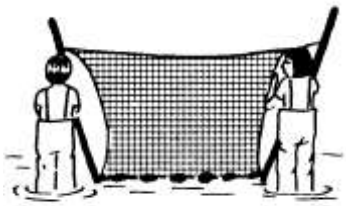
Supplement A:

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 Assessment Guide:

Species	Dissolved Oxygen	Salinity	Water Temperature	Habitat	Role in the Food Web
 Blue Crab	At least 3 ppm	3-30+ ppt	At least 59 degrees Fahrenheit for growth	Needs grassy areas to hide while molting	Scavenger, eats almost anything it finds. Food for other crabs, large fish, fish-eating mammals, and birds.
 Grass Shrimp	At least 2 ppm	1-2 ppt	Between 50 and 60 degrees Fahrenheit	Needs grassy areas to avoid predators	Eats plants and animals, including decaying matter, phytoplankton, and small invertebrates. Food for fish and large macroinvertebrates.
 Pumpkinseed	At least 6 ppm	0-17 ppt	39 to 75 degrees Fahrenheit	Needs shallow, clear areas to build nests	Eats small organisms like snails, worms, small fish, insects, mollusks, and plants. Food for larger fish, fish-eating mammals, and birds.
 Striped Bass	At least 6 ppm	1-11 ppt for young striped bass, up to 30 ppt for adults	40 to 70 degrees Fahrenheit for feeding	Needs grassy, fresh areas to hide when young; moves to saltier water when older	Eats small fish and invertebrates. Food for larger fish like sharks and fish-eating birds.
 Inland Silverside	At least 6 ppm	3-5 ppt	50-86 degrees Fahrenheit	Needs grasses for hiding	Eat zooplankton, shrimp, young squid, worms, insects, and algae. Food for larger fish and shorebirds.
 Mummichog	At least 6 ppm	1-2 ppt up to over 30 ppt	40-100 degrees Fahrenheit	Needs grasses for hiding	Eat algae, plants, insects and insect larvae, worms, small crustaceans and mollusks, the eggs of their own species, other fish and carrion. Food for larger fish, wading birds and seabirds.

Supplement C:

Water Quality Information Sheet

Measure	What is it?	Why is it important to food webs?	What impacts it?
Water Temperature 	The level of heat in the water, measured in degrees Fahrenheit (°F).	Organisms need certain temperatures to survive and reproduce. Rapid changes in temperature can harm species. Temperature also shares a direct relationship with the amount of dissolved oxygen in the water; cold water holds more dissolved oxygen than warm water.	Water temperature naturally fluctuates with changes in season. Human development can also impact temperature because stormwater runoff from surfaces like roads and parking lots enters streams and rivers at a higher temperature to create a warming effect.
Salinity 	A measure of how much salt is in the water, measured in parts per thousand (PPT).	Organisms are adapted to certain levels of salinity (freshwater fish cannot survive in the ocean and ocean species cannot survive in fresh water).	Indian Creek is a fresh body of water but at its mouth, it mixes with the brackish (partly salty) Severn River. Salinity can fluctuate with changes in season, tide, rainfall, and runoff. Humans can impact salinity by salting roads, which gets carried into the water as runoff.
Turbidity 	A measure of how cloudy or murky the water is. Turbid water is high in suspended sediment.	Waterways with high turbidity suffer because sunlight can't get through to the submerged plants below, so they cannot photosynthesize and add oxygen to the water. This harms fish and other species who need dissolved oxygen to survive.	Turbid water is high in suspended sediment like soil eroded from land, and increases after a storm or rain event carries stormwater runoff into the water. Turbidity can also increase with excess bacteria or algae in the water.
Dissolved Oxygen 	A measure of the available oxygen in the water, measured in parts per million (PPM).	Fish and aquatic species need oxygen to survive, just like humans and land animals do. Instead of breathing oxygen through the air with lungs, aquatic species obtain oxygen through the water with gills.	Just like on land, aquatic plants like underwater grasses photosynthesize and produce oxygen in the water. Dissolved oxygen can decrease when plants are blocked from the sun because of high turbidity or algae blooms (from excess nutrients in the water) and cannot photosynthesize. Temperature also affects dissolved oxygen because cold water holds more oxygen, so dissolved oxygen fluctuates depending on the season.
Biodiversity 	The variety of different species in a given environment, and a healthy population of each of those species, measured while seining and observing plants and animals around Indian Creek.	In general, a diverse environment is healthier and more resistant to environmental stresses. Biodiversity is also essential for a healthy **food web** (an inter-connected web of food chains, predator-prey-producer relationships). All organisms need a **diverse** selection of energy sources. (Osprey can eat minnows or pumpkinseed or striped bass or yellow perch or any other of countless fish species).	Overharvesting of aquatic species, habitat loss, the introduction of an invasive species that throws off the balance of the natural food web, algae blooms, litter, natural disasters and disease can all affect biodiversity and result in a lower variety of healthy species in an environment.

Supplement D:

Water Quality Testing Instructions

Dissolved Oxygen Tablets (dissolved oxygen):

Fill the small glass vial with water from Indian Creek. Place two dissolved oxygen tablets into the vial and firmly twist on the cap. Turn the vial end over end for about five minutes or until the tablets dissolve completely. Refer to the dissolved oxygen key to match the color of the water to the dissolved oxygen content in Parts Per Million (PPM).

Water thermometer (Water temperature):

Allow the water thermometer to fill with water so it sinks into the creek and only the top floats at surface level. Hold the line so you don't lose the thermometer. Allow 3 to 5 minutes to get an accurate temperature reading. Read the temperature in degrees Fahrenheit.

Hydrometer (Salinity):

Remove white cap and press the power button. Wait until the screen says 0.00, then place the tip in the water and gently move back and forth until the meter reading stabilizes. This may take a moment. Record the number. The reading is in Parts Per Thousand (PPT).

Turbidity tube (Turbidity):

Collect a sample of water in the provided bucket, being careful not to scrape up excess sediment from the bottom. Hold the turbidity tube upright in the empty bucket under the awning and fill it using the large funnel. Stand so you can stare straight down into the tube. Have someone else slowly release water (by gently pushing down on the tube) at the bottom of the tube. Continue releasing water until the black and white disc (called a Secchi disk) at the bottom of the tube **just** becomes visible (looking straight down, not from the side); and stop releasing water. Measure the water level using the markings on the side of the tube and refer to the turbidity key to determine turbidity.

Supplement E: Sample Report Card Poster

Indian Creek Waterfront Report Card

Complete each water quality test and give Indian Creek an overall grade.

Water Temperature:

_____ Degrees F

Low Normal High

Dissolved Oxygen:

_____ ppm

Bad Okay Good

Salinity

_____ ppt

Low Normal High

Turbidity:

_____ Visible Depth in cm

Bad Okay Good

Water Quality Grade:

Supplement F: Online Water Quality Reporting Procedure

Your water quality data will be recorded and graphed on the Arlington Echo website (arlingtonecho.org) so we can track the health of our nearby waters. Thank you for your help in this project!

Please follow the water quality testing instructions (Supplement D) as closely as possible to ensure consistency of data and follow the below procedures to record the data online:

1. Turn on the iPad by holding down the button on the top right corner of the iPad.
2. Sign into the iPad using the 4 digit code: 3822
3. Select the green icon for the app **"Survey 123"**
4. On the "My Surveys" screen select the water drop icon for the survey called **"Water Quality Monitoring"**
5. Select the blue symbol that says **"Collect"** and the survey should begin loading
6. Fill in the school name, date, and time and select **"seining pier"** for observation station
7. Choose the temperature, dissolved oxygen, and salinity range that your data best falls into.
8. Choose the turbidity you found in NTUs *note: this is not visible depth in centimeters, but can be found in the "Turbidity Units" column on the Turbidity Scale. The NTUs correlate to the visible depth in centimeters column on the left of the Turbidity Scale.
9. Check over your responses to ensure accuracy and then click the green arrow in the bottom right corner to submit your data.
10. After selecting the green arrow, select "Send Now".
11. Once you return to the Survey home screen, keep it up so you can easily access it with your next groups. Please put the iPad to sleep during long breaks for debriefs, snacks, or meals.

At the end of the day please return the iPad to an Arlington Echo 4th grade staff member. During lessons, let a staff member know if the iPad loses charge, stops working, or is damaged. In the morning of the second day of overnight field trips, ask a staff member to retrieve the iPad for you.

Thank you again for your help on this project!

Supplement G: Vocabulary

Turbidity: a measure of how cloudy or murky the water is; water that is high in turbidity has a high concentration of suspended sediment

Dissolved Oxygen: a measure of the available oxygen in the water (measured in parts per million)

Salinity: a measure of how much salt is in the water (measured in parts per thousand)

Producers: organisms that make their own food using the energy in sunlight

Consumers: organisms that cannot make their own food and instead get energy from the food made by others, through eating other organisms

Seine Net: a fishing net that hangs vertically in the water with its bottom edge held down by weights and its top edge buoyed by floats

Aerator: a device that circulates water to produce oxygen