Winooski Natural Resources Conservation District
"Connecting people to a sustainable landscape"
www.winooskinrcd.org

Algal Analysis Services Provided

Identification of algae to lowest practical taxonomic level

- The Environmental Protection Agency (EPA) recommends that all algae (soft and diatom) be identified. All algae cannot be identified to species level, because the growth forms of some algal species are morphologically indistinguishable, or the species may not be described in the laboratory's literature. Substantial information can be gained by identifying algae just to the genus level.
- Utilizing the EPA's alternative preparation techniques, a gridded wet mount microscope slide is prepared with the sub-sample. The original sample is homogenized, given time to settle and then a concentrated sub-sample is placed on the slide. The algae are identified and counted.

Relative abundance and taxa richness

- Relative abundance of "soft" algae is determined by dividing the number of cells counted for each taxon by the total number of cells counted.
- Relative abundance of diatoms is determined by dividing the number of valves counted for each taxon by the total number of cells counted.
- Total taxa richness is estimated by adding the number of "soft" algal taxa and diatom taxa

Metrics of biotic integrity

- ***Total number of genera:*** The generic richness should be highest in reference sites and lowest in impacted sites where genera become stressed. Total number of genera including diatoms and soft algae may provide a more robust measure of diversity than other estimates.
- ***Total number of divisions:*** Is represented by all taxa and should be highest in sites with good water quality and high biotic integrity.
- ***Percent sensitive diatoms:*** The sum of the relative abundance of pollution intolerant taxa.
- ***Percent Achnanthes minutissima:*** A cosmopolitan species with direct proportional abundance to toxic pollution.
- ***Percent motile diatoms:*** The sum of *Navicula* + *Nitschia*+ *Surirella.*

Identification if cyanobacteria is in sample

- In high densities, cyanobacteria are an undesirable component of freshwater ecosystems; they can produce hepatotoxins and neurotoxins that can cause fish kills, harm humans, wildlife and pets. Additionally, toxins produced can pose problems for households that get their drinking water from the body of water.

Diagnostic metrics that infer ecological conditions

- ***Percent aberrant diatoms:*** The percent of diatoms in a sample that have anomalies in stria or frustules shape. Indication of heavy metal contamination.

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- ***Percent Achnanthes minutissima:*** A cosmopolitan species with direct proportional abundance to toxic pollution.
- ***Percent motile diatoms:*** The relative abundance of diatom genera that is able to crawl to the surface if covered by silt.
- ***Pollution tolerance index (PTI):*** The impaction level of that site to overall pollutants.
- ***Trophic index:*** The impaction level of the site to nutrient levels.
- ***Salinity index:*** The impaction level of the site to salt.
- ***Acidity index:*** The impaction level of the site to acidic conditions.
- ***Siltation index:*** The impaction level of the site, as measured by motile genera.
- ***Palmer Algae Pollution Index:*** A specific group of algae is associated with municipal sewage treatment plants. This group thrives in organically polluted waters and is used as a biological indicator of organic pollution. The Palmer algae pollution index (PPI) was compiled from reports by 165 authors and ranks the species/genera most often encountered in the waters with high rates of organic pollution.
- ***Indicator forms:*** The notation of forms of algae that indicate eutrophic conditions.
- ***Nutrient criteria for soft bodied alga:*** determines minimum and optimal levels of nutrients needed for full algal growth. Assists in the determination of water quality impaction.

Other metrics that may be applied:

- ***Percent Community Similarity Index:*** based on relative abundance of forms present at test site against a reference site/ natural site.
- ***Area-specific cell densities and bio volumes*:** dividing the number of cells counted by the proportion of sample counted and the area from which the sample was collected.
- ***% Cyclotella sp.*** summer dominance of Cyclotella can cause a decrease in water clarity by scattering the light.
- ***Impairment of ecological conditions:*** the deviation between environmental conditions at sample site and a reference site.

Identification of taste and odor causing algae

- Forms of algae can produce taste and odor problems within drinking water.