Day 9: Who Are the Producers in Aquatic Ecosystems?

Mini-lesson — Children practice previously taught reading strategies as needed.

Inquiry Circles — Children complete answering their questions on the inquiry chart today.

Guided Science Investigation — Learners will draw their ideas of what a pond ecosystem looks like and identify the producers and consumers in a pond food chain.

Literacy Strategy: practice making connections	**Reading TEKS** ELA.3.6E	**CCSS** SL 3.2, W.3.7, W.3.8
Science Concept: algae, other aquatic plants, and some types of bacteria are the primary producers in aquatic food chains.	**Science TEKS** **2018–19:** 3.9A, 3.9B **2024–25:** 3.12B	**NGSS** 3-LS4-4

Science and Literacy Connection: Scientists make connections to the research of others before them. They can be inspired by something they've read, heard, or seen, and this may lead them to ask new questions.

Mini-Lesson (15 minutes)

OVERVIEW

Mini-lesson practice should be used as a time to practice the reading strategies previously taught in this unit. Teachers are encouraged to use this time to best meet the needs of their learners. Perhaps your class needs more time with the mini-lesson from the day before, or you may choose to circle back to mini-lessons from a week ago. The choice is yours; we just ask that you use this time to practice!

Teachers should determine if this mini-lesson will be facilitated with the whole class or a small group (i.e., a particular inquiry circle team) that needs additional support. If you are working with a small group, we suggest your other learners spend additional time within the inquiry circles.

Science Inquiry Circles (30 minutes)

OVERVIEW
Children have answered most or all of their questions on the inquiry chart. Today they must complete their work.

MATERIALS
Each team member needs:
- team Inquiry Chart
- pencils
- exploratory texts/media (see the "Ecosystem Resources" spreadsheet for ideas)

Teacher needs:
- class Inquiry Chart (pond ecosystem)

PROCEDURE
Each *italicized statement* below contains suggested wording the teacher may use for the lesson; additional teacher actions and considerations are in parentheses.

Before Inquiry Circles
1. *It is time to get into our inquiry circle teams. You will be with the same inquiry team as yesterday.*
2. *You have answered most (or all) of your Inquiry Chart questions. Review your Inquiry Chart to determine if you have questions that still need to be answered or if you have a question that needs more information from a different book, website, or an eBook.*
3. *We will start on our synthesis statements soon so we need to be sure to complete the Inquiry Chart today.*
4. *Now, inquiry teams will work together on their Inquiry Chart.* (Be sure to display the class Inquiry Chart as a model.)

During Inquiry Circles (20 minutes)
1. *You should make sure that your Inquiry Chart is complete. Have all questions been answered? Do you need more information? Have you recorded all of your resources on the Inquiry Chart?* (While teams are working together, walk around the room to facilitate as needed and to monitor progress.)
2. *Remember we have anchor charts to help guide your thinking. Do not forget to use them while in teams.* (Refer to all the mini-lesson anchor charts used to date, which should be posted in the classroom where learners can easily refer to them. Remind learners that they can use any of the reading strategies during inquiry circles.)
3. *My role is to help guide the inquiry circles, but I expect you to work as a team to solve your problems together.*

After Inquiry Circles (10 minutes)
1. *As we conclude our inquiry circles for today, each team will have a chance to share the questions they answered, as well as what they accomplished and what reading strategies they used. The Lab Director will lead the discussion about today's results. What did the team learn about its*

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ecosystem? Which reading strategy did team members use, and how did it help? What other problems did the team encounter? How did the team resolve those problems?

2. *The Data Scientist will now share with the entire class either something the team learned about its ecosystem, a reading strategy, or how the team solved a problem.* (Try to encourage teams to share a variety of things. You do not want just facts about ecosystems, just mini-lesson reading strategies, or just cooperative learning strategies. If you saw a great example in action, encourage that team to share with the entire class.)

Guided Science Investigation (30–45 minutes)

OVERVIEW
Learners will draw their ideas of what a pond ecosystem looks like. When complete, they will identify the producers and consumers in a pond food chain.

GUIDING QUESTIONS
Who are the producers in a pond ecosystem? What does a pond food chain look like?

BACKGROUND INFORMATION FOR THE TEACHER
Aquatic ecosystems, like terrestrial ecosystems, all depend on producers for the stability and success of their food chains and food webs. Ponds support a variety of ecosystems both on the surface surrounding it and in its waters.

Algae, single-celled photosynthetic organisms, are the primary producers in pond waters, with other aquatic plants contributing to the energy of food chains to a lesser extent. Suspended in water, this phytoplankton creates the energy necessary for the consumers' survival and is a source of dissolved oxygen for the pond.

MATERIALS
Each team member needs:
- science notebook
- pencil

Each team needs:
- 1 copy of the "Blank Pond" image

Teacher needs:
- "Blank Pond" image
- "Pond Drawing" image
- "Real Pond" image
- chart paper
- marker(s)
- computer/projector

SETUP
- Make copies of the "Blank Pond" image (1 per learner).

- Draw the same "blank pond" on a sheet of chart paper (you will save this drawing for later use).
- Prepare to project the "Real Pond" image (or make copies).
- You will also project the "Pond Drawing" image when noted below.

SAFETY
Remind learners to follow safety rules for making observations on their sample.

DAILY OBSERVATIONS
Observations can be made any time of the day as long as they are done daily. Observations should take 5–10 minutes, depending on the data each team is collecting.

PROCEDURE
Engage
1. Project the **"Real Pond" image**. *Describe what you see in the photograph.* (Grass, water, plants, any sign of life?) Accept all responses.
2. Identify the image as a pond. Explain that a natural pond is a body of water surrounded by banks. Explain that the term "banks" refers to the ground alongside or surrounding the pond and that rises above the water level. Point them out in the image.
3. Ask, *Are you familiar with any other types of ponds?* (Manmade?) *Have you ever been to a pond? If so, what have you seen there? Describe what it looked like.*
4. *Can anyone explain how ponds are different from rivers or streams?* Accept responses. If it's not mentioned, explain that, unlike rivers or streams, pond waters are still—they don't flow.

Explore
1. Distribute a **"Blank Pond" image** to each team member and post the chart paper on which you have reproduced the same image. Tell learners that this is a cross-section view of the pond. Explain that a cross-section is obtained when you "slice" through an object. *Imagine slicing an apple right down the middle and opening it up. You will see a cross-section of the apple. In our example, we are looking at the cross-section of a pond.*
2. Refer back to the **"Real Pond" image**. *Think, what kinds of animals might live in the area around the pond?* Instruct learners to draw their ideas in the appropriate place on the **"Blank Pond" image**.
3. *Why would these animals live close to a pond?* Accept responses. (Food? Water?)
4. Tell the class that even though you may not see it (even in real life) there is an ecosystem under the surface of the pond, in the water!
5. Ask learners to take turns drawing their ideas of what they think they might find living **IN** the pond.
6. Allow 5 minutes for them to complete their drawings, circulating around the room as they work to see what they are thinking.

Explain
1. When time is up, ask volunteers to share what they have drawn inside the pond. (Expect them to have fish and perhaps insects, frogs, turtles, etc.) Quickly sketch all of their ideas on the chart paper.
2. Remind learners, *In the last lesson we discussed the importance of producers in a food chain. Ponds have their own food chains. Who the producers are in the pond*? (Answers may vary and may include plants and grass).

3. Explain that submerged or floating plants in the pond may provide some of the energy for the food chain but that the main producer is a microscopic organism: algae.
4. *Algae, other types of phytoplankton, and some types of bacteria are at the base of the food chain in any aquatic ecosystem. They are the primary producers!*
5. Add, *However,* t*hese primary producers are so small that many of them can only be seen through a microscope, but they are present in the water.*
6. Refer learners back to the drawing you made on the chart paper. *Predict, who eats whom in a food chain that begins with algae as a producer?* Accept their responses and note them on the chart paper.
7. After discussing their ideas, project the **"Pond Drawing" image** (algae, tadpoles, fish, heron). Point out and discuss each part of the chain, beginning with the phytoplankton (algae).
8. Explain that this is a simple food chain and that, based on their ideas, they can see that there are many possibilities. *Consider that organisms enjoy eating a variety of foods. When you have many food chains, it becomes a food web.* You might refer to the science language card for food web.
9. As you point to the drawing on the chart paper, ask*, What do you think is the connection between organisms that live around or near a pond and organisms that live IN a pond?* Write your ideas about this in your science notebook.

Elaborate
1. Tell learners that they will learn more about algae and phytoplankton in the next lesson.
2. Ask if they have found any information about food chains in the research they are doing. If not, it may be something to look for as they continue their research.

Evaluate
1. Did learners identify appropriate organisms that live around and in the pond ecosystem?
2. Were any connections made between organisms that might live around the pond and those that might live in the pond?
3. Did learners identify the producers in a pond?
4. Did they communicate a reasonable understanding of a pond food chain?

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Science Language

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- A **food chain** describes the sequence of who eats whom that transfers energy between organisms.
- A **food web** is made up of many different food chains in a single ecosystem.
- **Producers** make their own food from simple substances and energy from the Sun. Plants are producers.
- **Consumers** cannot make their own food. They get their energy from eating producers and other consumers.
- **Decomposers** eat or break apart dead plants and animals, recycling nutrients that plants need for growing.
- **Bacteria** are organisms so small they can only be seen through a microscope. Some are decomposers that break down dead organisms.
- **Fungi** are a group of decomposers that feed on decaying matter. Mushrooms are a type of fungi.
- Living things get **energy** from the food they eat to help them move, grow, and survive.

Expanded Standards

Reading TEKS

ELA.3.6E: Listening, speaking, reading, writing, and thinking using multiple texts. The student uses metacognitive skills to both develop and deepen comprehension of increasingly complex texts. The student is expected to: (E) make connections to personal experiences, ideas in other texts, and society.

CCSS

SL.3.2: determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally. **W.3.7:** conduct short research projects that build knowledge about a topic. **W.3.8:** recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories.

NGSS

3-LS4-4: Crosscutting Concept: A system can be described in terms of its components and their interactions.

Science TEKS

2018–19: 3.9A: observe and describe the physical characteristics of environments and how they support populations and communities of plants and animals within an ecosystem. **3.9B:** identify and describe the flow of energy in a food chain and predict how changes in a food chain affect the ecosystem such as removal of frogs from a pond or bees from a field.

2024–25: 3.12B: identify and describe the flow of energy in a food chain and predict how changes in a food chain such as removal of frogs from a pond or bees from a field affect the ecosystem.