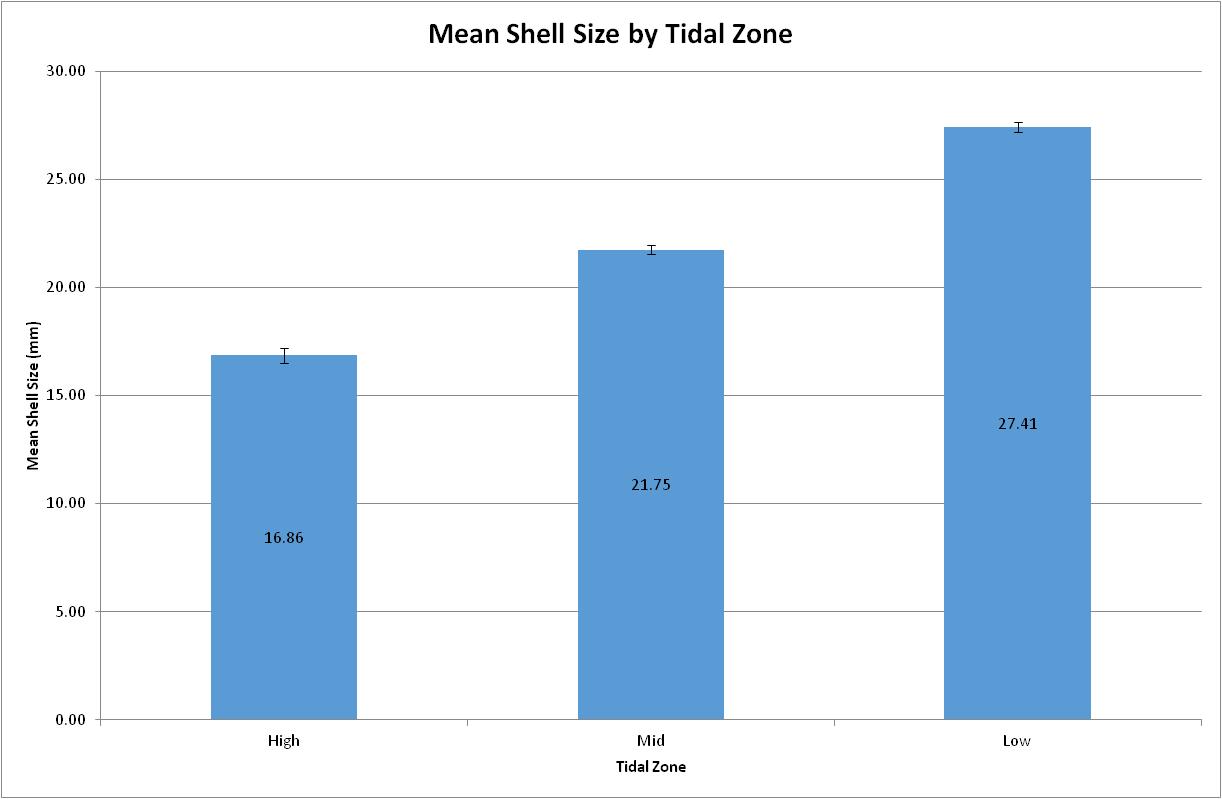


**Figure A1: Mean cockle density (cockles/.25m2) for the High, Mid and Low tidal zones. Error bars are +/- 1 standard error. The effect of tidal zone is significant (*F*2,21 = 7.115; *p*=.004). Mid and Low means are not significantly different by Tukey's HSD.**

****

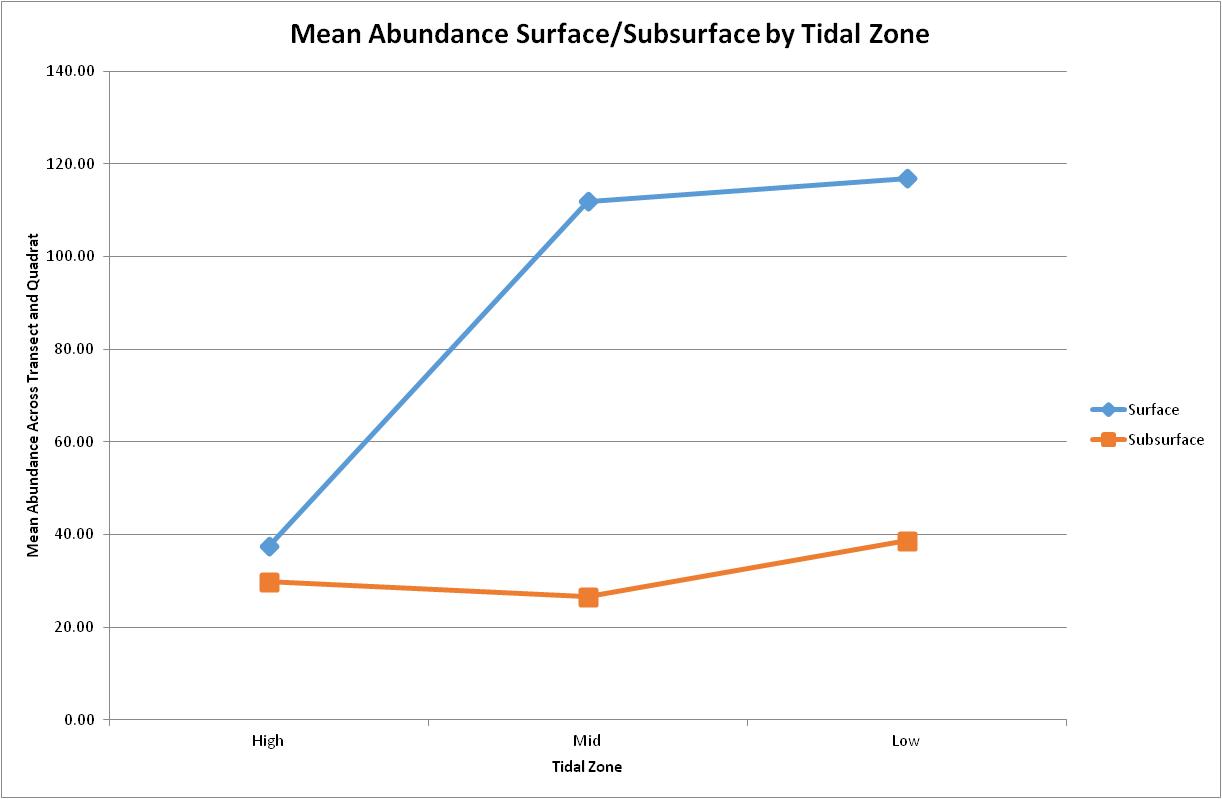
**Figure A2: Mean shell size (mm) for the High, Mid and Low tidal zones. Error bars are +/- 1 standard error. The effect of tidal zone is significant (*F2,3047*=342.09*; p*<.001). All means are significantly different by Tukey's HSD.**

**Effects of Surface vs. Subsurface:** Specimen collection proceeded in two phases -- cockles from the upper 2cm of substrate were counted separately as **surface** specimens; those from 2cm to 15cm were counted as **subsurface** specimens**.**

**Surface Region and Abundance:** Figure A3 shows a factorial plot of mean density (cockles/.25m2) as a function of surface position and tidal zone. A two-factor ANOVA with replication shows significant main effects of surface position (*F*=34.29; *p*<.001) and tidal zone (*F*=6.9; *p*=.003), and a significant two-way interaction between the two factors (*F*=5.76; *p*=.006).

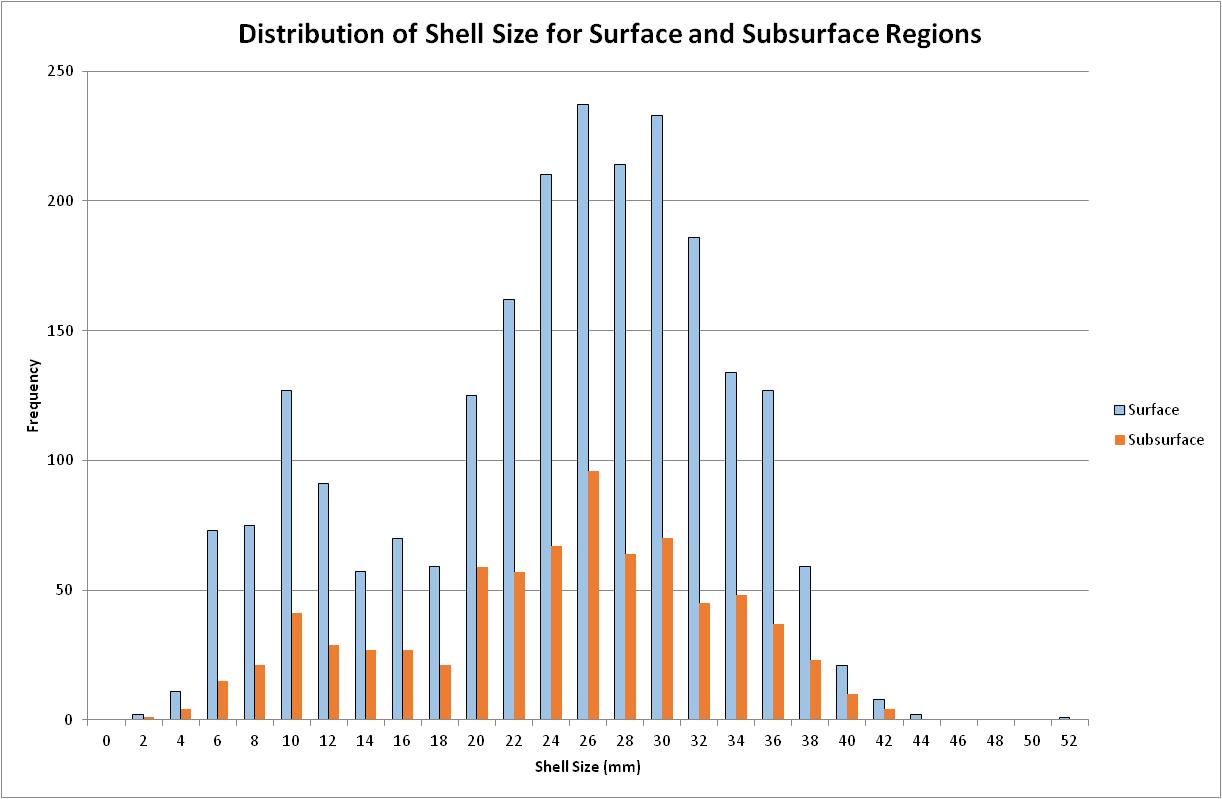
The effect of tidal zone is as observed in the combined analyses -- abundance is higher in the Mid and Low tidal zones than in the High tidal zone.

Abundance is higher at the surface than in the subsurface. This is as expected, given that *A. stutchburyi* is a burrowing suspension feeder. To feed successfully, these cockles must position themselves deeply enough in the sand to remain stable and avoid predation, but close enough to the surface that they are able to extend their feeding siphons into the water column.

****

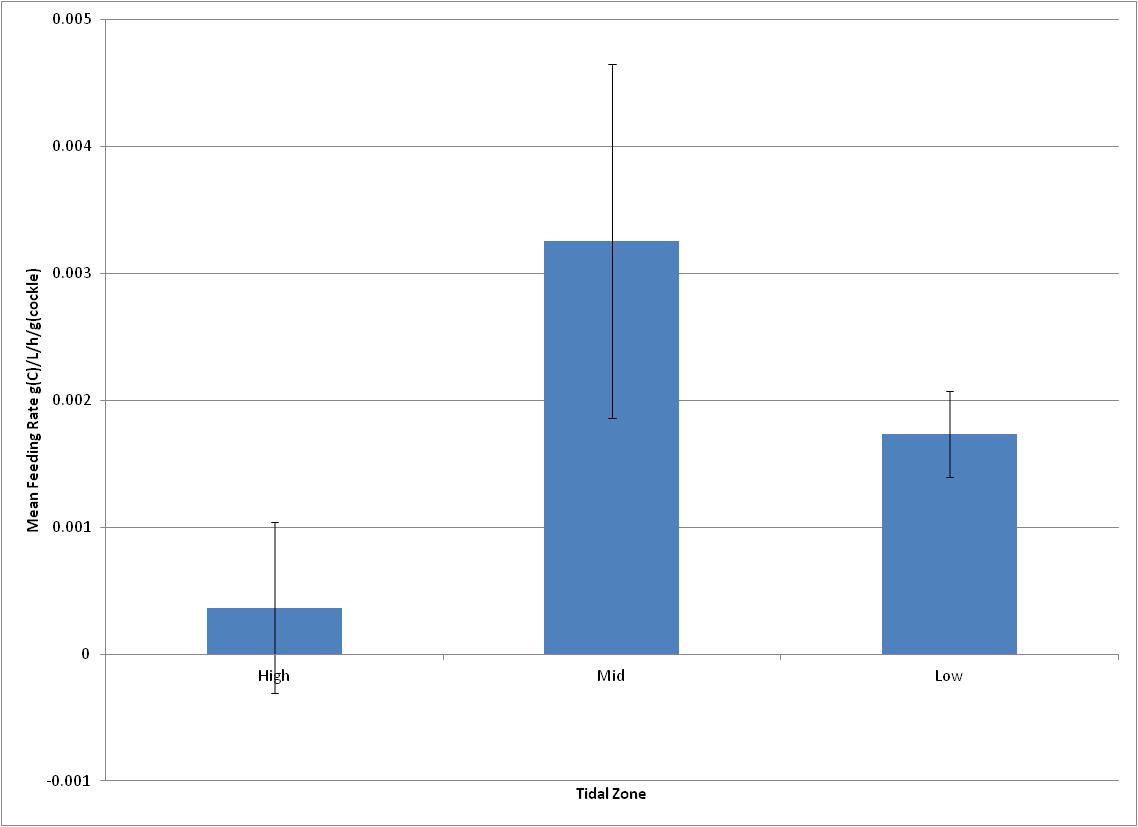
**Figure A3: Mean abundance by surface region and tidal zone. The two main effects and interaction are all significant (*p <* .01)**

**Surface Region and Size:** As noted above, cockles cannot feed if they position themselves where their feeding siphons cannot reach the substrate surface. One might expect, therefore, that cockles in the subsurface will be, in general, among the larger specimens. This pattern does not, however, appear in our data. Mean cockle sizes are essentially the same for the surface and subsurface regions (*x̄surface* = 23.72, s = 8.84; *x̄subsurface* = 23.63, s= 8.54; ns by t-test, *p*=.794). The general distributions of size within the regions are also very similar, allowing for the overall lower density in the subsurface region.Figure A4 shows the distributions of cockles, by size, for the surface and subsurface regions. Both regions show approximately the same bimodal shape, with modes at 10mm and 26mm. As cockles less then 20mm in size will be unable to feed when positioned in the subsurface as defined (because their siphons cannot extend into the water column), there is no clear adaptive reason for these small cockles to intentionally position themselves in the subsurface region. One concludes, therefore, that the subsurface region may be entered only inadvertently, and that whatever events cause this movement occur fairly uniformly across the full cockle population.



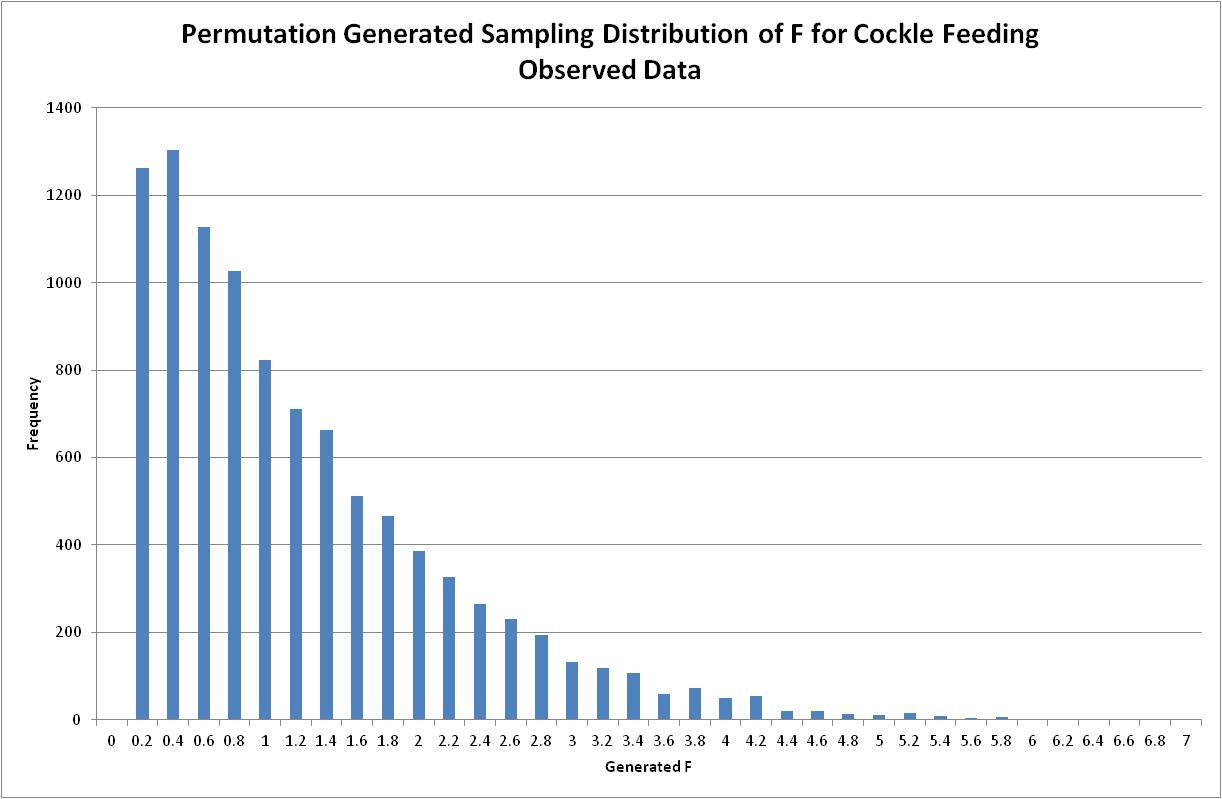
**Figure A4: Frequency distribution of shell size for surface and subsurface regions**

**Feeding Rates:**

****

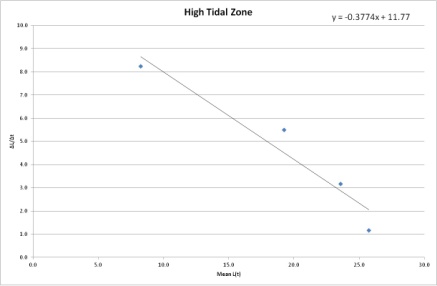
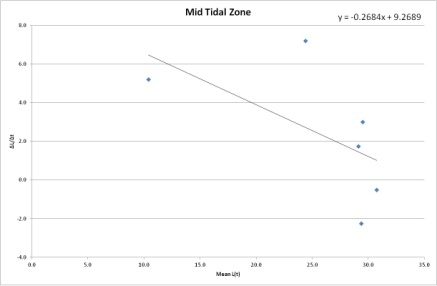
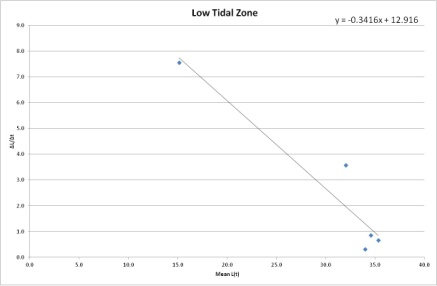
**Figure A5: Mean cockle feeding rate by tidal zone. Units are gCarbon/L/h/gcockle weight. Error bars are +/- one standard error of the mean. The main effect of tidal zone is not significant (*F*2,10 = 2.69; *p*=0.11)**

The apparent trend -- that feeding rates are higher in the mid and low tidal zones than in the high zone, is not significant (*F*2,10 = 2.69; *p*=0.11). Because of the very small sample sizes (only 13 values in total), it is worth considering alternative analyses. A primary concern for use of ANOVA on these data is that the normality assumption cannot be verified. Violations of normality can lead to erroneous ANOVA results. Because of the small size of this data set, we can assess the robustness of the ANOVA by using a permutation testing process to generate an estimate of the sampling distribution for F. In this technique, one assumes that the available data points constitute the entire data distribution. A large number of trials are run in which the data points are randomly assigned to conditions (maintaining the group *n* of 4, 4, and 5 for High, Mid and Low respectively), and an observed F is computed. The resulting values comprise a sampling distribution of F for these data with H0: μHigh = μMid = μLow. One can then use the value of the distribution which cuts off the upper α proportion as an adjusted critical value for F. The analysis as described was performed in R 3.4.4 using 10000 random permutations of the 13 observed data points. The generated sampling distribution of F is shown in Figure A6. The value in this distribution which equals or exceed 95% of the scores (i.e. the generated F-critical) is 3.12. Our observed F of 2.69 does not exceed this value (the cumulative frequency of 2.679 is .92), so we again fail to reject H0. We can assume that the original ANOVA is at least moderately robust against violations of normality in the data.

****

**Figure A6: Permutation Generated Sampling Distribution of F for Cockle Feeding Observed Data**

**Growth Rate Estimation:**

**  **

**Figure A7: Linear regressions of by *L(t)* with anchoring data point added at t=0 for each of the three tidal zones.**