

**LIMNOLOGY PRACTICUM POSTER SESSION 2014**

**STUDENT INDEPENDENT PROJECTS**

**12 ILLICK HALL, 12 DECEMBER 2014**

**ABSTRACT BOOK**

# SONG LAKE and other KETTLE LAKE PROJECTS

## Indications of Anthropogenic-Derived Nutrient Loading: Localized Concentrations of $^{15}\text{N}$ Isotopes in Song Lake

**Sarah Hindle & Jay Palumbo**

Algal blooms experienced by Song Lake, located in Tully, NY, may be in part a result of anthropogenic nutrient input – particularly septic system leakage. By looking at  $^{15}\text{N}/^{14}\text{N}$  ratios in organisms found in areas of different human population densities, we aimed to determine whether human population density was linked to nitrogen input. We hypothesized that  $^{15}\text{N}/^{14}\text{N}$  ratios would be higher in periphyton and gastropods found in areas of high population density, and that periphyton density would be higher in areas of high population density. Samples were analyzed via mass spectrometry to determine  $^{15}\text{N}/^{14}\text{N}$  ratios, and the dry masses of periphyton samples were used to determine periphyton densities. Periphyton samples taken from the site of high population density had higher  $^{15}\text{N}/^{14}\text{N}$  ratios than those taken from the sites of lower population densities. Gastropods appeared to follow the same trend, but had much higher variation. Due to limited fertilizer use on property adjacent to the lake, it is possible that the observed nitrogen input is a result of seepage from septic tanks. We recommend that the property owners association look at septic tanks as a possible point source of nutrient input leading to local eutrophication and algal blooms.

## Invasion of Variable Leaf Milfoil in Little York Lake

**Megan Beckwith, Rachel Reid, Melanie Rooney**

Our group chose to study invasive variable leaf milfoil (*Myriophyllum heterophyllum*) in Little York Lake by examining the amount of soil organic content, soil moisture, and light intensity in ten different sites along the lake. The soil sample was collected using a ponar, the light intensity was found using a licor, and the data were compiled into Excel for further analysis. Variable leaf milfoil can be found in multiple conditions of soil organic content, soil moisture and light intensity and no relationship was found between presence of the plant and any of these parameters. This aquatic plant is characterized as an invasive because it has the ability to outcompete almost all other macrophytes due to its wide range of habitat variability. There was a dramatic increase in the spread of *M. heterophyllum* between our sampling and extensive sampling at the same ten sites in 2011 and 2012. We hope the information we find can help the lake association committee to improve the management of variable leaf milfoil in Little York Lake.

## **Effects of Turbidity on Phytoplankton and Planktivore Abundance in Four Central New York Lakes**

**Cassandra Beaulieu & Katherine England**

The purpose of this project was to see if juvenile fish distribution changes with differences in turbidity and chlorophyll *a*. The project was influenced by a paper written in the Journal of Fish Biology by Blaber et. al., "Factors affecting the distribution of juvenile estuarine and inshore fish" and we wanted to know if these same factors that affect fish in estuarine and inshore habitats can also affect fish in inland lakes with no access to the ocean. Fish catchment data (used with permission from the NYSDEC region 7 office) were compared to turbidity and chlorophyll *a* data that were collected in four lakes in central New York. Three of the lakes were sampled on the same day (Tully Lake, Sandy Pond, and Lake Moraine) and the third lake was sampled the following week, on a day with similar weather conditions (Otisco Lake). The results showed no correlation of fish to any specific turbidity or chlorophyll *a* level, partly because of a low sample size, but a trend toward more planktivores was seen in lakes that had higher turbidity and chlorophyll *a*. A strong correlation between turbidity and chlorophyll *a* was found in these lakes, indicating that phytoplankton are a large part of the turbidity measurement and that TSS (total suspended solids) and CDOM (colored dissolved organic matter) are not the main things suspended in the water columns of these lakes that affect light penetration. The effects of high turbidity may be linked to a lower predation level and high chlorophyll *a* may be linked to an abundance of food within the system.

## **Stop Aquatic Hitchhikers! Implications for a Watercraft Steward Program in New York's Kettle Lakes**

**Emily Artruc**

Aquatic invasive species are a major threat to the ecology of lakes. They are spread mainly by anthropogenic means: attaching to boats and fishing gear, thus traveling from lake to lake. By inspecting and cleaning their boats, fishermen and recreational boaters can help prevent the spread of AIS. However, without education and enforcement, boaters are much less likely to do so. By employing watercraft stewards, lake communities can help prevent AIS from entering their lake. Conesus Lake is the western most Finger Lake and has had a watercraft steward program for two summers. The success of the program should set an example for other lakes without one. The communities around the Cortland county kettle lakes, Song, Tully, and Little York, are concerned about AIS entering their lakes.

I predict that after one summer of the watercraft steward program, there will be a decrease in contaminated boats that would potentially have invasive species. After consecutive summers, the number of contaminated boats will be significantly lower. Boats were inspected for AIS at the Conesus Lake boat launch every Friday, Saturday, and Sunday from 8:00 AM to 7:00 PM from Memorial Day weekend to Labor Day. Analysis of the data showed that more boats with previous watercraft steward contact were clean than contaminated with AIS. There was also an increase of AIS awareness in the community over the course of the summer. Because of the success of the program at Conesus Lake, the results of the analysis will be used to create a program for the Cortland County kettle lakes.

## **Optical characterization of several lakes in upstate New York**

**Christopher Strait & Alex Kulakowski**

Satellite and airborne imagery's use for remote sensing of inland waters is a young technology that can yield vast amounts of information using less resources. The signal available for such sensors is based upon the geometry of the light field. Measurements of inherent optical properties describe the impact of optically active constituents on the light field. The Inherent optical properties (IOP), absorption, scattering and backscattering, were measured in five lakes ranging in trophic states from oligotrophic to eutrophic. For absorption and scattering two distinct magnitude groups emerge. The two oligotrophic lakes, Skaneateles and Green lakes had much lower values than the other three lakes. Scattering was more variable than absorption especially among the more eutrophic lakes ( $\sigma=1.07$ ). This would indicate that the concentrations of inorganic particles in Wolf, Song and Onondaga lakes varied more than the organic constituents. The ratio between absorption at 440 and 676 nm correlated well with laboratory chlorophyll ( $r^2 = 0.67$ ). Remote sensing reflectance was calculated using backscattering and absorption values. Here Wolf Lake had the lowest signal in the blue region of the spectrum. This is due to the relatively low backscatter at this lake as compared to its absorption. This is the product of a high CDOM absorption component, which diminishes the light available for scattering. Song, Onondaga, Skaneateles and Green Lakes' remote sensing values all followed more closely to the typical pattern seen in the IOP measurements.

## **PROJECTS ON OTHER AQUATIC SYSTEMS**

### **Trace Element and Nutrient Concentrations Across An Anthropogenic Gradient in Webster Duck Pond, NY**

**Adrian Alvarez**

For a considerable portion of the year, ducks and other waterfowl flock to Webster Pond in Syracuse, NY and are fed corn by visitors, provided by the Angler's Association of Onondaga who run the pond. Management issues have been raised as the ducks contribute a great deal of waste material to the pond. This feeding, along with other anthropogenic influences, is mainly present toward one side of the lake, near the Angler's Association building. The other side is less disturbed and naturally spring-fed, creating an anthropogenic gradient. I collected water samples from four sites along this gradient – the side near the Angler's Association (AA) building, by the road, the far side near the stream and the stream – to look at how trace elements (Ba, Ca, Fe, Mn, Mg, and Sr) and phosphorus varied across this gradient; trace element concentrations were determined with ICP-OES and phosphorus (total P and total dissolved P) with spectroscopy methods. After performing a one-way ANOVA test for every element vs site, I found only Fe, Mn, TP, and TDP to be statistically significant (both  $<0.05$  and  $<0.01$ ). Tukey's HSD test revealed two distinct groupings for Fe, Mn and TDP: AA and the road (more disturbed) versus the far side and the stream. The more disturbed sides had higher P, high Fe, and high Fe, which suggest anoxic conditions (low redox potential). Besides giving conservationists a clear visualization on what duck overfeeding may be doing to the pond, one practical use for these results to the layman is that anglers may want to fish near the spring end for the best catches since the pond is artificially stocked.

## **Effects on Macrophyte & Macroinvertebrate Abundance Due to Eurasian Milfoil Treatments in Cazenovia Lake**

**Patricia Dombrowski, Greg Kronisch & Zack Lafaver**

Cazenovia Lake has been undergoing treatment for the last few years to decrease the abundance of an invasive species of aquatic plant, Eurasian watermilfoil (*Myriophyllum spicatum*), using the herbicide triclopyr, under the commercial name Renovate OTF™. Studies found this chemical to be toxic for a variety of species of invertebrates along with its intended effects on aquatic plants. Our project observed samples of macrophytes (aquatic plants) and macroinvertebrates from a total of five areas (one untreated, two treated in 2012, and two treated in 2014) to determine possible effects on the biota. At each site, quadrats at 1 meter depth were cleared of all vegetation and dry mass was measured. The invertebrates were collected using a petite ponar or by removing them from the previously-collected macrophytes. Our data showed that treated sites still had both large amounts of milfoil present and the lowest levels of invertebrate diversity. The control site had a much larger diversity of invertebrates and diversity of macrophytes. These results imply that triclopyr, the chemical used for milfoil control, affects more than Eurasian watermilfoil and may decrease the diversity of local aquatic macroinvertebrates.

## **Macroinvertebrate Micro-Migration: Juxtaposition of Impounded and Free Flowing Streams of New York**

**Alec Baker, Katelyn Barhite & Justin Herne**

The natural flow of water is a direct reflection of the physical, chemical, and biological aspects of the stream system. Conditions that the stream ecosystem experiences, such as temperature, velocity, as well as other varying seasonal changes, directly affect the distribution and activity of the biota inhabiting the system. When physical barriers alter the natural flow of the system, they cause changes in the dynamics of the stream, the effects of which are often unknown. Such barriers, like dams and impoundments, are implemented across New York State. A study was conducted in the upstream and downstream waters of Butternut Creek, in which Jamesville Reservoir in Jamesville, NY is centrally situated. To evaluate the environmental impacts of this barrier, macro invertebrate samples were collected by the use of drift nets. The samples were taken between the hours of five and six o'clock in the evening over the course of several weeks. The macro invertebrates from each sample were keyed out to the family level, and the stream velocity was recorded at each sampling event. These data were utilized to calculate the Catch Per Unit Effort between the sampling sites. A t-test was used to determine whether there were significant differences in the drift at the sampling locations. There was a statistically greater amount of Ephemeroptera at the upstream site, and more Podocopa at the downstream site. There was a trend toward more overall drift at the upstream site of Butternut Creek. We conclude that the impoundment at Jamesville Reservoir poses a significant barrier to macroinvertebrate distribution. These differences, as well as differences in stream ecology in Butternut Creek above and below the dam, have a significant effect on drift magnitude and assemblages.

## **Do Introduced Salmonids Displace Native Brook Trout in the Salmon River Watershed of New York?**

**David Vezendy, Russell Moore & William Schoenock**

Over the last century, New York watersheds have been exposed to a myriad of anthropogenic disturbances. Human development, agriculture, introduced species and acid rain have altered their physical and chemical properties. This has led to declines in the range and populations of New York's state fish: the brook trout. These fish require cool, highly oxygenated waters with low acid content for survival and sufficient reproduction. In their absence, we have routinely stocked our local waters with other salmonid species to maintain recreational fisheries. We sampled the biological, chemical and physical characteristics of eight tributaries of the Salmon River watershed to investigate the origin of local brook trout decline. Four of these; Orwell Brook, Trout Brook, North Branch Salmon River, and East Branch Salmon River, are stocked with trout. The other four; Coey Creek, Pennock Brook, Prince Brook and Cold Brook are not. It was predicted that higher acidities and low dissolved oxygen levels would be associated with lower populations. The effects of non-native salmonid stocking on populations was also investigated. Electroshocking was employed survey fish populations. Physical and chemical properties measured were: substrate type, water temperature and velocity, pH, conductivity and levels of dissolved oxygen. Brook trout populations were not found to be correlated with these physical and chemical parameters. Although it was not statistically significant, brook trout numbers appeared to decrease with the presence of other salmonids. Brook trout were only found in one of the stocked waters, while present in all non-stocked waters. Interestingly, the non-stocked waters of Prince Brook and Coey Creek produced non-native salmonids. These are likely to have migrated naturally from waters with established populations. Future studies should be conducted, on a broader scale, to investigate displacement of brook trout from their native range by stocked salmonids. Furthermore, comparison of displacement by directly stocked and naturally dispersed salmonids should be conducted on a similar scale.