SCEMFS
Science Center for Marine Fisheries

2014-2015 SCIENCE PROJECT

Estimating age in the ocean quahog

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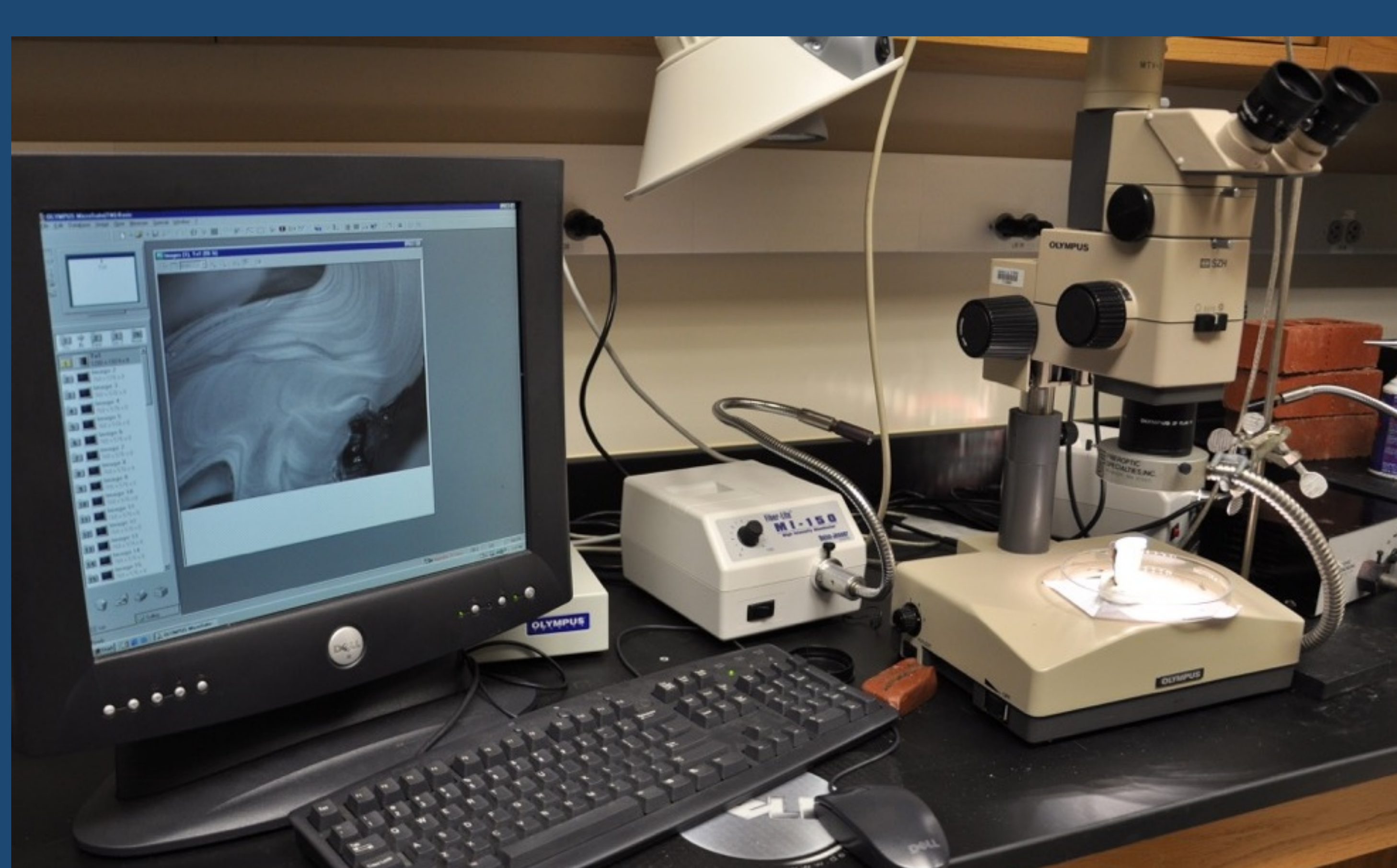
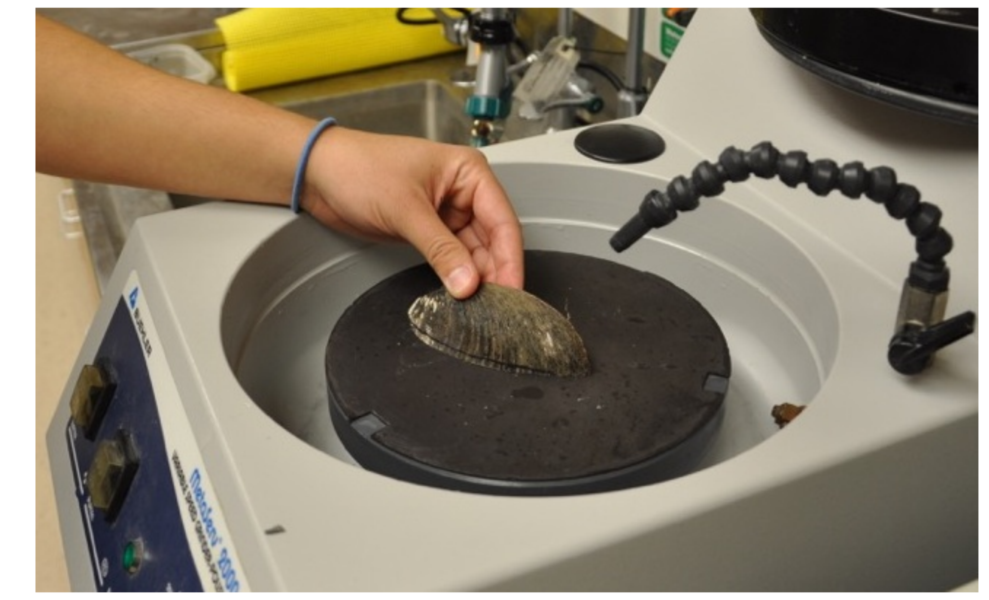
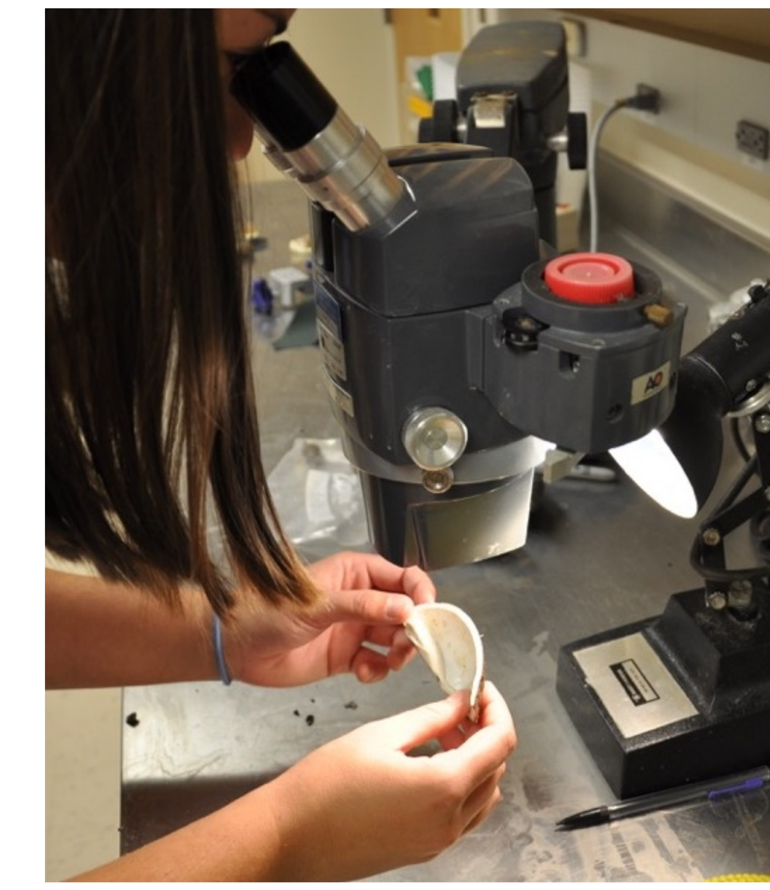
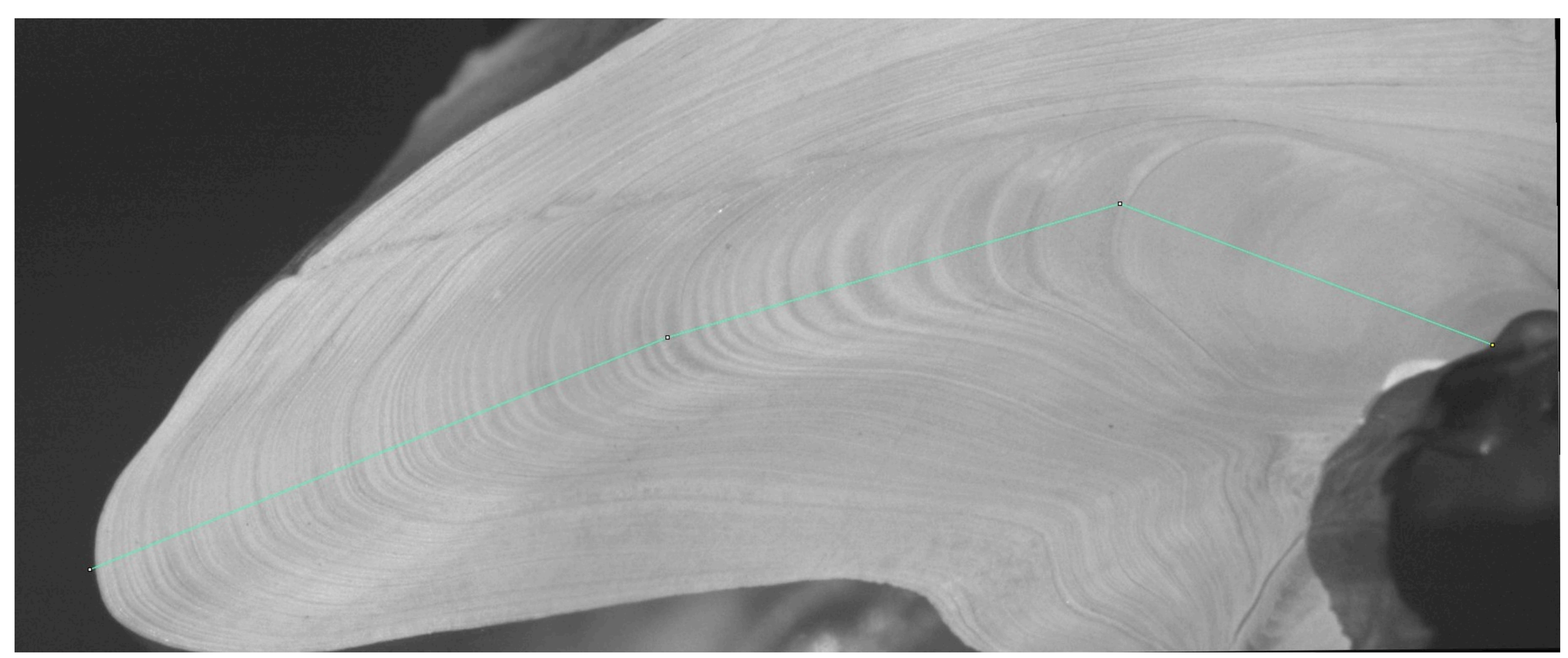
The ocean quahog (OQ) is very long lived (200 years is not considered rare) and its recruitment rate (frequency of recruitment events may not be or even need to be annual given longevity) has caused considerable debate in federal management plan development where "frequent" and sustained recruitment is considered optimal for stock sustainability. The situation is exacerbated by the fact that minimum size at harvest may correspond to ages in the 40+ year range. Size selective fishing gear does not retain sub market size classes, thus estimates of the number of pre recruit (to the fishery) year classes and the abundance of those year classes is unknown in surveys employing standard fishing gear (current situation). In 2014 the NEFSC-industry assessment survey employed the new Dameron-Kubiak dredge designed to retain small quahogs in a quantitative manner, in a selectivity study south of Long Island. This collected a broad size range of small (not recruited to the fishery) quahogs. This project is focused on (1) development of a current age at length curve for quahogs, (2) age estimation for the "small" demographic, and (3) a combination of (1) and (2) to estimate periodicity of recruitment of quahogs in the sampled population.

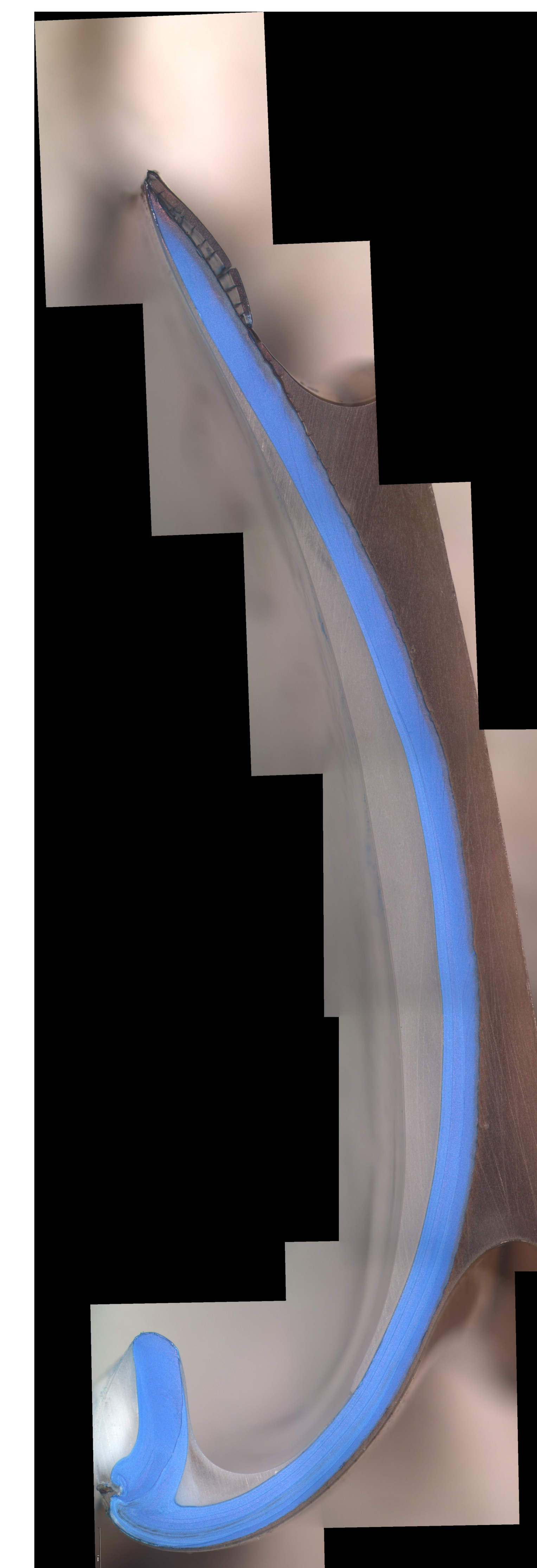






After shucking record shell length (L), the longest dimension parallel to the hinge, and height (H), the longest dimension from the hinge to the growing edge. Assessments use length. The sectioning and age determination work along the height axis. Larger valves (>50mm L) are sectioned with a modified commercial tile saw. For smaller valves we use an otolith saw. The exposed edge displays the layering that is associated with age in the valve. We polish that edge to facilitate counting of layers using a wet polishing wheel and polishing paper with increasingly fine grit. The final polished product may have many layers in it despite being only a few mm thick. The exposed polished edge is stained with Mutvei stain - an equal volume of 25% glutaraldehyde (a toxic fixative) and 1% acetic acid with addition of Alcian Blue stain. The acid etches the calcium carbonate layers and creates a microscopic 3D topography on the polished surface. The fixative carries the blue stain into the protein matrix on which the shell is built. The result is stained blue exposed edges which demonstrates the layers when illuminated with light from an oblique source.





The stained section is photographed by a high definition camera. We see the annual layers, the hinge region above has about 80. Note the thin green line across the image. Using free image analysis software program – Image J from the National Institutes of Health – we make a density scan along the green line, encompassing the entire growth history. We direct the software to plot an optical density (white to grey to black density scale – see plot to the right) along the line counting the alternate light and dark layers.