Connecticut NATIONAL ESTUARINE RESEARCH RESERVE

Water Quality Detective: Plankton Tow Lesson Plan

Learning objectives

Students will learn about plankton, how they change due to water quality and parameters, and how to identify them.

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: Water Quality Lesson Plan. Students can assist with plankton 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:

- Plankton net (80-micron sized mesh)
- Rope
- Pre-labeled collection bottle(s)
- Squirt bottle
- Bucket
- Field Data Sheet
- Labeling tape & marker, field data sheet and writing utensil
- Ice packs and cooler

In the classroom/lab:

- Sample(s) collected from the field
- Identification guide
- Observation sheet
- Compound microscope
- Microscope slides and cover slips
- Pipettes and scissors
- Kim wipes

Plankton collection (field)

Preparation to consider:

- Put ice packs in freezer the night before sampling.
- Ensure the plankton net is clean and free of debris from previous sampling.
- Securely attach the rope to the plankton net prior to the tow.
- If collecting from more than one location, time, depth, etc. – pre label your collection bottles with the relevant details.

Procedure:

1. Attach the collection bottle to the mouth of the plankton net.
2. Lower the net & bottle below the surface of the water to fill the bottle completely.
3. Lower the net to the desired sampling depth; if sampling from the surface, make sure the end with the larger circle is submerged fully.

Maintaining a consistent speed and for a predetermined duration, tow the submerged net at the desired depth

4. Steadily walk the plankton down the dock, coast or behind the boat you are sampling from; be sure to predetermine your duration or distance for consistency between multiple samples and maintain a consistent towing speed for the entire tow.

5. Remove the bottle from the plankton net and store it in a cooler with ice packs for transport back to the classroom.

   If collecting from multiple locations or depths – make sure your bottle is labeled before placing in cooler and potentially mixing it up with other samples!

Ensure the collection bottle (secured to the mouth of the plankton net) is filled with water before towing the net; this helps to ensure the net will stay submerged during the tow

6. If collecting more samples, rinse the net with the squirt bottle provided, to remove any of the previous sample's specimens.

7. Repeat steps 1 – 6 for any additional samples that you are collecting.

8. Place the net in the bucket for transport back to the classroom.

Water analysis (classroom or lab)

Preparation to consider:

- Set up the microscope(s) and gather all accessories and equipment needed.
- Print the classroom observation sheet(s).

Procedure:

1. Using the pipette, stir the sample gently to ensure an even mix of organisms within the bottle.

2. Collect a small amount of water from the bottle with the pipette.

   If you used a larger plankton net mesh size (80 microns), you can cut the tip of the plastic pipette with scissors to more easily collect the larger organisms.

3. Carefully dispense a few drops of the sample water onto the microscope slide and cover the drop with a microscope cover slip.

4. Place the sample slide on the stage of the microscope

Example of when to cut the tip of your pipette – this sample has many "large" zooplankton that you may not capture otherwise

5. Focus the microscope by:
   - Start with the lowest power objective (4x)
   - Start with microscope stage (the platform where samples are placed) as far away/down as it can go
   - While looking through the eyepiece, use the coarse focus knob (larger knob) to bring the sample into view
   - Next, use the fine focus knob (smaller knob) to adjust what you are seeing until it is a sharp image
   - Use the stage adjustment knobs as necessary to move your target specimen to the center of view
   - If needed, adjust the light intensity up or down for better viewing

6. Examine the sample under the microscope and identify the plankton and zooplankton species you collected; Use the Connecticut Sea Grant Phytoplankton Guide (provided) as a resource

7. Record your findings on the observation sheet; If you collected samples from more than a single location or depth, be sure to note any differences to help facilitate classroom discussion

Discussion

What did we find?

- Have each group share the phytoplankton they found and identified.
- Record on large sheet so groups can see the full list of phytoplankton present.

What could it mean?

- Why might the type of plankton observed change at each site?
  - How can different water parameters impact the plankton observed? (ex: salinity, temperature, turbidity, nutrients)
  - How can the different conditions of each site impact the type of plankton observed? (ex: pollution, tidal height, flow)

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

- How can season impact the type of plankton collected?
- Did you collect from multiple depths? Did that change species present and/or abundance of plankton?
- What do you think you would capture if you used a smaller mesh size for the plankton net?
- How might ocean acidification impact plankton?

Clean up:

Items needed:

- Fresh water
- Sink
- Drying space

Procedure:

1. Anything that has come in contact with sample water, rinse 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.

4.

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Plankton Tow Observation Field Sheet

Date:	*Optional* **Tidal Height:** High: Low:
Sample Location:	*Optional* Water Temperature (F or C - cirlce one) Salinity (ppt)
Weather:	pH Depth of sample location (ft or m - circle one)

Sample Bottle ID	Time of Collection	Depth of Collection (ft or m - circle one)	Duration of Collection (mins)

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Plankton Tow Classroom Observation Sheet

Sample ID:	**Microscope Observations** *Describe, Identify, and/or Draw what you see*