

# 2021 Gouldsboro Nursery Box Data: Quick Report

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On November 16, 2021, a team of volunteers retrieved and processed the 10 nursery boxes that had been floating in the old lobster pound behind Gouldsboro's Shellfish Resilience Lab in Bunker's Harbor. What follows is a quick summary of what we found from looking at the data so far. I will write more and share more pictures once I get a website up.



**Dana Rice and Josh Scott move the nursery boxes from the old pound to the lab.**

## The Data We Collected

Most of the nursery boxes contained at least a few green crabs. In some boxes, the crabs were large and well-fed. When there were more than a few crabs in the boxes, the live clams were intermixed with a lot of broken shells.

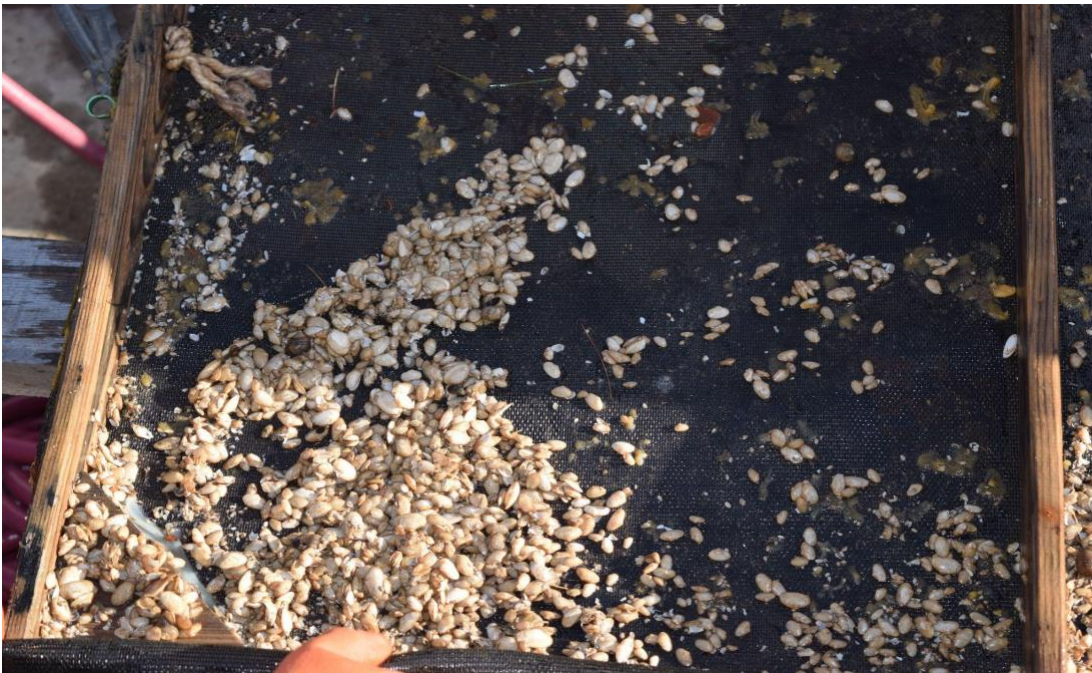
We needed to estimate the number of live clams in each box. We could not count them all, so we took 8 samples (generally ranging from 7 to 12 grams and from 20 to 35 clams) from each box after they had been washed and sorted by hand. These samples contained live clams and shells from clams that had been crushed by crabs. We weighed each sample and counted the number of live clams. We did this separately for each box since the ratio of crushed shells to live clams was different in each box.

We also took a separate sample from each box and measured the shell length of each clam in the sample. Because measuring shell length is time-consuming, we only measured shell lengths for a single sample from each box.





**Where many of the clams went.**



**Nursery box before sieving, rinsing, and sorting showing live clams and crushed shells.**

## What We Found, Very Briefly

The data collected are summarized on [this set of Google sheets](#). Feel free to take a look at the results. There are three spreadsheets in this set:

- A sheet with all the sampled weights and counts for each box.
- Another that summarizes the first sheet to provide overall totals for each box.
- A third sheet that has all the shell length measurements.

Using these data, we estimate that there were 33,719 live clams in the 10 nursery boxes. Later, when I have more time, I can provide error estimates around that number. For now, it is a pretty good bet that the actual number is between 31,000 and 35,500. We had put about 100,000 very small clams in the boxes when we set them out in early summer. So, about a third of them made it through the summer and will be overwintered in the lab.

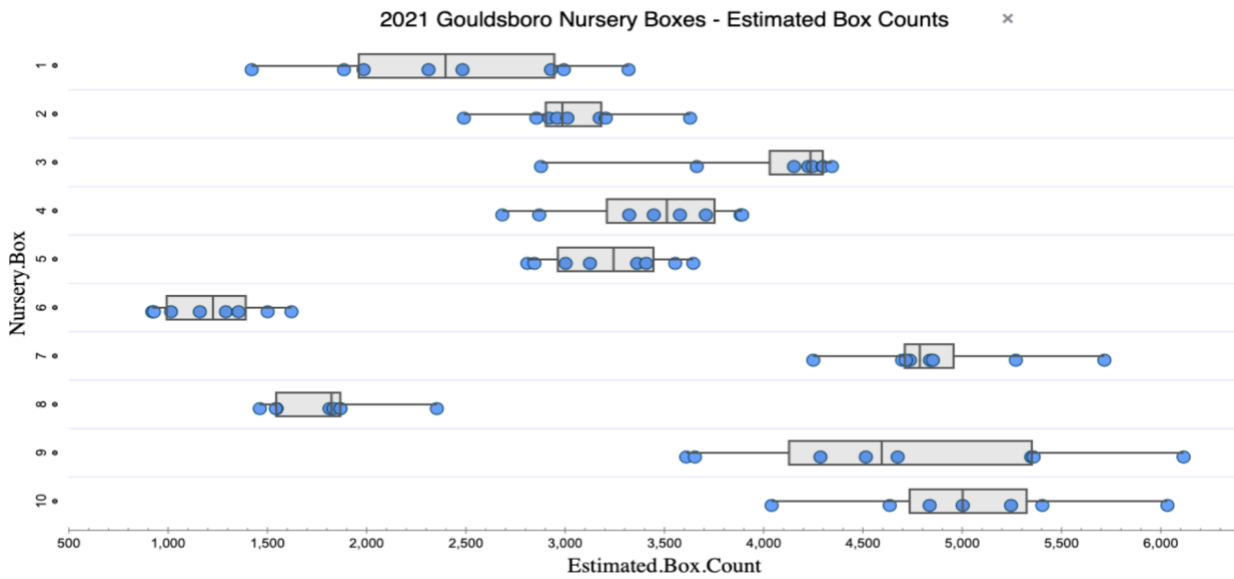
The average shell length across all the boxes was 12.6 mm -- about a half-inch. Because we did not collect shell length data when the clams were put into the boxes, we don't have an estimate of the amount of growth. However, my understanding is that the clams measured only a few millimeters when they went in the boxes, so there was a lot of growth.

## What We Found, In a Bit More Detail

### Clams per Nursery Box

Some of the boxes had big crabs that had a great summer. Interestingly, boxes with big crabs tended to have few little crabs. (Hmmm...) One box (number 6) was open on one side. The other boxes were in better shape.

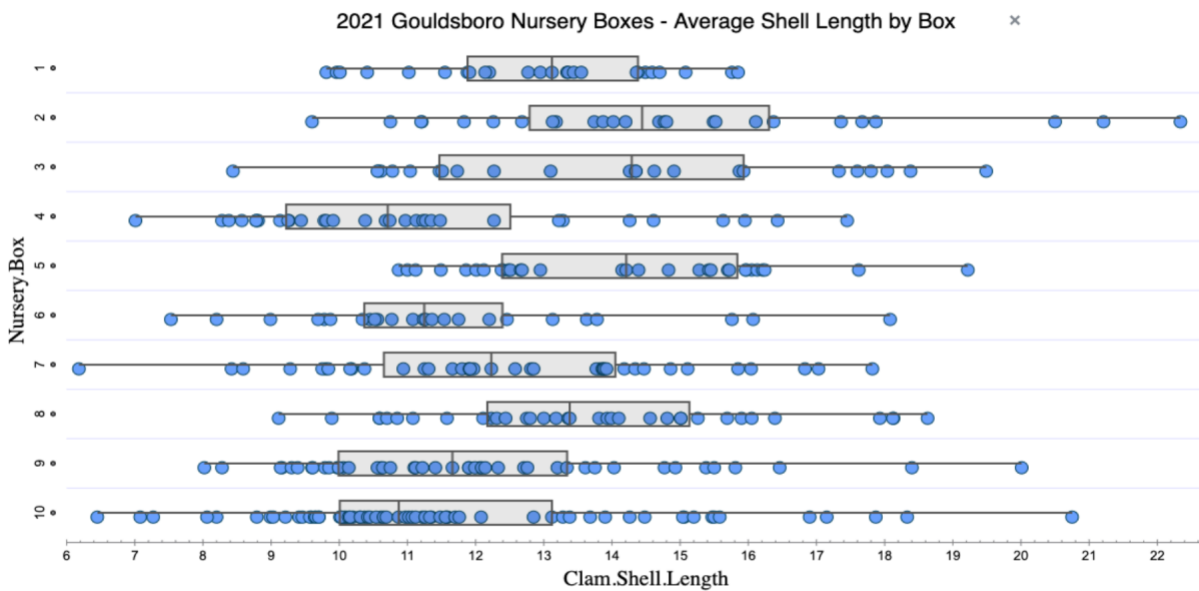
Since we took multiple samples from each box, weighed them, and counted clams in each, we have a set of estimates for the total clams in each box. The top graph on the next page shows each of those estimates. The line in the middle of each rectangle is the median of the estimates for that box, which is the number where half the estimates were larger, and half were smaller.



As you can see, clam survival varied greatly across the boxes. Survival in box six, the one that was partially open, was especially low. Each box started out with approximately 10,000 clams.

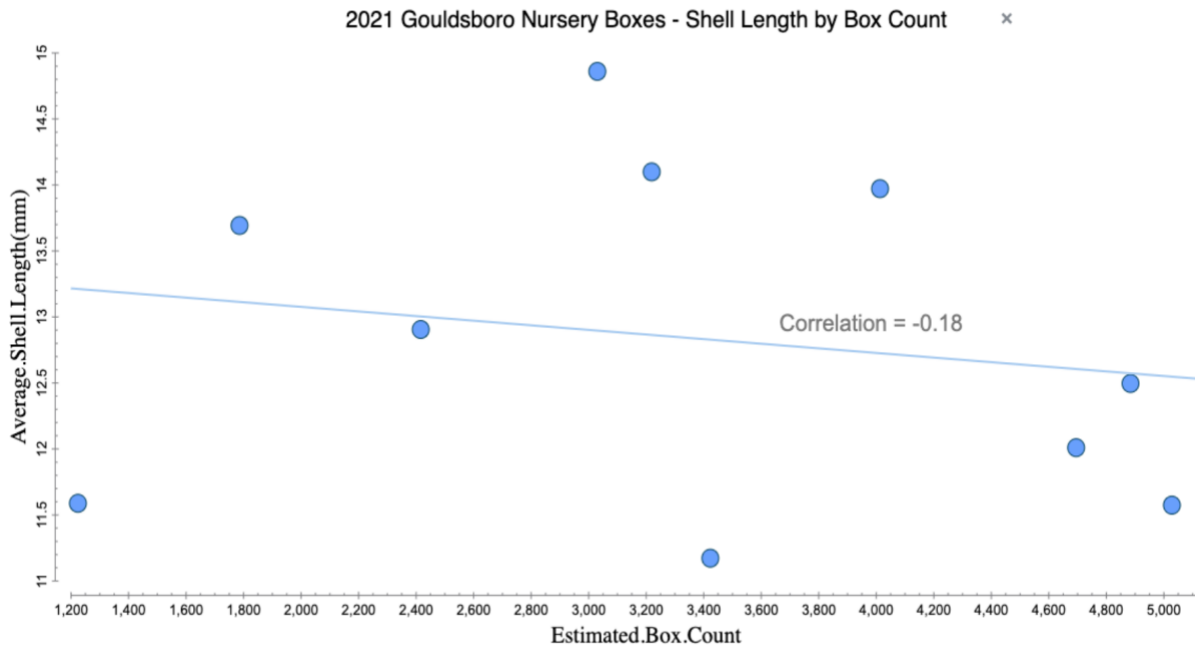
## Shell Length

The graph below shows how shell length varied across all the clams that we counted in all the boxes. Again, the line in the middle of the rectangle is the median. In this case, the median is the shell length where half the clams we measured were larger and half were smaller. The rectangle shows the smallest and largest shell length for the middle half of the clams. You can see that there was more variation in shell length for some boxes than others.



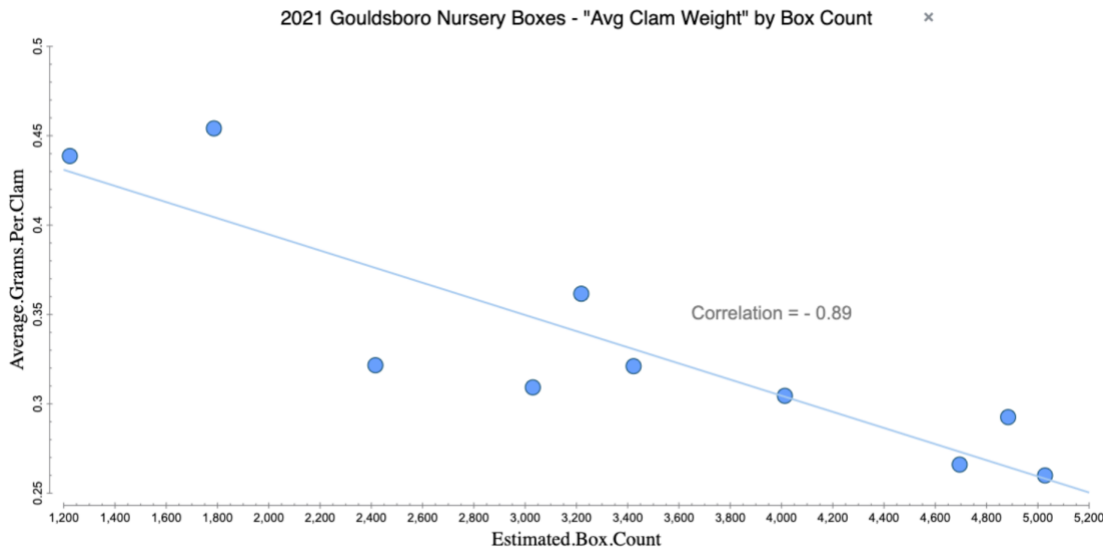
As noted above, the average shell length of all the clams we measured was about 12.6 mm. However, as the following graph shows, the average shell length per box was about the same

for boxes with differing levels of predation. (The graph shows that there was very little correlation between average shell length and estimated box count -- the "best fit" line is pretty flat.)



## Size and Weight

Interestingly, there IS a strong inverse relationship between "clam weight" and estimated box count, as the following graph shows. Since the previous graph showed that the average shell length was about the same across all the boxes, how can this be? (Short, fat clams in boxes where there was more predation?)





The answer is that we did NOT get our “grams per clam” measurement by weighing individual clams. What we did was scoop out a cupful of clams and shells, weigh the whole mess of clams and shells, and then count just the live clams. So, it makes good sense that the “weight of stuff in the box per living clam” would be greater in the boxes with more empty shells.

## Discussion

### What Worked Well

The volunteers! This was an excellent, focused, hard-working crew. Volunteers included Janeeka Anderson and Mike Cronin, Pauline Angione, Michael and Chantal Jennings, Deidre Manning, Becky O’Keefe, Vicki Rea, Dana Rice, and Josh Scott. Heidi Leighton, the area biologist for the Department of Marine Resources, pitched in, and Sarah Hooper, Mike Pinkham, and I teamed up to keep things on track and make sure all the volunteers had what they needed. We also had a visit from Gouldsboro Town Manager Eve Wilkinson and *Ellsworth American* reporter Letitia Baldwin. You can [read Letitia’s story here](#) (and see more pictures!)

Another thing that worked well was the Gouldsboro Shellfish Resilience Lab. Mike Pinkham and I spent time wondering and worrying about setting up multiple workstations with running seawater so that volunteers could rinse and process the clams. The pump out in the harbor and our plumbing setup in the lab did everything we needed and the work area around the lab was perfect for this messy, wet work. (It also helped that it was a sunny, not-too-cold day.



**Heidi Leighton, Vicki Rea, Pauline Angione, and Michael Jennings working on fine sieving of clams after rinsing and initial coarse sieving in a fish tote.**

Yet another thing that worked was our plans for weighing, measuring, and recording data. This was our first time trying to collect a lot of data while trying to keep up with a bunch of folks who were processing the clams. I wanted to make sure we collected what we needed, but also recognized that the weighing and measuring could become a bottleneck. Special thanks to Vicki Rea for doing a great job of keeping the weighing, counting, and recording process moving. Also worth noting: the inexpensive (\$10) scales that we used to measure at the gram level and at the hundredths of gram level did what we needed at a price we could afford.

Becky O'Keefe's discovery that credit cards -- or credit card-like things such as store loyalty reward cards -- make excellent tools for sorting through clams and shells. Broken shells don't stick as much to the cards as they do to gloves and fingers.

A nice, unplanned bonus was that Heidi Leighton was able to identify all the different critters that folks found in the nursery boxes. Having her there to tell us what we were looking at, and then tell us more about what that animal ate and did, added a lot to the experience.



**Gouldsboro Shellfish Committee member Mike Cronin sorting clams from shells.**

### Small Things We Will Do Differently

- Maybe move to the south side of the building to stay in the sun and away from the north wind.
- Add one more person to the weighing and measuring team. (This time it was just Vicki and me.) That means buying one more small (0.01 gram) scale.

- Move the weighing and measuring operation to the back of the lab -- in the tank room. (This year we were in the doorway and in the way.)
- Throw the green crabs that we find in each box into a separate bucket so that we can count and measure them. (I would like to quantify the relationship between crabs and predation.)
- Improve the sampling for shell length process to ensure that selection is as random as we can make it.
- Capture shell length information when we put the clams into the trays.
- Consider doing clam weight and count estimates when we put the clams into the trays.

## Big Things to Try

We need to find ways to reduce predation over the summer. In ‘informal conversations with our colleagues at DEI, we learned that they too had a good bit of predation in their nursery boxes. Maybe it was just that kind of year ... but we also know that each year we have more green crabs.

One thing we might do is divide the nursery boxes into more compartments. This year they were divided in half. So, a green crab had easy access to half the clams in a box. If we divided the box into, say, 12 compartments, would that reduce predation? That should be something we can find out.



The other, HUGE message here is that we really need to get to work on finding out whether we can grow softshell clams **INSIDE** the lab during the summer by placing them in upwellers.

We could not try that this year because we did not have the lab up and running. Now that the lab is operational, building the upwellers, learning how to use them, and setting up experiments to compare summer growth in the nursery boxes with growth inside the lab will be focus areas for the coming year.

**Gouldsboro' 2021 Clam Cohort in their winter quarters.**



## Thanks

Thanks to all the volunteers who helped get the 2021 clam cohort safely into their winter quarters.

And we also want to thank the Broad Reach Fund and the Maine Shellfish Restoration and Resilience Fund for making this work possible.

## More on the Data

The graphs you see in this little report were made with TuvaLabs ... a program that would allow YOU to play with the data and look at other relationships. If you would like to do that, let me know and I will send you the links.