

Title

Oyster Reef Ecology Lab Mini Lesson

Grade Level

Third, Fourth, & Fifth

Student Target

Third Grade Science Benchmarks

- SC.3.N.1.1 Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
- SC.3.N.1.2 Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups/
- SC.3.N.1.3 Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.
- SC.3.N.1.4 Recognize the importance of communication among scientists.
- SC.3.N.1.5 Recognize that scientists question, discuss, and check each other's evidence and explanations.
- SC.3.N.1.6 Infer based on observation.
- SC.3.N.1.7 Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.
- SC.3.N.3.2 Recognize that scientists use models to help understand and explain how things work.
- SC.3.L.15.1 Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.
- SC.3.L.17.2 Recognize that plants use energy from the Sun, air, and water to make their own food.
- SC.3.P.9.1 Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.

Fourth Grade Science Benchmarks

- SC.4.N.1.1 Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.
- SC.4.N.1.2 Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
- SC.4.N.1.3 Explain that science does not always follow a rigidly defined method ("the scientific method") but that science does involve the use of observations and empirical evidence.
- SC.4.N.1.4 Attempt reasonable answers to scientific questions and cite evidence in support.
- SC.4.N.1.5 Compare the methods and results of investigations done by other classmates.
- SC.4.N.1.6 Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.
- SC.4.P.9.1 Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.
- SC.4.P.10.1 Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.
- SC.4.P.10.4 Describe how moving water and air are sources of energy and can be used to move things.
- SC.4.E.6.3 Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
- SC.4.E.6.5 Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.

- SC.4.L.16.4 Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
- SC.4.L.17.1 Compare the seasonal changes in Florida plants and animals to those in other regions of the country.
- SC.4.L.17.2 Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.
- SC.4.L.17.3 Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.
- SC.4.L.17.4 Recognize ways plants and animals, including humans, can impact the environment.

Fifth Grade Science Benchmarks

- SC.5.L.15.1 Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.
- SC.5.L.17.1 Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycles variations, animal behaviors and physical characteristics.
- SC.5.N.1.2 Explain the difference between an experiment and other types of scientific investigation.
- SC.5.N.1.6 Recognize and explain the difference between personal opinion/interpretation and verified observation.
- SC.5.N.2.2 Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.
- SC.5.P.10.2 Investigate and explain that energy has the ability to cause motion or create change.
- SC.5.E.7.2 Create a model to explain the parts of the water cycle. Water can be a gas, liquid, or a solid and can go back and forth from one state to another.

Third Grade Florida Core Standards Language Arts

- LAF.3.L.3
- LAF.3.RI.1
- LAF.3.RI.3
- LAF.3.RL.1
- LAF.3.RL.3
- LAF.3.RF.3
- LAF.3.SL.1
- LAF.3.SL.2
- LAF.3.W.3
- LAF.3.W.4

Third Grade Florida Core Standards Math

- MAFS.3.G.1
- MAFS.3.MD.1
- MAFS.3.MD.2
- MAFS.3.NF.1
- MAFS.3.OA.1

Fourth Grade Florida Core Standards Language Arts

- LAFS.4.L.3
- LAFS.4.RI.1
- LAFS.4.RI.2
- LAFS.4.RI.3
- LAFS.4.RL.1
- LAFS.4.RL.3
- LAFS.4.RF.3
- LAFS.4.SL.1

LAFS.4.SL.2
LAFS.4.W.2
LAFS.4.W.3

Fourth Grade Florida Core Standards Math

MAFS.4.MD.1
MAFS.4.MD.2
MAFS.4.NF.2
MAFS.4.OA.3

Fifth Grade Florida Core Standards Language Arts

LAFS.5.L.3
LAFS.5.RI.1
LAFS.5.RI.2
LAFS.5.RI.3
LAFS.5.RL.1
LAFS.5.RL.3
LAFS.5.RF.3
LAFS.5.SL.1
LAFS.5.SL.2
LAFS.5.W.2
LAFS.5.W.3
LAFS.5.W.4

Fifth Grade Florida Core Standards Math

MAFS.5.G.1
MAFS.5.G.2
MAFS.5.MD.1
MAFS.5.MD.2
MAFS.5.OA.2

Materials

Teacher

- Selected site in your schoolyard with several tree or shrub species
- Provide “There’s No Place Like Home” worksheet

Student

- Pencil
- Hand lenses
- Clipboard
- Activity worksheet

Warm-up

Discuss the concept of microhabitat reminding students that “micro” means small and “habitat” is where an animal finds its food, water, shelter, and space (an organism’s neighborhood). Ask your students to identify and describe the different microhabitats they might find throughout the schoolyard like on a large oak tree, parking lot, or drainage ditch. Students will learn about microhabitats in their schoolyard which will be interpreted into microhabitats of the estuary with oyster reefs of the Loxahatchee River.

Main Lesson

1. Divide students into groups of 2-3 and assign each group a plant to study and instruct students to work together to complete a group worksheet
2. Encourage students to examine the entire plant (including bark, living leaves, dead leaves, accessible roots, flowers, branches, and seeds or nuts).
3. Have them record different findings on their worksheets

4. After 10-15 minutes, call the class together and let each group point out the different microhabitats located on its plant to the rest of the class

Reflection

1. Conduct a whole-class discussion addressing the following questions:
 - a. How many different microhabitats could you find on one plant?
 - b. What kind of organisms do you think might live in each of the microhabitats you found?
 - c. Describe and identify any animals you found in those microhabitats
2. Make sure students understand how important these microhabitats are for both the plants as well as the organisms living within them.
3. Students should realize that many organisms are adapted to live in very specific microhabitats or feed on specific parts of plants.

Assessment

Participation in the activity

Review of completed activity worksheet

Attachments

- Information packet about the Loxahatchee River Center
- Map of the Loxahatchee River
- "There's No Place Like Home" Worksheet
- Oyster Reef Ecology Main Regular Lesson

Title

Oyster Reef Ecology Lab Regular Lesson

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Fourth Grade Florida Core Standards Language Arts

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- LAFS.4.SL.1

LAFS.4.SL.2
LAFS.4.W.2
LAFS.4.W.3

Fourth Grade Florida Core Standards Math

MAFS.4.MD.1
MAFS.4.MD.2
MAFS.4.NF.2
MAFS.4.OA.3

Fifth Grade Florida Core Standards Language Arts

LAFS.5.L.3
LAFS.5.RI.1
LAFS.5.RI.2
LAFS.5.RI.3
LAFS.5.RL.1
LAFS.5.RL.3
LAFS.5.RF.3
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LAFS.5.W.2
LAFS.5.W.3
LAFS.5.W.4

Fifth Grade Florida Core Standards Math

MAFS.5.G.1
MAFS.5.G.2
MAFS.5.MD.1
MAFS.5.MD.2
MAFS.5.OA.2

Materials for Pre & Post Lessons

Teacher

- River Center Packet
- Oyster Reef Ecology Mini Lesson
- Oyster farming, production, and habitat loss reference information
- Oyster reef restoration reference information

Student

- Computer Access
- Research references

Pre-visit Warm-up Lesson (Completed in classroom before visiting)

1. Review the information in the Loxahatchee River Center packet with your students
2. Complete optional mini lesson provided by River Center education staff upon field trip registration confirmation
3. Review the interactive website and oyster reef poster
<http://loxahatcheeriver.org/rivercenterflash/index.html>
<http://www.loxahatcheeriver.org/resources.php>

Main Lesson (Completed during visit with River Center staff)

1. Welcome, introduction to the River Center, overview of today's field trip, and safety/rules talk
2. Divide the students into 2 groups to rotate through 3 different activities
 - a. Lovin' the Loxahatchee River Tour – focusing on fish species, adaptations, habitats, and ecosystems

- b. Oyster Reef Ecology Lab: hands-on activity (See below)
 - c. Water resources discussion – Where our water comes from, how we use water in our everyday lives, where it goes once it flows down the drain, waste water treatment, and water conservation
3. Touch tank demonstration

Oyster Reef Ecology Lab Main Lesson (Completed during visit with River Center staff)

1. Students will be divided into groups of 2-3 and each given collecting dishes; pipettes, turkey baster, and collection containers. Each group will receive an oyster bag containing oyster shells that had been removed from the river that morning.
2. Vocab: producers, consumers, decomposers, herbivorous, omnivorous, carnivores, food chains, food webs
3. While water is poured over the oyster bag, another student shakes the bag vigorously allowing the organisms to fall out into the bucket below. Other team members collect the organism to identify and exam under microscopes.
 - o Some examples are decaying mangrove leaves, mangrove propagules, seeds, sea grasses, snails, amphipods, crabs, shrimp, small fish, etc.
4. A class discussion on what each team found and relating it to the oyster reef habitat as a micro-habitat in the estuary ecosystem. Students are getting a firsthand look at the primary consumers of the feed web as well as the understanding of the fish nursery food supply.
5. Class data is collected to see the diversity of plants and animals as well as quantity of each species. Students will collaborate on their data findings and create appropriate graphs.

Post-visit Reflection Lesson (completed in classroom after visiting)

- Have the students research major oyster farming and production found throughout the United States such as Washington, the Chesapeake Bay, and Apalachicola
- Discuss why these estuaries have been so productive, the history of habitat destruction and over production
- Have the students research oyster reef restoration projects in Martin, St. Lucie, and Palm Beach County

Assessment

- Participation in the activity
- Grade reflection on their research reports on restoration efforts

Attachments

- Information packet about the Loxahatchee River Center
- Oyster Reef Restoration programs
 - o <http://www.oysterrestoration.com/>
- Oyster Reef Poster

Creating STEM Connections – Oyster Reef Ecology

Science

- See standards listed above

Technology

- Students have utilized scientific tools such as microscopes, stereoscopes, hand lenses, pipettes, petri dishes, collection materials, document reader throughout their field experience at the River Center. Students can use tools found in the school's science laboratory/classroom to investigate items found throughout their schoolyard.

Engineering

- Research oyster reef restoration projects throughout the Loxahatchee River. Students can research where scientists and engineers found shell substrate, how they transported materials, and found the ideal location for the restoration project.
- Students can design their own “oyster reef condo” using art, craft, and recycled materials.

Mathematics

- See standards listed above

Title

Oyster Reef Ecology Lab Regular Lesson

Grade Level

High School: 9th-12th

Student Target

9-12 Grade Benchmark

SC.912.L.15.13

SC.912.L.17.2

SC.912.L.17.3

SC.912.L.17.6

SC.912.L.17.7

SC.912.L.17.8

SC.912.L.17.9

SC.912.L.17.11

SC.912.L.17.12

SC.912.L.17.16

SC.912.L.17.17

SC.912.L.18.7

SC.912.E.7.1

SC.912.E.7.8

SC.912.N.1.1

SC.912.N.1.7

Materials for Pre & Post Lessons

Teacher

- River Center Packet
- Oyster Reef Ecology Mini Lesson
- Oyster farming, production, and habitat loss reference information
- Oyster reef restoration reference information

Student

- Computer Access
- Research references

Pre-visit Warm-up Lesson (Completed in classroom before visiting)

1. Review the information in the Loxahatchee River Center packet with your students
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Main Lesson (Completed during visit with River Center staff)

1. Welcome, introduction to the River Center, overview of today's field trip, and safety/rules talk
2. Divide the students into 2 groups to rotate through 3 different activities
 - a. Lovin' the Loxahatchee River Tour – focusing on fish species, adaptations, habitats, and ecosystems
 - b. Oyster Reef Ecology Lab: hands-on activity (See below)
 - c. Water resources discussion – Where our water comes from, how we use water in our everyday lives, where it goes once it flows down the drain, waste water treatment, and water conservation
3. Touch tank demonstration

Oyster Reef Ecology Lab Main Lesson (Completed during visit with River Center staff)

1. Students will be divided into groups of 2-3 and each given collecting dishes; pipettes, turkey baster, and collection containers. Each group will receive an oyster bag containing oyster shells that had been removed from the river that morning.
2. Vocab: producers, consumers, decomposers, herbivorous, omnivorous, carnivores, food chains, food webs
3. While water is poured over the oyster bag, another student shakes the bag vigorously allowing the organisms to fall out into the bucket below. Other team members collect the organism to identify and exam under microscopes.
 - o Some examples are decaying mangrove leaves, mangrove propagules, seeds, sea grasses, snails, amphipods, crabs, shrimp, small fish, etc.
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Assessment

- Participation in the activity
- Grade reflection on their research reports on restoration efforts

Attachments

- Information packet about the Loxahatchee River Center
- Oyster Reef Restoration programs
 - o <http://www.oysterrestoration.com/>
- Oyster Reef Poster

Creating STEM Connections – Oyster Reef Ecology

Science

- See standards listed above

Technology

- Students have utilized scientific tools such as microscopes, stereoscopes, hand lenses, pipettes, petri dishes, collection materials, document reader throughout their field experience at the River Center. Students can use tools found in the school's science laboratory/classroom to investigate items found throughout their schoolyard.

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- Students can design their own "oyster reef condo" using art, craft, and recycled materials.

Mathematics

- See standards listed above