

Lesson: Water's Living Things: Adaptation Station
Quarter 1—Survival



Environmental Literacy Question: How have humans affected the Chesapeake Bay and its watershed?

Topic/Essential Question: What characteristics of an organism help it survive in its habitat and how have human activities changed its habitat and ability to survive?

Unit/Lesson Sequence: One of two lessons in the “Water's Living Things” 4th grade module based at Arlington Echo Outdoor Education Center.

Content Standards:

- **Environmental Literacy**
 - 4.A.1.b. Explain and demonstrate food webs for a particular environment.
 - 5.A.1. Analyze the effects of human activities on earth's natural processes.
 - 8.F.1.b. Identify actions that can be taken as individuals and those that require the involvement of other people, organizations and government.
- **Science**
 - 3.F.1.a. Identify and describe the interactions of organisms present in a habitat.
 - 6.B.1. Recognize and describe that people in Maryland depend on, change, and are affected by the environment.
 - 3.A.1.b. Classify a variety of animals and plants according to their observable features and provide reasons for placing them into different groups.
- **Common Core Standards for English Language Arts Standards-Speaking and Listening-4th Grade**
 - Comprehension and Collaboration**
 - CCSS.ELA-Literacy.SL.4.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 4 topics and texts*, building on others' ideas and expressing their own clearly.

Length of Lesson: 35 minutes

Student Outcome: I can search for connections between Indian Creek's characteristics as a habitat and the adaptations of the organisms that live there.

Knowledge of the Learner:

- Prerequisite knowledge, skills, and processes: the functions of different members of a food web. An understanding of the components of a habitat and how animal adaptations help them survive in certain habitats.
- Student needs, interests, previous learning: these will be determined during the pre-assessment.
- Conceptual difficulties: understanding how human actions on the land can affect the quality of the water.

- Differentiated: The lesson will reach different types of learners. Naturalist and kinesthetic learners will benefit from the hands-on experience of seining and studying living organisms. Logical/mathematical, interpersonal, and intrapersonal learners will learn by interpreting, reflecting on, and discussing the organisms found and their adaptations.

Knowledge of Content:

- Content knowledge for activity leader: Provided in the Lesson Plan and Supplements.

- **Vocabulary:**

Habitat	Adaptation	Antennae	Camouflage
Claws	Counter Shading	Filter-feeder	Gills
Lateral Line			

- **Resources:**

PFD for each child and adult	Waders for each child and adult
Plastic Container for specimen	Aerator(s) for each container
Fish ID Cards	Seine Net
Dip nets	Adaptation Cards
Felt Board for adaptation cards	

- **Supplements:**

- A: Using the Seine Net
- B: Indian Creek Species' Adaptations
- C: Adaptation Cards Cheat Sheet
- D: Adaptation Station Journal Page

Lesson setup:

Move the waders from the S-hooks and lay them along the wooden wall by size (written on the front) with the front of the waders facing out. Collect the teaching materials from the shed at the end of the boat pier – containers, fish fact cards, dip nets, seine net, felt board, and adaptation cards.

Collect water from the creek in plastic containers with aerators to hold any organisms caught while seining. Before the lesson, use the seine or dip nets to catch some example organisms and place them in a container on the picnic table with an aerator.

Instructional Delivery

Module Introduction: All students and activity leaders will meet at the porch behind the Dining Hall. Arlington Echo staff will inform students about PFDs and hand them out to students and chaperones. Each student must keep their PFD on for the duration of the activities unless otherwise instructed. Adults must wear a PFD if they go into the water. Arlington Echo staff will discuss with students ways to behave safely down at the waterfront (no running, wearing a PFD, paying attention to instructions, leaving small rocks on the ground).

Motivation/Warm-up

Introduce yourself and ask some pre-assessment questions:

- a. *Today we'll be searching for species who live in and around Indian Creek to determine what adaptations animals need in order to live here.*
- b. *What four components make a habitat? **Food, water, shelter, space***
- c. *Look around, what qualities do you think define Indian Creek's habitat?*
 - i. **Food**—*insects, small animals in the water, fish, plants*
 - ii. **Water**—*brackish water connected to the Severn river, influenced by tide*
 - iii. **Shelter**—*grasses, trees, plants, rocks, and piers in and around the water*
 - iv. **Space**—*shallow water*
- d. *How might humans impact this habitat and the animals who live here? **Negative**—*Littering, paving the shoreline, runoff, oil from boats. **Positive**—planting native plants, picking up trash, building habitats like osprey platforms.**

Procedure:

If more than 10 students, divide the students into two groups: one group will focus on seining while the other group investigates adaptations.

- At least one activity leader should be in the water with the seiners while the other(s) help the water quality testing group.
- Allow 10-15 minutes for one group to seine while the other investigates adaptations. Switch and allow 10-15 minutes to complete the second activity.

Seining:

1. Putting on waders:
 - Ask students to take a seat on the lower ledge facing the water. Ask chaperones to help you pass out waders to students based on shoe size (size 4 or 5 to smallest students, 6 fits most students, 7 or above for larger students).
 - Explain the proper procedure for putting on a pair of waders:
 - *Sit down and take off your PFD and place it behind you.*
 - *Remove one shoe, slide that foot all the way into the boot of the waders (make sure the waders are facing the correct way); remove the other shoe and slide that foot all the way into the other boot of the waders. Keep socks off the ground the whole time; this helps keep dirt out of the waders.*
 - *Once both feet are in the boots, stand up and pull waders up and over the shoulders. Fasten straps. (Do NOT try to jump up and down to pull on the waders.)*
 - *Put on PFD over the waders.*
 - **Tip:** activity leaders should put on waders before the lesson begins; students often need assistance when putting on waders. Ask chaperones to help as well.
 - Make sure each student securely fastens their PFD over the waders. The students must keep their PFD on for the duration of all waterfront activities. Chaperones may put on waders if they wish to seine; adults must also wear a PFD when seining.
2. Lead students onto the dock:
 - Discuss the conditions of the water and where the students can and cannot go while

they are investigating (*this will be communicated to activity leaders from Arlington Echo staff during morning training based on water conditions*).

- Before entering the water, remind students to take small steps and shuffle their feet to avoid tripping (walk like a penguin); NOT to run, swim, or bend/sit down in the water.
 - Demonstrate the proper technique for using a seine net (**Supplement A**) and a dip net.
 - Lead students into the water. At least one adult must be in the water anytime students are in the water (chaperone and/or activity leader).
3. In the water:
- Two students (or one adult and one student) can use the seine net while the rest use dip nets. *Remind students with dip nets that many of the organisms they are trying to catch use the grasses for shelter; so while they may be tempted to use their dip nets in the open water, they will be more successful closer to shore.*
 - When organisms are caught, assist students in transferring them to a plastic container with an aerator (for oxygen). *If aerator stops working, please let AE staff know immediately—animals cannot be left without an aerator. Remind students to wet their hands before handling fish (dry hands can remove the scales and mucus layer that protect the fish from disease).
 - Only adults should transfer crabs and jellyfish with tentacles to the container. Always pick up crabs from the back, behind their swim fins to avoid being pinched. Always hold jellyfish by the top being careful to avoid the tentacles.
 - If time allows, give each student the opportunity to use both seine and dip nets.
4. Give students time to examine what is collected, using fish cards for identification. Students should also take note of any other living things they see around them (birds, plants and animals). If there are no organisms already caught for adaptation investigations, take the organisms caught to the picnic table tank.
5. Allow students a few minutes to change out of their waders before moving on to adaptation investigation or to their next activity.

If there is a limited catch or if you find anything unusual, keep specimens in buckets with aerators for next groups just in case they don't find anything.

Adaptation Investigation:

1. Invite students to take a seat at the picnic table. Place any organisms caught while seining on the other picnic table in a container with an aerator.
2. Remind students that we're investigating animals who live in Indian Creek to see what adaptations they have to help them survive in this habitat. Ask students: *What are adaptations? Adaptations are traits that help living things survive in their environment. These can be physical characteristics or behaviors.*
3. Tell students that as a group you'll play a quick game to review different adaptations that animals in the water can have. Let them know that there are more adaptations than the ones on the cards, these are just common ones that they might see.
4. Adaptation Game:
 - a. Similar to charades or taboo, this game involves trying to get the group to guess a

specific word without using that word. In this case, we are trying to get students to guess the adaptation.

- b. Spread the cards with the adaptation and picture out on the table, so the students can read them.
 - c. Place the felt board somewhere the students can see it.
 - d. Hold onto the cards with the adaptation clues.
 - e. Let students know that you will read a clue. Each clue personifies the specific adaptation it refers to. (I.e. "I am sharp and strong" = claws)
 - f. When a student thinks they know which adaptation the clue matches up with, they should raise their hand. If you call on a student, they should pick up, point to, or read the card with the matching adaptation.
 - g. If they are correct, they can place the adaptation and clue on the board together (as a reference) and then pick a new clue to read to the group.
 - h. Continue until all of the adaptations and clues have been read.
*if short on time, you can eliminate some rare adaptations (like barbels) from play or start with a few examples on the board
5. Once all the adaptations and matching clues are on the board ask the students: *How do these adaptations help animals survive in the water? Have you ever seen any of these adaptations on an animal before? What are some examples of animals with these adaptations?* **(Supplements B and C)**
 6. Ask students to move over to the container of organisms. Tell students that they may gently and carefully pick up the organisms. Ask them to look for adaptations these organisms have.
 7. While students are examining the organisms, ask them: *What adaptations do these organisms have? Do they all have the same adaptations or different? What do they have in common? How might these adaptations help them survive, catch prey, and avoid predators?*
 8. After a few minutes have students return the organisms to their container and take out their journals and a pencil.
 9. In their journals, students should turn to the page entitled "Adaptation Station" and draw an animal that lives in Indian Creek, labelling its adaptations. **(See Supplement D)**

*if you were unable to catch any organisms seining, have students brainstorm what animals they see or think might live here and draw the adaptations of those animals.

Lesson Conclusion:

After both activities, give the students who seined last time to change out of their waders while the adaptation investigation students finish their drawings. When the entire group is ready, make sure waders are laid out on the ledge and that all students have their shoes and PFDs on, and chaperones have the journal bag.

Ask students: *So what adaptations do animals have to help them live in and around Indian Creek?*

Follow up by asking: *How might humans impact this habitat positively or negatively? Do you think that could have an effect on adaptation?* Let students brainstorm and come up with a few ideas before moving on to their next activity.

Module Debrief:

After all groups rotate through both waterfront activities, they will meet back up on the porch behind

the Dining Hall to have a large group debrief. This will be an opportunity for students to tell an Arlington Echo staff member what they learned and discovered over the course of the two activities.

Notes for Clean up

Please clean, organize and return the lesson materials to the boat shed on the pier at the end of each day of instruction. Waders should be hung up on the hooks to dry. **The last group of students should bring their life vests up to the dining hall porch after the lesson.** Remember to inform the Arlington Echo Staff if you need assistance or if any materials are damaged or missing.

Notes for morning set up (overnight trips):

Remember to set up your materials prior to the mornings activities. If you do not spend the night, please arrive to AE to set up your activity by 8:45 AM, activities begin at 9:05 AM.

Notes for Inclement Weather:

Arlington Echo encourages keeping our outdoor activities outdoors—even in the rain—but in the case of severe weather (thunder, severe cold, etc.), the rain location for this activity will be in the lower Resource Lab. The alternate activity is the Indoor Fish Adaptations lesson. Students will design their own fish using craft materials provided. **(See Build a Fish lesson plan.)** You'll find aquariums with fish and reptiles representative of those found in habitats like Indian Creek.