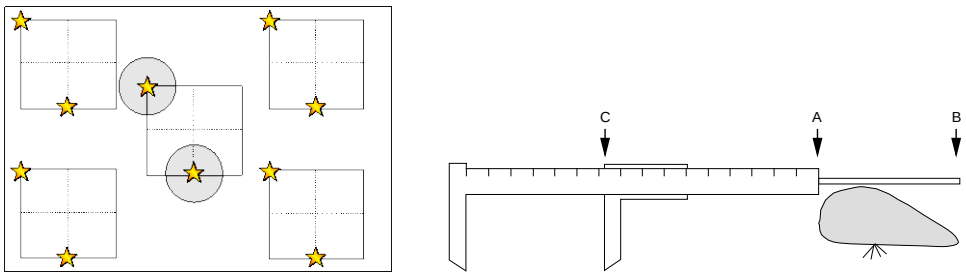
MARINe Mussel Measurement Protocol – Revision 10 October 2012

Mussel Size-Distribution

Purpose: annual undisturbed sample of mussel size distribution (to complement cover data) that can be compared throughout the network of monitoring sites.

Method: Examine the 50 X 75 cm mussel plot to quickly determine if there are >10 mussels present. If it appears there are 10 or fewer mussels, search carefully for cryptic mussels, but do not spend excessive time searching for tiniest possible mussels. If you confirm there are 10 or fewer mussels in the plot, measure the lengths of all existing mussels as described below and you are done (do not make any mussel bed/patch depth measurements). If there are >10 mussels present, measure mussel lengths and bed/patch depths as described below.

Place a 20 X 20 cm miniquad in each of the 5 locations indicated in diagram. For each miniquad location, measure length (to nearest cm) of mussel(s) visible directly under each of the 2 designated points (indicated by stars) (10 total measurements per 50 X 75 cm mussel plot). Measure not only the mussel directly contacted by the designated point (put appropriate size tick mark in column headed "Top". If multi-layered bed/patch, also measure any deeper mussel under the point that can be reasonably measured without undo disturbance to the bed (put tick mark(s) in column labeled "Under" – note that all understory measurements are pooled). There is no need to indicate whether a mussel is attached to another mussel or to the substrate. Also **measure 5 bed/patch depths at the upper left corner/designated point** (see below), unless there are 10 or fewer mussels per photoplot.



If there is no mussel under a designated point, measure length of nearest mussel to the point that can be found within the 50 X 75 cm plot (also measure bed/patch depth at this mussel (see below). Do not search for or measure any mussels outside the plot. A mussel is only measured once, so if a measured mussel is also closest to another designated point, the next closest non-measured mussel is chosen (use lumber crayon if needed to distinguish measured mussels). For example, if there are only 16 single-layer mussels in 1 clump in the 50 X 75 cm plot, 10 of these 16 mussels would be measured no matter where the clump occurred in the plot.

To measure a mussel, rest the end of the caliper (A, in sketch) against one end of the mussel. Slide the caliper open until the tip of the rod (B, in sketch) reaches the other end of the mussel ((e.g., the umbo). Read mussel length on the scale (C, in sketch) to the nearest centimeter. For extra thick mussel beds, a long rod and ruler can be used in place of the caliper.

For plots where mussels are rare or absent, there may be <10 (even zero) measurements. For plots containing 10 or more mussels, a total of at least 10 length measurements will be recorded (more if multiple measurable mussels occur below any of the 10 designated points).

Mussel Bed or Patch Depth

Purpose: sample thickness of mussel bed/patch to approximate population biomass (when combined with separately-scored mussel cover in photoplot).

Method: No need to measure bed/patch depths if there are 10 or fewer mussels in the 50 X 75 cm photoplot (can get approximate biomass data from mussel length measurements). For all plots with >10 mussels/plot, **at each of the same 5 designated point**s used for mussel length records, measure the depth (to nearest centimeter) of mussel or mussels (if multilayered) directly under the point. This measurement is taken perpendicular to the substrate orientation under the point, upwards from substrate to top part of mussel that lies directly under the point. There is no need to record layering status. Since the measuring rod cannot go through the mussel(s), place it in a nearby gap and project across to the point location (a small ruler can help with this projection).

For bed/patch depth measurements where no mussel was under point (next closest mussel within photoplot was utilized – see above), record depth from substrate to highest point of chosen mussel.

Note that for a single-layer mussel oriented vertically by longest length, the mussel length and bed/patch depth measurements would be the same; however, since mussels vary in orientation, and multi-layering may occur, the 2 measurements will rarely be the same.

If the entire plot is an "obvious" monolayer, then put a check mark in the monolayer box, if not leave it blank, but still measure the bed depth.