

# The Wonderful WIZ: Methods for In-Situ Measurement of Oceanic Nutrients

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Tiny plant-like organisms called phytoplankton serve as the backbone of coastal ocean ecosystems like Harpswell Sound, ME, converting sunlight into biomass and energy that can be used by the whole ecosystem. But to survive—and thrive—phytoplankton require their waters to contain inorganic nutrients. The exact type and amount of these nutrients depends on the specific species of phytoplankton, though they commonly include nitrate, phosphate, silicate. Another nutrient, ammonium, is also often produced as phytoplankton decompose at the end of their lifespans. The amount of nutrients we find in a coastal environment can tell us important information about the phytoplankton composition of the area. Current methods of nutrient measurement, however, require researchers to directly sample the water they wish to measure. This is time and resource intensive, so this summer was spent investigating hands-off methods of nutrient measurement with the state-of-the-art, in-situ WIZ probe.

The summer started by calibrating the chemistries of the WIZ. A dilution series was created for each desired nutrient (nitrate, phosphate, ammonium, and silicate) and run on the WIZ over the course of six weeks. The WIZ measures absorbance, which when plotted with the known concentrations of the dilution series, allowed for the construction of a calibration curve for each nutrient (Figure 1). These calibrations were then programmed into the WIZ for deployment and data collection. Following the calibration of each nutrient, dilutions were run back through the WIZ to validate the WIZ's calculated concentration values. Once calibration and validation of the four principal methods was complete, the WIZ was deployed in the wet lab of the Schiller Coastal Studies Center to run every two hours for the fall semester.

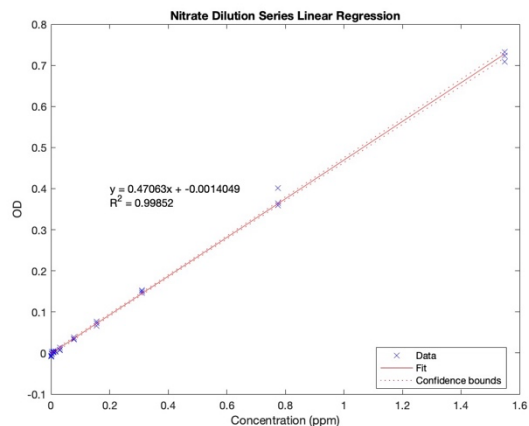


Figure 1. Example of WIZ calibration curve. Curve shown is for nitrate. Note the calibration formula and  $R^2$  value on the graph.

After calibration, additional functionality of the four principal WIZ methods was explored. The nitrate method was found to have the capability of also measuring nitrite. This dual nitrate-nitrite method was transferred to our current, in-lab nutrient measurement instrument, the SmartCHEM nutrient autoanalyzer, to give it greater functionality. Moreover, the WIZ ammonium method was determined to have the possibility of measuring colored dissolved organic matter. Further tests of these features will occur during honors project research in the fall semester.

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