**Astrangia Quadrat Sampling Fall 2023 Protocol**

Objective: Investigate change in morphotype of *A. poculata* along a depth gradient.

Hypothesis: *A. poculata* transitions from primarily a symbiotic morphotype in shallow water to aposymbiotic in deeper water.

**Light sensors:**

* A light sensor will be attached to the corner of each quadrat
* During sampling, the time of quadrat placement will be recorded, and the ambient light will be read every 15 seconds
* Divers don’t need to do anything, except make sure that the quadrat is oriented facing up and not swimming over the sensors while they are sampling the quadrat

**Quadrat sampling:**

* 0.5m PVC quadrats will be haphazardly placed along a depth gradient
* Conditions for quadrat placement:
  + Horizontal surface (less than 45˚ slant)
  + Hard bottom (no sand or lose rubble)
  + Quadrats must be at least 1m apart
* Within each quadrat, divers will record:
  + Time start and end
  + Exact depth (to later be standardized by tide height that day)
  + Number of Apo colonies
  + Number of Sym colonies
* Each quadrat will be sampled by two divers to minimize bias in interpreting apo vs. sym.

**Data Sheet for divers:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Quadrat # | Time start | Time end | Exact depth | Diver 1  APO | Diver 1  SYM | Diver 2  APO | Diver 2  SYM |
| 1 | 9:15 | 9:18 | 45 | 4 | 3 | 3 | 4 |
| 2 | 9:21 | 9:26 | 43 | 10 | 0 | 10 | 0 |
| 3 | 9:29 | 9:32 | 39 | 12 | 3 | 15 | 2 |
| 4 | 9:40 | 9:43 | 32 | 9 | 6 | 9 | 7 |

Expected raw data would look like:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Exact\_depth | Corrected\_depth | Time\_start | Time\_end | Date | N\_Apo | N\_Sym | Light\_lum |
| 8 | 9 | 9:35 | 9:37 | 8/29/23 | 0 | 3 | 45 |
| 11 | 12 | 9:40 | 9:42 | 8/29/23 | 1 | 2 | 38 |
| 25 | 26 | 9:43 | 9:47 | 8/29/23 | 0 | 5 | 32 |
| 29 | 30 | 9:50 | 9:55 | 8/29/23 | 3 | 3 | 26 |
| 30 | 27 | 11:10 | 11:13 | 9/1/23 | 6 | 4 | 19 |
| 36 | 34 | 11:15 | 11:17 | 9/1/23 | 8 | 1 | 14 |
| 45 | 42 | 11:19 | 11:23 | 9/1/23 | 12 | 0 | 7 |

Analysis:

* Convert raw counts of apo and sym into count-based proportions
* Test for a change in the proportion with depth and with light using regressions

References for analysis:

* <https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.13234>
* R code for an example can be found in Crawley 2012 page 636
* Forrester et al. 2022