Connecting Schools to Resource Management
A Study to Inform Decisions About Clam Seeding in Gouldsboro

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Background

Soft shell clam resource management has become more complex and expensive for many Maine communities because of increased predator pressure resulting from climate change. Working within a program called "Maine Community Shellfish Investigations" (CSI-Maine), Schoodic Institute and the Downeast Institute (DEI) have partnered with the town of Gouldsboro and with Sumner Memorial High School to learn whether schools might assist towns in **reducing the costs of local clam management** while also providing students with opportunities to encounter **important scientific ideas** and to develop **proficiency in scientific practices** in work that matters and has value to their community.

2018 Research Sites

Gouldsboro's clam management program includes the "seeding" of clam flats with hatchery clams and the use of nets to protect clams from green crabs. Gouldsboro would like to expand this work to sites that have been productive in the past but are now "dead mud." The shellfish committee wanted information about two sites – Bunker Cove and a cove at the end of Lesko Lane.

The town wanted information about potential growth rates, survival, and recruitment at different tide levels at each site.

Methods

Using a design developed by DEI, we placed 36 six-inch plastic plant pots at each site. Each pot was filled with mud from the site, and 12 hatchery clams with SL of about 12 mm were placed on the surface of each pot. Pots were arranged in 1 m quadrats with 4 pots per quadrat and 3 quadrats at each tide level – low, mid, and high. Half the pots were covered with ¼" mesh plastic netting, half were not. Pots were placed at the sites on May 22, 2018 and retrieved on Oct. 23, 2018. Working pot by pot, Sumner students separated the clams from mud using a 2 mm sieve. Hatchery clams and new recruits were measured and counted. Dead clams were examined to collect information about probable cause of death.

Findings

Sumner students met weekly in January and February of this year to analyze the data and prepare for a presentation to the Gouldsboro shellfish committee on March 20. Below are some of the findings they will present.
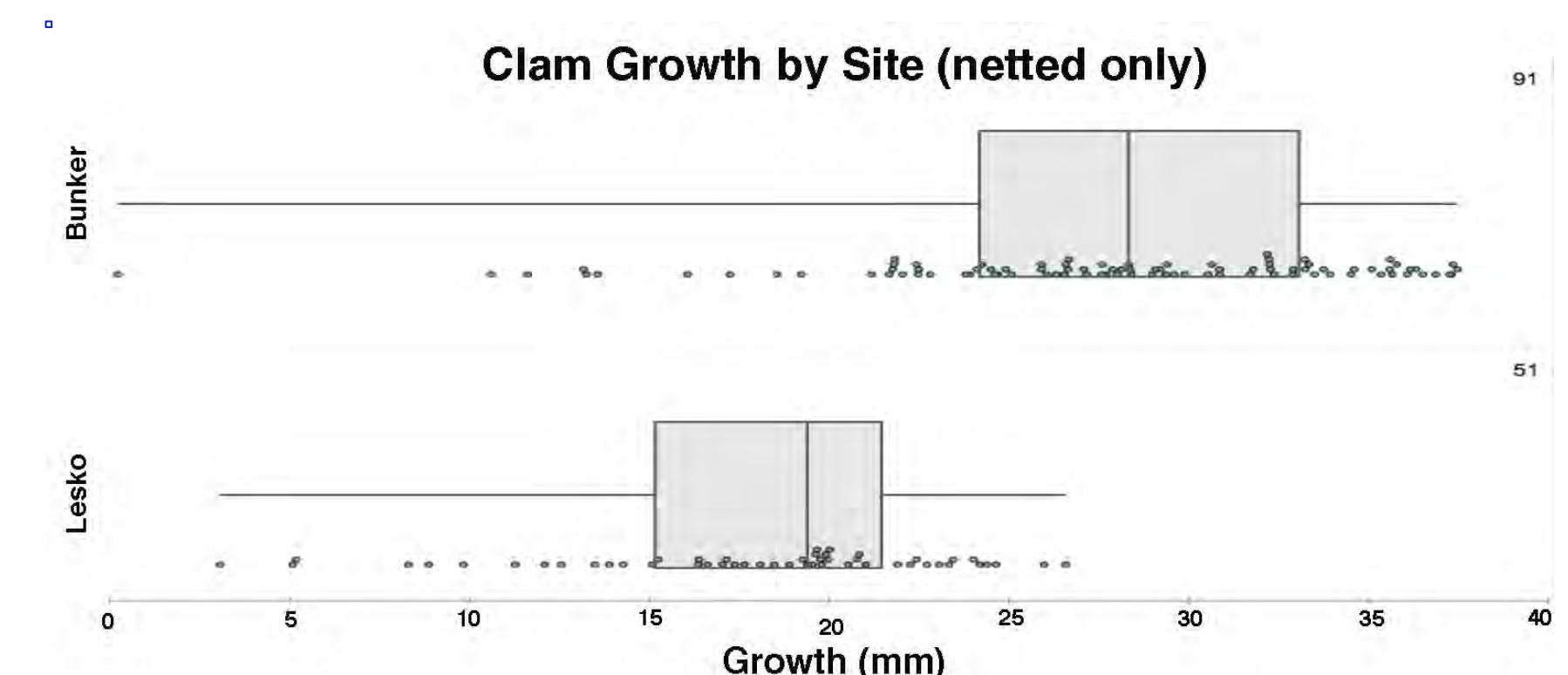

Figure 1. Distribution of clam growth at each site. Only 7 of the 432 clams in pots without nets survived; they were excluded from this analysis. Median growth at the Bunker site was 28.3 mm; at Lesko it was 19.4 mm.
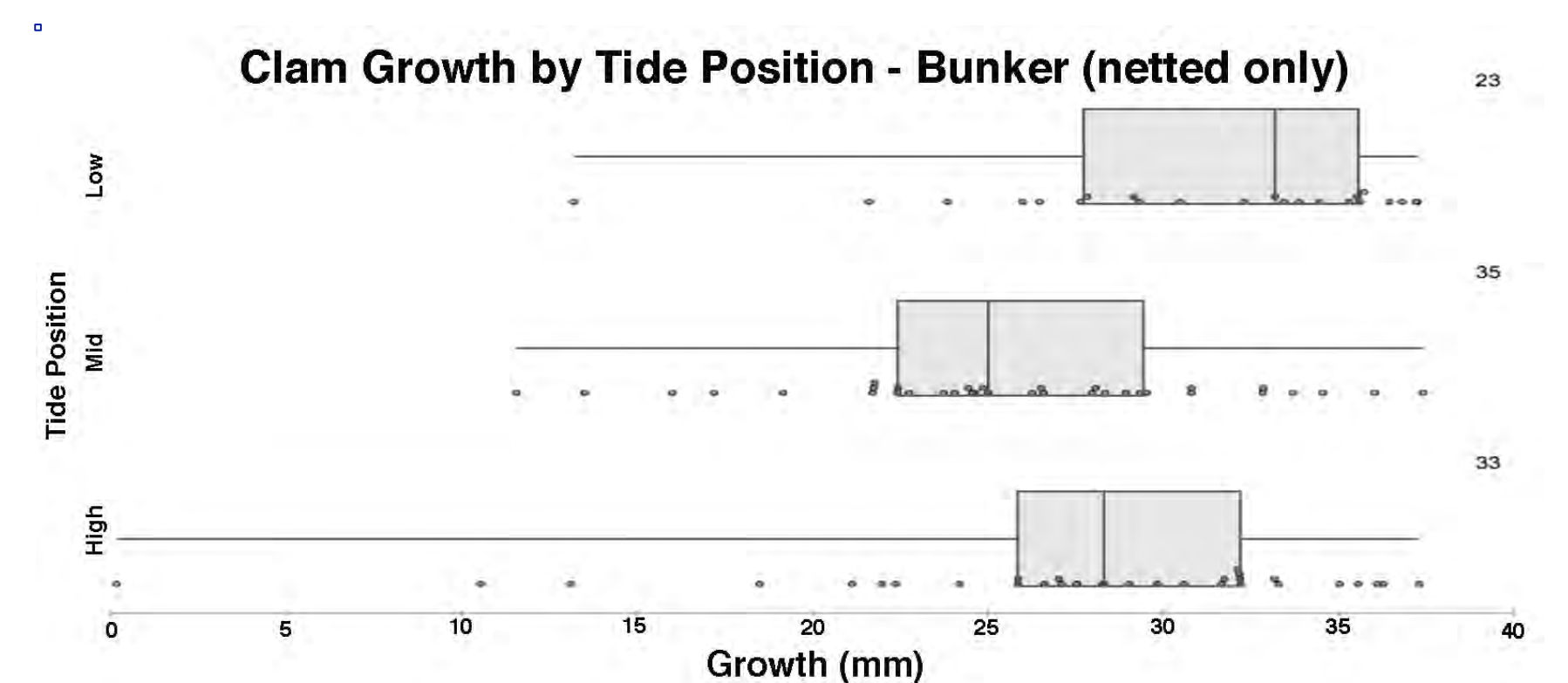

Figure 2. Distribution of growth at the Bunker site by tide position. The numbers along the right show the count of survivors at each position. As expected, growth was greatest when clams were underwater for more time, but fewer survived.
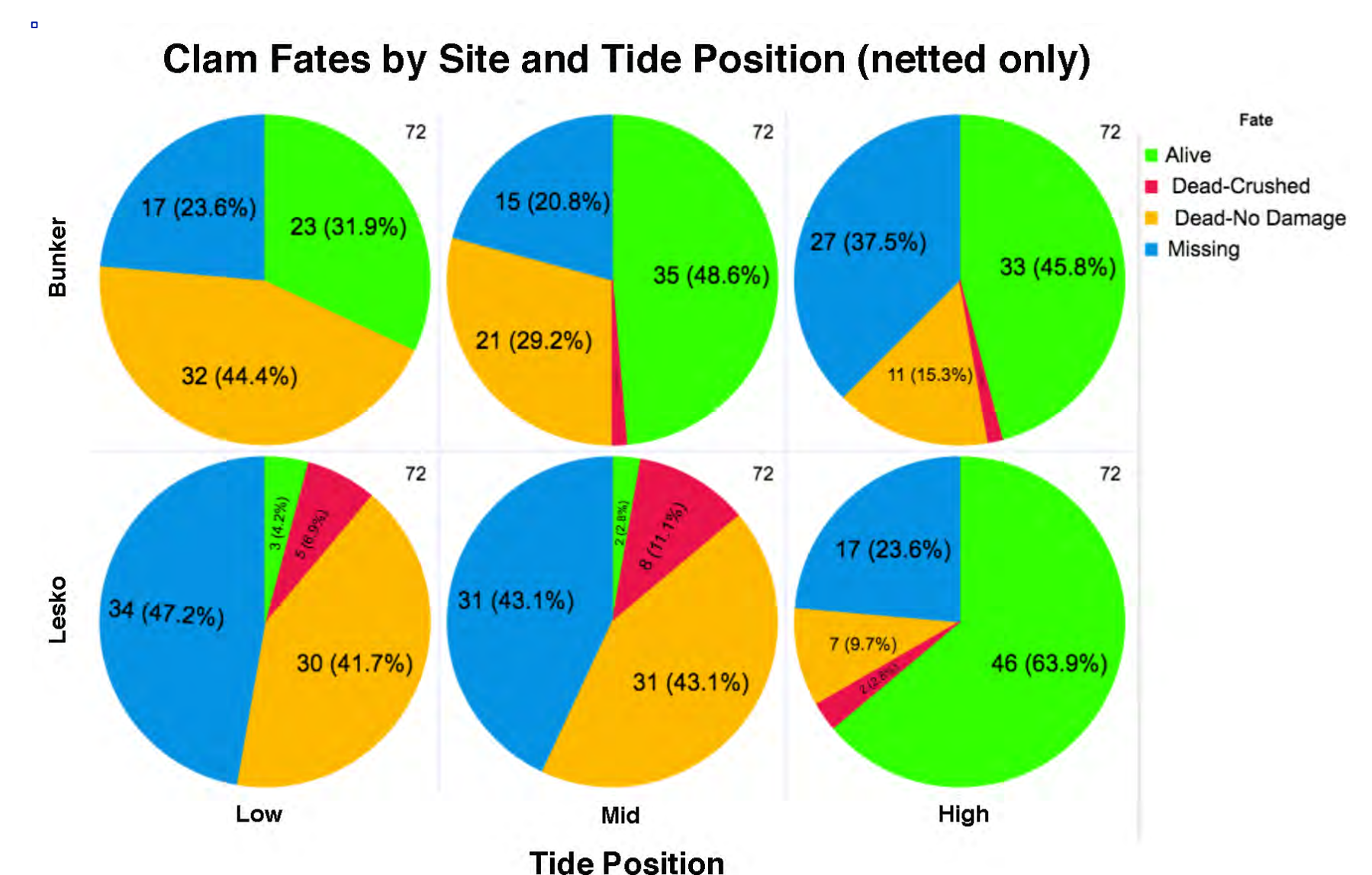

Figure 3. Clam fates at the two sites by tide position. Pots without nets were excluded. Note that at the Lesko site, high tide appears to be the only viable location. Also note that almost half (44%) of the clams at the low tide position at the Bunker site were found dead in the pots.
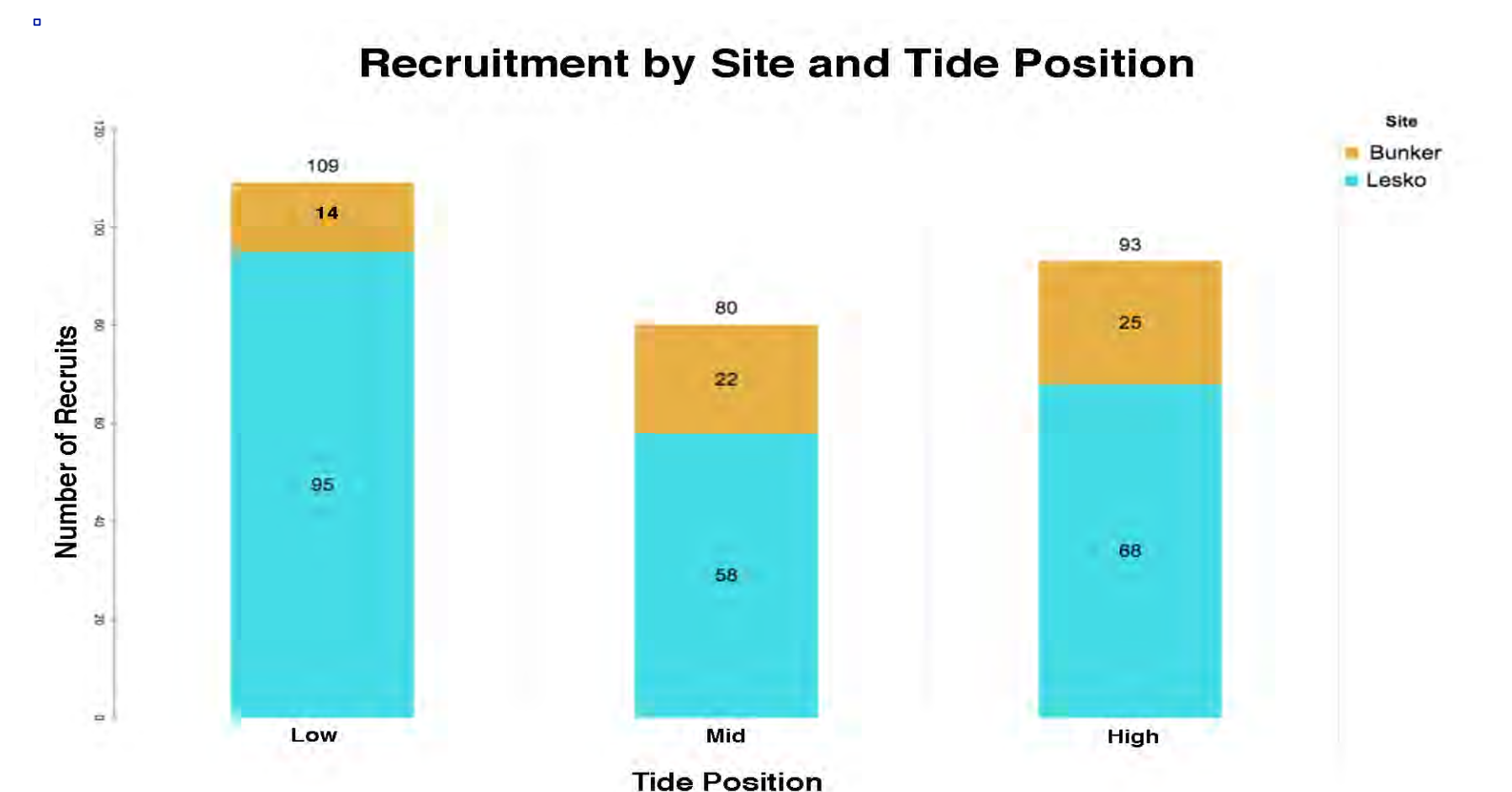

Figure 4. Number of clams recruited at each site and tide position in all pots. Most pots had ≤ 5 recruits. Only 8 pots had 10 or more recruits. All were at Lesko.

Analysis

Analysis of these sample data suggests that growth and survival are likely to be better at the Bunker site than the Lesko site. However, students noted that the survival rate was < 50% at both sites and all tide positions except for high tide at Lesko. Further, they were concerned about the large number of dead clams found in pots at lower tidal positions at Bunker. We turned to Kyle Pepperman at DEI to see if he had an information about the possible causes of the high mortality. He sent photos of the dead clams found in pots at these locations; here is one photo.
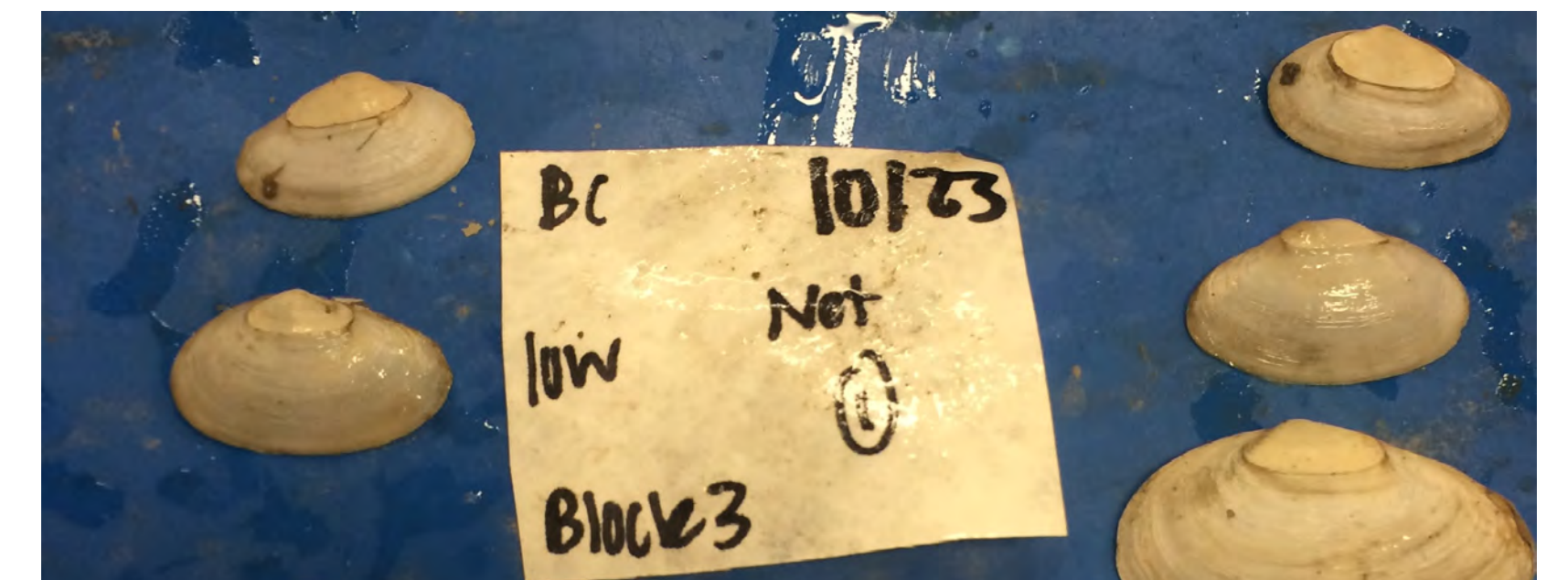
Note that all of these clams were alive long enough to grow to a size of at least twice their original shell length and in some cases much more. Kyle reported that each shell was empty and uncrushed, which suggests predation by milky ribbon worms.

Next Steps and Implications

The students will present their findings to the Gouldsboro shellfish committee on March 20, 2019. They recognize that there is no simple answer to whether and where the town should invest its resources at these sites. Work between now and then will focus on supporting a good discussion of the alternatives and trade-offs. We hope the information from these experiments will be useful as the fishermen make decisions about clam seeding and that the committee will identify other sites at which it would like assistance in exploring in 2019.

Thinking beyond this year, Schoodic Institute wants to learn more about how to help schools provide data that shellfish committees need. We also hope to collect information about whether these kinds of connections between schools and shellfish committees not only provide unique learning opportunities for students, but also help sustain the fishery and reduce the costs that towns incur in managing it.

Acknowledgments