Figure Legends

Figure 18. a) Initial ($\bar{x}_{SL}$ ± 95% CI = 13.9 ± 0.19 mm, n = 598); and b) Final ($\bar{x}_{SL}$ ± 95% CI = 19.1 ± 0.18 mm, n = 598) shell lengths of cultured Arctic surfclam individuals that were deployed in small (1-ft x 2-ft x 3-inch deep) intertidal nursery growout boxes on 20 April 2023 at Timber Cove, Gouldsboro, Maine, and retrieved 269 days later on 14 January 2024.

Figure 19. Photograph of: a) a 1-ft x 2-inch x 3-inch wooden nursery growout box. Surfclams were added to boxes containing no sediment at one of six densities per box (25, 50, 100, 150, 200, 225). Large predators were excluded from boxes as PetScreen® (0.9 x 1.7 mm mesh) was affixed to the top and a piece of tightly-woven polyester landscape fabric to the bottom. b) boxes being deployed. Boxes are placed on top of the mudflat surface and then anchored in place by driving two 22-inch laths into the mud adjacent to each of the short ends of the box. When laths attain a depth so that their top is even with the top of the box, two nails are hammered through the lath and into the side of the box. Boxes remain in place until they are collected to process their contents.

Figure 20. Photographs from 15 January 2024 at Mud Hole Cove, Beals, Maine. a) experimental matrix (note: a quarter-inch film of soft mud had been deposited on all boxes due to two intense winter storms that occurred within 48 hours of each other (see: https://en.wikipedia.org/wiki/January_8%E2%80%9310,_2024_North_American_storm_complex) on 10 and 12 January; b) three boxes weighing approximately 20 pounds each are added to plastic fish totes to haul off the mudflat; c) the first 400 feet to the shore that is 1,200 feet away; d) eleven of twenty fish totes used to collect the sixty nursery growout boxes at the halfway point between the study site and the trucks used to transport the boxes to the processing facility.

Figure 21. Photographs of the sample processing laboratory at the Downeast Institute. a) building is 16-ft x 20-ft located on top of a wharf that overlooks a tidal impoundment (east) and Western Bay (west); b) four of eight workstations located on the eastern side of the building; a total of 16 work stations exist; c) close-up of worker opening a nursery growout box.

Figure 22. Photograph of cultured Arctic surfclam juvenile. Total shell length (SL) (yellow line) (greatest anterior-posterior distance) equals 20.29 mm. Initial length (red line) that is deposited on the date of field deployment as a disturbance line equals 13.03 mm. (Similar lines are formed on the valves of cultured soft-shell clam juveniles [Beal et al. 1999]). Absolute growth (Final SL – Initial SL) = 20.29 mm - 13.03 mm = 7.26 mm. Relative growth [(Final SL – Initial SL)/Initial SL] = (20.29 mm - 13.03 mm)/13.03 mm = 0.557.

Figure 23. (a) Relative growth [(Final Shell Length-Initial Shell Length)/Initial Shell Length] vs. initial shell length for Arctic surfclams at Timber Cove, Gouldsboro, Maine (20 April 2023 to 15 January 2024). $r^2 = 0.5191$, n = 598, F = 643.38, P < 0.0001, df = 1, 596. Least squares regression line ($\hat{Y} = 1.324 - 0.0668X$) is show in black along with the two concave 95% CIs for $\hat{Y}$ that appears as blue dashed lines above and below the regression line. (b) Absolute growth (Final Shell Length-Initial Shell Length) vs. initial shell length for the same clams from the same origin as in 2a. $r^2 = 0.2094$, n = 598, F = 157.81, P < 0.0001, df = 1, 596 ($\hat{Y} = 10.267 - 0.3689X$). 95% CIs for $\hat{Y}$ as described above. While not shown here, the relationship between Final SL and

Initial SL was also statistically significant ($r^2 = 0.4366$, n = 598, F = 461.78, P < 0.0001, df = 1, 596; $\hat{Y} = 10.267 + 0.6311X$).

Figure 24. Example of analysis of covariance using two stocking density treatments (25 vs. 225 surfclams/box) to examine the relationship between relative growth and initial size for cultured Arctic surfclams with an initial shell length ≥ 10 mm. Here, the lines are parallel (F = 3.60, df = 1, 182, P = 0.0562), and the effect due to increasing density was statistically significant (F = 12.70, df = 1, 182, P = 0.0005). The least-square mean for the low density group was 0.473 and 0.281 for the high density group indicating that the effect due to increasing density was a decrease in growth rate by ~ 40%.

Figure 25. Temperature at high tide at both field locations: Timber Cove, Gouldsboro, Maine; Mud Hole Cove, Beals, Maine from 17-18 June 2022 to 4-5 August 2023. Notice that summertime seawater temperatures trend ~3.5°C warmer at the western location (Gouldsboro), and that colder wintertime temperatures also occur at the western location as well.

Figure 18.

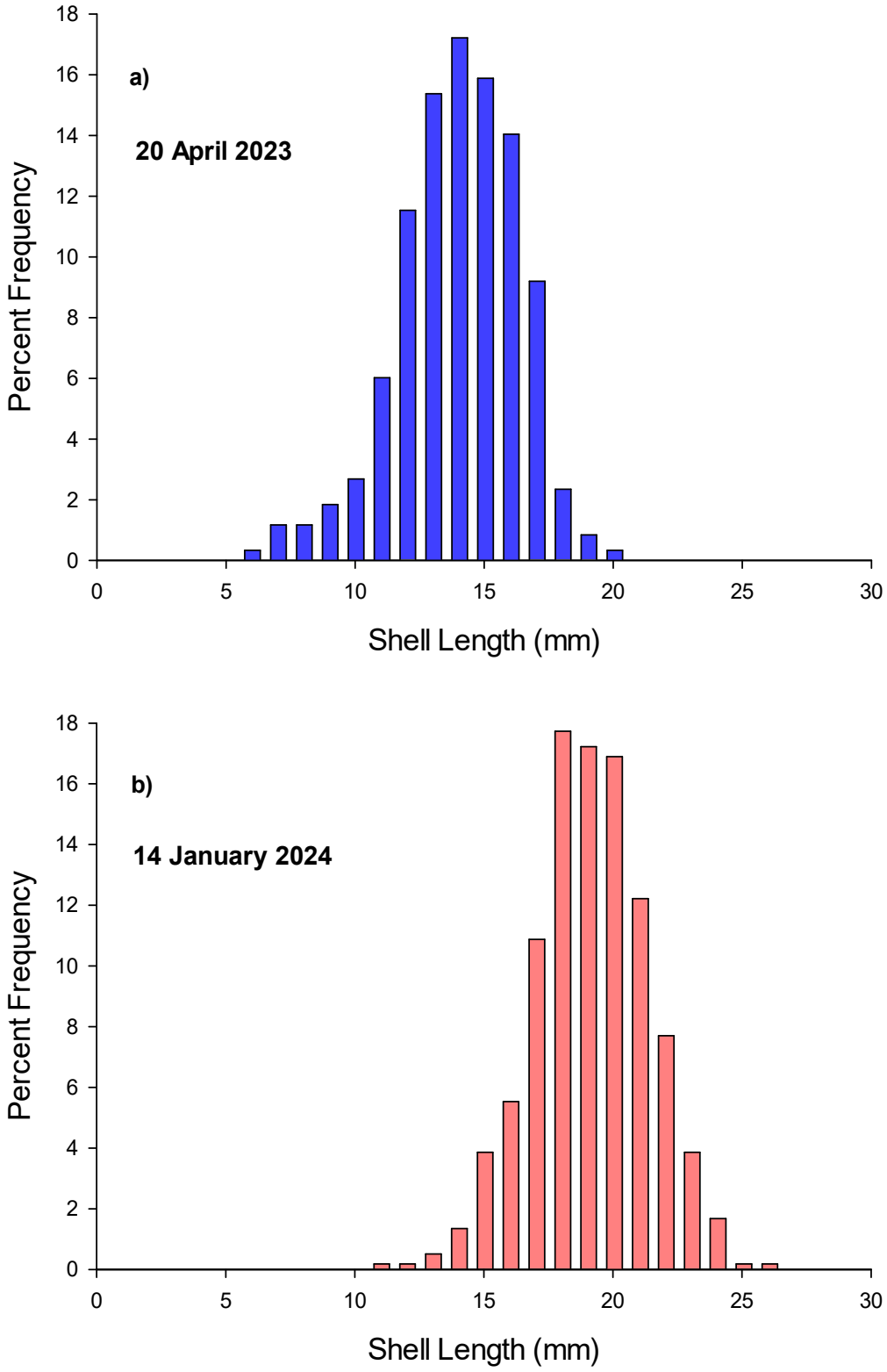

a)
20 April 2023
Percent Frequency
Shell Length (mm)
b)
14 January 2024
Percent Frequency
Shell Length (mm)

Figure 19.

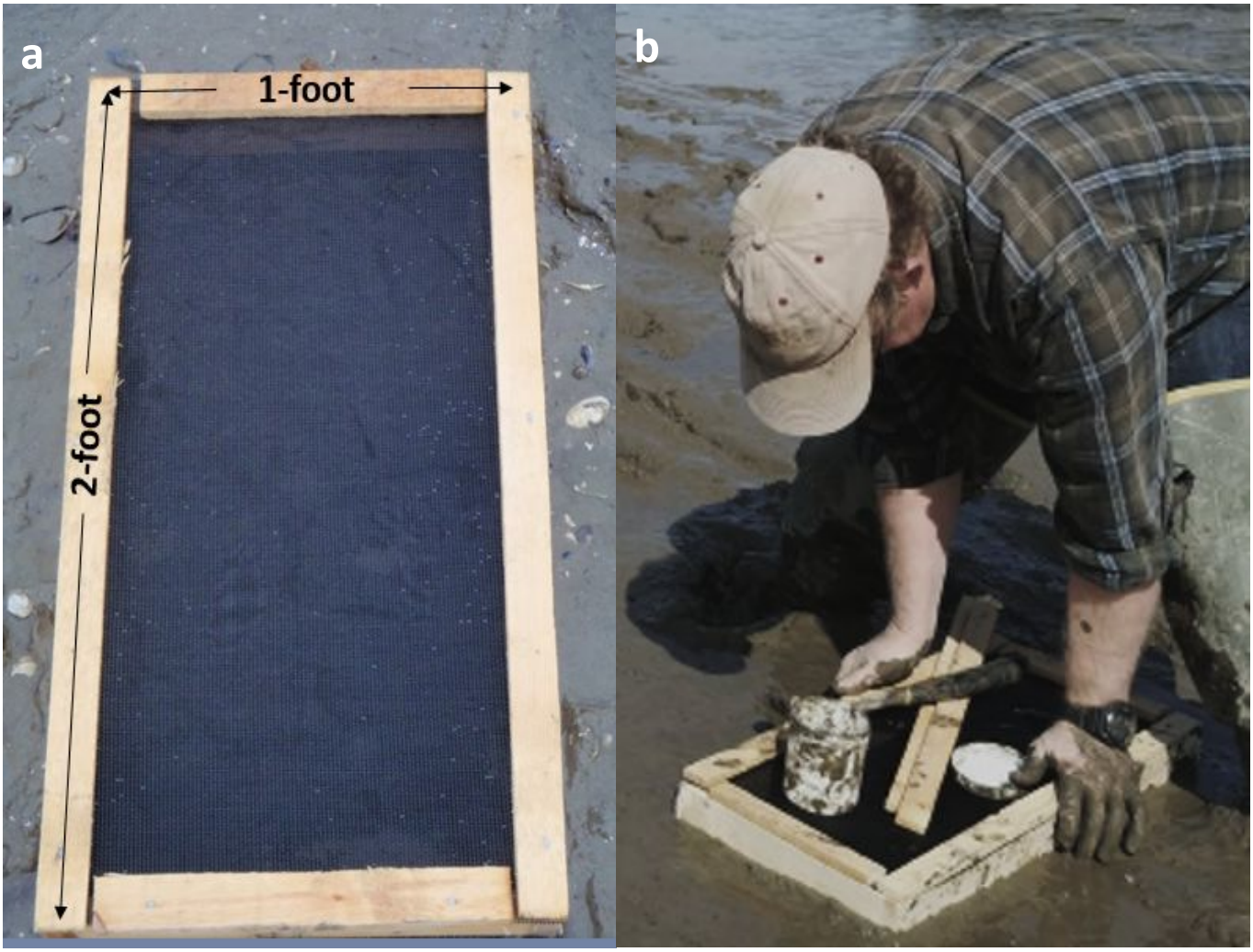


Figure 20.

Figure 21.

Figure 22.

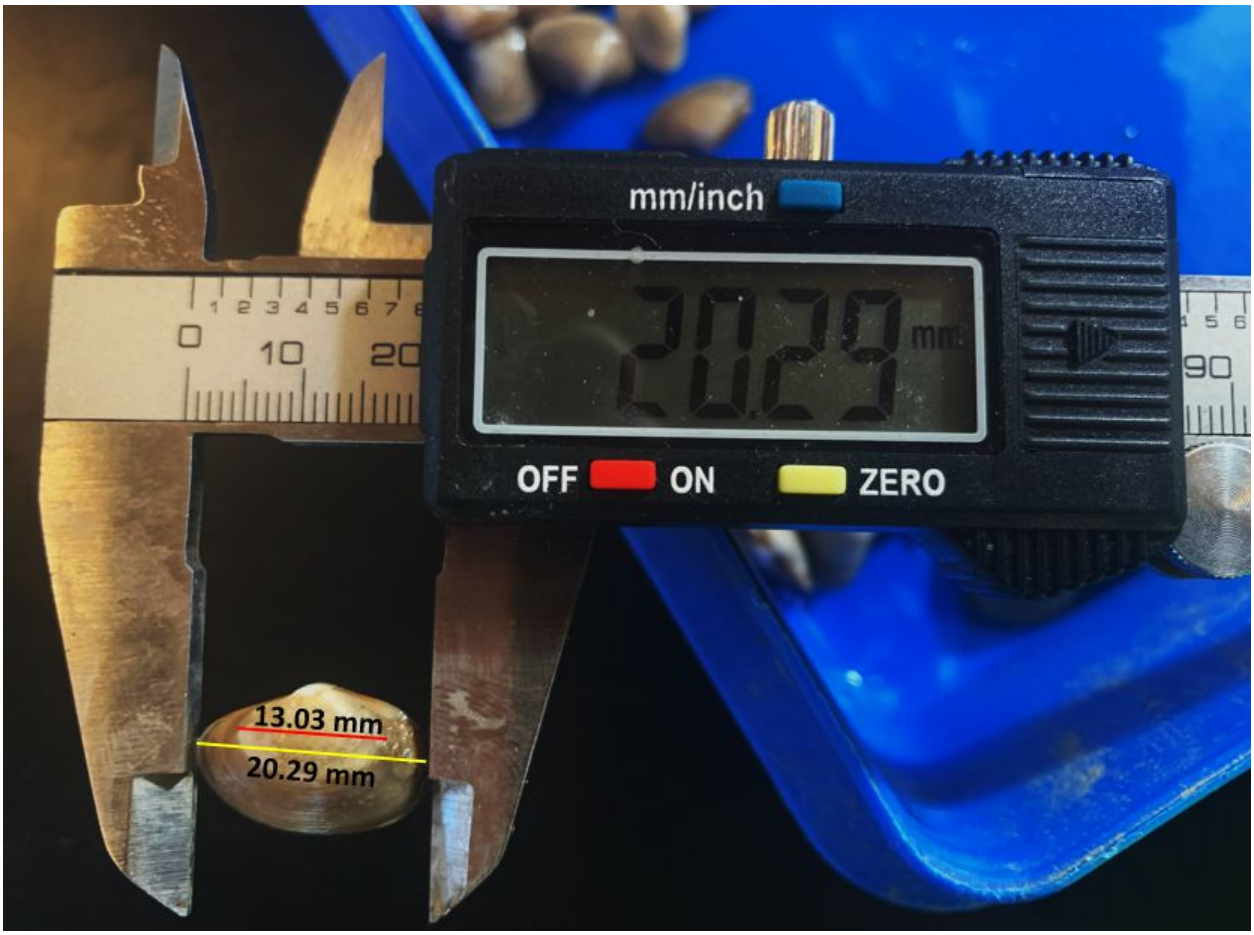


Figure 23.

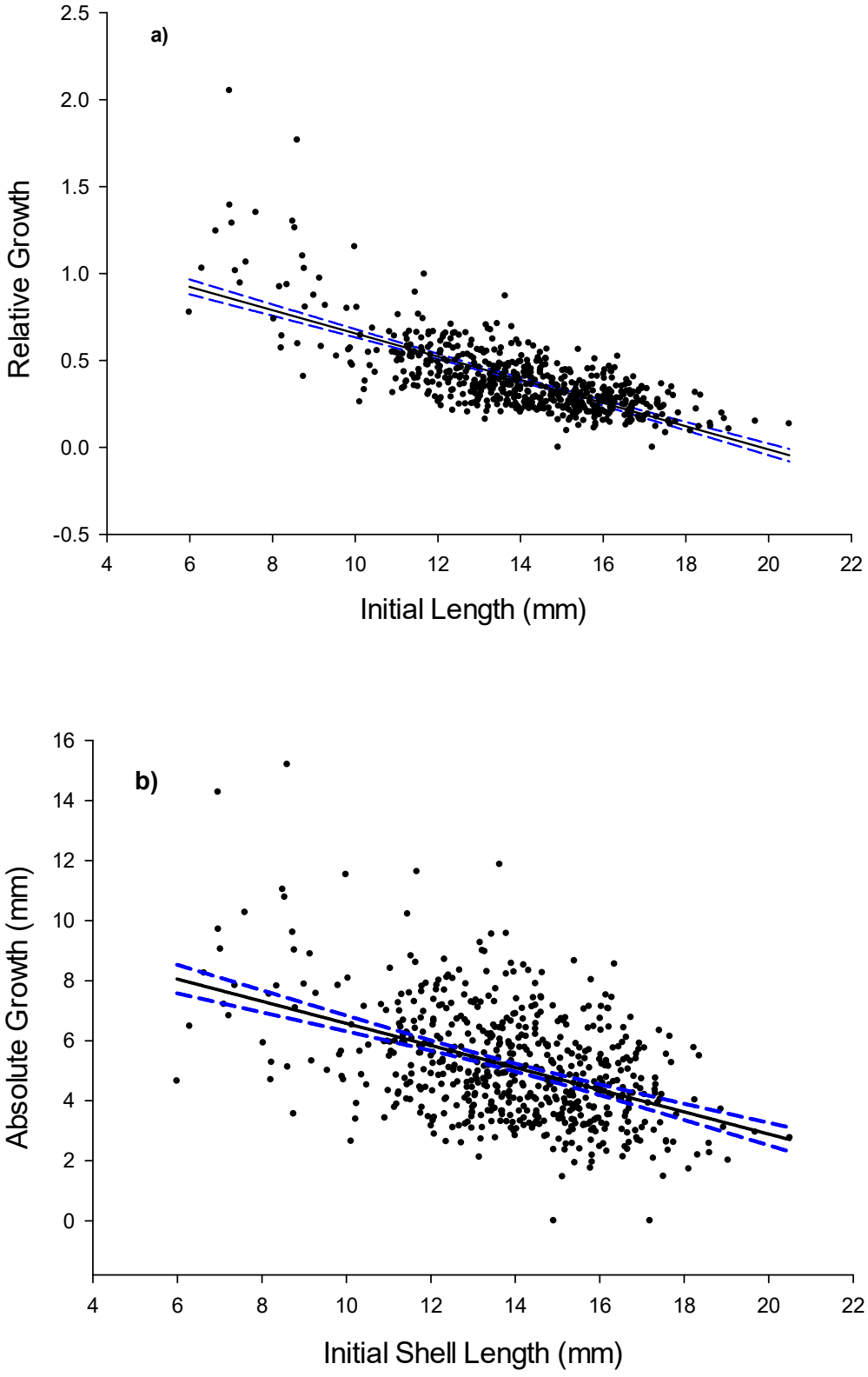

a)
Relative Growth
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
4
6
8
10
12
14
16
18
20
22
Initial Length (mm)
b)
Absolute Growth (mm)
16
14
12
10
8
6
4
2
0
4
6
8
10
12
14
16
18
20
22
Initial Shell Length (mm)

Figure 24.

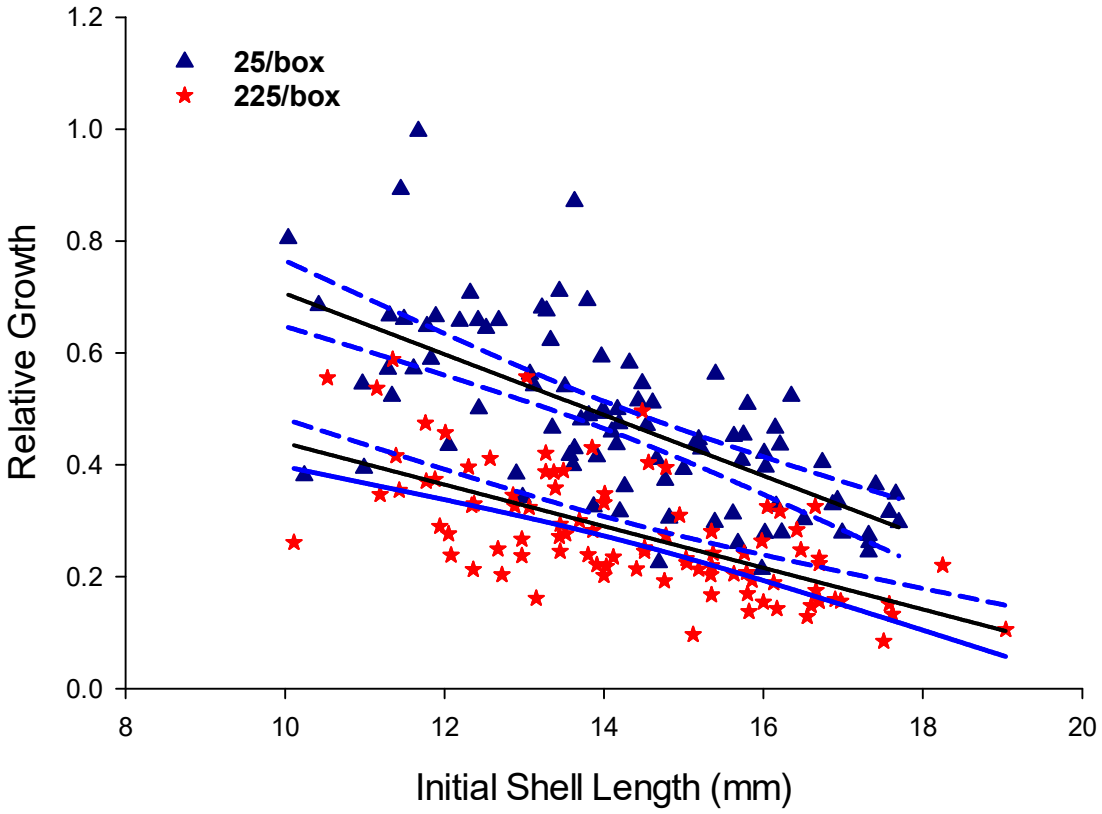
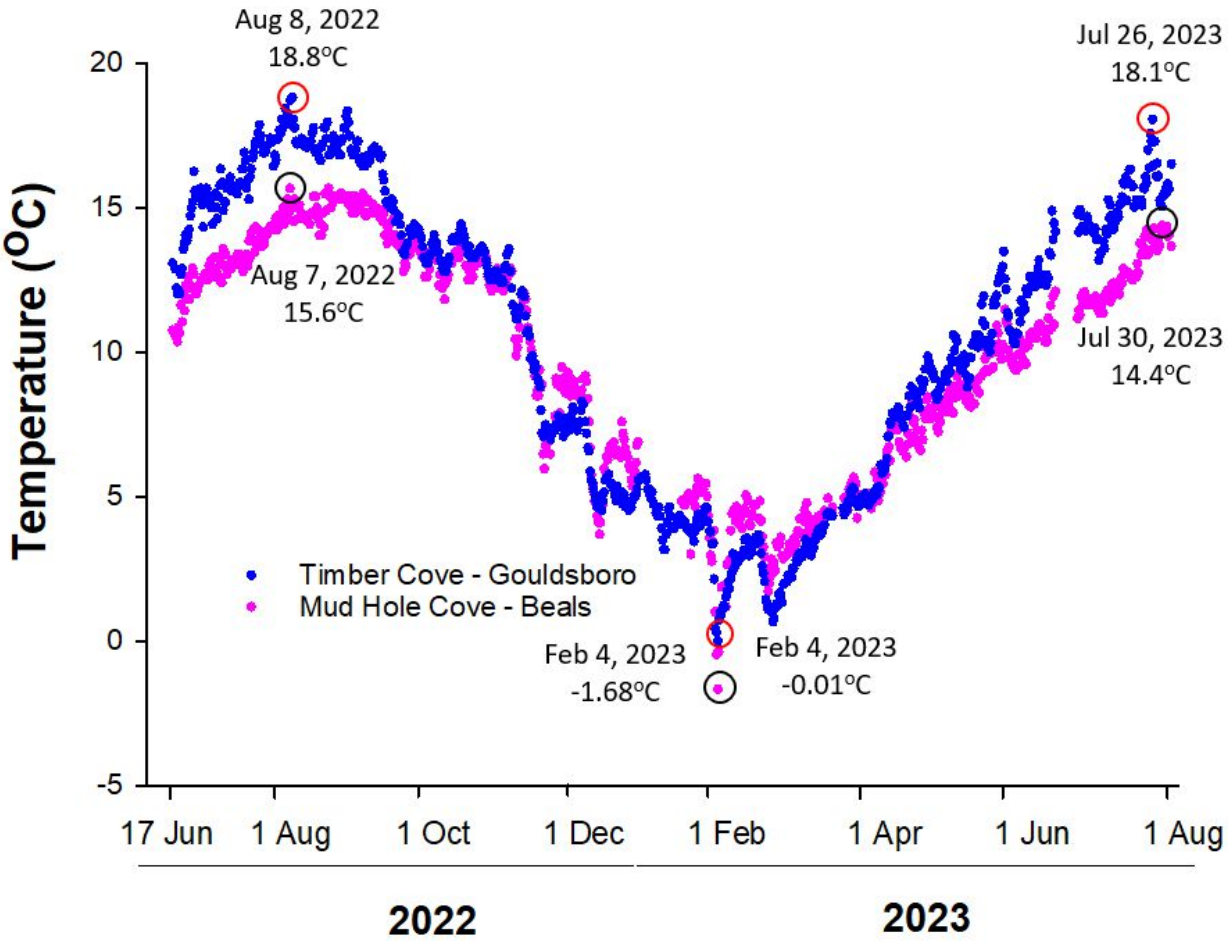

25/box
225/box
Relative Growth
Initial Shell Length (mm)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
8
10
12
14
16
18
20

Figure 25.


Aug 8, 2022
18.8°C
Jul 26, 2023
18.1°C
Aug 7, 2022
15.6°C
Jul 30, 2023
14.4°C
Timber Cove - Gouldsboro
Mud Hole Cove - Beals
Feb 4, 2023
-1.68°C
Feb 4, 2023
-0.01°C
Temperature (°C)
20
15
10
5
0
-5
17 Jun
1 Aug
1 Oct
1 Dec
1 Feb
1 Apr
1 Jun
1 Aug
2022
2023