The objective of this project is to gain a deeper understanding of available fluorometers and how they compare to each other and to extracted methods.

Six fluorometers will be compared. The standard method using extraction will be the gold standard for comparison and will be run on a Turner Trilogy. The bbe AlgaeTorch and the Turner FluoroSense are field instruments that measure in vivo chlorophyll and phycocyanin. The Amiscience FluoroQuik and the Turner CyanoFluor are comparable units that quickly and easily measure chlorophyll, phycocyanin and the ratio between them from a small amount of fresh, whole water. The bbe Phycoprobe can be used as a field instrument or in the lab. We will be using it in its workstation mode. It quantifies chlorophyll, multiple classes of algae and unbound phycocyanin.

Samples will be collected from a few ponds known to have high levels of cyanobacteria. Three, two liter surface samples will be collected from the edge of each pond. If any surface scum is present, it will be cleared before samples are taken to remove the possibility of differences occuring due to scum being in the samples in differing amounts. At the same time, measurements will be taken with the field instruments, the AlgaeTorch and the FluoroSense. A sonde will be used to collect temperature, dissolved oxygen, conductivity, pH and salinity.

Within a day after collection, each of the field samples will be analyzed in triplicate on the FluoroQuik, the Phycoprobe, and the CyanoFluor and will be filtered and extracted to be run on the Trilogy. A filtered sample will be used as a blank on the CyanoFluor to correct for dissolved organic materials interference. Gluteraldehyde will be added to 125mL aliquots of each sample and will be stored for creation of permanent mounts. Permanent mounts will be used for cell counts to verify the results of the fluorometers and to look at community dominance. A 10mL aliquot will also be reserved for potential microcystin analysis.

Next, each sample will be frozen for at least 4 hours and then thawed to be analyzed in the same way on each instrument. From these results a comparison between running fresh and frozen samples on all the instruments can be made. In addition, the samples will go through two more freeze/thaw cycles before being run on the FluoroQuik once again. This data will be used to look for increased consistency in analysis and normalization of samples across and within waterbodies after three freeze/thaw cycles.

In order to gain a deeper understanding of the Phycoprobe, a few other variables will be compared. Gluteraldehyde will be added to some samples to determine whether they can be preserved before being run. A time series of fluorescence measurements will be taken to examine degradation due to light exposure. Lastly, any variability due to the sample being stirred while measurements are taken will be observed.