

Lesson: How to be a Dragon



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 “Survival and Adaptations” 4th grade module based at Arlington Echo Outdoor Education Center.

Content Standards:

Environmental Literacy Standards

[MSDE 4.0 Populations, Communities And Ecosystems](#) The student will use physical, chemical, biological, and ecological concepts to analyze and explain the interdependence of humans and organisms in populations, communities and ecosystems.

[MSDE 5.0 Humans And Natural Resources](#) The student will use concepts from chemistry, physics, biology, and ecology to analyze and interpret both positive and negative impacts of human activities on earth’s natural systems and resources.

Science

[MSDE 2.0 Earth/Space Sciences](#) The students will use scientific skills and processes to explain the chemical and physical interactions (i.e. natural forces and cycles, transfer of energy) of the environment, Earth, and the universe that occur over time.

[MSDE 3.0 Life Science](#) The students will use scientific skills and processes to explain the dynamic nature of living things, their interactions, and the results from the interactions that occur over time.

Common Core State Standards:

Writing Standards:

[CCSS.ELA-Literacy.W.4.1](#) Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

Speaking and Listening Standards:

[CCSS.ELA-Literacy.SL.4.4](#) Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace

Length of Lesson: 35 minutes

Student Outcome: The students will identify adaptations of a dragonfly that help it to survive in a freshwater habitat. Students will also identify human activities that change a dragonfly habitat and discuss ways a dragonfly would cope with those changes.

Knowledge of the Learner:

- Prerequisite knowledge, skills and process: Students have previously researched dragonflies and dragonfly habitat. Students should also know what adaptations and fossils are. Students should be able to listen to instruction and follow directions.
- Student needs, interests, and previous learning will be identified in the pre-assessment.
- Conceptual difficulties: Learning to use and read the water quality testing supplies; students' ability to identify dragonfly adaptations, and actual dragonflies.
- Differentiation: Lesson will be adapted based on students' skills.

Knowledge of Content:

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

- **Vocabulary:**

| | | |
|------------|----------|------------|
| Habitat | Antennae | Freshwater |
| Adaptation | Venation | Salinity |
| Nymph | Marsh | Fossil |
| Turbidity | | |

- **Resources:**

| | |
|---------------------------|---------------------------|
| Dragonfly Puzzle | Expo Markers |
| Dragonfly Fossil Outline | Turbidity Tube |
| Dragonfly model | Dissolved oxygen test kit |
| 5 Gallon Bucket for Water | Thermometer |
| Funnel | Salinity Meter |
| Dragonfly tally sheets | Water Binder |

- **Supplements:**

- Supplement A: Dragonfly Adaptations
- Supplement B: Dragonfly Puzzle/Journal Page
- Supplement C: Components of a Healthy Dragonfly Habitat
- Supplement D: Water Quality Monitoring Procedures
- Supplement E: Survey 123 and Online Water Quality Reporting
- Supplement F: Design-a-Dragon Journal Page

Lesson Setup:

This lesson takes place at the picnic table by the Marsh, while the materials are kept in the I&C closet at the Main Pavilion. Gather all materials from their designated space and bring them down to the picnic table by the marsh. Place the dragonfly puzzle on the table. Keep dragonfly fossil and model to the side until needed. Collect water from the marsh in the 5-gallon bucket and leave out on the marsh dock by the Wetland sign. Place the thermometer in the water

where reaching it will be easy. Set the salinity meter, turbidity tube, funnel, and dissolved oxygen test kit out on the marsh dock for water testing later in the lesson.

Instructional Delivery

Module Introduction:

All students and activity leaders will meet at the main pavilion for an introduction to the Survival Module with an Arlington Echo staff member. During the introduction, Arlington Echo staff will go over what an adaptation is, examples of animal and plant adaptations, and what every organism needs from a good habitat. After the introduction, the activity leader for *Hopping through Time* will take their group to the Bog, while the activity leaders for *How to Be a Dragon* will lead the first group down to the marsh.

Pre-assessment/Warmup:

1. Ask students, **what is an adaptation?** *Adaptations are traits or behaviors that help living things survive in their environment.*
2. Today we are going to learn about dragonflies and how they survive. First lets think of some insect adaptations:
 - *Some insects have large multi-lensed eyes which helps them look for prey and keep an eye out for predators. Other insects have long antennae to help them sense prey and their surroundings*
 - *The feet of insect can vary, helping them to jump, dig, run or swim depending on their environment*
 - *Insects have adapted mouthpieces which help them eat certain foods*

Procedure:

1. Now that we know more about insect adaptations, let's figure out a dragonfly's adaptations!
 - Here, the instructor would pass out pieces of a dragonfly and descriptions of each adaptation. One at a time, the students would put the pieces together, and match the descriptions, following along in their journals **(Supplements A and B)**
2. Ask students, **how long do you think dragonflies have been around?** *300-350 million years!!*
 - Explain that not much of a dragonfly has changed in that time except it's size
 - Show the shadow image to students (24-28 inch wingspan)
 - Show an example of a dragonfly today

- **Why do you think dragonflies have gotten smaller over time?** *A decrease in the amount of Oxygen on Earth is the likely reason – as oxygen levels decreased, so did the size of the dragonfly. Another reason could be because of the adaptations of birds of prey, as they got better at hunting, dragonflies decreased in size to be less easy to spot.*
3. Point out how the students are right by a Marsh. Discuss why it might be a good habitat for a dragonfly
 - *Slow moving fresh water available to lay eggs and space for nymphs to search for food*
 - *Lots of low-lying plants allowing dragonflies to fly around freely*
 - *Good habitat for other insects that dragonflies prey upon*
 4. Head out to the marsh to look for Dragonflies and see if it is a good habitat.

Dragonfly Search

1. Pass out the dragonfly tally sheets and expo markers to groups of 2.
2. Challenge the student to search in pairs for dragonflies very quietly and record the different ones they see. After 3-5 minutes, compare results and collect the tally sheets and markers.

Water Quality Tests

1. Return to the picnic tables and explain to students that they will take four different measurements of water quality to determine if the Marsh and Indian Creek are healthy enough to support life and make a good habitat for a dragonfly.
2. Before EACH test, discuss with students: **(Supplement C)**
 - What the test is measuring and why it is important
 - What levels of the measurement classify the water as healthy
 - The different factors (human or natural) that may affect this water quality measurement
2. Collect water in the 5-Gallon Bucket from the creek.
3. For the following tests, record all results in the iPad on the Survey123 app: **(Supplements D and E)** and have students fill in the blanks on the back of their dragon fly tally sheets with expo marker in pairs:
 - a. Perform the dissolved oxygen test first, since it takes a while for results to show.
 - b. Meanwhile, ask another student to pull the thermometer out of the water, read the temperature and report to rest of group.
 - c. Perform the salinity and turbidity tests using the bucket of water collected at the beginning of the lesson.
 - d. By now the dissolved oxygen test sample should be ready. Compare results to the DO color chart to determine dissolved oxygen range.
4. Ask students to assess the health of the marsh based on the results of water quality testing and the number of dragonflies they saw.

Assessment:

1. Ask students, **“If this marsh habitat were to be negatively affected, the dragonflies would need to adapt to survive. What are some human activities that would change the dragonfly’s habitat?” (Supplement D)**
 - *Driving cars, using fertilizers and pesticides could pollute the water, preventing it from being a good habitat to lay eggs.*
 - *Building near a marsh or other freshwater habitat could cause erosion, or the movement of sand/soil into the water, reducing water quality, killing some of the dragonfly prey*
 - *Excessive use of road salt near a dragonfly habitat could change the water’s salinity.*
 - *Continued level of CO2 emissions could cause increased temperatures, overheating and killing dragonflies.*
2. If time allows, have students complete the page “Design-A-Dragon” in their Journals **(Supplement F)**
3. Finish up by discussing ways human can positively affect dragonflies
 - *Reduce the use of pesticides*
 - *Protect dragonfly habitats by not constructing near them*
 - *Build a pond or Bio-retention area at your school, neighborhood or home*
 - *Reduce car travel by riding a bike, walking and advocate for your friends and family to do so as well.*

Notes for Cleanup:

Please organize and return the lesson folder, and all materials to the I&C Closet at the back of the Main Pavilion to the right of the fireplace. Remember to inform the Arlington Echo Staff if you need assistance or if any materials are damaged or missing.

Notes for morning setup (overnight):

Remember to set up your materials prior to the morning activities. If you do not spend the night, please check in with the AE staff assigned to the module and be at your teaching location by 8:45 AM, the first lesson starts 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 determined when your schools arrives (Main Pavilion or Field Hall).