Allied Biological
580 Rockport Road
Hackettstown, NJ 07840

Our new AR-101 Hydro-rake at work in Shadow Lake.

Potamogetons

908-850-0303 Allied Biological www.alliedbiological.com

2006 Fall Update

On Climate Change and Lakes

This past May, while attending the NY Federation of Lakes Annual Conference to give a presentation on plant control at Glen Lake, I was fortunate to sit in on two talks on climate change and its effect on lakes. The talks were given by Michael Martin, the President of the North American Lake Management Society, and Scott Kishbaugh, NYDEC's principal Limnologist and head of the Citizens Statewide Lake Assessment Program (CSLAP). Neither Michael nor Scott knew of the other's talk prior to the Conference, so it was remarkable how similar the two presentations were. I'd like to cite some of the more important points that were touched on in these presentations.

On Global Climate Change

Average annual temperature has risen 1°F in the last century, and average minimum nighttime temperature has risen 0.4°F in the last decade. 19 of the 20 hottest annual temperatures have occurred since 1983, and 1998, 2003, 2004 & 2005 were the four hottest years on record.

On the Global Effects of Climate Change

Michael Martin noted five Global effects from Climate Change:

1. Extreme heat events are more frequent.
2. Heavy precipitation events are more frequent
3. More rain falls at the "wrong time", leading to greater erosion.
4. Less rain falls when its needed, leading to droughts and lower groundwater levels
5. There is a decrease in ice cover.

Scott Kishbaugh noted that based on 150 years of worldwide ice-out data, 95% of lakes showed a reduced duration of ice cover. Also, between 1850 and 2000, the duration of ice cover decreased by 19 days on average.

On the Impact to Lakes

Michael noted numerous potential impacts to lakes. These include lower water levels from increased evaporation and less groundwater recharge, a decrease in the absorption and filtering capacity of wetlands and changes in the fish and plant communities from temperature shifts. Longer periods of summer stratification in lakes can also lead to greater nutrient recycling and greater accumulation of contaminants in aquatic organisms. Scott noted that according to CSLAP records since 1986, there seems to be a causal relationship between increased water temperature and both increased weed growth and decreased water quality. His data also noted an increase in hotter air and water temperatures, and a decrease in colder air temperatures.

Over the last decade or more, Allied Biological has witnessed some of the changes noted above, as have our clients. In particular, we've seen the earlier appearance of invasive plant species due to milder winters and earlier ice-out dates. We've seen greater variability in rainfall patterns make retention of herbicides more difficult. In lakes where the expansion of aquatic weeds was stagnant for years, we've seen significant increases in habitat range and plant density. We've also found viable algae and floating plant growth well into December.

Each year lake managers and associations try to strike a balance between recreational lake use, sufficient plant growth for fish habitat and good ecology, and the availability of funds to achieve these goals. Substantial efforts are often made to reduce nutrients and erosion by protecting the lake's watershed. These efforts become even more critical as climate change brings about impacts well beyond our local control.

No impact on fish found following Waneta Lake herbicide application

The following abstract is from the 2006 American Fisheries Society Symposium, and summarizes a September 9, 2006 presentation by Matthew Sanderson, NYSDEC Fisheries Biologist. As you may recall from previous newsletters, Lamoka and Waneta Lakes are two connected, ~800 acre impoundments in Western New York. Both lakes have been plagued with extensive growth of Eurasian Watermilfoil.

"Fisheries surveys in Waneta and Lamoka Lakes from 2002 to 2005 were conducted to assess potential changes in the fish community of Waneta Lake after an April 2003 whole-lake treatment with the herbicide fluridone. A variety of standard fishery statistics were used to compare and evaluate potential differences in the status of fish populations between lakes, years, and seasons. Very few significant differences were detected. Abundance of chain pickerel and yellow perch was higher in Lamoka, and smallmouth bass abundance was higher in Waneta. A trend toward slower growing largemouth bass in Lamoka was observed. Faster growing bluegill were observed in Waneta, and there was a significant interaction between lakes and years. Yellow perch grew faster in Lamoka, but were larger at age 0 in Waneta. Consistent patterns in Kr and Wr were detected in five and four of the nine commonly sampled species, respectively. The four years of data examined do not appear to show that the fluridone treatment of Waneta Lake adversely affected the fish community. If loss of cover for juvenile fish or loss of food and cover for invertebrate prey of juvenile fish exists in Waneta Lake, it has yet to manifest itself in a detectable way."

The Fishing Restriction has been removed for all Endothall Products Aquathol®K, Aquathol® Super K, Hydrothol 191 and Hydrothol® Granular Reprinted from CEREXAGRI-NISSO LLC

Endothall based aquatic herbicides and algaecides have been used for more than 30 years to control exotic and nuisance aquatic plants and algae. These products are sold under the trade names Aquathol® and Hydrothol® by Cerexagri-Nisso. Aquathol and Hydrothol are biodegradable and do not bioaccumulate in the aquatic food chain.

Until recently the label prohibited consumption of fish from the treated area (the area to which the herbicide is applied) for 3 days following treatment. As part of the original registration, the U.S. Environmental Protection Agency required Cerexagri-Nisso to complete over 120 studies defining the safety, chemistry and environmental fate for endothall, including an expensive battery of toxicology studies on laboratory animals. The label wording, including restrictions, was based on that data. The fish consumption restriction was based on data that demonstrated non-detectable levels of endothall in fish three days after exposure.

Since that time, Cerexagri-Nisso has completed additional residue studies that were submitted to the EPA in support of establishing allowable levels of endothall in fish tissues. The EPA has reviewed the data and determined that the consumption of fish from water treated with endothall, according to the label, does not pose a risk to human health.

Part of the EPA mandated toxicology protocol is the establishment of the No Observable Effect Level (NOEL) in laboratory animals. The NOEL is the highest dose at which no adverse health effects are observed. In terms of endothall, an adult would have to eat 3080 lbs of fish from water treated with Aquathol® K every day for a lifetime to reach the NOEL.

Satellite coverage unreliable for Summer/Fall 2006

Allied Biological offers Differential Global Positioning System (DGPS) mapping of vegetation surveys and herbicide applications on larger lakes and wetlands using WAAS satellite coverage. By early Spring 2006, we began to experience extended periods of poor or inadequate satellite reception, which affected many of our mapping requirements. Mid-Tech, our system provider, offered the following explanation:

"AOR-W Satellite Moves West *On February 1st, 2006 WAAS Satellite AOR-W along with its signal footprint began moving towards the West. This is the first of several WAAS related changes that will occur this year, resulting in a new configuration of WAAS Geostationary (GEO) satellites. During the move, the AOR-W satellite will continue to broadcast corrections and integrity information for GPS. Upon completion of this move, sometime in April or early May 2006, WAAS will temporarily be unavailable in the extreme Northeast U.S. No impact is expected for the remainder of the U.S. Service will be fully restored in the fall of 2006 when the FAA's new WAAS geostationary satellite (PanAmSat) is fully operational.*

The reasons for this configuration change are many. The most critical application of WAAS is aviation, which relies on the WAAS system for en-route and approach navigation to aircraft. Other reasons include satellite leases that are expiring and the fact that new satellites are coming into service. The move of AOR-W to the west mainly impacts users on the East Coast or Northeastern regions of the US and Southeastern regions of Canada. Between now and the end of September our Eastern users will be experiencing poor WAAS reception and temporary interruptions of the signal.

A new PanAmSat satellite, launched in October 2005 will be coming on-line for the East coast. The current estimate for this new satellite to be fully operational is late September to early October of 2006. This new satellite will be "replacing" the AOR-W satellite that is moving towards the West."

For those clients affected by this satellite outage, we sincerely apologize for your inconvenience, and for not being advised, and advising you, of this issue prior to its occurrence. We have confirmed that the new satellite is in place, and currently running in Test mode. We hope it will be fully functional by the end of November.

June rains problematic for Sonar Applications

With recommended retention times for the herbicide Sonar growing longer each year, this past June's heavy rains impacted plant control throughout Pennsylvania, New Jersey and New York. Sonar is typically applied in May, and needs at least 30 days, to a high of 90 days of retention time to effectively control target plants. With unusually heavy storms in June, many lake communities were forced to spend extra funds to achieve control with Sonar, or had to abandon Sonar applications for more predictable, but shorter term control with contact herbicides. A list of sample June, 2006 rainfall totals and averages are outlined at right.

Location	June 2006 (inches)	Average (inches)
Atlantic City, NJ	5.05"	2.74"
Boonton, NJ	9.55"	3.96"
Newton, NJ	9.91"	4.08"
Hammonton, NJ	6.37"	3.68"
New Brunswick, NJ	7.89"	4.04"
Greenwood Lake, NY	8.18"	4.28"
New York City	8.55"	3.84"
Poughkeepsie, NY	7.33"	3.73"
Riverhead, NY	5.83"	3.21"
Stroudsburg, PA	11.05"	4.56"

NJ data – Office of NJ State Climatologist, NY, PA data – National Weather Service

Cutrine Plus vs. Copper Sulfate

By Bill Ratajczyk, Applied Biochemists

Cutrine-Plus is used extensively for algae control in aquaculture, drinking water reservoirs, irrigation systems, golf course ponds, recreational lakes, farm ponds, etc. The following discussion addresses a number of factors and issues, which must be considered in evaluating algae control with Cutrine-Plus as compared to copper sulfate applications. Of particular concern are items relating to chemistry and environmental considerations. Both short- term and long-term factors must be considered.

The copper in Cutrine-Plus is chelated with a mixture of ethanolamines. The pH of the formulated product is approximately 10.5, which allows the copper to stay in solution even under conditions of high hardness and alkalinity. It is this soluble copper which is algicidal. The increased contact time provides for more complete copper uptake by individual algae cells. No loss of copper occurs due to chemical precipitation or binding to particulate matter.

Based upon toxicological testing and resultant EPA registration/labeling of Cutrine Plus, there are no restrictions on water use for swimming, fishing, crop and non-crop irrigation, drinking, nor domestic use. Based upon labeled dosage rates, there is a sufficient margin of safety for non-target organisms. Since copper is not lost from solution via precipitation reactions, lower dosages and less frequent applications have been required than with copper sulfate. Less elemental copper is added to the aquatic environment. The issue of bottom sediment accumulation of high copper concentrations has raised state and federal agency concerns where frequent treatments with high doses of copper sulfate have been practiced.

Copper sulfate forms copper ions and sulfate ions when dissolved in water. The strong, positive charge on the copper ion has a high affinity for carbonates, bicarbonates and any negatively charged particulate matter. In alkaline water, copper is rapidly precipitated from solution forming copper carbonate. Tests have shown that as much as 90% of the copper is lost from solution within a few hours after treatment. Such insoluble forms are ineffective for algae control. Furthermore, there have been some concerns over health effects from high sulfate levels in water. The adjacent graph shows test results of % active copper lost in water at 65 ppm alkalinity and a 7.4 PH.Dr. Barry Rosen at the University of Tampa in Tampa, FL conducted laboratory tests on Anabaena Circinalis a filamentous cyanobacteria (blue-green algae) that produces taste and odor causing compounds episodically in the Hillsborough River Reservoir. Long-term (4 days) and short-term (1 to 24 hours) exposure of Anabaena to copper sulfate and Cutrine ranging from 0.01 to 1.0 ppm copper were conducted on exponentially growing cells. Exposure was in sterile river water collected during the Anabaena bloom period in the reservoir. Filament numbers and fragmentation of the filament into smaller filaments and single cells were determined daily (long-term) and hourly (short-term) for each treatment. In the long-term experiments with 0.01 to 0.3 ppm copper sulfate, there was significant fragmentation of filaments within one day which was proportional to concentration between 0.1 and 0.3 ppm. By day 4, only single cells were found at 0.3 ppm. In contrast, the same concentration of Cutrine did not affect filament integrity during the first day of growth and only caused slight fragmentation throughout the experiment. For the Hillsborough River reservoir, treatment with Cutrine appears to have a dual benefit: Anabaena dies upon exposure and does not fragment. Copper sulfate leaves viable cells and also causes fragmentation, which promotes propagation rather than control of this organism.

Cutrine Plus continues to be the first choice of reservoir operators for algae control treatments. Applied Biochemists has recently added a new "Ultra" formulation which incorporates a non-ionic, aquatic surfactant for improved penetration of cell walls on hard to control species.

Allied Biological discontinues use of copper sulfate in lakes & ponds

After much consideration, Allied Biological has decided to stop applying copper sulfate as a lake and pond algaecide. Copper sulfate, a product whose composition hasn't changed significantly in the last half century, is perhaps the most widely used algaecide in the country due to its availability and its relatively low cost. Despite its popularity, copper sulfate has several negative attributes in comparison to the more effective, yet costlier chelated copper algaecides. Over the last two years, the cost of copper sulfate has risen significantly, closing the price gap between copper sulfate and chelated algaecides, so we are choosing this opportunity to wean our lakes and ponds off this outdated product. Our primary reasons are:

- § Chelated copper algaecides contain less elemental copper (7-9%) than copper sulfate (25%), yet are more effective.
- § Chelated copper algaecides are effective for longer than copper sulfate because they stay suspended in the water column longer.
- § Chelated copper algaecides are also less toxic to fish and zooplankton than copper sulfate because they release the copper ion more gradually.
- § Copper sulfate is more likely to contribute to rebound blooms of problematic algae than chelated copper algaecides.
- § Copper sulfate, a solid, is more hazardous to product applicators due to inhalation exposure to dust particles.
- § Copper sulfate bags are notorious for breaking when in storage or transport, creating hazardous material disposal problems.
- § Chelated copper algaecides work better in alkaline or colder waters than copper sulfate.

Starting next season, we will be applying primarily Cutrine Ultra and Captain chelated copper algaecides for algae control. In some cases there may be a slight cost increase, but dosage rates can be targeted to specific algal types, allowing for selectivity of more desirable but less abundant algae, and potentially reducing the frequency and quantity of repeat algaecide applications.

We see this decision as being a considerable benefit to the lake and pond ecosystems we manage, as well as to our personnel who apply algaecides. We sincerely hope that other users of copper sulfate follow our lead and choose safer and more effective algaecides over copper sulfate.