

28 May 2019

CSI-Maine – 2018-19 Season

CSI-Maine (Community Science Investigations-Maine) builds on three ideas:

1. Rural communities need data and science to manage local resources and economies.
2. Schools can help provide data and scientific know-how.
3. Students who work with data and scientific ideas and practices in support of their communities develop a deeper understanding of science and of their communities.



Fishermen and students help a fisheries scientist retrieve experiments in deep mud at Bunker Cove.

Over the past two years, CSI-Maine has helped students conduct citizen science research that helps Gouldsboro manage and sustain its clam fishery. As the Gulf of Maine has gotten warmer, the number of green crabs (a clam predator) has increased because more young crabs survive the winters. Clams in many of Gouldsboro's coves now need protection from crabs to maintain a harvestable population. Providing such protection takes money and effort, which is why it is essential for the town to have data about clam growth, survival, and new clam recruitment in a cove before investing. With the aid of foundation support, our partners at the Downeast Institute have been able to provide this information over the past few years. However, Gouldsboro understands that it cannot count on such support over the long run and needs to develop the ability to collect and analyze data on its own. Schools can assist in providing that capacity and can provide students, including students who feel they cannot or do not want to “do science,” with the opportunity to engage in scientific work that is interesting and useful.

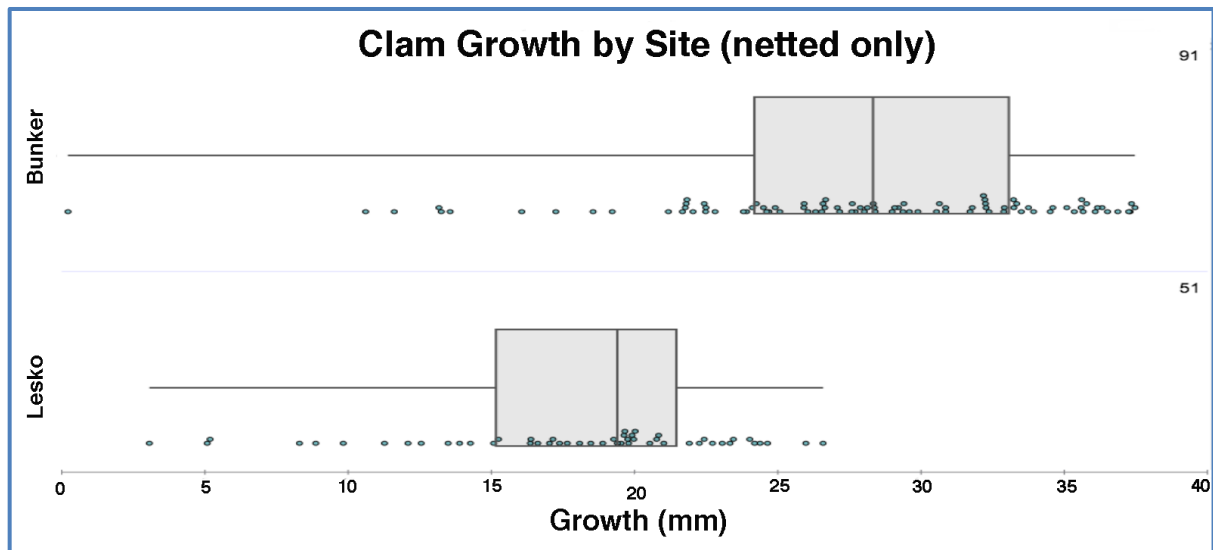
CSI-Maine also reaches beyond students. A principal goal of CSI-Maine is to increase the ability of towns like Gouldsboro to collect and use experimental data, together with other scientific knowledge and (very importantly) with local knowledge, to make decisions that benefit the town and the resources it manages. Developing community-wide ability to use experimental data involves more than working with students. It also means working with fishermen, scientists, and town officials to create a decision-making “network” of different kinds of know-how that the town can rely on to identify the information that it needs and to find people who can help produce that information, analyze it, and use it in decision making.



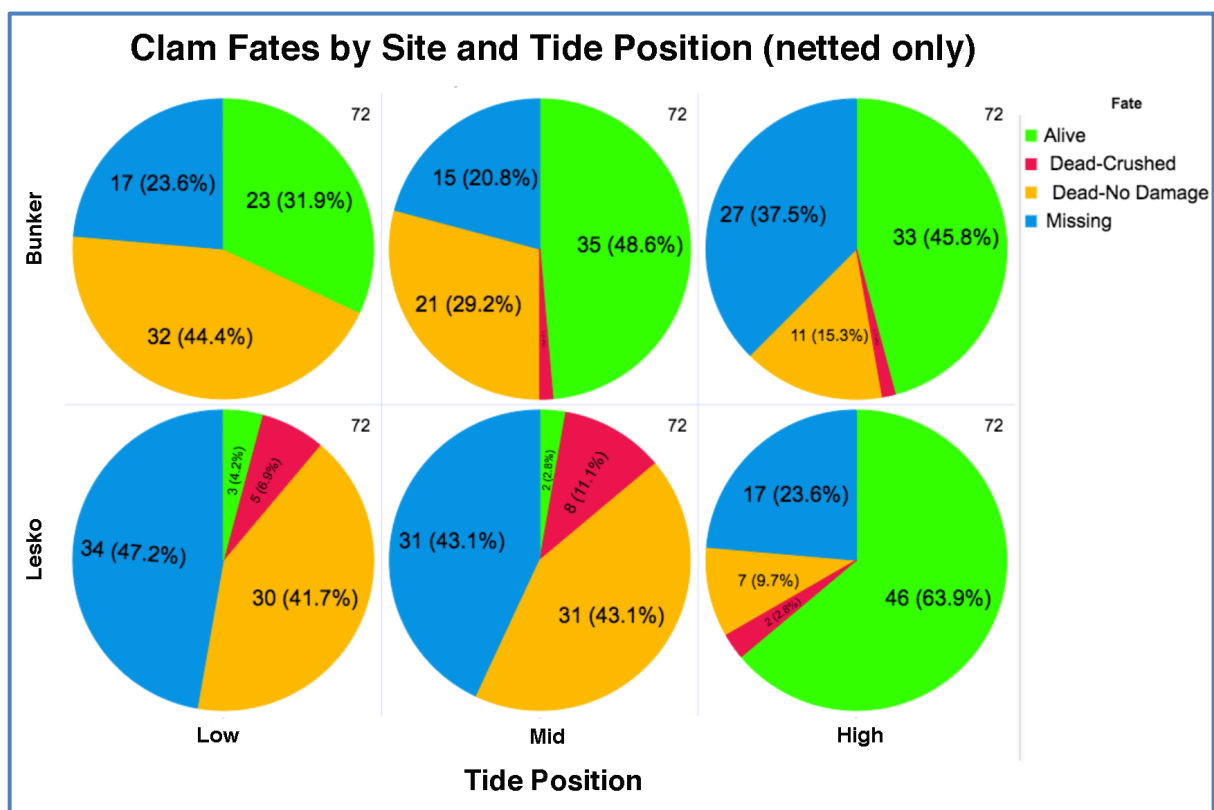
Students process experiments retrieved from clam flats, washing away mud and collecting adult and juvenile clams using a 2 mm sieve.

Highlights from This Past Year

This past year we developed procedures that Gouldsboro's shellfish committee and Sumner Memorial High School can repeat year after year to develop an understanding of which bays and coves are most productive and how they are changing. Working under the direction of shellfish warden Mike Pinkham, students assisted fishermen in retrieving experiments from two coves that the town was considering as sites for future seeding and management work. The students processed all the clams retrieved from the experiments and collected data about growth, survival, and recruitment. This spring, they analyzed the data and presented their findings to the shellfish committee. Briefly, students found that growth and survival were limited at one site and strong at the other. However, they also found an interaction between survival and position along the tidal gradient (how much time the clams are underwater) that, upon further analysis, suggested that there could be a severe milky ribbon worm problem at what appeared to be the more favorable site. The students prepared the graphs on the following page to explain what they found. The experimental data that the students collected, analyzed, and presented kept the town from using a site that looked promising but probably would have resulted in a poor return on the time and money invested.



Graph showing results of comparison of clam growth at the two sites. The strong growth at the Bunker site caused students to tentatively conclude that they should recommend the use of the Bunker site. However, more in-depth analysis (see the graph below) suggested that the situation was more complicated.



Comparison of clam fates at the two sites. The students found an interaction between tide position and survival at the Bunker site, noting that nearly half the clams at low tide were found dead in the experimental units. Retrieving the samples from the freezer, students found evidence of milky ribbon worm predation.

Going Forward

The Gouldsboro shellfish committee now has a better understanding of the value of this kind of experimental work. During the 2019 season, the committee will again work with Sumner teachers and students to collect data, this time from two sites in West Bay. The fishermen and students will also begin new, small-scale experiments to capture clam spat and then overwinter the juvenile clams for use as clam seed in 2020. The town wants to see if it can produce its own clam seed because purchasing clam seed from outside suppliers is expensive and difficult to sustain financially. Again, participation by students and teachers will be essential to undertaking this experimental work.

The Gouldsboro shellfish committee is also beginning conversations with other towns in the region to explore the possibility of coordinating the timing of opening areas to harvesters. The intent is to avoid inadvertent flooding of the market that drives prices down. As with decisions about which clam flats to cultivate, moving forward with thinking about how to coordinate arrangements between towns about opening and closing flats will require data. This is another area where collaboration between shellfish committees and schools could be useful. Students can learn to collect and use economic data, and towns might be able to develop new capabilities to manage their resources.

Objectives for the coming years include:

- Expanding the program to include more schools, including middle-school students.
- Expanding the work to neighboring towns.
- Taking on new questions that the shellfish committee needs to answer.
- Developing new ways for fishermen, scientists, teachers, and students to share information and to build on each other's knowledge and capacities.

Regarding this last point, Mike Pinkham and I are planning to create a "Think Tank" made of fishermen, scientists, and students that will meet periodically to look at research findings and questions in more detail. The goal is to get beyond "presentations," where one person is up front, talking, and everyone else is just listening. We want to create a place where ideas and evidence can be considered in depth. The Think Tank would make recommendations to the full shellfish committee.

This is exciting work. We believe we are breaking new ground not only in terms of how to sustain a locally managed fishery but also in terms of how to help young people discover that they can participate in science and decision-making and that their communities value what they, as the next generation of town citizens, have to offer.

Bill Zoellick
Education Research Director

This project relies on teachers, students, town shellfish committees, and the Downeast Institute. We owe special thanks to Susan Walsh and Vernon Campbell who teach at Sumner Memorial High School, Kyle Pepperman of DEI, and to Mike Pinkham, the Gouldsboro shellfish warden. We received financial support from the Schoodic Community Fund and the Elmina B. Sewall Foundation through the ELLMS network. We also thank Tuva Labs for complimentary access to data analysis software and the Gulf of Maine Research Institute for advice and insight. For more information contact bzoellick@schoodicinstitute.org.