The Washington State Lake Protection Association Newsletter

WATERLINE

SEPT 2009

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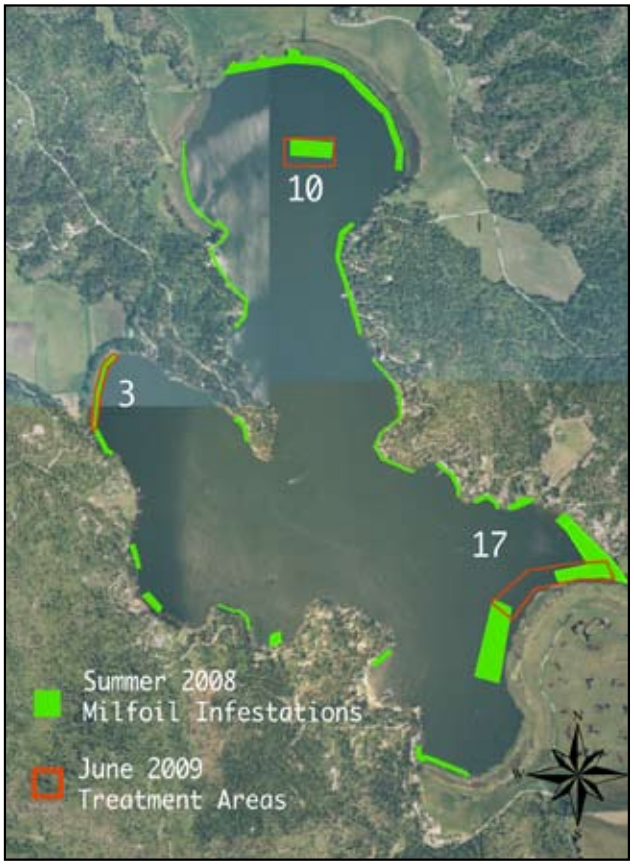
Newman Lake battles Eurasian watermilfoil

Newman Lake is a 1200-acre lake twenty miles northeast of Spokane, near the Washington-Idaho border. Eurasian watermilfoil, a non-native and highly invasive aquatic weed, was first discovered at Newman Lake in September 2002 in a small area near the outlet gate at the lake's southeast end. In 2003, the Newman Lake Flood Control Zone District (NLFCZD) began control efforts, including frequent boat and diver surveys, hand-pulling by divers, and herbicide treatment with granular (Aqua-Kleen and Navigate) and liquid (DMA4) formulations of 2, 4-D. Staff considered these methods most likely to control the milfoil given the extent and conditions of the lake's infestation. This approach also met the goals of the community, with its history of passionate involvement in improving Newman Lake's water quality, which were to minimize costs as well as impacts to recreation and natural ecosystems.

The different control methods have had varied rates of success and milfoil has remained under moderate control, but this tenacious invasive has not been eradicated. In 2008, to reduce overall milfoil biomass, the NLFCZD treated some areas twice. Timing and scope were changed from previous years to provide greater control early in the growing season and to reach more areas with milfoil. Known milfoil concentrations were treated with granular form 2, 4-D (Navigate) in mid-June to get a jump start on plant growth. After this initial treatment, NLFCZD staff conducted intensive surveys to find other areas of milfoil infestation. Thanks to great water clarity on



Newman Lake milfoil infestation and treatment areas

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Cyanobacteria events in Snohomish County lakes may have lessons statewide

By Marisa Burghdoff, Snohomish County

Certain species of cyanobacteria (commonly called blue-green algae) have the potential to produce toxins that pose health threats to people and animals that play in or drink affected water. In Snohomish County, Cassidy, Ketchum, and Loma Lakes have had documented toxic cyanobacteria events. In 2007, Snohomish County Surface Water Management (SWM) received a grant from the Department of Ecology's freshwater algae program to focus on these lakes to 1) reduce the risk to human and animal health through early bloom detection and citizen notification; 2) increase public understanding of algae problems and their causes; and 3) reduce the incidence of blue-green algae blooms by working with residents to decrease nutrient inputs.

In 2008, the project focused primarily on early bloom detection and citizen notification. SWM staff monitored the lakes weekly, looking for blooms, collecting environmental data including chlorophyll *a* and phycocyanin levels (a pigment specific to cyanobacteria), and sampling for toxins. The summer and early fall of 2008 proved an eventful time to study cyanobacteria. Lake Ketchum experienced overlapping blooms that produced toxins consistently from early July through mid-October. At the beginning of the summer, the liver toxin microcystin was found at levels as high as 416 ug/l, which far exceeds the Washington Department of Health (DOH) recreational limit of 6 ug/l. Later in the summer, the neurotoxin anatoxin-a was twice found at levels exceeding the recreational guidelines. Lake Cassidy experienced cyanobacteria blooms from August through October and had unsafe levels of microcystin in three of the eight weeks. SWM posted DOH signs warning lake users, sent algae bloom email alerts,

Cyanobacteria bloom on Lake Cassidy

Cyanobacteria events in Snohomish County lakes

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set up a website on toxic algae, and issued press releases to increase public awareness of the blooms.

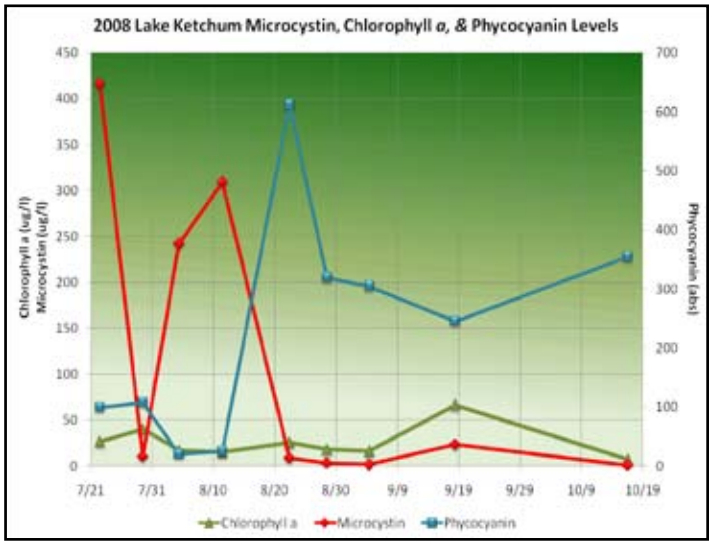
One objective of the monitoring was to detect early warning signs that could signal the onset of blooms or toxin production. Bloom predictors were hard to pinpoint in 2008, though, since Lake Ketchum had a continuous bloom. Nor did the 2008 data reveal consistent environmental indicators of toxin production. For example, there was not a strong relationship between pigment (phycocyanin & chlorophyll *a*) and microcystin levels at Lake Ketchum's sampling locations. Additional testing of anatoxin-a would have been helpful and should be possible in 2009.

Although weekly monitoring continues in the summer and early fall of 2009, the focus has shifted toward better informing the public about the risks of toxic blooms and reducing nutrients to prevent blooms. Outreach includes a series of mailers about algae awareness and controlling nutrients, targeted workshops at each lake, and a specific focus on septic systems. As the end of the project approaches, we will be evaluating the monitoring, the notification procedures, and the outreach materials to determine their effectiveness. This project will provide an overall strategy for handling toxic algae blooms in Snohomish County that can be shared statewide. For more information, please visit **www.lakes.surfacewater.info.**

2008 Algal Toxin Levels* (ug/l)

Date	Ketchum Microcystin	Ketchum Anatoxin-a	Cassidy Microcystin
6/30/2008	0.05†		
7/22/2008	**416.00**		
7/29/2008	**10.10**		
8/4/2008	**242.00**	**1.00**	
8/11/2008	**309.00**	0.03†	0.77
8/22/2008	**8.62**		4.98
8/28/2008	2.98	0.30	0.14
9/4/2008	1.49	**12.90**	0.05†
9/10/2008	**>6**		**>6.00**
9/18/2008	**23.10**	0.67†	**20.10**
10/3/2008	0.05†		**>6.00**
10/16/2008	0.56		>3.00

*Bold Values exceed Washington State Department of Health recreational standards of 6ug/l for microcystin or 1 ug/l for anatoxin-a.
† Value was less than the method detection limit



Wrap up your summer in Spokane at the annual conference!

Join us in Spokane on September 22nd and 23rd for the 22nd annual WALPA conference, the perfect ending to your 2009 lake season. This year's conference, themed "Healthy Watersheds and Clean Lakes-Working for a Sustainable Future," will be held at the Doubletree Hotel-Spokane City Center. The event will feature topics of scientific and community interest – something for every WALPA member. Planned sessions include Lake Restoration and Management Plans, Aquatic Invasive Species, Fisheries Research, Cyanobacteria and Algae, Lakescaping and Shoreline Restoration, Legislative Activities and more, culminating in a Stump the Experts Session at the end of Day Two.

For the first time, the conference will add a social event for conference attendees and those who may want to join WALPA. On the evening of the 22nd, bring your neighbors, colleagues, or students interested in lake issues to learn what WALPA is all about. This informal session, complete with refreshments and a no-host bar, will include presentations on various lake and environmental issues. It's a great way to meet friends old and new and get that much more out of the conference. This session will be an "open mike" format, so if you have something lake-related to present, contact Jacob McCann (**509-477-7262** or **jmccann@spokanecounty.org**) and he will get you on the list. Hope to see you there!

Newman Lake battles Eurasian watermilfoil

Continued from cover

survey days, we found plants in areas not previously noted. Consequently, we treated 60 acres with 2, 4-D in July, roughly double the area treated in past years.

Initial surveys saw a reduction in plant biomass, but some established plants remained in deep water areas. Many dockside plants remained as well, since it is hard to get the herbicide to the plants in tight quarters. While applying liquid DMA4 might have worked in this context, it might also have meant undue hardship to the many homeowners with lake intakes who would have been affected by accompanying restrictions on irrigation and potable water.

Given the limited success of previous years, NLFCZD staff moved to a new strategy in 2009. Encouraged by anecdotal reports of results at Liberty and Cocolalla Lakes, staff decided to use liquid DMA4 in the larger open water areas. As some of these areas are ten feet deep and exposed to prevailing winds, past treatments of liquid formulations had proven ineffective. But a new approach by the applicator (Inland Water Pest Control and Lakeland Restoration) injects the herbicide into a desired depth of the water column, which may allow greater plant uptake, less wind spread, and thus greater control. The applicator also used a higher concentration, changing a rate of 2.0 ppm at 5ft average to 3.5 ppm at 8 ft depth. Since the treated areas (see map front page) are largely open water, public impact was minimal. The dockside areas not included in this year's treatment are being monitored closely, and as many have a rocky substrate, there has not been significant spread of existing plants. These smaller concentrations will be hand-pulled.

Thirty acres were treated on June 30th; initial surveys on July 16th found almost no milfoil in treated areas. The few plants that remained did not look healthy and may not have survived. While a more complete survey will be done late in September, these initial results are promising. Even in highly exposed, deep water settings, the DMA4 seems to be effective in controlling Eurasian watermilfoil when injected at depth and in higher concentrations. Let's hope that these results persist, with fewer areas to treat in Summer 2010!

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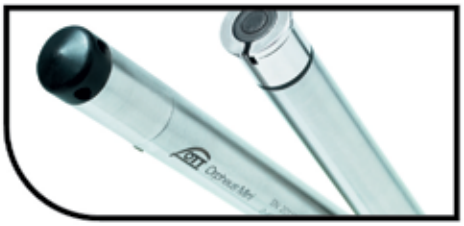

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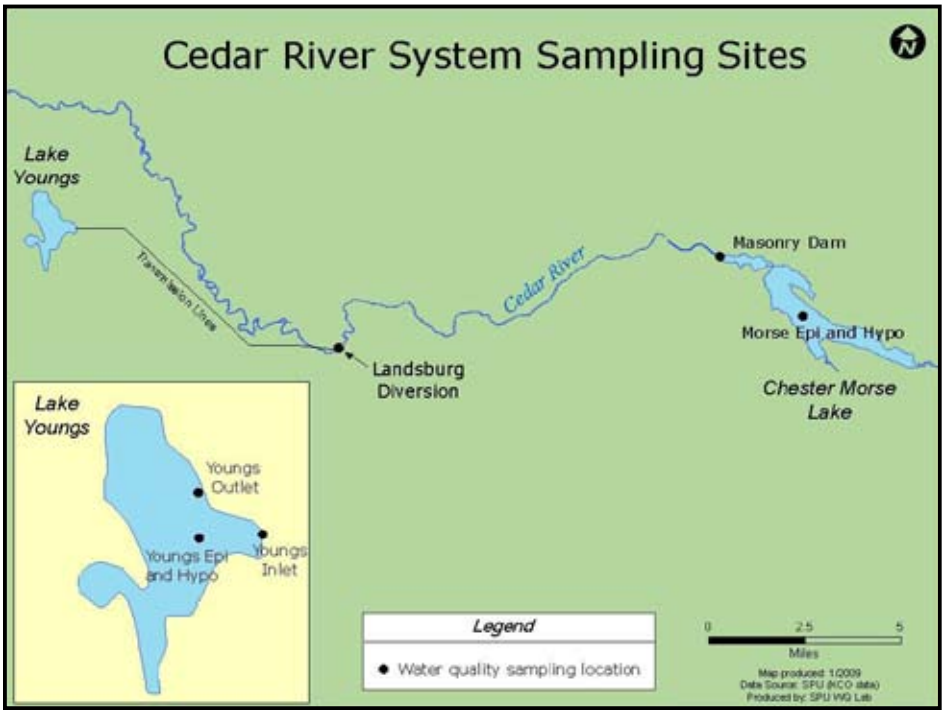
Recent changes in algae affect treatment operations at Seattle's Lake Youngs

by Rob Zisette, Herrera Environmental Consultants

Seattle Public Utilities (SPU) operates the Cedar River watershed water supply system, which serves high quality drinking water to the Seattle metropolitan area. The upper portion of this protected watershed drains to Chester Morse Lake. There water is released from the Masonry Dam to the Cedar River, which flows twelve miles to Landsburg. At Landsburg, the water supply is diverted from the river, treated with chlorine and fluoride, and piped for eight miles to Lake Youngs (see map). Lake Youngs receives no other inflow and has an area of 700 acres, a maximum depth of 105 feet, and a hydraulic retention time of 115 to 140 days. Water withdrawn from Lake Youngs is treated with ozone, ultraviolet light, chlorine, and lime, but is not filtered before entering the water supply distribution system.



In the past few years, Lake Youngs water quality changes have raised aesthetic concerns and affected water treatment operations. SPU conducted a workshop in February, 2009 to better understand the reasons for and implications of these changes, particularly with regard to the lake's algae populations. Workshop panelists included WALPA members Gene Welch, Jean Jacoby, Mike Brett, Sally Abella, and Rob Zisette.

At the workshop, SPU reviewed the results of Lake Youngs monitoring conducted since the early 1990s. Water quality concerns have typically been associated with spring diatom blooms of either *Tabellaria* or *Synedra*. The primary concern around the blooms has been their clogging of customers' filters, but they also affect water treatment operations by increasing ozone and chlorine demands. This pattern changed noticeably starting around 2003. Since then, the timing of blooms has been less predictable and several different algal species have dominated, some of which have caused operational and aesthetic concerns. Examples include:

- A summer bloom of *Uroglena* in Chester Morse Lake in 2003, 2004, and 2008 that also grew in Lake Youngs and affected the taste of treated water before SPU began using ozone in 2004.
- Fall blooms of *Tabellaria* in 2005 and 2006, and late summer bloom of *Fragilaria* in 2007.
- A summer bloom of *Sphaerocystis* in 2006 that nearly doubled the ozone demand.
- Abundant *Botryococcus* in the summer of 2007, some of which floated and some of which settled in distribution reservoirs.
- A late spring bloom of *Cyclotella* in 2008 (see photo p. 7) whose sticky extracellular microfilaments clogged screens in the treatment plant and led to bypassing the lake for more than two weeks.

Statistical analysis indicates that chlorophyll concentrations have increased in Lake Youngs since 2003, but there has been no significant change in phosphorus concentrations. Trend analysis shows that inflow phosphorus concentrations and flow rates have decreased since 2003. Together, these results suggest that internal phosphorus loading from deep sediments may have increased since 2003. Increased internal loading, which develops during summer stratification, may explain the unusual recent occurrence of summer and fall algae blooms. However, it is unclear why *Cyclotella* bloomed in the late spring of 2008, or whether it will bloom again in the future. (Author's note: some workshop participants expressed concern about the trend analysis results and conclusions.)

The workshop panelists recommended the following steps to reduce impacts and enhance the understanding of algae growth in Lake Youngs:

- Move fluoride treatment from Landsburg to the Lake Youngs outlet to reduce external phosphorus loading by more than 20 percent (because fluorosilic acid has

Continued from previous page

significant phosphorus content).

- Calculate the phosphorus mass balance for the lake on a monthly basis using existing data, and conduct additional sediment studies to better estimate internal loading amounts.
- Enhance the monitoring program by installing a weather station and a telemetered multi-parameter water quality profiling system at Lake Youngs.
- Investigate further development of a hydrodynamic and water quality model to evaluate effects of potential operational changes that may improve water quality, such as extending the intake into the hypolimnion or bypassing inflow around the lake for an extended period.
- Improve prevention measures and monitoring of aquatic invasive species, including surveys of the Didymosphenia (rock snot) populations first observed in the Cedar River and Lake Youngs in 2008.

SPU staff have already begun implementing these recommendations and greatly appreciate the limnological advice from WALPA members.

Sampling Cyclotella "snow" in Lake Youngs, June 2008

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In This Issue:

Team assembles to test Western Washington lakes for toxic blooms

By Joan Hardy, Washington Department of Health, and Beth Cullen. King County

This summer, a team of scientists initiated an ambitious and timely study to investigate the possible toxicity of algae blooms in Western Washington lakes. Washington State Department of Health (DOH) has partnered with Snohomish, King and Pierce Counties, Washington State Department of Ecology (Ecology), and Seattle University to determine the public health ramifications of cyanotoxins.

Funded by a grant from the Centers for Disease Control (CDC), the team developed the Regional Examination of Harmful Algal Blooms (REHAB) project which includes routine monitoring of lowland Puget Sound lakes. Ten lakes from each of the three counties were selected based on the type of blue-green algae present, previous history of toxic blooms, and public access.

Every two weeks for five months, volunteers or county staff sample the thirty lakes. Samples are sent to the King County Environmental Laboratory (KCEL) which tests for microcystins (liver toxins) and anatoxin-a (a nerve toxin). KCEL will soon test for saxitoxin and cylindrospermopsin as well. Water Services Inc. conducts quantitative phytoplankton analysis on each sample. Results are typically available in a week or so, but are analyzed faster if a bloom is currently occurring. Toxicity information allows county staff to make management decisions, such as whether to post warning signs, or whether to close the lake if there are reports of human or animal illnesses.

One intent of the project is to track animal and human reports of illness associated with exposure to toxic blooms. Another goal is to measure toxicity levels in the lakes, determine how often blooms are toxic, and observe how long toxicity persists. King County will enter environmental data from the REHAB project into CDC's Harmful Algal Bloom-related Illness and Surveillance System (HABISS), a database that includes toxicity and public health information. Project partners hope that data collected over the next three years will help unlock clues about why algae produce toxins and whether toxin production can be prevented.

If you, your child, or your pet felt sick or experienced flu-like symptoms after swimming in a lake, please contact DOH at **1-877-485-7316** (toll free). If you see a bloom on your lake and think it should be tested for toxicity, contact your local health jurisdiction or Ecology at **1-425-649-7288**. Remember that only laboratory tests can determine whether a bloom is toxic or non-toxic.

For more information on toxic blooms and toxicity symptoms, visit the DOH website at: **http://www.doh.wa.gov/ehp/algae/default.htm** or Ecology's website at: **http://www.ecy.wa.gov/programs/wq/plants/algae/index.html.**