

Heidi Sosik's research took the workshop beyond the traditional tools of bottles, nets and filters to *in situ* flow cytometric methods that allow her to ask questions about what regulates coastal phytoplankton populations. She and colleagues Rob Olson and Alexi Shalapyonok have developed the FlowCytobot – a flow cytometer that detects individual particle properties such as fluorescence and light scattering and works underwater in an autonomous mode to provide real-time access to data. FlowCytobot is deployed at the Martha's Vineyard Coastal Observatory, a facility that is available to any users who want to test new sensors in a setting with high power and data bandwidth. Most recently, Sosik and colleagues have developed a second generation instrument, Imaging FlowCytobot, that combines aspects of FlowCytobot capabilities with in-flow single cell imaging techniques. Using these tools, they have been asking questions like: What causes inter-annual variability and what processes lead to this kind of variability? Some cell identifications can be made down to the species level. She is also interested in what is the ecological entity, how does it change and when does it matter.