Seagrasses In Classes

Eelgrass Field Studies : Grades 6-8

*Field Studies will be led by CEHL Educators.*

**Overview:** Students follow protocols to measure bed density, plant height, and test water quality at an eelgrass bed in the field.

**Materials** (1 per group of three if possible)

- Quadrats
- Meter Sticks
- Clipboards
- Pencils
- Rubber Bands
- Density Data Sheet
- Density Estimator Guide
- Water Quality Data Sheet
- Thermometer
- Compass
- Refractometer
- Kim Wipes
- Distilled Water in squirt bottle
- Lamott D.O. Test Kits
- Waste Chemical Container
- Gloves
- Goggles

| Activity | Time for 60-min class | Time for 90-min class |
|---|---|---|
| I Introduction | 10 | 10 |
| II Density | 20 | 30 |
| III Water Quality Testing | 15 | 30 |
| IV Conclusion | 5 | 10 |

**I Introduction:** Have students stand in a circle at the Eelgrass Bed. Explain that we will be doing the same procedures that scientists and volunteers use to collect data about the eelgrass bed, which can be used to determine its health and monitor changes over time. Remind students to be careful not to harm the plants, and to be careful not to walk in mud that is soft, they could get stuck which is very damaging to the mudflat, the eelgrass, and the organisms living in it.

> **Data Quality:** Data sheets are very valuable to a scientist working in a lab. He or she might not remember all the details about a particular trip to a field if he makes frequent field trips, or, the data sheet is from another observer. It is important to fill it out as thoroughly as possible. You should write clearly, so it is legible to someone else who is entering the data into a database or a spreadsheet. You should fill out every field (every line or box), write 0 if you measured a zero, and "not measured" if you didn't make a measurement. Be sure that every data sheet has your name(s) and the date and the location. If it doesn't all your hard work making observations goes to waste!

**Eelgrass Density:** Explain how to measure density of an eelgrass bed. Ask students to guess the density of the whole area that will be measured and write their guesses on their data sheet when they get them. Some scientists measure the density by counting shoots in a quadrat at regular intervals along transects. We measure by taking the density of random samples. Demonstrate the process: Throw quadrat (don't bias by throwing to patches) into the area to be measured, count the number of shoots and enter this into total shoots, and measure three random leaves. Mark whether it is inside a patch, outside a patch, or on the edge. If you notice any flowering shoots, (you may be able to tell which ones will flower because they are yellower than the others), you can count those and enter that number in the Flowering shoots column. Subtract that number from the Total shoots to get the number of vegetative shoots. Enter all this on your data sheet. Repeat the process from where you are standing. If it lands in a spot with no eelgrass, be sure to enter "0" for that throw. Take as many samples as you can in the time you have!

**Water Quality:** Water quality data can tell us a lot of things that may be affecting other measurements we are taking, and about the overall health of the area. We will be measuring water temperature, air temperature, wind direction, salinity, and dissolved oxygen. We will be going over the procedures with you after you gather density data.

## II Density observations:

Give each group of three students a quadrat, a meter stick and a clipboard holding a density datasheet, density estimator, and Water Quality datasheet. Let them throw the quadrats and measure density for 15-20 minutes. Check with each group to make sure they're entering data correctly and filling out all fields.

## III Water Quality measurements:

After the 20 minutes, have the students put the water quality data sheets on top on their clipboards. Give each student a water sample bottle or one to each group if there are not enough bottles. Go through steps 1-5 of fixing D.O. samples before demonstrating the protocols for measuring salinity and temperature. Distribute tools to each group, let them make the measurements themselves, and record their measurements on their data sheets. Then complete the DO fixing and titration.

*Salinity:* Performing Refractometry on a Sample

1) Clean off refractometer lens with distilled water.
2) Completely cover blue lens with distilled water; use screwdriver to set at zero.
3) Clean out eyedropper with distilled water.
4) Collect sample in eyedropper.
5) Place 3 or 4 drops of sample on lens so it is completely covered and close the daylight plate.
6) Read salinity through viewer (where white and blue meet) in parts per thousand.

7) Record salinity on data sheet.
8) Clean off lens and clean out eyedropper with distilled water.

*Temperature:*
1) Remove Thermometer from box and wait at least 5 minutes for it to adjust to the air temperature.
2) Record Air temperature on data sheet.
3) Place thermometer at least 6 inches underwater for 5 minutes.
4) Read temperature underwater (in degrees Celsius).
5) Record water temperature on data sheet.

*Fixing a Dissolved Oxygen Sample using a Lamott D.O. Kit*.
(students should wear gloves and goggles for this.)
1) Rinse bottles in water (3 x)
2) Fill bottles underwater, making sure no air bubbles remain in bottle.
3) Add 8 drops of #1 solution (manganese sulfate).
4) Add 8 drops of #2 solution (alkaline azide).
5) Place cap on bottle and invert gently eight times.
6) Let sample sit until it is clear under the neck of the bottle.
7) Add 8 drops of #3 solution (sulfuric acid)
8) Shake sample vigorously until sample is clear and no particles are seen.

*Measuring (Titrating) Dissolved Oxygen Samples*
1) Measure 20 mL of sample with graduated cylinder.
2) Place the 20 mL in designated titration bottle.
3) Fill titrator with sodium thiosulfate until green platform part of the plunger is at zero; no air bubbles should be present.
4) Put titrator in the hole in the titration tube cap; add drops of sodium thiosulfate drop by drop, swirling the tube after each drop, until the solution is light yellow.
5) Add 8 drops of starch and swirl (solution should be dark blue).
6) Continue adding sodium thiosulfate drop by drop, swirling the titration tube after each drop
7) Read titrator (1:1 parts per million).
8) Record D.O. on data sheet.
9) Repeat procedure for second sample bottle; record second D.O. reading and average the two readings on the data sheet.
10.) Empty bottles and cylinder into the waste container.

**IV Conclusion:** Students come back to a circle. Thank them for all the great data they gathered. Reiterate the importance of having name, date and location written on the data sheets. Let them know that their teacher can take the data sheets back with her and keep them safe. They can analyze the data they gathered later, such as calculating the total density of the area to see whose guess was the closest. (Or CEHL educators will collect the data sheets and calculate the total density back at the lab, and post it on the Seagrasses in Classes blog for their class!). Let the students ask questions and share reflections on the processes they just learned.