

Limnology Lab
Zoology 415
Fall 2008

Overview

Boat handling

We will typically use jon boats with outboard motors. All students should don proper personal flotation devices while onboard. It is important to gain skills in operating the boat (steering, stopping, etc.)

Dissolved Oxygen Meters

Although a number of devices are available for quantifying the concentration and percent saturation of oxygen in water, the most typical probe for quantifying oxygen has a gold cathode that attracts oxygen atoms (oxygen atoms are highly electronegative...means they greedily swipe electrons from the orbits of other atoms). When an electrical voltage gradient is set up between the gold cathode and the anode of the probe, the current between the two is proportional to oxygen concentration. The oxygen travels through a permeable membrane to the electrodes.

Note: The permeable membrane becomes easily fouled, given that it is attracting many charged particles on its surface. Thus, it is important to continually replenish the membrane with freshwater as readings are taken.

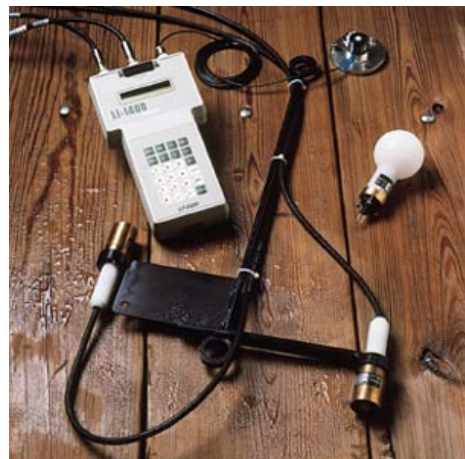
Quanta Handheld Meters

These are a brand of hand-held, multi-probes that quantify dissolved oxygen as well as other water chemistry parameters. The meters we will use in class quantify

- pH is the log concentration of H^+ in the water ($pH = -\log_{10}[H^+]$)
- conductivity is the electrical conductance between two electrodes in the water (related to total ions in the water); measured as mS/cm; mS is milliSiemens
- temperature ($^{\circ}C$)

Light Meters

These photometers quantify light in μE . We have two sensors. One quantifies ambient light (including light scattered around it). The other quantifies incident light from the surface.



Wisconsin Zooplankton Net

- pulled through the water and the net mesh collects plankton larger than the mesh diameter (typically 63 μm)
- Volume sampled = area of net mouth x distance pulled



Schindler-Patalas Trap

This apparatus allows you to sample a known volume of water at any given depth. The net is lowered to the desired depth and the trap door is then closed. Plankton are then filtered out.



Kemmerer Bottle

Samples a known volume at depth.

Van Dorn Bottle

Another sampler for water at discrete volumes.



Ponar and other dredges

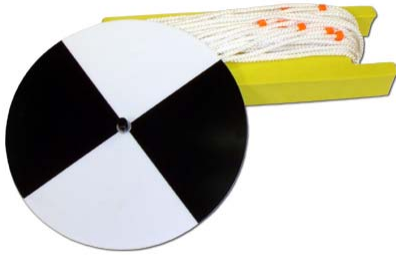
Used to sample substrate and benthic organisms in lakes.



Percussion Sediment Corer

Plastic tube. Send weight down. Causes tube to penetrate sediment.

Secchi Disk



Drop into water on shaded side of boat (without sunglasses). Descend until the white and black sections no longer discernable, then lift until they reappear. Measure depth.

Echosounder. Conventional fish finders use pulses of high-frequency sound (typically 200 kHz) to measure bottom depth and the relative size of objects intercepting the sound as it travels to the bottom. We will be using a sophisticated echosounder that works with two frequencies to measure the surface of the bottom (at 200 kHz) as well as the subsurface (soft sediments) at 28 kHz. These data will be referenced using global positioning.

Fluorometer This piece of equipment will be used to quantify concentrations of chlorophyll a in water. This pigment is fluoresced by a lamp within the meter and then the light emitted by the excited pigment is measured. The intensity of the light produced is compared to a standard calibration curve generated using a known concentrations of chlorophyll a.

Spectrophotometer. This meter also can be used to quantify chl a concentrations by measuring the absorbance of light at 664 nm. Specs measure optical density, which is inversely related to transmittance (the amount of light passing through the sample).

Ethanol. This will serve as the primary sample preservative for all of our lab efforts.