Aquatic Sampling

Thermal Stratification

- Temperate lakes stratify during warmer months
- Related to temperature
- Driven by density
  - Atmospheric temperatures fall
  - Surface water cools and sinks
  - Seeks density equilibrium
- Fall turnover
Stratification

- **Epilimnion** - the most productive layer
  - Warmer temperatures
  - Higher levels of dissolved oxygen
  - Greater light penetration
  - Nutrient availability

- **Metalimnion** - transitional zone
  - Defined by the thermocline (decrease in temperature greater than or equal to 1°C per meter).

- **Hypolimnion** - deeper water
  - Colder, more dense water
  - Hypoxic, not productive

Water Quality

- Physical
- Chemical
- Biological
Physical Characteristics

- Temperature
- Dissolved Oxygen
- pH
- Turbidity

Physical Measurements

YSI 556: Handheld Multi-Probe Meter

- Accurate and dependable
- Expensive

Temperature

- Drives physical, chemical, and biological processes
- DO
  - Increased temps = less available oxygen
- pH
  - Higher temps = chemical reactions
- Changes spatially and temporally
Dissolved Oxygen

- Colder water can hold more oxygen
- General critical value: 4 mg/L

pH
**Turbidity**

- How clear is the water?
- Indicates biological activity/productivity
- Can also be suspended solids in water
- Effected by weather: run-off and erosion
- Affects water temperature

**Secchi disk**

**Chemistry of Water**

- Surface water absorbs carbon dioxide from the atmosphere, used for photosynthesis
- Builds up in hypolimnion (no productivity). Reacts with water to form carbonic acid
- Carbonic acid is hydrolyzed into a weak acid—lowers the pH
- Calcium bicarbonate (limestone) ionizes in solution, the ion hydrolyzes to a slightly alkaline solution
- Increase in alkalinity helps to buffer the carbonic acid in the hypolimnion
Chemical Characteristics

- Alkalinity: buffering capacity of water
- Phosphorous: most limiting nutrient
  - From run-off and erosion, used in epilimnion
  - Trapped in sediments
  - Released by decomposers

Chemical Measurements

- Test kits:
  - Cheap
  - Not as accurate
  - Can be somewhat subjective

Discrete point sampler

Vertical Point Water Sampler
Biological Characteristics

- Food webs
  - Phytoplankton
  - Planktivores
  - Macroinvertebrates
  - Fish communities

Biological Measurements

- Plankton net
  - Known diameter and known distance
  - Quantitative sample
- Dip net/ D-net

Invertebrate Issues

- Can be a challenge to sample
  - Small
  - Different life stages
  - High mobility
  - Patchy distribution
Eckman Grab

- Can be used at varying depths
- Obstructions may keep jaws from closing

Fish Communities
Species composition and distribution of age classes

Electrofishing
Fish Communities

- Seine
  - Kicking
  - Quarter haul

In the end...

- All the information put together can tell a lot about the integrity of the habitat.

- Data collected can be compared over time to look at trends (good or bad).