

Grade 3: Life Science Module: Unit 2

Lesson Sequence 4: The Importance of Habitat

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Overview

Total Time: 3 hours of instruction (divided into three sections)

In this lesson sequence, students return to the cause and effect relationship between an organism and its habitat. They think specifically about the habitat of duckweed and how a pond can be a healthy habitat for frogs in each stage of the life cycle. They continue to practice constructing arguments with a claim, evidence, and scientific reasoning.



Lesson Sequence Focusing Question and Big Idea

What is the cause and effect relationship between an organism and its habitat?

- An organism is affected by how well its habitat provides its necessary resources (food, water, shelter, space, and air) for survival. How well the habitat provides these resources determines how well an organism will survive.

Long-Term Learning Addressed (Based on NGSS)

Construct an argument of the observed relationships between environment and survival of an organism (surviving well, less well, or not at all). (Based on NGSS 3-LS3-2 and 3-LS4-3)

This lesson sequence explicitly addresses:

Science and Engineering Practices

- **Analyzing and Interpreting Data:** Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation. *Students collect and analyze data on duckweed to understand that duckweed grows well under certain conditions. Note: This Science and Engineering Practice is not explicitly aligned with 3-LS3-2 or 3-LS4-3.*
- **Engaging in Argument from Evidence :** Construct and support an argument with data, evidence, or a model. *Students construct an argument about the observed and researched relationship between the habitat and an organism's ability to survive well. They use the gathered evidence from research about a frog's habitat to argue which part of a pond habitat is most important.*

Crosscutting Concepts

- **Cause and Effect:** Students routinely identify and test causal relationships and use these relationships to explain change. *Students identify the cause and effect relationship between the habitat and an organism's ability to survive well.*

Disciplinary Core Ideas

- **LS4.C Adaptation:** For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. *Students look at how different parts of a habitat provide the needs that organisms (duckweed and frogs) have in order to survive well.*

- **LS3.B Inheritance of Traits:** The environment also affects the traits that an organism develops. *Students observe how the different parts of a simulated habitat affect the growth of duckweed.*



Lesson Sequence Learning Target

- I can explain the effect that the habitat has on how well an organism survives.

Ongoing Assessment

- Student science notebook: Habitat entry
 - Engaging in Argument: Duckweed Section
- Scientists Meeting: Building Understanding

Agenda

Total Time: 3 hours of instruction

Section 1

1. **Opening**
 - A. Reviewing Focusing Question and Learning Target (15 minutes)
2. **Carrying Out an Investigation**
 - A. Gathering Data from Duckweed (10 minutes)
3. **Analyzing and Interpreting Data**
 - A. Scientists Meeting: Analyzing and Interpreting Data (25 minutes)
 - B. Engaging in Argument: Duckweed and Habitat (25 minutes)

Section 2

1. **Obtaining Information**
 - A. Habitat Stations (50 minutes)

Optional Extension: Frog Habitat Observation

Section 3

1. **Engaging in Argument**
 - A. Identifying Evidence (30 minutes)
 - B. Scientists Meeting: Building Understanding (25 minutes)

Teaching Notes

Purpose of lesson sequence and alignment with NGSS standards:

- In this sequence, students continue to investigate how the environment can influence the traits of an organism (a Disciplinary Core Idea). They also learn that in order for an organism to survive well, the environment needs to be a suitable habitat for an organism (a Disciplinary Core Idea).
- In Section 1, students return to the duckweed investigation they started in Lesson Sequence 2. They collect data and analyze the results (a Science and Engineering Practice). They then use this data to argue the best place in a pond for duckweed to grow.

- In Section 2, students explore the cause and effect relationship (a Crosscutting Concept) between a frog's ability to survive well and its habitat. Rotating through stations, they obtain information about the food, water, shelter, and space available in a pond and take note of the needs of a frog throughout its life cycle.
- In Section 3, students synthesize the information from the lesson sequence and practice constructing an argument (a Science and Engineering Practice).

How it builds on previous work in the Life Science Module:

- In Lesson Sequence 2, students started an investigation with duckweed. In this lesson sequence, they collect and analyze their data from the investigation to understand the cause and effect relationship between an organism and its habitat. They apply this learning to frog habitats. They also use this learning as they design their frog ponds in the next lesson sequence.

How it connects to the CCSS Standards and EL Education's Language Arts Grade 3

Module 2:

- Students use the Back-to-Back and Face-to-Face protocol in Language Arts Grade 3 Module 2.
- The student argument in Section 1 provides students with an opportunity to practice argument writing (CCSS ELA W.3.1).
- The Scientists Meeting in Section 2 provides students with the opportunity to practice their speaking and listening skills while collaborating in whole group discussions (CCSS ELA SL.3.1).

Possible student misconceptions:

- Students need to understand that water and sunlight are the components that plants need to make food. Students may think of these resources as food for the plant instead of resources to make food.
- Students may not understand that plants make their own food because they hear people talking about “feeding” their plants when applying fertilizer.

Possible broader connections:

- Connect to other sciences by thinking like a scientist about the cause and effect relationships all around us. Think of the cause and effect relationship between the sun and the earth, producers and consumers, force and motion.

Areas where students may need additional support:

- Continue to remind students of the norms and expectations for pair and group work.
- For students who need additional support organizing their ideas in conversation, provide discussion questions from the Scientists Meeting in advance and provide ample processing time.

- Students will construct an argument for their frog pond as part of the summative assessment in Lesson Sequence 5—preview that summative assessment. Students will practice constructing an argument twice in this lesson sequence.
- If the duckweed was collected locally, return it to its habitat. If it was ordered, discard of it in the trash, not down the drain.

In advance:

- Read each section and complete the Preparing to Teach: Self-Coaching Guide.
- Select a duckweed plant that is growing well to use as an exemplar in Section 1.
- Prepare Habitat Stations (see supporting materials): Decide how to set up the three stations in your space. Consider duplicating resources so that fewer students are at each station at a given time. Do not create more than six stations (two of each kind). Consider augmenting the stations with the optional materials suggested.
- Determine groupings for the Habitat Stations.
- Review the Back-to-Back and Face-to-Face protocol (see Classroom Protocols pack on Curriculum.ELeducation.org).
- Post: Unit 2 guiding question, lesson sequence guiding question, lesson sequence learning targets, Habitat anchor chart, Planning a Frog Pond anchor chart, Norms of a Scientists Meeting anchor chart, and Scientists Do These Things anchor chart.

Optional extensions:

- *Frog Habitat Observations:* Consider visiting local pond(s) to explore frog pond habitat. Create a note-catcher for students to gather evidence from what they see at the pond about the food, water, shelter, and space available. This information can be used as evidence as they create their frog pond design and argument in Lesson Sequence 5.

Vocabulary

habitat: the natural home of an organism

food: resources needed to grow (plants need water, sunlight, and carbon dioxide from the air to grow; animals eat plants or other animals)

water: clear liquid without color, taste, or smell (water is needed for every organism to survive well; how much water an organism needs, where the water is found, and the health of the water are all considered in a habitat)

shelter: a place to live; an animal lives near, on top of, around, or inside it

space: the amount of area that is available to use; the area or amount of space an animal or plant needs to survive well

organism: a living thing, like a plant or animal

Materials

General Materials

- ✓ Student science notebook (from Unit 1, Lesson Sequence 1; one per student)
 - Habitat entry (page 42 of student science notebook)
 - The Pond Is a System entry (from Lesson Sequence 3; page 38 of the notebook)
 - Environment and Organisms' Traits entry (from Lesson Sequence 2; page 32 of the notebook)
- ✓ Habitat anchor chart (begun in Lesson Sequence 2)
- ✓ Planning a Frog Pond anchor chart (begun in Lesson Sequence 1)
- ✓ Exemplar duckweed plant (from Lesson Sequence 2; one to display)
- ✓ Norms of a Scientists Meeting anchor chart (begun in Unit 1, Lesson Sequence 1)
- ✓ Scientists Do These Things anchor chart (begun in Unit 1, Lesson Sequence 2)
- ✓ Habitat Stations (for teacher reference)
- ✓ Highlighters (one per student)

Science-Specific Materials (gathered by the teacher)

- ✓ Duckweed Investigation materials (from Lesson Sequence 2)
- ✓ Teacher Duckweed Investigation materials (from Lesson Sequence 2)
- ✓ Teacher science notebook (from Unit 1, Lesson Sequence 1)
- ✓ Materials to augment the Habitat Stations (optional)
 - Jar of pond water
 - Live specimens of common pond plants
 - Live specimens of common bugs found in and around a pond
 - Abiotic features of ponds like a cup of mud, rocks, small fallen tree branches, or logs

Section 1: Opening

A. Reviewing Focusing Question and Learning Target (15 minutes)

- Direct students' attention to the posted lesson sequence focusing question and lesson sequence learning target and read them aloud ⁽¹⁾:
 - *“What is the cause and effect relationship between an organism and its habitat?”*
 - *“I can explain the effect that the habitat has on how well an organism survives.”*
- Invite students to take out their **student science notebook** and open to the **Habitat entry**.
- Provide students time to jot down their own thinking and preliminary responses to the focusing question.
- Circulate to support students. Look for them to be writing down responses such as: “An organism, like a frog, will survive well in a habitat where its needs for food, water, shelter, and space are met.”
- Direct students' attention to the posted **Habitat anchor chart** and **Planning a Frog Pond anchor chart** to remind students that a habitat is the natural home of an organism.

- Invite students to turn to their frog pond cross-section diagram in **The Pond Is a System** entry of their student science notebook.
- Ask students to turn and talk with an elbow partner:
“Do you have the three parts of a habitat on your cross-section diagram?” (Responses will vary.)
“Are habitat needs different for different parts of the life cycle?” (Yes. Frogs always need food, shelter, space, and water but not always the same kind.)
“What else do you need to know about the food, water, shelter, and space to design a frog pond so that frogs can survive well?” (Responses will vary.)
- Use the Habitat anchor chart and Planning a Frog Pond anchor chart to reinforce the idea that students need to be able to understand the relationship between organisms and their habitat, especially duckweed and frogs, to design a good frog pond.

Preparing to Teach: Self-Coaching Guide

1. How are my students doing with learning targets? How can I support them in their self-assessment?

Section 1: Carrying Out an Investigation

A. Gathering Data from Duckweed (10 minutes)

- Ask students to retrieve their **Duckweed Investigation materials** and move to sit with their group from Lesson Sequence 2.
- Invite students to open up their student science notebooks to the Duckweed and Habitat data table in the **Environment and an Organism’s Traits** entry ^(*).
- Remind students that they were investigating the cause and effect relationship between an organism’s traits and its environment, and the investigation question was:
 — “Under what conditions in a pond does duckweed grow well?”
- Emphasize the phrase *grow well*.
- Using a total participation technique, invite responses from the group:
“What will a duckweed plant that is growing well look like? What will be the size of its leaves? The color of its leaves? How many times will it reproduce and make more plants?” (The leaves will be full, the color will be green, and it will reproduce at least one time.)
- Show students an **exemplar duckweed plant** that is growing well.
- Explain that they are going to collect data on the size of the leaves, the color of the leaves, and the number of plants in their investigation.
- Retrieve the **Teacher Duckweed Investigation materials** and model how to observe the duckweed and record data on the Duckweed data table (in the **teacher science notebook**) including the date, color of the leaves, size of the leaves, and number of plants. Answer clarifying questions.
- Give students 5 minutes to record data with their group on their Duckweed data table.

Preparing to Teach: Self-Coaching Guide

1. How familiar are my students with gathering data? What support will they need?

Section 1: Analyzing and Interpreting Data

A. Scientists Meeting: Analyzing and Interpreting Data (25 minutes)

- Ask students to bring their science notebooks and gather for a Scientists Meeting.
- Direct students' attention to the **Norms of a Scientists Meeting anchor chart**.
- Using a total participation technique, invite responses from the group:
"What are the norms of a Scientists Meeting?" (take turns talking, build on one another's ideas, disagree respectfully, ask questions to clarify information)
- Tell students that the goal of this meeting is to interpret and analyze the data they have collected about the best places for duckweed to live. In other words: "What does the information on the Duckweed data table mean?"
- Give students specific positive feedback on their careful and persistent efforts to gather data. Tell them that analyzing the data will help them answer the question about the best places for duckweed to live in a pond ⁽¹⁾.
- Model for students how to make meaning from the Duckweed data table by thinking aloud. Say ⁽²⁾:
"I see that in my control, where I didn't put the ice cube in every day, the duckweed plants were all bright green, there were more plants, and the leaves grew bigger. I also see that in the Test 1 and Test 2 cups, the plants stayed bright green but there weren't as many as in the control cup and they were not as big. Because the color of the leaves stayed the same but there were fewer plants and the leaves were smaller in the cold water, I think I can claim that duckweed does not grow as well in colder water—so I don't think the deep or shady parts of the pond are best."
- Ask students to turn and talk with an elbow partner:
"What do you think the data in your Duckweed data table suggests?" (Responses will vary.)
- Invite groups to share out. Capture their variable and results on the board. Make three lists: grows well, doesn't grow well, and inconclusive. List the shared variable under the identified result.
- As students share, ask clarifying and probing questions about the data, and invite other students to ask questions as well:
"How much?"
"How many?"
"Was there anything surprising in the data?"
- Consider asking metacognitive questions about the data-gathering and analyzing process:
"How did you decide what to do next? What was surprising about that information?"
- Invite students to ask questions about the group's process as necessary:
"Did anyone get similar results? How are they similar?"
"Did anyone get different results? How are they different?"
"Does anyone see something this group might have missed?"
"Does anyone have any questions for this group?"

- When all groups have presented their data, ask students to evaluate the data they have collected as a class:

“Are there inconsistencies in the data?”

“Did we collect enough data?”

“What did this data make you wonder?”

“What further information might be helpful?”

“How might you get that data?”

“What further questions do you have?”

- Invite students to return to their seats.

Preparing to Teach: Self-Coaching Guide

1. Consider measuring the temperature of the water during the initial and final reading to practice gathering data and using a thermometer.
2. If my model experiment yielded no clear results, I can model finding “inconclusive” results.

B. Engaging in Argument: Duckweed and Habitat (25 minutes)

- Direct students’ attention to the posted **Scientist Do These Things anchor chart** and use the “Engage in Argument” section to remind students that a scientific argument has three parts: claim, evidence/reasoning, and evaluation of evidence.
- Remind students that they have carried out an investigation around this question and have been preparing to make an argument about the following question ⁽¹⁾:
 - What is the best place in a pond for duckweed to grow so that it grows well?
- Remind students that they have identified evidence that will help them answer this question. Ask:

“What evidence do you have about the conditions where duckweed grows best?” (This list generated on the board about the duckweed data.)

- Tell students they have also thought about the places in a pond when they read “Life in a Pond” and completed the Pond Article note-catcher in Lesson Sequence 3. Invite students to open their student science notebook to The Pond Is a System entry and find the Pond Article note-catcher.
- Tell students the next step in constructing an argument is to evaluate their evidence.
- Ask students to turn and talk with an elbow partner:

“Is the evidence we collected from reading and collecting data through an experiment good evidence? Why or why not?” (It is good evidence because it is from a variety of sources.)
- Tell students they are now ready to make a claim.
- Ask students to turn and talk with an elbow partner:

“What space in the pond seems to have conditions like the variables that seemed to make the duckweed grow well? How do you know?” (Responses will vary but may include: The deep parts of the pond have colder water; the edge of the pond has water with more debris.)

- Invite students to share out. Tell students that this statement—identifying the best space in the pond to make duckweed grow well—is their claim.
- Invite students to turn back to the Habitat entry in their student science notebook and put their finger on the “Engaging in Argument: Duckweed and Habitat” section.
- Walk students through this section, noting where they can find each piece of their argument:
 - Claim: Statement they just developed identifying the best space in the pond to make duckweed grow well
 - Evidence 1: Taken from Duckweed data table/collected list on the board/Pond Article note-catcher
 - Evidence 2: Taken from Duckweed data table/collected list on the board
 - Evaluation of evidence: Their evaluation of the evidence; stronger students should be encouraged to think about additional evidence that is needed
- Invite students to complete each of these sections individually to write their argument ⁽²⁾.
- Circulate to support students as they construct their argument ⁽³⁾.

Preparing to Teach: Self-Coaching Guide

1. Based on the student arguments constructed in Lesson Sequence 2, what kind of support do my students need?
2. What specific students should I work with during this time?
3. Would students benefit from working with their investigation groups instead of alone?

Section 2: Obtaining Information

A. Habitat Stations (50 minutes)

- Refocus whole group and direct students’ attention to the posted lesson sequence learning target. Tell students that in order to design the best frog pond, they need to understand the habitat needs of a frog. To better understand those needs and acquire this information, they are going to rotate through stations in groups.
- Invite students to open up their student science notebook to the Habitat entry and find the Habitat note-catcher.
- Ask students to follow along as you read the questions in each section of the note-catcher.
- Point out where you have set up the **Habitat Stations** ⁽¹⁾.
- Explain to students that they will be using the texts, pictures, and videos at each station to answer all the questions in their note-catcher about food, water, shelter, and space. Tell students they will have about 15 minutes at each station, and you will signal to them when it is time to move to the next station. Remind students that they will be working in groups, but that they should each complete their own note-catcher.
- Explain that there are three different stations with two of each type, so the class will be divided into six groups. Tell students that they should be sure to visit a water station, food station, and shelter/space station.

- Move students into pre-determined groupings and assign each group to a beginning station. Remind students to bring a pencil and their student science notebook with them ⁽²⁾.
- Invite students to begin working at the first station ⁽³⁾.
- Monitor time and facilitate transitions ⁽⁴⁾ ⁽⁵⁾.
- Direct students to return to their seats once they have visited all three stations.

Preparing to Teach: Self-Coaching Guide

1. How will I set up and distribute materials at stations?
2. How can I best group students for information gathering?
3. How can I best support students during station learning?
4. What can students work on if they finish the stations early?
5. How will I signal to students it's time to move?

Section 3: Engaging in Argument

A. Identifying Evidence (30 minutes)

- Remind students that the reason they have been learning about habitats is so they can collect evidence to help them argue that the frog pond they designed will be a good habitat and meet all the needs of a frog. They now know what the needs of a frog are and how those needs can be met in a frog pond.
- They will now practice making arguments with evidence and reasoning.
- Direct students' attention to the posted Scientists Do These Things anchor chart and remind them of the parts of an argument. Explain that they are going to practice making a scientific argument using the Back-to-Back and Face-to-Face protocol. Remind them that they used this protocol in Language Arts Grade 3 Module 2, and review as necessary. Refer to the Classroom Protocols pack on Curriculum.ELeducation.org for the full version of the protocol.
- Invite students to bring their student science notebook and find a partner and stand back-to-back with each other, being respectful of space.
- Ask students the following question:
“What is the most important part of the frog pond? Why?”
- Invite students to open their student science notebook to the Habitat entry and identify evidence that will help them argue what part of the frog pond is the most important. Remind them that they could also argue that no part is the most important but all parts are important.
- After 1 minute, ask students to turn face-to-face and share their responses.
- Have students repeat this process with the same partner for the following questions:
“What is your first piece of evidence from your notebook that supports your claim in response to the question ‘What is the most important part of the frog pond?’”
“What is your scientific reasoning?”

- Have students repeat this process with a new partner for the following questions:
“What is the second piece of evidence from your notebook that supports your claim in response to the question ‘What is the most important part of the frog pond?’”
“What is your scientific reasoning?”
- Have students repeat this process with a new partner for the following questions:
“Discuss if your evidence or your partner’s evidence was good evidence. Did the evidence support (make sense with) the claim? Is there evidence you could collect that would help support your claim?”
- Refocus whole group and point out to students that they made a claim by answering the question ⁽³⁾.
- Ask students to return to their seats.

Preparing to Teach: Self-Coaching Guide

1. Would my students benefit from doing this exercise a few more times?

B. Scientists Meeting: Building Understanding (25 minutes)

- Ask students to bring their science notebooks and gather for a Scientists Meeting.
- Referring to the Norms of a Scientists Meeting anchor chart, remind students of the norms of this kind of meeting.
- Using a total participation technique, invite responses from the group:
“What are the norms of a Scientists Meeting?” (take turns talking, build on one another’s ideas, disagree respectfully, ask questions to clarify information)
- Tell students the goal of this meeting is to build understanding about the cause and effect relationship between a frog’s habitat (a frog pond) and the survival of the frog.
- Invite students to open their science notebooks to Habitat entry to the Constructing an Explanation section.
- Direct students’ attention to the posted lesson sequence guiding question and select a volunteer to read it aloud:
 — “What is the cause and effect relationship between an organism and its habitat?”
- Say ⁽³⁾:
“We know that the environment can affect the traits of an organism. We saw that with the Hungry Bullfrog game. We confirmed that with the duckweed experiment. Who can explain how the results of the duckweed experiment show us a cause and effect relationship?”
- Direct students’ attention to the Habitat anchor chart.
- Say something like: “And we know that organisms have needs for food, shelter or space, and water. And those things have to be available in the environment. The place where they can get all their needs met is the habitat. We learned all about the habitat of a frog today.”
- Using a total participation technique, invite responses from the group:
“What are some things you learned about the habitat of a frog?” (Responses will vary.)
- As students share, capture their responses in the Habitat anchor chart.

- Encourage students to build on one another's ideas:
 - "Can someone paraphrase what Student A said?"*
 - "Who thinks something similar to Student A?"*
 - "Who thinks something different from Student A?"*
 - "Can you add to what Student A said?"*
- Ask:
 - "How is the surface of the water in a pond part of the habitat for frogs?" (Responses will vary. Frogs eat some of the bugs that live in the surface of a pond.)*
 - "How is the bottom of the pond part of the habitat for frogs?" (Responses will vary but may include: Tadpoles and froglets swim in the pond water; eggs are sometimes sheltered by plants in the pond.)*
 - "How is the edge of the water in a pond part of the habitat for frogs?" (Responses will vary but may include: Tadpoles often live and eat in the shallow water at the edge; adult frogs jump out into the plants on the edge of the pond.)*
- Say:
 - "When you participated in the Back-to-Back and Face-to-Face protocol, you made an argument in your notebook about the pond (or a frog's habitat)."*
- Ask:
 - "What did you argue was the most important part of a frog's habitat? Why?"*
 - "Is one part of the pond more important than others, and why?"*
 - "How are the parts of the pond important to the life cycle of the frog?"*
 - "What if one part of the pond (give a specific example) was gone—would the frog survive? Would it complete its life cycle? Why or why not?"*
 - "What made you change your argument?"*
 - "What are other examples of how a habitat can provide the needs of a frog so that the frog survives well?"*
- Remind students to use the information in their science notebooks as evidence as they participate in the conversation about the cause and effect relationship between an organism and its habitat.
- Discuss students' responses about the most important part of a frog pond. Guide students to understand that there is not a most important part of a frog pond; rather, all parts are important as the different parts support the frog throughout its life cycle.
- If conflicting information arises, help students challenge one another's ideas respectfully:
 - "Why do you think you have different conclusions from Student A's?"*
 - "With what in Student A's argument do you disagree? On what points do you agree? What evidence do you have to support those ideas?"*
- Direct students' attention to the Planning a Frog Pond anchor chart.
- Ask:
 - "What have you learned that will help you complete your task to design a frog pond where a frog will survive well?" (Responses will vary but could include: the necessary parts of a habitat and how they relate to a frog's life cycle.)*
 - "What information are you still lacking?" (Responses will vary.)*

- Give students specific positive feedback about their ability to construct a scientific argument and gather the valuable information about frog ponds. (Example: “Based on all the good thinking I heard in your arguments today, I am confident that you can design a frog pond and argue why it’s a good design.”)

Preparing to Teach: Self-Coaching Guide

1. What are some additional questions I can ask if my students aren’t seeing the connections?
 - “Let’s think about what happened to the duckweed. That’s the effect. What happened to the duckweed?”
 - “Let’s think about what caused it. What did we do? How did the environment make a difference in the traits of the duckweed?”
 - “What evidence do you have?”