

Grade 3: Life Science Module: Unit 2

Lesson Sequence 1: Anchoring Phenomenon for Environment and Traits

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Overview

Total Time: 1.5 hours of instruction (divided into two sections)

This lesson sequence begins Unit 2 of the Grade 3 Life Science Module. The anchoring phenomenon for this unit is introduced with a class read-aloud of *Bullfrog at Magnolia Circle* and a video of a common frog habitat. After learning about the issue of habitat loss, students are introduced to their performance task: designing a frog pond that could be built in a schoolyard or nearby park.



Unit 2 Guiding Question and Big Ideas

What are necessary parts of a frog habitat, and how do they interact to support the survival of frogs throughout their life cycle? How can we build that (in the schoolyard or in the community or a local park)?

- Frog habitats must meet the needs of food, water, shelter, space, and air for the frog at all stages of its life cycle.
- Frogs have very distinct phases in their life cycle, and each phase has unique needs.
 - A frog's eggs do not need food, but they do need to be sheltered in a safe place that keeps them wet at all times. This is typically the shallow-water edge of a pond, with leaf litter and twigs to provide protection from possible predators.
 - When frogs are tadpoles, the food that is consumed is algae found along the edge or on the bottom of the pond.
 - When the tadpoles become froglets, their diet includes small insects in the water.
 - As adults, frogs will live on both the shore of the pond as well as throughout the water of the pond. The adult frog consumes insects and minnows—any animal small enough to fit into its mouth.
- Frog ponds can be built by finding a suitable site, making a plan for the shape and depth of the pond as well as what structures and features will meet the needs of the amphibians that will inhabit the pond.

Long-Term Learning Addressed (Based on NGSS)

Make a claim about the merit of a solution to a problem by citing relevant evidence about how the solution meets the criteria and constraints of the problem of habitat loss for amphibians. (Based on NGSS 3-LS4-4)

This lesson sequence does not explicitly teach any of the Science and Engineering Practices, Crosscutting Concepts, or Disciplinary Core Ideas. See Teaching Notes.



Lesson Sequence Learning Targets

- I can reflect on the issue of frog habitat loss.
- I can generate ideas about what I will need to know in order to design a frog habitat.

Ongoing Assessment

- Scientists Meeting: Gathering Ideas
- Student science notebook: Frog Pond Anchoring Phenomenon entry

Agenda

Total Time: 1.5 hours of instruction

Section 1

1. Opening

- A. Reading Aloud: *Bullfrog at Magnolia Circle* (15 minutes)
- B. Observing a Habitat (10 minutes)

Optional Extension: Pond Mapping

2. Obtaining Information

- A. Naming the Problem (20 minutes)
- B. Naming a Solution (20 minutes)

Section 2

3. Asking Questions

- A. Scientists Meeting: Gathering Ideas (25 minutes)

Teaching Notes

Purpose of lesson sequence and alignment with NGSS standards:

- In this lesson sequence, students are introduced to the performance task and the anchoring phenomenon for Unit 2, which is meant to activate student thinking and interest in the module guiding question, as well as to create a “need to know” for the long-term learning target. Because the purpose of this lesson sequence is to activate student thinking through the anchoring phenomenon, there are no Crosscutting Concepts, Science and Engineering Practices, or Disciplinary Core Ideas explicitly addressed. Students are asking questions and designing solutions (both Science and Engineering Practices), but these practices are not explicitly taught, nor are students expected to meet the rigor of the 3–5 grade level band. As students learn about habitat loss, they begin to note cause and effect (a Crosscutting Concept), but this concept is not explicitly taught at this point. Both the guiding question and the long-term learning are aligned with 3-LS4-4; by the end of the unit, students will be able to answer the guiding question and have mastered the long-term learning.
- In Section 1, students return to *Bullfrog at Magnolia Circle*, a book read aloud from in Unit 1, Lesson Sequence 1. In this lesson sequence, they read to learn about the bullfrog’s habitat. They also watch a video of a common frog habitat to further build their background knowledge.
- In Section 2, students observe aerial photos of urban sprawl and learn about the problem of frog habitat loss. They are introduced to one solution—building a local frog habitat. They read success stories of frog pond construction and are introduced to the performance task. Through the performance task, students demonstrate mastery of 3-LS3-2, 3-LS4-3, and 3-LS4-4.

- In this lesson sequence, the teacher continues capturing students' ideas in the teacher science notebook. Use the notes collected during Scientists Meetings and other class discussion time in conjunction with student work to guide instruction, create appropriate scaffolding, record student misunderstandings, and make connections between the science content and students' lives. Refer to it often.
- The lesson concludes as students participate in a Scientists Meeting to share their current thinking about the needs of frogs within a habitat.

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

- The learning previewed in this lesson sequence builds directly on students' learning from Unit 1. Students must draw on their learning of life cycles in Unit 1 to design a frog pond that meets the needs of a frog in all stages of its life. In Unit 1, students learn that an organism's traits are inherited from its parents. In Unit 2, students understand that an organism and its environment have an important relationship and the expression of those inherited traits can be influenced by the environment.

How it connects to the CCSS Standards and EL Education's Language Arts Grade 3 Module 2:

- In Language Arts Grade 3 Module 2, students read *Bullfrog of Magnolia Circle*.
- 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 may think that frog ponds cannot be built by humans. In fact, wetland restoration and pond building by humans is commonplace as well as fairly successful for providing habitats for frogs. Students are explicitly taught about successful pond construction in Section 2.

Possible broader connections:

- Connect to students' lives by discussing examples of construction projects in your area that have disrupted or changed wetland habitats.
- Connect to other sciences where human engineering or design has improved the lives of many organisms, including humans.
- Create math connections by including cost constraints of building the frog pond and having students research and determine the cost of materials necessary for construction.
- Consider creating partnerships with local wetland experts (see the Society of Wetland Scientists; www.sws.org) as well as park services in your area. Many experts are excited about opportunities to work with youth.
- Investigate local wetlands.
- Research laws that protect local wetlands.

Areas where students may need additional support:

- If students have not previously read *Bullfrog at Magnolia Circle* the book should be read through in its entirety the first time. During the second reading, the teacher should pause after each page to discuss and record observed pond structures.
- Students may need additional support processing negative feelings about human impact on the environment due to learning about habitat loss. Maintain a solution-oriented outlook, at this age level—students should be encouraged to think of how they can help.
- 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.

Down the road:

- Students will be designing their frog pond in Lesson Sequence 5 based on meeting the survival needs of frogs as well as the constraints shared during this lesson sequence. Consider structuring students in teams for this assignment.
- The purpose of the Scientists Meeting in this lesson sequence is to allow students to share their current thinking about the survival needs of frogs within a habitat as well as to uncover any student misconceptions. Students should be encouraged to talk to one another and add onto the ideas of their classmates. The teacher can encourage students to reflect on their thinking by asking questions such as: “Why do you think that?” Additionally, probing for details (e.g., “Tell me more about that”) can lead to a deeper understanding of student thinking. Remember, you don’t need to correct misconceptions at this point. Rather, take note of what instruction your students will need. This whole class discussion also allows students to clarify their thinking before writing about their ideas in the student science notebook.
- Be sure to guide the student conversation during the Scientists Meeting so that “learn about a frog’s habitat” is on the Planning a Frog Pond anchor chart because student learning in Lesson Sequences 2–4 centers on the components of a frog habitat. Identifying the necessary components of a frog’s habitat and the relationship of the habitat to each phase of the frog’s life cycle will be an essential part of the performance task.
- Gather materials for the duckweed experiment in Lesson Sequence 2. If possible, collect local duckweed. Duckweed is a common aquatic plant found in lakes, ponds, and other still bodies of water. If collecting locally is not possible, order it online (see Additional Resources in the Grade 3 Life Science Module Overview for possible vendors). You will need approximately $\frac{1}{4}$ cup for the class. See the materials list in Lesson Sequence 2.

In advance:

- Read each section and complete the Preparing to Teach: Self-Coaching Guide.
- Prepare:
 - Technology necessary to play “Common Frog” (<http://www.arkive.org/common-frog/rana-temporaria/video-03a.html>).
 - Before and After Habitat slideshow.
 - Pond Success Stories photo cards. Students will tape a card into their notebook, so be sure there are enough copies for each student to have one card.

- Determine triads for Section 2.
- Post: Unit 2 guiding question, lesson sequence learning targets, Norms of a Scientists Meeting anchor chart, Scientists Do These Things anchor chart, and Planning a Frog Pond anchor chart.

Optional extensions:

- *Pond Mapping*: Students go to a local pond and complete detailed observation. See <http://www.ca4h.org/files/13927.pdf> for more information.

Vocabulary

habitat: the natural home of an organism where its needs for food, water, shelter, and space are met

constraints: restrictions or guidelines such as time, money, safety, or materials that limit or direct what is possible

Materials

General Materials

- ✓ *Bullfrog at Magnolia Circle* (book; one to display; for teacher read-aloud)
- ✓ “Common Frog” (video; play 0:00–1:37; see Teaching Notes)
- ✓ Before and After Habitat slideshow (to display; teacher-created; see Teaching Notes)
- ✓ Student science notebook (from Unit 1, Lesson Sequence 1; one per student)
 - Frog Pond Anchoring Phenomenon entry (page 30 of student science notebook)
- ✓ Pond Success Stories photo cards (one set per triad)
- ✓ Tape (one per triad)
- ✓ Performance task (one per student and 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)
- ✓ Unit 2 guiding questions (one to display)
- ✓ Planning a Frog Pond anchor chart (new; co-created with students during Section 2; see supporting materials)

Science-Specific Materials (gathered by the teacher)

- Teacher science notebook (from Unit 1, Lesson Sequence 1; for teacher reference)

Section 1: Opening

A. Reading Aloud: *Bullfrog at Magnolia Circle* (15 minutes)

- Direct students’ attention to the posted lesson sequence learning targets and read them aloud:
 - “*I can reflect on the issue of frog habitat loss.*”
 - “*I can generate ideas about what I will need to know in order to design a frog habitat.*”

- Underline the word *habitat*.
- Ask:
“What do you already know about where frogs live?” (Responses will vary.)
- As students share, capture their ideas in the **teacher science notebook** to be referenced later.
- Define where a frog lives and meets its needs for survival as its *habitat* ⁽¹⁾.
- Using a total participation technique, invite responses from the group:
“Based on the learning targets, what will your task be in this lesson sequence?” (brainstorming about how to make a place where frogs can live)
- Gather students in a circle for a read-aloud ⁽²⁾.
- Tell them they are going to listen to you read an excerpt of *Bullfrog at Magnolia Circle* aloud. As you read aloud, they should work like a scientist to make close observation of the living and non-living structures (plants, water, rocks, logs) that are present in the bullfrog’s habitat in the story.
- Read pages 6–8 and 24–30 of *Bullfrog at Magnolia Circle* aloud, pausing after each page to ask:
“What structure(s) did you hear about or see in the bullfrog’s habitat?” (rock, lily pad, pond, plants to attract insects, long grass to hide in, shallow water, deeper water)
- As students share, capture their ideas in the teacher science notebook ⁽³⁾.
- Invite students to capture the class ideas in their notebook in writing or pictures.

Preparing to Teach: Self-Coaching Guide

1. What experience do my students have with the term *habitat*? Will they need further explanation?
2. How familiar are my students with the text? Would they benefit from having it read in its entirety first? Or alternatively, if they have heard it many times, perhaps a picture walk would be more appropriate?
3. Will I use chart paper to track the information publicly or my teacher science notebook?

B. Observing a Habitat (10 minutes)

- Give students specific positive feedback on their close observations. (Example: “You were looking very closely to notice the plants and animals in the habitat.”)
- Tell students that they are going to now view a video of various frogs’ habitats and at different stages in the frogs’ lives. Again, ask them to notice the different living and non-living structures that are present in the various habitats.
- Show the “**Common Frog**” video.
- Ask students to turn and talk with an elbow partner:
“What living and non-living structures did you notice?” (Responses will vary.)
- Show the video again. Call on volunteers to share out with the whole group ⁽¹⁾.
- As students share, capture their ideas in the teacher science notebook.
- Invite students to capture the class ideas in their notebook in writing or pictures.

Preparing to Teach: Self-Coaching Guide

1. If my students are failing to notice living and non-living structures in the habitat, what questions can I ask?

Section 1: Obtaining Information

A. Naming the Problem (20 minutes)

- Arrange students into pre-determined triads.
- Ask students to turn and talk (1):
 - “Where have you seen places like those in the video or Magnolia Circle near our school or where you live?” (at a pond, in the woods, in my backyard)*
 - “Has anyone seen a green space that has been changed to be a street or a house?” (Responses will vary, but encourage students to consider construction and road building sites in the area.)*
 - “Have you ever seen a wild frog?” (Responses will vary.)*
- If students respond “yes,” consider posing the following questions:
 - “What did that place look like?” (a lot of green plants and water)*
 - “What would happen if the structures—like plants, rocks, and water—were removed and there was a sidewalk put down instead? Would that be a good habitat for a frog? Why?” (Responses will vary. Do not correct students at this point, but note any misconceptions.)*
- Display the **Before and After Habitat** slideshow.
- As students examine the photos, ask them to discuss within their group about what organisms lived in these places at different times:
 - “What has changed in the two photos?” (The trees have been cut down and a manmade structure has been put up.)*
 - “What does it mean when the color turns from green to gray?” (Concrete or buildings have replaced the trees.)*
 - “Where do you think the organisms who lived here in the first photo live now?” (They can’t live where they used to live.)*
 - “What happened to all the living things that used to live in this area?” (Some died, some left, and some stayed and found a way to survive in the new habitat.)*
 - “Why is this a problem?” (The animals may not be able to travel to a new location.)*
- When you come to the last set of photos, explain that Slide 7 shows a pond called Little Paradise Pond in Woodlands, Texas. Then show the students Slide 8.
- Discuss this slide whole class. Ask ⁽²⁾:
 - “What happened to the pond?” (It was drained or filled in.)*
 - “How do you know?” (It turned from green to gray.)*
 - “Habitat loss is a major problem for amphibians because they need a place that is both wet and dry. That’s not always easy to find. What happened to the frogs and other amphibians that lived in this pond?”*

(Responses will vary. Students will likely say they died or could not find a wet place for their eggs and so couldn’t reproduce.)

- Invite students to take out their **student science notebooks** and open to the **Frog Pond Anchoring Phenomenon entry**, putting their finger on the “Naming the Problem” section. Tell students they will have 5–10 minutes to write three to five sentences about how habitat loss affects frogs and why this is a problem.
- Invite students to begin writing.
- Circulate to support students as they work.
- After 5–10 minutes, invite volunteers to share out.

Preparing to Teach: Self-Coaching Guide

1. How likely is it that my students have seen a pond? What are some local examples? What pictures could I bring in to help them become more familiar with ponds?
2. Where can I find local pictures that show the urban growth of our area?

B. Naming a Solution (20 minutes)

- Keep students in triads.
- Using a total participation technique, invite responses from the group:
“Organisms depend on their environment for survival. How can we help frogs survive?”
- Invite a few volunteers to share out. Then tell students that they will be creating a solution to frog habitat loss. This solution will be a design for a frog pond for their community.
- Tell students that there are numerous examples of frog ponds being built by humans and having a positive impact on frog habitat. Explain to students that they are going to read about other people who built ponds to help stop frog habitat loss ⁽¹⁾.
- Distribute the **Pond Success Stories photo cards** to each triad and **tape**.
- Tell students that they should work with their group to read each card closely and discuss:
“What made this pond successful?”
“What evidence is there that the pond was successful?”
- After 10 minutes, invite volunteers to share out.
- Focus students’ attention on the Naming a Solution section in their student science notebook, and invite them to tape one of the cards into their notebook (or record the evidence from the pond success cards).
- Distribute and display the **performance task** handout. Read it aloud as students follow along, reading silently in their heads.
- Direct students’ attention to the *constraints* of the frog pond design. Define the word *constraints* as restrictions or guidelines such as time, money, safety, or materials that limit or direct what is possible ⁽²⁾.
- Invite students to turn and talk:
“What do you think you will need to know about frogs and frog habitats in order to complete this task?” (what frogs need to live and where frogs normally live in the wild)
- Answer clarifying questions.

Preparing to Teach: Self-Coaching Guide

1. Could I find some local examples of wetland reclamation? Are any frog ponds constructed locally?
2. If my students are going to design and build a pond in the schoolyard or local park, what would be the additional constraints?

Section 2: Asking Questions

A. Scientists Meeting: Gathering Ideas (25 minutes)

- Ask students to bring their student science notebooks and gather for a Scientists Meeting ⁽¹⁾.
- Direct students' attention to the **Norms of a Scientists Meeting anchor chart** ⁽²⁾.
- 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)
- Remind students that a Scientists Meeting is a conversation where they speak to one another as scientists and not just to the teacher.
- Tell students the goal of this meeting is to gather ideas and questions about designing frog ponds. This will help them complete the performance task at the end of this module.
- Reference the **Scientists Do These Things anchor chart** and remind students that throughout this Life Science Module they will be doing the work of scientists—like engaging in argument. Point out that the performance task asks students to engage in argument about the quality of their solution to frog habitat loss.
- Tell students that they will begin preparing for their argument in this Scientists Meeting.
- Select a volunteer to read the steps in the "Engaging in Argument" column under "Preparing for the Argument" on the Scientists Do These Things anchor chart ⁽³⁾:
 1. Pose the question.
 2. Identify evidence that answers the question.
 3. Evaluate whether that evidence is good enough.
- To pose the question, select a volunteer to read the posted **Unit 2 guiding questions**:
 - "What are necessary parts of a frog habitat, and how do they interact to support the survival of frogs throughout their life cycle? How can we build that (in the schoolyard or in the community or a local park)?"
- To begin identifying what evidence will be needed to answer the guiding questions, ask students to turn and talk with an elbow partner ^{(4) (5)}:
"What questions do you have about frog habitats?" (Responses will vary but may include: Where do frogs normally live?)
"What do you already know about frog habitats?" (Responses will vary.)
"What do you already know about frog life cycles?" (A frog life cycle includes eggs and tadpoles, froglet and adult)
"How might a habitat affect frog life cycles?" (If they don't have a place to lay eggs, frogs can't start another life cycle.)

“What do we need to know to be able to design a frog pond?” (How big? How deep? What shape? What kind of plants should be in the pond?)

“What evidence will we need to collect to know that we have designed a good frog pond?” (Evidence that shows the pond is a healthy place for a frog to live.)

- Invite pairs to share out. As students share, capture their ideas on the **Planning a Frog Pond anchor chart**.

- As students share out, push them to provide evidence for their ideas:

“What have you seen, heard, or read that makes you think that?” (Responses will vary, but students should draw on personal experiences and learning.)

“What experience have you had that supports that idea?”

- Be sure that students name what they need to learn about frogs’ habitats. Encourage as much detail around this idea as possible.
- Ask questions to help students connect their ideas:

“Do others agree or disagree? Why?”

“Can someone paraphrase what Student A said?”

- Summarize students’ ideas recorded on the Planning a Frog Pond anchor chart. Let students know that they will spend a significant amount of time investigating pond design in the coming lessons, and that you look forward to seeing how their ideas change and grow.

Preparing to Teach: Self-Coaching Guide

1. How well did my students keep the norms of Scientists Meetings in Unit 1?
2. Which norms would it be helpful to revisit?
3. What experience do my students have with engaging in argument? What further explanation might they need at this point?
4. The questions students have are valuable information. How can I capture it and use it to drive instruction in Lesson Sequences 2–4?
5. Perhaps my students would benefit from revisiting the bullfrog life cycle in their notebook.

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