



Water Quality Detective Water Sampling Lesson Plan

Learning objectives

Students will learn about water quality, how human activities can positively or negatively affect it, and how to assess local water quality.

Note: All materials needed for this lesson plan can be found in the CT Reserve's loan kit. Contact CTNERR.Education@uconn.edu for more information on how to borrow the kit.

Overview

This lesson can be combined with the CT Reserve's Water Quality Detective: Plankton Tow Lesson Plan. Students can assist with water collection or, if you cannot bring students into the field, you can collect samples prior to the lesson and have students conduct the classroom/lab activity.

Equipment List

In the field:

- Buckets to collect and transport water
- At-depth sampler
- Pre-labeled collection bottle(s)
- Field Data Sheet
- Thermometer
- Labeling tape & marker, writing utensil
- Ice pack and cooler
- Safety gloves

In the classroom/lab:

- Field data sheet
- Classroom data sheet
- Map of collection sites (add stars to represent collection areas)
- Collected Samples
- Lamotte Water Quality Kit
- Safety gloves

Water collection (field)

Preparation to consider:

- Identify locations that you know (or suspect) will have different water quality measurements, such as:
 - Locations with ranging tidal influence,
 - Locations with ranging human impacts, and
 - Different depths (surface vs. at-depth sampler).
- Put ice packs in freezer the night before sampling.
- Pre-label your collection bottles with the relevant details.

Procedure:

1. Using a bucket or the at-depth sampler (directions below), collect water sample.
2. Label each sample (A, B, C, etc.).
3. Take temperature and record on field data sheet.
4. Place sample in cooler with ice (it is recommended to keep water samples cool and out of the sunlight as some water quality parameters can change over time if not kept cool/dark).
5. Repeat for each site you're collecting a sample.

If using the at-depth sampler...

1. Open both sides of the at-depth sampler by pulling the cording of both ends directly outward at the same time, then folding them up over the sampler body.
2. Slip the two metal tubes together (one inside the other) and align the holes.
3. Once aligned, insert the trigger pin (from above) into the aligned holes.
4. Submerge the at-depth sampler into the water, allowing it to fill so that it will more easily sink to depth.

5. Lower the at-depth sampler to the desired depth, using the 1ft increments marked on the line.
6. Once at depth, gently “swing” the at-depth sampler from side to side to ensure you are capturing water at that depth (vs the surface water that initially filled the at-depth sampler).
7. Let the at-depth sampler steady straight down at depth.
8. Get a firm grip on the line used to lower the at-depth sampler to depth and pull sharply upward (a firm tug of just a few inches should be sufficient).
9. Slowly pull the at-depth sampler back to the surface and open one end to pour and collect your water into the sample collection bottle.

**** Important SAFETY note** for the at-depth sampler: use much caution if attempting to close the sampler on land; the closing action is very quick and can hurt any nearby fingers, hands, etc. The closing mechanism is meant to take place under water ******

Water analysis (classroom or lab)

Preparation to consider:

- Create a map with stars on the locations where water was collected from for students to use.
- Review and familiarize yourself with the Lamotte Water Quality Kit instructions for parameters you plan to test your sample for (recommended: salinity, pH, turbidity, nitrate).

Procedure:

- Place buckets of water at each student station with a Lamotte kit and pull out the kits/instruments you plan to use (example: refractometer, pH, nitrate, turbidity).
- While wearing gloves, gently swirl or invert the sample bottle to ensure mixing and begin testing your water quality parameters:
 - Salinity
 - Using a plastic pipette, dispense a few drops of sample onto the prism of the refractometer
 - Close the cover and look through the eye piece, while aiming the refractometer towards a light source
 - Adjust the eyepiece as needed to bring the salinity scale into clear focus
 - Read and record the salinity value by determining where the white and blue colors meet; look for the parts per thousands (‰) on the right side of the view field
 - Wipe the prism dry and remember to rinse with freshwater before storing
 - pH, nitrate, turbidity
 - Follow the instructions provided in the Lamotte Kit

Discussion

What did we find?

- Have each group share the water quality measurements for their site
- Record on large sheet so groups can see the differences among sites

Note – on the map, locations are labeled with actual names; the buckets are labeled as “A, B, C, etc.”

What could it mean?

- Why might the water quality parameters change at each of the sites? *Things to think about: Proximity to the ocean, what is around location (residential, industry, nature, etc.)*
- Parameter notes:
 - Temperature
 - Water with greater tidal influence should be cooler
 - What other factors can influence temperature? (*Depth, season, latitude*)
 - Salinity
 - Drinking water is 0 ppt (parts per thousand); Open ocean is 35ppt
 - Moving up the river, salinity is expected to go down
 - What other factors can influence salinity? (*Depth, rainfall, mixing, weather, etc.*)
 - pH
 - Open ocean pH is 8.1; coastal water pH is in the 7 range
 - Nitrate
 - Open ocean nitrate should be lower than coastal waters; also consider what is happening nearby (*Farms, fertilizer, etc.*)
 - Turbidity
 - Open ocean turbidity should be lower than coastal water; also consider what is happening nearby (*Runoff, etc.*)

Which site is which?

- Look at data sheets & what measurements you recorded
- Where do you think each bucket of water was collected from? Why?

Additional discussion questions

- What are some characteristics of these habitats?
- What wildlife would you find at these sites?
- What is a watershed and what are its implications?
- How would pollution affect the water quality?
- What would sea level rise do at each site?

Clean up:

Items needed:

- Fresh water
- Sink
- Drying Space
- Waste Container(s) (provided with CT Reserve kit)

Procedure:

1. Rinse anything that has come in contact with sample water thoroughly with fresh water.
2. Allow items to dry overnight.
3. Check off the inventory list and repackage all items into CT Reserve loan kit.



Water Quality Observation Field Sheet

Weather:[illegible]



Connecticut
NATIONAL ESTUARINE
RESEARCH RESERVE

Name: _____

Water Quality Classroom Sheet

	Temp	Salinity	pH	Turbidity	Nitrate	Additional Parameter(s)?	Where is this water sample from?
Location Code	units:	units:	units:	units:	units:	units:	

Additional Notes (use back of sheet as well):

