of (what was thought to be) crude oil blocking its intestinal tract. The intentional and unintentional (sometimes sea turtles are caught accidentally in fishing nets and drown) taking of sea turtles and their eggs has also jeopardized the survival of some marine turtle species.

Of the seven species of marine turtles, three are heavily exploited for trade (Green, Hawksbill and Olive Ridley sea turtles). Two of these species can be found around the Virgin Islands (Green and Hawksbill sea turtles).

The Green turtle is harvested for its meat, and the belly cartilage, neck, tail bones and flippers are used in manufacturing turtle soup. The eggs, which are also a rich source of protein, are taken frequently.

Hawksbill turtles are often killed for their shell due to its greater thickness and color pattern on the scutes. Jewelry and ornaments are made from the raw tortoise shell.

Other uses of marine turtles include the production of leather products from the skin of the flippers, and the use of the oil in cosmetics and folk medicine.

In short the intrinsic value of each part of the sea turtle makes it a profitable animal in large-scale international trade.

The United States now protects marine turtles under the Endangered Species Act of 1973. But, until efforts such as this become worldwide, marine turtles will remain endangered.

F. Conservation of Sea Turtles:

There are several techniques being used for the conservation and restoration of depleted sea turtle populations.

Most sea turtle conservationists agree that there should be an international ban on the use of sea turtles and their products in trade. If a turtle product is harder to sell because markets have been closed, prices will be lower and pressure on populations will drop. It is this rationale that got sea turtles placed on the U.S. Endangered and Threatened Species list.

Another method of conservation involves protecting nesting female turtles from exploitation by means of beach patrols. Breeding females are the most important members of the sea turtle species. Yet when they come ashore to lay their eggs, they are often taken advantage of by poachers since turtles are slow, clumsy and vulnerable out of the water. In Surinam, where beach patrol crews were likely to see every nesting turtle, 24% of the tagged females were found nesting again in subsequent years. Where there are no beach patrols, the percentage of remigrating females is much less due to poachers. The last method is the conservation practice of relocating turtles' nests to protected sites. However, a good-intentioned turtle conservation program involving the relocation of eggs can be ineffective or detrimental to the sea turtle population. When a nest is shifted to an alternative site, unless that site is exactly the same temperature as the previous one, the sex of the turtles will be altered. Eggs incubated only a few degrees cooler than normal will produce 100% males. In addition eggs must be moved within 24 to 48 hours after being laid to prevent the embryo from being dislodged from the egg membrane.

It is unrealistic to think that worldwide conservation efforts will come about because humans simply empathize with the predicament sea turtles are in. The challenge ahead of us is how to meet the needs of the people and still coexist with marine turtles without threatening their existence. However, with new achievements such as "turtle farming," the challenge may be met in the near future.

III. FOLLOW-UP QUESTIONS

1. List and/or discuss three adaptations of sea turtles to the marine environment.
2. Which three species of sea turtles can be found in the Virgin Islands?
3. How can Leatherbacks be distinguished from the other two species of sea turtles in the Virgin Islands?
4. What are costal scutes?

5. What is a carapace?
6. How do Hawksbill and Green turtles differ?
7. Why do Hawksbill turtles have a hooked jaw?
8. Which species of marine turtle migrates to the Virgin Islands each year between April and August? What do they come here to do?
9. Describe and/or discuss the nesting process of marine turtles.
10. What are two reasons for hatchling mortality during their journey from the nest to the water's edge?
11. Why are marine turtles being endangered?
12. List and/or discuss four ways in which humans use sea turtles.
13. What protection do marine turtles get under the Endangered Species Act of 1973?
14. What information is being gathered by the Division of Fish and Wildlife through tagging and measuring sea turtles? How will this information be used?
15. What measures are being taken by the Division of Fish and Wildlife (and other organizations) to protect marine turtles?
16. What can you do to help?

IV. ADDITIONAL RESOURCES

A. Glossary

Adapted/Adaptation: The process of making adjustments to the environment. Sea turtles are adapted to living in a marine environment by having a streamlined shell, flippers, and lungs with the capacity to hold air for long periods of time. Tortoises, sea turtles' terrestrial cousins, would soon die in a marine environment since they lack the necessary adaptations to survive there.

Carnivore/Carnivorous: A carnivore is a meat eater.

Coexist/Coexistence: To exist together at the same time or in the same place.

Endangered: An endangered species is one which is in danger of extinction throughout all or a significant portion of its range. (A threatened species is one that is likely to become endangered).

Migrant/Migration: Animals that make annual trips from one place to another with seasonal change.

Mollusks: Invertebrate animals characterized by a soft, usually unsegmented body often enclosed wholly or in part by a shell (i.e. oysters, clams, conch, whelk, etc.).

Pelagic: Of the open ocean (distinguished from coastal waters).

Predator/Predation: An animal that kills and eats other animals.

Species: A biological classification comprising a subdivision of a genus and consisting of a number of plants and animals all having a high degree of similarity. They can generally interbreed among themselves, and show persistent differences from members of allied species.

Terrestrial: Living on land rather than water.

B. Bibliography

The following listing of resources is arranged by subject in alphabetical order. It is indicated after each resource listing whether the resource is to be used by the teacher and/or students, and if located at the library, which one. (C.V.I. stands for the Ralph M. Paiewonsky Library at the College of the Virgin Islands, and P.L. stands for the St. Thomas Public Library downtown.)

ADAPTATION:

Burnett, A.L. and T. Eisner. Animal Adaptation. Holt, Rinehart & Winston, New York. 1964. 136 p. (teacher, C.V.I.).

Wallace, B. and S. Adrian. Adaptation. Prentice-Hall Inc., Englewood Cliffs. 1961. 115 p. (teacher, C.V.I.).

Williams, G.C. Adaptation and Natural Selection. Princeton University Press, Princeton. 1966. 307 p. (teacher, C.V.I.).

ENDANGERED SPECIES:

Krutch, J.W. Wildlife in Danger. The Viking Press, New York. 1969. 368 p. (teacher/students, P.L.).

United States Fish and Wildlife Service. Convention on international trade in endangered species of wild fauna and flora annual report. 1977. (teacher/students, C.V.I.).

United States Fish and Wildlife Service. Endangered Species Technical Bulletin. 1977- (teacher/students, P.L.).

United States National Oceanic and Atmospheric Administration. Endangered Species Act. 1973. (teacher/students, P.L.).

TURTLES:

Bustard, R. Sea Turtles. Taplinger Inc., New York. 1973. 220 p. (teacher/students, C.V.I. and P.L.).

Carr, A. So Excellent a Fish. Natural History Press, Garden City. 1967. 248 p. (teacher/students, C.V.I. and P.L.).

Ernst, C.H. and R.W. Barbour. Turtles of the United States. University Press of Kentucky, Lexington. 1972. 347 p. (teacher/students, P.L.).

Ingle, R.M. and F.G.W. Smith. Sea Turtles and the Turtle Industry. University of Miami Press, Miami. 1949. 107 p. (teacher, C.V.I.).

Rebel, T.P. Sea Turtles. University of Miami Press, Miami. 1974. 250 p. (teacher, C.V.I.).

SEA TURTLES OF THE VIRGIN ISLANDS

2. For 90 million years sea turtles have inhabited the oceans of the world. Unlike their terrestrial relations, the tortoises, sea turtles have a streamlined shell, flippers and lungs with the capacity to hold air for long periods of time. It is these adaptations to their marine environment, as well as other characteristics, that make these marine reptiles so fascinating.
3. Of the seven species of marine turtles that inhabit the earth, three can be found in the Virgin Islands. These include the Leatherback,
4. the Hawksbill
5. and the Green turtle.
6. Leatherbacks can be distinguished from the other two species of marine turtles in the Virgin Islands by their enormous size and unique shell, or carapace. Unlike Green and Hawksbill turtles, the shells of Leatherbacks are covered with a layer of tough, rubbery skin which has seven ridges running lengthwise.
7. Green and Hawksbill turtles have plates on their shells. We call these costal scutes. Although both species have four costal scutes on either side of the carapace, and five in the middle, the costal scutes on Hawksbills overlap.
- 3.
9. Another way to identify Hawksbill turtles from Greens, besides looking for the Hawksbills' "beak," is by the interocular plates located on the head. Hawksbill turtles have two pairs of these plates,
- 10.
11. while Greens have one pair.
12. Unlike the other two species of sea turtles in the Virgin Islands, Leatherbacks are migrants who come to nest on Sandy Point, St. Croix during their breeding season, which occurs from April through August.
13. Leatherbacks feed on jellyfish, sea squirts and juvenile fish and are the largest living turtle species. They have been known to reach lengths of over six feet and weights of 1,000 or more pounds! Of all the marine turtle species, it is believed that Leatherbacks travel the longest distances at sea. This female Leatherback was tagged by Fish and Wildlife biologists while nesting on Sandy Point, St. Croix in May of 1981.

14. Two and one-half months later she was recaptured 1,680 miles from St. Croix at Atlantic City Beach, New Jersey.
15. Second in size to the Leatherback is the Green turtle, which may grow up to 600 pounds. It is primarily vegetarian and feeds on algae and sea grasses.
16. These turtles can be seen most frequently around shallow bays where there is enough sunlight for turtle grass and other plants to grow. Green turtles are not common nesters in the Virgin Islands, but are year-round residents.
17. Hawksbill turtles, unlike Greens, can be found more frequently around coral reefs where they feed on mollusks, shellfish, jellyfish, algae and coral.
18. Their hooked jaws are specially adapted to prying mollusks and crabs out of crevices in the coral. Hawksbills are one of the smaller marine turtles, with the heaviest specimen recorded being 280 pounds. Hawksbill turtles are known to nest on all three U.S. Virgin Islands and are year-round residents.
19. All sea turtles mate in the water with the male holding onto the female's shoulders.
20. When it comes time to lay the eggs, the female leaves the water and crawls up the beach to a nest site above the high tideline, digs a pit in the sand with her flippers up to two feet deep,
21. deposits 50 to 200 eggs, covers the nest cavity with sand to protect it from predators,
22. then returns to the sea. A female normally lays eggs several times during breeding season at nine to 14-day intervals, depending on the species. The egg laying process most commonly occurs at night and may take up to a few hours.
23. For the larger marine turtles this is an exhausting process since they must pull their weight with their front flippers and push with their hind ones. This leaves a symmetrical pattern in the sand. Leatherback and Green turtles move their flippers together, while Hawksbills move their flippers alternately. A Hawksbill track will appear as one midline with alternating flipper marks on either side.

24. Once the eggs are buried, they will remain there for the incubation period.
25. After approximately two months, the hatchlings will emerge from their shells and push their way upward from the nest cavity to the surface.
26. Once on the surface, the hatchlings go quickly and directly to the water's edge. Most hatchlings make this journey at night when there are less predators out, but many never make it to the sea.
27. At this young age they are vulnerable to attack from crabs, birds, mongooses, and dogs. Even if the hatchling reaches the sea, the risk of falling prey to carnivorous fish while crossing the reef flats is likely.
28. Another reason for hatchling mortality is disorientation. Hatchlings are guided to the sea by the reflection of the moon on the water. Sometimes they are attracted in the wrong direction by the lights of civilization or, just before dawn, by the light of the rising sun. If the hatchling does not reach water by daybreak, the sun will soon cause its death by inducing heat exhaustion.
29. Once the hatchlings reach open ocean, they tend to "disappear" for the first year of their lives. Little is understood about this phenomena, but it is thought that they are dispersed by ocean currents and may travel in mats of floating seaweed.
30. When it comes time for these turtles to mate, they will return to the place of their birth and nest at the same beach, or close to it.
31. All three species of sea turtles in the Virgin Islands are endangered. This means that their populations are so low that they face the danger of extinction. The major reason for this is habitat reduction due to offshore and oceanic water pollution and the development of nesting beaches by increasing human populations. Another reason for this is that humans have overexploited sea turtles for their products, for virtually every part of a sea turtle can be used and their eggs can be eaten.
32. The sea turtles that are most often eaten and used in turtle soup are the Greens. Hawksbill turtles are also eaten, while Leatherbacks are not. Other products taken from turtles include: their oil for cosmetics and folk medicine, their skin for leather products,

33. and their shells from which jewelry and ornaments are made. Hawksbill turtles are widely known for their beautiful shells.
34. Congress has recognized the need to protect sea turtles within recent years. They are now protected under the Endangered Species Act of 1973. Neither the whole animal nor any products from it may be taken, sold, possessed, or imported into the United States.
35. In the Virgin Islands the Division of Fish and Wildlife is presently studying Marine Turtles under the endangered species program.
36. Information on distribution and growth rates of marine turtles is being gathered by studying Green and Hawksbill turtles caught in sea grass beds and coral reefs in small bays where they live. This is done with the help of a large net which, when dropped off a boat, encloses an area of the bay.
37. Divers capture the turtles within this area and bring them to the boat.
- 38.
39. Once on board the turtles are tagged,
- 40.
41. measured, and then released. Distribution and growth information will be gained when these turtles are recaptured.
- 42.
43. Reproduction is also studied by tagging and measuring nesting females and gathering information about the nests.
44. The information gathered from these studies will aid the Division of Fish and Wildlife in future management plans to help these species to survive.
45. Even though commercial sea turtle fishing has ceased, turtles are still being captured and eggs are taken illegally.
46. Future management plans include patrolling areas where poaching may be happening, particularly during nesting season. Other plans include relocation of eggs, which might otherwise be lost, to protected sites and the protection of nests from predators such as man, mongooses, and dogs.

47. Conservation of Marine Turtles must become the responsibility of everyone if these animals are to survive. Any information regarding turtles in trouble, or tagged turtles, should be reported to the Division of Fish and Wildlife.
48. If Marine Turtles are given a chance to repopulate, then there may come a time once again when humans can take what they need from them, within limits,
49. and still live in unison with these great creatures without threatening their existence.