LESSON 4 – RETRIEVING THE CLAM CONTAINERS

Title: Retrieving the Clam Containers

Content Area Subjects:

Science, Math, English Language Arts

Grade level(s):

Grades 3 -12+ (adapt to any level)

Standards:

MAINE Learning Results

- Career and Educational Development. Interpersonal Skills (A3.pre-k to diploma.a,c)
- ELA. Informational texts (A3.3.c); (A3.3.e); (A3.6.e); A3.9-diploma.b); Research (C1.3-5.a,c,d)(C1.6-8.g); (C1.9-diploma.a,c); Listening (E1.3-diploma.c); (E1. 9-diploma.a); Speaking (E2.3-8.d); (E2. 9-diploma.a)
- Health and Physical Education. Cooperative Skills (I1.pre-k to diploma.a-d); Responsible Behavior (I2.pre-k to diploma)
- Math. Data (B1.4-8.a,b); (B1.9-diploma); Measurement and Approximation (B1.4-diploma.a,b); (B1.9-diploma.a,b,c); (B2.3-6); (B2.7.1a, 1b); (B2.8-diploma.3)
- Science. Scientific Inquiry and Technological Design (B1.3-diploma.a); (B1.3-diploma.b); (B1.3-diploma.c); (B1.3-diploma.d); (C1.3-diploma.a)
- Social Studies. Taking Action Using Social Studies Knowledge and skills (A3.3-diploma)

Common Core:

- ELA. (V.3-12.6); (SL.3-12.1c); (SL.3-5.1); (L.3.5b);(L.3.5b)
- Science and Technology. (R.6-12.4); (R.7-12.4)

STEM Skills

Hypothesis/Brief Description:

- How does the place where juvenile soft-shell clams, *Mya arenaria*, live on a flat (upper, mid, and lower tidal zone) affect how they grow and survive?

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- The field-based experiment will consist of four main parts: preparation of materials, planting/deploying the experiment, harvest/termination of field component, and analysis. Students will prepare and place the experimental units containing juvenile clams (ca. ½-inch in shell length) into the soft-bottom environment at high, middle, and low tidal zones. Several months later, the units will be excavated and their contents inspected for living and dead clam individuals. An accurate count of surviving clams and a measure of each shell (for growth rate) will be taken to collect data to answer the essential question/hypothesis.

Adaptations for different age levels:

All students in the project schools K-12 were not involved in the retrieval of the clam units. Time constraints set the situation for each school. We had discovered during the placement, that many younger students, Grades K-4 find moving through the mud flat difficult, so it may be that the older students would be the ones selected to retrieve the containers at mid tide and low tide locations. All students could be involved in collecting and labeling containers, but retrieval might work best with Grades 3 and above. All students may complete the worksheets that accompany the lesson individually, in groups, or with a partner. For younger students, the instructor could lead a discussion using the worksheet as a guide and having the younger students moving through the concepts as a group.

Objectives/goals:

After completing the activities, the student will be able to:

Collect and sort the clam containers that have been exposed to the elements; and,

Identify and tag each container and place it in a collection bag.

Time needed:

1 day in the early fall (approximately four months after the containers were placed) to retrieve the containers and mark them as to location and net/no net

Keywords and Phrases: data, final length, growth rate, hypothesis, initial length, juvenile clam, *Mya arenaria*, hatchery mark, high tide, high waterline/mark, low tide, low water line/mark, mortality rate, survival rate, tidal zones: upper intertidal zone, middle intertidal zone, and lower intertidal zone

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Materials Needed:

- Black plastic fish totes to carry clam containers filled with sediments and clams back to the washing area (DEI or another location with a water source – which does not need to be seawater) 8 containers will fit in a tote. Calculate the number of totes from the chart/ group/team number;
- Plastic grocery bags and tags to identify each container;
- Plastic garbage bags for students to sit on during the bus trip back to school;
- The students will need permission slips that allow their participation, providing the who, what, when, where, why, and how to their parent(s)/guardian(s), and explaining that students will need to bring boots, outdoor play clothes, and a complete change of clothes;
- Paper towels, wet wipes, sanitary gel, etc. for cleaning use during and after the field experiment;
- Map or chart that documents the location of each container;
- Tally count of containers to make sure all were collected;
- Special code for any container which has moved totally out of place;
- Aluminum trowels;
- Boots and casual clothes;
- Transportation to the Downeast Institute (DEI) and the placement tidal flat

The items listed below are for follow up activities and should not be taken on the trip:

- "Umbrella Chart" (worksheet size-one for each person or team);
- "Umbrella Chart" (Large chart paper – use markers to draw the circle);
- Markers for the large umbrella chart;
- Pencils or small point markers for the individual data sheets and charts; and
- Tape or some way to connect responses to the large umbrella chart

The Procedure:

Introduction

The instructor will say: "Today we will complete another step in our research project by retrieving the containers from the tidal zone. Let us talk about what we think has happened in the approximately four months since we planted the containers and why."

(Allow the students some time to think about this and make some statements about what they may find. Lead them into thinking about the possibilities of tidal action, climate, and predators. Prepare them to understand that some containers may be completely empty of anything but shells – particularly for the younger students, who may be upset by the discovery that their clams have died or

disappeared. **Approach the discussion that no matter what we find, everything is important to research).**

The instructor will say something similar to, "We do not know all the possibilities of what we may find, but all findings are important to research. We must collect all of the containers that we can. We must make sure what container was planted where by referring to our chart. We must make sure to tag and identify each container before we place it in the grocery bag in preparation of removal from the flat. (The tag should include information such as the field site name, the tidal location, and whether the container was completely netted or un-netted.) This is a very important day to our research. As prospective scientists, we must use all of our observation techniques. It is important to make note of what we see, hear, smell, and touch while we are completing this phase of our research. No detail is too small to consider, and we cannot know all of what we may find until we get there. The answers to our questions will not be available until we determine what remains in each container."

Key Questions

- What can we expect?
- Will we find all of the clam containers?
- Will the nets be on all of the containers?
- Will the containers be in the same place as we planted them?
- Will we find all of the containers from the upper tidal zone? the middle tidal zone? the lower tidal zone?
- Will the clams from one area look the same as those from another area?
- Will the clams still be in the containers?
- Will the clams be alive?
- What else (other organisms) will be in the containers?

Main Activity

The students and supervisors will travel to the tidal zone to retrieve the clam containers which have been in the flat since spring. The time frame should be 3-5 months after the initial placement of containers.

The containers will be dug up, coded, and placed into a plastic bag of some sort (could be a plastic grocery bag) making sure that the container is tagged and marked on the chart as to location in the flat – high, middle, or low tidal zone, and marked as to whose container was whose, if the experiment was set up to have individual student/team containers. Some containers may be out of place. The students will collect all the containers and count to make sure they have retrieved all that they can.

Methodology for students in Grades Pre k – 12 developed at Downeast Institute in 2011 by Brian Beal, Ph.D., UMM, Director of Marine Resources.

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If time allows, the students will continue to the washing stations. This activity could be scheduled for a later time if necessary. If the containers will not be washed until later, they must be kept cool so the clams will live.

The group will take the containers to the washing location (DEI or another location with a good water source. Salt water is not required. If the containers are washed and data is collected, continue with the conclusion below.

Conclusion

In a small group or large group discussion have them record on chart paper their responses to all questions listed earlier as the Key Questions.

The Instructor could lead the students in a discussion of "What does this mean? What could happen next? How could our information be used?" (To promote student interest in preserving or helping to preserve the clam industry, the Instructor could center discussion on such possibilities.)

Assessment/ Extension Activities/Follow Up:

Students could do an "Umbrella Chart" as a conclusion to their lesson and an extension of their learning. This could be done individually or in a small/large group. Sheets should be kept for future reference. The group could prepare a big "Umbrella Chart" with the main idea "Today I learned That" on Chart Paper, having each group or individual pick out a choice from their individual chart to tape to the big chart. After the favorites have been put on the classroom size Umbrella Chart, the instructor can review the choices with the group as a summary of the field experiment. (This large chart can be a simple drawing or sketch on a blackboard, whiteboard, or chart paper with the students taping their responses around it.)

If the subject of erosion or storms causing containers to be moved out of place during a project did not come up during a discussion of the Key Questions, The Instructor is encouraged to insert an extension activity here or in the future on coastal erosion as a result of storm events.

Usually containers are found, unless the erosion/storm damage is very severe, but containers may have moved out of place.