Title
Food Web of the Loxahatchee River Mini Lesson

Grade Level
Second, Third, Fourth

Student Target
Second Grade Benchmark

SC.2.N.1.1	Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.
SC.2.N.1.3	Ask “how do you know?” in appropriate situations and attempt reasonable answers when asked the same question by others.
SC.2.N.1.6	Explain how scientists alone or in groups are always investigating new ways to solve problems.
SC.2.L.16.1	Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies.
SC.2.L.17.1	Compare and contrast the basic needs that all living things, including humans, have for survival.
SC.2.L.17.2	Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs.

Third Grade Benchmark

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.1.4	Recognize the importance of communication among scientists.
SC.3.N.1.6	Infer based on observation.
SC.3.L.14.1	Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.
SC.3.L.15.1	Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.
SC.3.L.17.1	Describe how animals and plants respond to changing seasons.
SC.3.L.17.2	Recognize that plants use energy from the Sun, air, and water to make their own food.
SC.3.P.10.1	Identify some basic forms of energy such as light, heat sound, electrical, and mechanical
SC.3.P.10.2	Recognize that energy has the ability to cause motion or create change.
SC.3.E.5.2	Identify the Sun as a star that emits energy; some of it in the form of light.

Fourth Grade Benchmarks

SC.4.N.1.1	Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information, conduct individual and team investigations through free explorations and systematic investigations, and generate appropriate explanations based on those explorations.
SC.4.N.1.3	Explain that science does not always follow a rigidly defined method (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.L.16.3	Recognize that animal behaviors may be shaped by heredity and learning.
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	Recognize that plants use energy from the Sun, air, and water to make their own food.

SC.4.L.17.2	Explain that animals, including human, 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.
SC.4.E.6.3	Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.
SC.4.E.6.6	Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).
SC.4.P.8.2	Identify properties and common uses of water in each of its states.
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.10.2	Investigate and describe that energy has the ability to cause motion or create change.
SC.4.P.10.4	Describe how moving water and air are sources of energy and can be used to move things.

Second Grade Florida Core Standards Language Arts

LAFS.2.L.3
LAFS.2.RI.1
LAFS.2.RI.3
LAFS.2.RL.1
LAFS.2.RL.3
LAFS.2.SL.1
LAFS.2.SL.2
LAFS.2.W.3

Second Grade Florida Core Standards Math

MAFS.2.G.1
MAFS.2.MD.4
MAFS.2.OA.1

Third Grade Florida Core Standards Language Arts

LAFA.3.L.3
LAFA.3.RI.1
LAFA.3.RI.3
LAFA.3.RL.1
LAFA.3.RL.3
LAFA.3.RF.3
LAFA.3.SL.1
LAFA.3.SL.2
LAFA.3.W.3
LAFA.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
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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

Materials

Teacher

- Choose from one of the following books:
  - Who eats what? Food chains and food webs by Patricia Lauber
  - Ocean Sunlight: How tiny plants feed the seas by Molly Barg
  - The true story of the three little pigs by Jon Scieszka
  - What do you do if something wants to eat you? By Steve Jenkins
- Whiteboard
- Piece of bread
- Knife to cut the bread

Student

- School Lunch

Warm-up

1. Read one of the books listed in teacher's materials
2. Have the students record what they ate for lunch

Main Lesson

1. Ask students what they had for lunch. List their responses on the board. Write the words plants and animals on the board. Ask students to sort the food items into these two categories. For example, a lunch consisting of a cheeseburger, fries, and milk would be sorted this way:

Plant	**Animal**
Bun	Cheese
Lettuce	Hamburger
Tomato	Milk
Ketchup	
French Fries	

2. Ask students:
   a. Why do we need to eat?
   b. Where do cows get the energy they need to build muscle and produce milk?
   c. Where do plants get the energy they need to make leaves, like the lettuce we eat?
3. Explain energy flow and the fact that only a small part (10%) of the energy captured or eaten at one step in the food chain is available to organisms at the next step in the food chain. To visually explain this process:

4. Hold up a slice of bread and tell students that one slice of bread contains approximately 100 calories of energy. If they eat the bread, they will get all 100 calories of energy to use for moving, growing, and making heat.
5. Now cut the bread into 10 pieces. Explain that if a cow eats the bread instead, and students then eat a burger made from that cow's meat, they would get only 10 percent of the energy from that slice of bread. (Hold up one of the bread pieces.) That's because the cow uses 90 calories or 9/10 (90%) of the energy in the bread to move, grow, and make heat. Only 10 calories or 1/10 (10%) of the energy from the bread gets stored in the cow's meat and is available to students when they eat the hamburger.

Reflection

- What happens to all the trash you throw away at lunch? Where does it go? What happens to it there?
- What happens to the energy stored in uneaten food and in dead plants and animals?
- Where do plants get the energy they need to grow?
- What do plants use the sun's energy to manufacture?
- What do plants use most of their energy for?
- For what does the cow use the energy from the corn?
- How much of the energy stored in the corn gets passed on to you in burgers?
- For what do you use the energy in the burgers?
- How would eating more plants help us better feed the many people in the world?
- What else besides energy do we get from plants and animals? When we eat them? (Answers: vitamins, minerals, and other nutrients needed to build body parts and keep the body running smoothly)
- What do decomposers eat?
- What do decomposers do with the energy they get from eating dead things and waste material from living things?
- What important role do decomposers play in our environment? (Be sure to point out the role decomposers play in returning nutrients back to the soil.)

Assessment

- Summarize by drawing a food chain that shows how energy in an ecosystem comes from the Sun and flows from producers to consumers to decomposers. For example:
  Sun -> grass -> rabbit -> fox -> bacteria (decomposers) feeding on dead fox
- Students should understand: Organisms need energy to move, grow, and keep warm.
- Students should understand: Energy comes from the Sun, gets captured by plants, and is then transferred from organism to organism.
- Students should understand: Energy is lost each step of the way as heat or energy needed for the chase.
- Participation in the activity

Attachments

- Information packet about the Loxahatchee River Center
- Map of the Loxahatchee River
- Food Webs of the Loxahatchee River Main Lesson
- Estuary food web sample sheet

Food Web

(Pretest / Post-test)

(You may use the back of this paper or attach additional sheets to answer the questions.)

1. Explain how animals get their energy.

2. Show the flow of energy in the Loxahatchee River food chain from a producer to a carnivore.

3. What do all animals need in order to survive?

4. Choose an animal and describe an adaptation the animal has to help it survive in its environment.

5. Pick one of the following ecosystems and create a food web. (cypress swamp, mangrove estuary, oyster reef, sea grass estuary, Atlantic coral reef)

6. Ho do human affect a food web?

Title
Food Web of the Loxahatchee River Regular Lesson

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Materials for Pre-Post Lesson

Teacher
- River Center Packet
- Copies of the Pre & Post Test and Answer Key

Students
- Paper
- Pencil

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

- Review the information in the Loxahatchee River Center packet with your students.
- Complete optional mini lesson provided by River Center education staff upon field trip registration confirmation
- Administer pre-test to your students
- Review the interactive website activity http://loxahatcheeriver.org/rivercenterflash/index.html

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 habitats, species identification and adaptations, and food chains
    b. Food Webs of the Loxahatchee River hands-on activity: See below
    c. Water resources discussion – Where our water comes from, how we use water, where it goes once it's down the drain, water conservation
3. Touch tank demonstration

Food Webs of the Loxahatchee River Main Lesson (Completed during visit with River Center staff)

1. Students will participate in an activity to identify the components of a food web in the Loxahatchee River and the inter-connectedness of the animals and plants in these ecosystems and watershed
2. Each student will tell the class what animal they represent, as each organism is introduced, review the adaptations that allow it to survive in this ecosystem/watershed and how each one gets its energy. We will focus on the flow of energy from the producer, consumers, and decomposers.
3. Using string students will start connecting and interacting species based on survival. The process will be repeated until all related cards/students have been connected. Holding their part of the web, students will see which species are important to multiple animals, and asking several questions about impacts on this food web, how the interaction could be affected.

4. After completing the activity we discuss the various positive and negative impacts on this ecosystem, when environments change, plants and animals must adapt to the new conditions in order to survive or they will die.
    - Hurricanes, Fertilizers, pesticides, litter/cleanups, boat traffic/laws

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

- Use the list of organisms listed below (or chose your own) to construct a food web that might be found in an estuary (or another part of the Loxahatchee River Watershed). Discuss what would happen if one of these organisms disappears from this area or becomes over populated.
    - Raccoons, sea grass, bacteria, snails, oysters, shrimp, small fish, great blue heron, crabs
- Write about your experiences at the Loxahatchee River Center

Assessment

Participation in the activity
Complete the post-test included in your packet

Attachments

Information packet about the Loxahatchee River Center

Creating STEM Connections – Food Web 2nd, 3rd, & 4th Grades

Science

- See standards above

Technology

-

Engineering

- .

Mathematics

- See standards above