

Lesson: Seining

*Arlington Echo works to continuously improve our lessons. This lesson may be modified over the course of the school year.



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

Topic/Essential Question: How is the earth's climate changing?

Unit/Lesson Sequence: This is one of two lessons in the "Severn Science" 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-**
 - 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	Climate		

- **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, always wearing a PFD, paying attention to instructions, leaving small rocks on the ground).

Motivation/Warm-up

Introduce yourself and ask some pre-assessment questions:

- 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.*
- What four components make a habitat? **Food, water, shelter, space***
- Look around, what qualities do you think define Indian Creek's habitat?*
 - Food**—insects, small animals in the water, fish, plants
 - Water**—brackish water connected to the Severn river, influenced by tide
 - Shelter**—grasses, trees, plants, rocks, and piers in and around the water
 - 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.*
- e. *Can the changing climate affect the animals that live in the Indian Creek and Severn River?*

Yes! As the climate changes, animals may have to either move from the current area to a new area that would be a better suited environment. Some animals/plants may not survive over time due to changing climate.

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) complete the adaptation activity.
- 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 a matching game, this activity 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.

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 securely.

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.

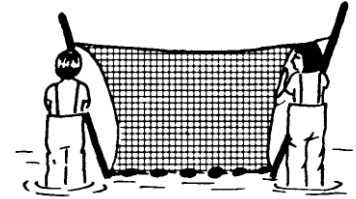
Notes for Inclement Weather:

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 **Microorganisms**. This lesson is located on the Arlington Echo website (www.ArlingtonEcho.org) or will also be available to you when you arrive for training at Arlington Echo.

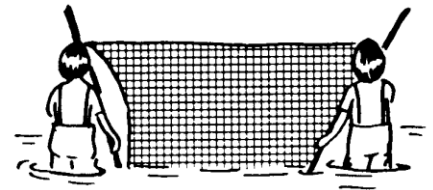
Supplement A:

Using the Seine Net

Step 1. Two students carefully unroll the seine net so the weighted side is in contact with the river bottom.



Step 2. Students walk out to hip-deep water, bumping poles along the bottom and tilting poles about 45 degrees (as pictured).



Step 3. Students stop walking and prepare to raise the net out of the water. Students should count aloud to 3 and coordinate their motions so they each flip their pole horizontally and raise the net out of the water and parallel to the surface of the water in one swift motion on “3”.

Step 4. Students on the pier or a third student in the water can assist with getting the catch out of the net with their hands or a dip net. Hands should be wet when handling fish to prevent harming the fish’s skin!

Supplement B: Indian Creek Species' Adaptations

Species (alphabetical order)	Adaptations
Alewife	Counter shading, spot on their body to confuse predators, large eyes, lateral line, adults live in the ocean and migrate to fresher streams or rivers to spawn
American Eel	Snake-like body, protective slime coating that allows them to migrate short distances on land, adults live in fresh to brackish water and travel to salt water to spawn
Atlantic Menhaden	Filter-feeder, counter shading, spot on their body, extremely slimy coat, lateral line
Atlantic Needlefish	Long slender body for camouflage
Atlantic Silverside	Streamlined body, forked tail for speed, opaque and silvery to camouflage
Bay Anchovy	Translucent body
Blue Crab	Shell, claws, antennae, swimming and walking legs, flaps that seal water in gills so they can move over land, hides in grasses during molting (soft shell)
Bluegill	Dark spot, spines on fin
Brown Bullhead Catfish	Barbels to find food in muddy water, counter shading
Comb Jelly	Transparent, filter-feeder
Common Pipefish	Camouflage—hides easily in eelgrass or seaweed beds, can change color like its cousin the seahorse
Grass Shrimp	Transparent body for camouflage, antennae
Hogchoker	Bottom dwellers, flatfish, camouflage
Killifish	Counter shading, bands or stripes to help camouflage in grasses
Margined Madtom	Spines, barbels
Mummichog	Counter shading, stripes and spots for camouflage, very pollution tolerant
Naked Goby	Bury themselves in mud in the winter, camouflage
Pumpkinseed	Black spot, spines, camouflage pattern
Sea Nettle Jellyfish	Transparent, stinging tentacles
Sheepshead Minnow	Camouflage, teeth to hunt prey, can withstand low oxygen levels
Striped Bass	Counter shading, lateral line, spines
White Perch	Spines, counter shading, lateral line
Winter Flounder	Bottom dweller, flatfish, camouflage, one eye migrates to the other side of the body
Yellow Perch	Adapted to living in brackish water (used to only live in fresh), spines, counter shading, lateral line

Supplement C: Adaptation Cards Cheat Sheet

Adaptation (alphabetical)	Clue	Examples
Antennae	We come in sets of two and help animals feel and sense changes in the water.	Grass shrimp, blue crabs
Barbels	Catfish need us to find food by touch and taste when it's hard to see in muddy waters.	Catfish
Camouflage	I help animals escape predators by blending in with their surroundings.	Pipefish, killifish, flatfish, grass shrimp—anything that can blend in with its surroundings
Claws	We're sharp and strong. Not only do we help crabs catch food and protect themselves, we also help them attract mates.	Blue crabs
Counter Shading	When fish have me, they look darker on top and lighter on the bottom. I help them blend in with both the water, when looked at from above, and the sunshine, when looked at from below.	Striped bass, menhaden, perch
Filter-feeder	I can separate small particles and plankton from the water as a source of food.	American oysters, Atlantic menhaden, comb jellies
Flatfish	I can live on the bottom of the water because my body is shaped like a pancake and my eyes are on the same side.	Hogchoker, flounder
Gills	We help animals take in oxygen from the water just like lungs help you take in oxygen from the air.	Almost all fish and many animals besides fish who live underwater (like crabs) have gills
Lateral Line	I run from the gills to the tail of a fish, allowing them to detect changes, sense vibrations, and stay balanced in the water.	All fish have some form of lateral line, it can be more easily seen in some species (like bass and perch)
Scales	I'm a fish's shining armor, protecting their body and making it comfortable for them to swim from side to side.	Most fish have scales
Shell	I support and protects a crab's body.	Blue crab
Slime	You probably think I feel weird, but fish love me! I coat their skin, helping them move smoothly through the water and protecting them from disease.	All fish have a slime coat, some—like menhaden—are extremely slimy
Spines	We make a fish look bigger and create problems for any predators trying to eat them. Be careful if you pick up a fish with us on its back, we can slice your hand!	Pumpkinseed, striped bass
Stinging Tentacles	Instead of scales, spines, or sharp teeth, jellyfish use us to capture prey and defend themselves from predators.	Sea nettles