Manatees in the Classroom
Lesson Plans and Activities for Educators
**Manatee Word Scramble**

*Answer Key*

Cixto — Toxic
Mslamam — Mammals
Tysmescoe — Ecosystem
Gudnog — Dugong
Vireobrhe — Herbivore
Apdroetr — Predator
Enasirni — Sirenian
Cfruaes rawet — Surface water
Literretras — Terrestrial
Sleatwnd — Wetlands
Bathiat — Habitat
Gyodorhlcio lycec — Hydrologic cycle
Diel depes — Idle speed
Bricksha — Brackish
Aitcuaq — Aquatic
Spyrecno — Necropsy
Minear — Marine
Nolago — Lagoon
Oxtice pieces — Exotic species

*Habitat Test Answer Key*

1. D
2. A
3. C
4. B
5. D
6. C
7. D
8. D
9. B
10. C

*Manatee Test Answer Key*

**Fill-in-the-blank**

1. 10–15%
2. 60 years
3. Herbivores
4. 20 mph, 3–5 mph
5. Litter, flood gate/canal lock structures, watercraft collisions
6. From their unique, distinctive scars
7. Florida, Massachusetts, Texas
8. two–five, two
9. Chirps, whistles or squeaks
10. C – Both federal and state law

**True or False**

1. True.
2. False. The Steller’s sea cow is extinct.
3. False. Manatees are semi-social, somewhat solitary animals.
5. True.
6. False. Manatees are mammals and must surface to breathe air.
7. True.
8. False. Manatees are herbivores.
9. False. Manatees are passive animals.
10. True.

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**Sign Up For A Virtual Manatee Presentation**

Save the Manatee Club is now offering virtual manatee presentations for schools and other groups upon request. Each session features a visual presentation, cool manatee videos, and Q&As with experienced staff and volunteers. The presentation lasts 20-30 minutes, with time for questions, or it can be tailored to the length of time desired. Topics include manatee anatomy, animal relatives of manatees, manatee research, and manatee protection. Older students and adults can learn more about manatee conservation efforts and how they can help. Come “Meet the Florida Manatee” and learn about these unique aquatic mammals right at home.

Email Save the Manatee Club’s Volunteer Coordinator at volunteer@savethemanatee.org or call 1 (800) 432-5646 to schedule a presentation.
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 be easily modified for any grade level by adjusting the amount of detail.

**What Do Manatees Need To Survive In Their Environment?**

Ask students to decide what manatees need to survive in their environment.

From this discussion, inquire as to other questions students might have about manatees and their environment. Allow the students to research and explore just how manatees have come to survive as long as they have. Perhaps students could also identify ways that they can help protect the environment so manatees can continue to survive. The manatee habitat display activity (see following page) could be a great outcome of the student’s research.

**Comparison Studies**

There are several comparison studies students can do on the topic of manatees and their habitat. First, ask students to compare their weight to a manatee. The average weights of the West Indian manatee and the Steller’s sea cow are given in the chart below. Bring a scale to class and have 10 students volunteer to be weighed individually. Keep track of each student’s weight and see how many students it takes to add up to the weight of one West Indian manatee. What about the Steller’s sea cow? Next, do the same exercise for length.

In addition, ask students to compare the amount of food they eat to the amount of food the manatee needs. They can examine weight, caloric value, and health benefits, among other things. They can also compare an herbivorous diet with an omnivorous or carnivorous diet and the anatomical differences between herbivores, omnivores, and carnivores.

Finally, encourage a comparison study that focuses on marine and freshwater animals that live in the Florida manatee’s habitat. Is there any competition for resources?

**Explore the Technology Involved in Tracking Manatees**

Radio signals from manatee tracking devices are received by polar orbiting satellites and analyzed to yield locational data. Sensors built into the unit give additional data on water temperature and the manatee’s activity. Researchers access the information daily by computer.

1. Have the class research information about satellites.
What are they? How do they work? How do they get up in space? What does “polar orbiting” mean, and why is this kind of satellite useful?

2. Contact an electronics expert at your local high school, vocational school, or community college. Ask him or her to be a guest speaker and give information on radio signals. How does the information from the transmitter get up to the satellite and down to the researchers? What do the terms “uplink” and “downlink” mean? How are research data decoded by the computer?

3. Have the students explore other things that use radio communications. For example, a television, radio, microwave, garage-door opener, and cellular telephone all use radio signals.

Create a Manatee Myth

Sailors throughout history often thought they were seeing mermaids when they were really seeing manatees. “Sirenia,” the name of the scientific order to which manatees belong, comes from the ancient mythological word “siren,” a term used for monsters or sea nymphs who lured sailors and their ships to ruin with their mesmerizing songs. Create a mythological story about sailors and manatees incorporating facts from this guide.

Make a Manatee Habitat

Make a plaster cast or use materials like papier maché and paint to create a manatee habitat, such as a spring run. You can also create a diorama in a cardboard box or aquarium. Include aquatic vegetation, trees, fish, access to a river, sanctuary signs, boats, and people. Create posters or murals showing manatees and threats to their survival. You could even turn your classroom into a manatee habitat!

Write Laws to Protect Sirenians

Ask students to investigate how laws to protect manatees and their habitat are formed at different levels of U.S. government: federal, state, county, or city. Next, divide students into groups that represent the various government levels. They can also create an international government. Each group should be in charge of developing recommendations to protect the sirenian species and habitat within their area. Have the groups write a report on their law and give an oral presentation to the class. They can make use of research materials to write their report and create their presentation.

The students’ law should answer these questions: Why are Sirenians in trouble? What specific actions are necessary to save them? How will these actions be carried out? Where will the money come from? How can the public help? What will be the penalties for breaking the law? How will it be enforced? Does the governmental entity (the United Nations, for example, or a state wanting a less restrictive law than the federal government) really have the legal authority to pass and enforce such a law? If not, why not? What about entities such as the World Bank or the World Trade Organization? How can rules about something like trade have an effect on wildlife? In addition, have students research the Endangered Species Act. How does their law compare to the ESA? Have students find out more about other organizations that work to preserve wildlife. Are they private or governmental? What do they do?

Establish a Class Manatee Sighting and Mapping Program

Jemp is a West Indian manatee who was rescued in July 1995. One month later, he was tagged and released in Tampa Bay. Over the years, Jemp’s travels have taken him up and down the west coast of Florida. Jemp has been spotted in waters near Port Charlotte, St. Petersburg, Everglades City, Tampa Bay, Sarasota, and Port of the Islands.

1. Have students find these areas on a map and plot Jemp’s favorite hangouts with pushpins. Find the latitude and longitude of these locations.

2. Calculate the distance Jemp has traveled between these spots. Figuring that manatees swim an average of 5–8 kilometers (3–5 miles) per hour, how long would it take Jemp to get from one destination to another? Why do you think he chooses these particular spots?

3. Visit a website on the Internet that has manatee tracking information (see savethemanatee.org/tracking for more information) and do a search for tracking programs for other species.

Cast a Deciding Vote

Ask students to imagine that they are serving as city commissioners for a coastal county in Florida. The city commission has to cast the deciding vote on a marina project that could have an impact on manatees and wetland habitats by increasing boat traffic on the waterways. However, the marina project will also create new jobs through construction and tourism, and the town is dependent on tourists and recreational boaters.

Ask the students to research the pros and cons of the situation, decide how they will vote, and be prepared to defend their position. You might have students write and give speeches or create public service announcements based
on their research and decisions (see Create a Speech or a Public Service Announcement on this page).

Stress that governmental decisions are often complex. Politicians must balance their own beliefs and interests with the varied interests and concerns of a multi-faceted constituency. Ask students to think of ways to reach a middle ground. Perhaps the marina could be modified to lessen the impact on manatees and their habitat, or the number of law enforcement officers in the area could be increased.

Discuss Threats to Manatees

Discuss the major threats to manatees today: loss of habitat (due to pollution and other causes), watercraft collisions, litter (such as fishing line or plastic bags), harassment, and flood gate/canal lock structures. Which is the most serious threat, and why? Ask students to research a specific area of Florida and compare how it has changed in the last 20, 50, or 100 years. Have them draw a picture representing the habitat of 20 years ago, and then have them cross out a portion to represent the percentage lost. Discuss the causes of this habitat loss and the consequences of this loss for manatees and other species. Also, discuss what can be done to reduce or eliminate these threats.

Discuss How Water-Related Issues Affect Our Lives and the Lives of Wildlife

Locate the five water management districts in Florida and their boundaries (do an Internet search for “Florida Water Management Districts”). Have the students draw the district boundaries on their map and identify the major water systems each one regulates. If you live outside of Florida, identify the major water systems in your area. Ask students to pick a particular part of the state where water is an important issue (perhaps their own county) and research that area. Write to water management districts, local governments, chambers of commerce, and newspapers to obtain information. Have they experienced any droughts in recent years? Floods? Forest fires? Discuss these issues in class. What influence do water issues have on wildlife? In addition, discuss and identify watersheds, aquifers, and recharge areas and their importance to humans and the environment. What are the conflicts surrounding competing interests for these natural resources?

Create a Speech or Public Service Announcement

Manatees are sometimes unintentionally killed or injured by fishing activities. They drown in nets, or they can die from infection caused by entanglement in crab trap lines, monofilament fishing line, or hooks. In Florida, it is a second-degree misdemeanor to intentionally discard any monofilament fishing line or monofilament netting into or onto the waters of the state.

1. Have students write a public service announcement (PSA) appropriate for television or radio to educate the general public regarding the threats that discarded monofilament can cause to wildlife. Students may create a video or audiotape, or they could perform the PSA “live” in front of the class. The recommended length of the PSA is 30 seconds. Ask a TV or radio station to broadcast the PSA, play it over the intercom at school, or post a video on the school website.

2. Suggest that students create educational posters or an ad for a magazine or newspaper about the threats that discarded monofilament line creates for wildlife. Have students cut out or draw pictures, write the copy, and make the advertisement appealing to the general public. Students could vote privately and award a group “winner.” Submit the ad for publication in an actual newspaper or magazine, or publish it in the school newspaper.

Visit Manatee Viewing Areas – In Person or via the Internet

If you live in or near Florida or Ohio, you can arrange a field trip for your class to see manatees in order to help students experience these animals firsthand. If a field trip is not possible, you may experience manatees “live” through our webcams at ManaTV.org.

Manatee Word Scramble

This activity uses words and concepts related to manatees and dugongs, and it is useful as a review of previously introduced materials. The activity can also be used to stimulate a class discussion of concepts associated with manatees, other sirenian species, habitat, and additional issues. The following words are relevant to manatees and scrambled, and answers can be found at the end of this guide:

Cixto, Mslamam, Tysmescoe, Gudnog, Vireobre, Apdroet, Enasirni, Cfruaes rawet, Literretras, Sleatwnd, Bathiat, Gydorhlcio lycec, Diel depes, Bricksha, Aitcuaq, Spyrecno, Minear, Nolago, Oxtice piesces, Greeddanen.

Students can work individually or in groups to unscramble each word. After they unscramble the words, ask the students to use each word in a sentence, and then discuss the meaning of the word and how it relates to manatees.
Cooperative Learning Activity: Sirenian Species

Grade Levels 6-10

Objective: This cooperative learning activity is designed as an introduction to the sirenian species of the world. Students will learn to work together and also learn some interesting facts about the natural history and habitat of each species. At the same time, they will be improving their cooperative learning skills. After completing this activity, each student will be able to:
1. Explain at least one fact about a sirenian species.
2. Compare the different geographical areas of the world where manatees and dugongs are found.
3. Chart the scientific classification of sirenians.
4. Describe the habitat of the various sirenian species.

Preparation:
Make one copy of the Sirenian Species Cards (see following page) for each group of five students in your class. Cut the cards out for the students or provide each group with a pair of scissors.

Exercise Instructions:
1. Divide your class into groups of five students. Each student should have a blank piece of paper and a pen or pencil.
2. Ask each student in the group to be responsible for one sirenian species (dugong, West Indian manatee, West African manatee, Steller’s sea cow or Amazonian manatee). Have the student write the name of the sirenian species that they choose at the top of the paper and make six spaces to write in sirenian facts.
   For example:
   Dugong
   1.
   2.
   3.
   4.
   5.
   6.
3. Give each group a set of the 10 Sirenian Species Cards. If you have provided scissors, ask each group to cut the cards out.
4. Mix the cards up and place them in a stack. Have the group decide which student will go first, second, third and so on.
5. The first student should choose one card and read the three facts on the card aloud, one fact at a time.
6. After each set of facts on the card is read, the group should decide which sirenian the card is referring to. The student who has that particular sirenian’s sheet should fill in the facts from the card on their sheet. Follow this same procedure for all the students in the group until each of the five students has read the facts on two cards.
7. When the cards have all been read and the fact sheets are filled in, ask the students to answer the following questions with the information they have obtained:
   • From the information you have, can you tell which sirenian weighed the most?
   • Which species of sirenian is the smallest?
   • Which sirenian is/was found in cold water?
   • Two of the sirenians have notched tail flukes. Which ones are they?
   • Which sirenian averages three to four meters (10 to 13 feet) in length?
   • People who live in the United States are most familiar with which sirenian?
   • Which sirenian is/was without any teeth?
   • Which sirenian inhabits the western coast of Africa?
   • Which sirenian is extinct?
   • Which sirenian lives exclusively inland?

Card Answers:
1. **Sirenian Species**  
Can be seen around Australia  
Prefers coastal ecosystems  
Has no nails on the flippers

2. **Sirenian Species**  
From the Kingdom Animalia  
Has a notched tail fluke  
2–4 meters (8–13 feet) in length

3. **Sirenian Species**  
Hunted to extinction in 1768  
Inhabited cold waters  
Weighed around 4 metric tons  
(approximately 8,818 pounds)

4. **Sirenian Species**  
Lived in the Bering Sea  
7–9 meters (24–30 feet) in length  
Toothless

5. **Sirenian Species**  
Classified under Phylum Chordata  
The Sirenian most familiar to  
people in the United States  
Found in fresh or brackish water

6. **Sirenian Species**  
Strictly an herbivore  
3–4 meters (10–13 feet) in length  
Average weight 362–544  
kilograms (800–1,200 pounds)

7. **Sirenian Species**  
Found mostly on Africa's west coast  
Belongs to the Class Mammalia  
Has nails on the flippers

8. **Sirenian Species**  
Lives in warm, tropical waters  
3–4 meters (10–13 feet) in length  
Similar in size and appearance  
to the West Indian manatee

9. **Sirenian Species**  
Part of the Sirenian order  
Lives exclusively in freshwater  
Smallest member of the Family  
Trichechidae

10. **Sirenian Species**  
Not known to be territorial or aggressive  
Up to 3 meters (10 feet) in length  
Threatened by hunting pressures
Classroom Activity:
Public Opinion Poll

Grade Levels 7-12
Objective: The goal of this assignment is to encourage students to think about their attitude and the attitudes of others. The questions can be used to initiate group discussion on manatee and habitat protection issues. You can also tailor the questions to make them more specific to issues in your area.

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

1. If I owned a boat, I would follow posted speed zone signs in manatee areas..................SA A U D SD
2. I think one way to help protect manatees is to increase the current fine for breaking the boating speed limit in manatee protection areas..................................................SA A U D SD
3. I believe funding for enforcement of speed limits on Florida waterways should be increased.......SA A U D SD
4. I think the manatee population is increasing, so there is no need to protect them...............SA A U D SD
5. If I were swimming or boating and saw manatees, I would observe them from a distance.......SA A U D SD
6. If I owned a house on the water, I think it would be okay to build a dock over a seagrass bed.....SA A U D SD
7. It is important for someone to monitor the opening and closing of flood control structures so manatees are not crushed or drowned..........................................................SA A U D SD
8. Florida’s economy will be ruined if additional manatee protection measures are adopted........SA A U D SD
9. In order to help protect manatees, I believe we should reduce the speed limit for boats on more of Florida’s waterways..........................................................SA A U D SD
10. I don’t think manatees are indigenous (native) to Florida, so it’s not important to protect them...SA A U D SD
11. I believe the biggest threat to manatees comes from speeding boats..................................SA A U D SD
12. I think the best way for people to appreciate manatees is to touch them when they are swimming or diving. It’s a way to get people interested in helping them..........................SA A U D SD
13. If I owned a boat, I don’t think I would like anyone telling me how fast I should drive it...........SA A U D SD
14. More manatees are dying every year, so I believe more should be done to protect them........SA A U D SD
15. I believe that there should be more manatee sanctuaries in Florida and those sanctuaries should be off-limits to boats and jet skis..........................................................SA A U D SD

Post Activity Discussion:

Use the statements above to encourage each student to share his or her thoughts about manatee and habitat protection issues. Ask for volunteers to comment on the impacts or benefits of each statement. In addition, discuss public opinion polls and how they work. You could ask students how they think the general public would respond to the statements and why. Discuss the difference between attitudes that arise from emotion versus opinions derived from scientific fact. You might also ask how students could change their own attitudes or attitudes of others.

This activity could be used a second time at the end of the unit to measure if students’ attitudes change as a result of learning about manatees and their habitat. Students can also research these issues by using material from Save the Manatee Club’s website at savethemanatee.org or other research sources. In addition, you might ask the students to design their own public opinion poll and survey other students in the school.
Classroom or Club Activity:
Skit and Manatee Drawing Contest

Grade Levels 9–12, working with 5th and 6th grade students

Objective: The goal of this activity is to foster stewardship of the environment, especially of the manatee, and to spur community involvement. It offers high school students an opportunity to share their compassion for, and knowledge of, manatees with elementary school students.

Exercise Instructions:
1. Have high school students write a skit or short play that features a manatee in some perilous situation. The students should make or bring in costumes for the characters in their play. Examples of characters: a speedboat, a manatee mother, her calf, a concerned human being, etc. A narrator could also be employed to set the scene and direct the action. The plot could include some conflict or danger that the manatee must avoid, and could also include a happy resolution to send a positive message. For a second part of the project, another group of high school students
2. should produce a list of questions about manatees, their habitat, perils, the importance of manatee conservation, and how each student can help. These questions will serve as an informal introduction to the skit and, therefore, should be targeted toward an elementary audience.
3. Contact an elementary school in the area and arrange to have the skit performed in one or two classrooms. Either 5th or 6th grade classes are suggested as appropriate target audiences for this project.
   A. Once the high school students arrive in the elementary school classroom, have them introduce themselves, their school or club, and the objective of their visit. They might bring in posters or pictures of manatees and encourage the children to share their own stories of manatee encounters.
   B. After a short question and answer session to foster interest, the high school students can then perform their skit.
   C. To conclude the activity, the high school students introduce their manatee drawing contest. Make certain the elementary school students understand that each and every drawing will be posted at a booth at an environmental event, such as Earth Day, or at an upcoming festival, or in their school. Have the high school students make or purchase prizes to be awarded to the elementary school students. Examples are manatee plush toys, manatee posters, or other manatee-themed items. Finally, have the high school students set a date for the submission of the drawings and arrange for their pickup from the school.
4. After the drawings are submitted, the high school students should convene to judge the drawings. Then, they should arrange for a booth rental at an upcoming event. The students should post the drawings at their booth for visitors to see and clearly identify the first, second, and third place winners. After the event, have the high school students set up a visit to the elementary school to return the drawings to the contestants and award prizes to the winners. As an alternative to renting a booth at an upcoming event, the winners’ drawings can be posted in the elementary school, and prizes can be awarded on site.
Manatee Pre/Post Test

Objective: Test your knowledge about manatees. The first 10 questions are fill-in-the-blank and multiple choice questions and the second half of the test features true and false questions. After completing the manatee unit in your class, take the test again and see how much you learned!

1. On average, manatees eat about ________ % of their body weight in vegetation daily.
2. Manatees have few natural enemies and it is believed that they can live up to ________ years.
3. Manatees are the only aquatic mammals that are __________________________.
4. Manatees are slow-moving animals, although they have been known to swim up to ______ mph in short bursts. On average, manatees swim at about _________ mph.
5. Data from research have shown that many manatee mortalities are directly related to human contact or encroachment. List three human-related causes of manatee mortality.
   1. 
   2. 
   3. 
6. Manatees may look alike to us, but researchers have a unique way of telling them apart. How do they do it?

True or False
1. Manatees live in salt, brackish or fresh water. 
   a. True  b. False
2. The Steller’s sea cow population is increasing. 
   a. True  b. False
3. Manatees tend to travel in groups. 
   a. True  b. False
4. The federal Environmental Protection Agency (EPA) coordinates the Florida Manatee Recovery Plan, a list of tasks geared toward recovering manatees from their current threatened status. 
   a. True  b. False
5. Manatees are native to Florida. 
   a. True  b. False
6. Manatees breathe underwater through gills on the sides of their necks. 
   a. True  b. False
7. Manatees prefer shallow, slow-moving bodies of water. 
   a. True  b. False
8. Fish and algae make up the majority of a manatee’s diet. 
   a. True  b. False
9. Female manatees are very aggressive when they have a calf by their side. 
   a. True  b. False
10. Manatees are scientifically classified in the Phylum Chordata, which means they have a backbone. 
    a. True  b. False
Habitat Pre/Post Test

Objective: This will test your knowledge about manatee habitat and habitat for sirenians around the world. There are ten multiple choice questions.

1. Habitats where manatees are found must provide them with which of the following:
   A. A breeding area
   B. Sheltered living
   C. Food supply
   D. All of the above

2. The four necessary elements of manatee habitat are:
   A. Food, water, space, shelter
   B. Water, shelter, sky, trees
   C. Fish, sun, metal, water
   D. Rain, food, stars, space

3. Manatees are susceptible to cold-related disease. The lower end range of water temperatures they can tolerate is:
   A. 7º to 13º C (45º to 55º F)
   B. 31º to 33º C (88º to 92º F)
   C. 20º to 22º C (68º to 72º F)
   D. –23º to –29º C (–10º to –20º F)

4. Manatees are herbivores, but they probably wouldn’t eat which of the following plants?
   A. Hydrilla
   B. Douglas fir tree
   C. Tapegrass
   D. Water lettuce

5. Although Florida manatees are migratory, they do not migrate to which of these places?
   A. Florida
   B. Louisiana
   C. North Carolina
   D. Montana

6. What sirenian is found around the northern part of Australia?
   A. Amazonian manatee
   B. Steller’s sea cow
   C. Dugong
   D. West Indian manatee

7. What animal would you most likely find sharing its home with a manatee?
   A. Snowy owl
   B. Grizzly bear
   C. Gray wolf
   D. Turtle

8. Seagrass beds are an important feeding area for manatees. Which of the following is a cause of seagrass bed destruction?
   A. Surface water run-off
   B. Herbicide spraying
   C. Prop dredging
   D. All of the above

9. In which area would you most likely find manatees during colder weather?
   A. Under icebergs
   B. In power plant outflows
   C. Resting on the beach
   D. 5–10 miles out at sea

10. Even though the Florida manatee and Antillean manatee are closely related, they do not share the same geographic locations. The Antillean manatee can be found in which of the following places?
    A. Central American waterways
    B. Indian Ocean
    C. Bering Sea
    D. Lake Erie