March 2012

Editor:
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LAKE WISE

A Voice for Quiet Waters

The newsletter of the Oregon Lakes Association

Note from the President

OLA is starting into its 22nd year and its Board is initiating a program to make sure that OLA stays vibrant and strong. We met in Portland on March 15th to finalize the 2012 work plan and to provide direction for a number of new activities.

Part of our plan is to make sure that OLA has a strong infrastructure. During this year, we will be examining ways of improving our website and newsletter and taking advantage of other social media (e.g. facebook and twitter). We are also in the process of planning the 2012 conference. We are looking at the possibility of having the conference at Oregon's most notable lake, Crater Lake, in September. We hope to finalize the location and date this Spring so that you have plenty of time for planning on being there.

We are also looking at a number of initiatives for OLA. We have put together an Outreach Committee that has been working with several agencies (U.S. Forest Service, Oregon Health Authority, Army Corp of Engineers) to set up a Harmful Algae Bloom Technical Workshop on April 9 in Corvallis (see the announcement on the back page of this newsletter). This committee will explore the feasibility for setting up an annual OLA scholarship award for college students that we can hopefully launch by the 2012 OLA Conference. We have put together a Legislative and Governmental Affairs Committee that will be providing feedback to ODEQ on the 2012 design for the National Lakes Assessment in Oregon, and will be exploring some possible legislative concepts, including one that will look at restricting the use of phosphorus in lawn maintenance fertilizers.

A Board discussion of the internal combustion motor ban at Waldo Lake being re-opened for public comment resulted in a decision to re-submit the letter in support of the ban that OLA originally sent on December 12, 2009. The Oregon State Marine Board is taking comments on these Waldo Lake rules from March 1 through April 10, 2012. The purpose of re-visiting the rules (OAR 250-020-0221 and OAR 250-030-0030) is to correct alleged procedural irregularities related to their previous adoption. The rules implement the Oregon Scenic Waterway Act by prohibiting internal combustion motorboats and float planes on Waldo Lake, a statutorily designated state scenic waterway, in order to preserve the natural setting of the lake, minimize disturbance of its natural beauty, protect its aesthetic values, and provide an unimpaired quality of recreational experience. An exception is provided in the rules for official governmental use and emergency landings of float planes. The Board encourages members to provide comment to the OSMB. More information is available at the OSMB website, www.oregon.gov/OSMB/news/2012/WaldoPubHearingRel.shtml.

All of these activities take membership support. We have started to work on membership renewal by contacting past members to encourage them to renew their OLA membership. If you have not already done so, please send in your 2012 membership (form attached, or go to the website: www.oregonlakes.org). I think that you will find OLA membership to be a great bargain and you will be supporting Oregon's only "voice for quiet waters."

Individual memberships (which are tax deductible) are a bargain rate of $25. If you attended the 2011 conference in Portland, your 2012 membership was included.

If you are interested finding out more about any of these activities, or working on a committee or with the board, please let me know. You can contact me by e-mail or by phone.

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Resolution of the 2011 HAB Advisories & Changes for 2012

Delaying the mailing of the final 2011 issue of *Lake Wise* until December still did not allow enough time for the active Harmful Algae Bloom advisories to expire. The languishing advisories were at Lost Creek Lake, the South Umpqua River, Gerber Reservoir, Sru Lake, and Fall Creek Lake.

- The advisory at Fall Creek Lake was lifted on 30 December 2011. Its posting on 20 September was the first HAB advisory for this reservoir. It is unclear if the drawdown reported in the December 2011 issue of *Lake Wise* had any role in the advisory.
- South Umpqua River was posted on 29 July in response to dog deaths along Myrtle Creek. It was 9 January 2012 before these warnings were removed.
- Lost Creek Lake's second advisory for 2011 was posted on 23 September and lasted until 11 January 2012.
- The Gerber Reservoir advisory was in effect from 23 August to 31 January 2012.
- Sru Lake was posted for high *Anabaena* levels from 24 August to 7 February 2012.

The Oregon Health Authority adopted several modifications to its HAB Sampling and Advisory Guidelines for 2012 at a March 12, 2012, stakeholders meeting in Eugene. The changes reflect an increased emphasis for basing advisories on the presence of toxins in the water, rather than the presence of cyanobacteria. New guideline values were set for anatoxin-A, saxitoxin, and cylindrospermopsin to join the existing value for microcystin:

Health Advisory Guideline Values for Cyanotoxins in Oregon's Recreational Waters

	Anatoxin-A	Cylindrospermopsin	Saxitoxin	Microcystin
Guideline Value, µg/L	20	6	100	8

Other modifications to the 2011 protocols include:

- Testing for all toxins associated with the taxa of cyanobacteria present above threshold values, rather than just testing for anatoxin-A and microcystin.
- Elimination of 1 week waiting period to lift advisory after cell counts and toxin level fall below threshold.
- A data-based advisory exception process for blooms dominated by *Aphanizomenon flos-aquae*, because strains from Oregon have not yet been documented for producing toxins.
- Clarifications to flow charts for HAB advisories and monitoring.

The full guideline documents for HAB sampling and advisories will soon be available on the Oregon Health Authority, Public Health Division website, http://public.health.oregon.gov.

A *LakeLine* Look at Lake Abert

In a laudable and continuing endeavor to pass on what he has learned about Oregon lakes, Doug Larson has recently published, with co-author Ron Larson, another of his "Featured Lake" articles in the Winter 2011 issue of *LakeLine* (volume 31, #4). It is Lake Abert that is scrutinized this time, in 12 pages of text, photos, and cited references. The article expands the presentation Doug gave at the OLA Conference last October. In spite of being "the largest landlocked saline water body in the Pacific Northwest", and being adjacent to a major highway, Lake Abert is little regarded or recognized by most Oregonians. The article describes in some detail, a variety of reasons why the lake deserves more respect. Single copies of *LakeLine* can be purchased at the NALMS book store, at www.nalms.org.

Washout at Mochettaz Reservoir in Yamhill County

The 22 acre-feet capacity, private irrigation reservoir washed out in late January, sending a gush of water into Yamhill County's Baker Creek. Mochettaz Reservoir is found at coordinates 45.2205, -123.3103, it is registered in the USGS Geographical Names Information System as reservoir #1130167, and has a 1952 priority date for water rights with the Oregon Water Resources Department. It is a roughly oval shaped pond on an east/west axis, with a distance between its vertices of just less than 500 feet. Its earthfill dam has a maximum height of 18 feet and stretches 750 feet along the entire northern half of the pond. The pond was built on the channels of two, intermittent creeks, which kept it essentially full in the eight Google Earth photos taken between 1994 and 2006. The OWRD last inspected the dam in March 2009, and had it rated as a low hazard.

Overflow from the reservoir normally passes through irrigated fields to the north for about a quarter mile before merging with Baker Creek. After the washout, the creek was littered with tangles of downed trees, and a bank failure downstream was discovered to have exposed a 24 inch water transmission line belonging to McMinnville Water and Light. Root wads from downed trees were harvested and mingled with the rip rap used to restore the creek channel and protect the water line. There was no word about plans to restore the reservoir.

Brine Flies at a Freshwater Lake

Theodore Harris and Frank Wilhelm have been driving from their base at the University of Idaho to Heppner, Oregon since 2008 to tend to their research project at Willow Creek Reservoir. They presented a summary of their work, "Alteration of Nutrient Regimes in Large Scale, *In-situ* Enclosure Experiments to Reduce Cyanobacteria Biovolume and Toxicity", at the OLA Conference in Portland last October. In the December 2011 issue of the WALPA newsletter, available at www.walpa.org, they recounted their surprise when one of their visits coincided with a hatch of brine flies.

The researchers had not encountered swarming insects on their previous visits so specimens were collected and were later identified as *Ephydra hians*, two-winged flies of the Ephydridae family and known as shore flies or brine flies. These flies are well known at the Great Salt Lake in Utah, Mono Lake in California, and Oregon's Lake Abert, but these lakes are all conspicuously saline and/or alkaline. Willow Creek Reservoir is a fresh water lake with moderate alkalinity. The pool behind the novel, roller-compacted, concrete dam began filling in 1983, which was too late for the reservoir to be included among the lakes profiled in the *Atlas of Oregon Lakes*. *W*ater quality data for the reservoir is not readily accessible, but the USGS monitors Willow Creek at a

site immediately downstream of the dam, and these records show the annual range of specific conductivity typically varies between 150-480 µsiemens/cm, and an analysis for acid neutralizing capacity gave a value of 67 mg/L as $CaCO_3$.

The life cycle of *E. hians* begins with eggs laid in a subsurface substrate, such as algal mats. The eggs hatch in a few days and the larvae actively feed through three instar stages before pupating. Feeding experiments have concluded that cyanobacteria are a preferred food source, but the larvae grow best when a diverse diet including diatoms, green algae, and organic debris is utilized. The puparium floats to the water surface when the adult is ready to emerge. The adults buzz about, eating, mating, and laying eggs for about two weeks before dying. In optimal conditions, two generations can be produced during a summer. Water temperature and food availability are key factors. Dormant larvae can over-winter and resume development as the water warms in the spring.

The larvae are able to survive in waters with salinities up to about 120 g/L TDS. They can also move assimilated carbonate and bicarbonate into limestone crystals, which are shed at emergence. These capabilities allow brine flies to utilize habitats that are unavailable to other species. There are times when brine flies and brine shrimp (*Artemia* sp.) are the only creatures to be found in Lake Abert, and a predator free environment can only be good news for a primary consumer such as brine flies. Empty pupae cases can litter the shoreline in windrows after a hatch on saline lakes. Estimates of >370 million empty cases per mile of shoreline have been reported at the Great Salt Lake. The cases were a food staple for the Paiute Indians of California and Nevada. Gulls, grebes, and phalaropes are among the birds that feast on the adult flies. The larvae and pupae are readily taken as prey where aquatic predators are present. With such an established position in the food web, it does not seem likely that brine flies serve as a means to pass cyanobacteria toxins from primary consumers to primary predators. When the hatch at Willow Creek Reservoir was underway, there was an HAB advisory in effect and microcystin levels greater than 500 µg/L had been observed.

Brine flies are not precluded from fresh water habitats, but their reproductive success rate there is not assured. They would not be so well noticed if their numbers were less or they were not dominant among the insect population at lake's edge. If these observations from the published literature are reliable, then the report of the brine fly hatch at Willow Creek Reservoir is remarkable more for its success than the presence of brine flies at a freshwater lake. Because there is so little published data from Willow Creek Reservoir, it is hard to determine if the hatch was a unique event. It will be of interest to see if the hatches will persist.

What is Readily Known About Willow Creek Reservoir?

Heppner was established as an Oregon landmark in 1873, when Henry Heppner and Jackson Morrow opened a general store there, and the US Post Office recognized George Stansbury as the first Heppner Postmaster. This location on Willow Creek, between the confluences of tributaries Balm Creek, Hinton Creek, and Shobe Canyon Creek, was also at the junction of stage roads that would later become State Highways 74 and 207. The ratification of Indian treaties signed in 1855 had opened the region to settlement and the developing farm community had produced a need for a business center. Morrow County was created in 1885, and Heppner was made the county seat in an 1886 election. By 1900 a railroad spur line connected Heppner to the main rail route traveling from Astoria to Ontario and beyond.

This prosperity suffered a setback on June 14, 1903, when a flash flood down Willow Creek destroyed much of the town and killed nearly a fourth of its estimated 1148 residents. The event remains the worst natural disaster

in Oregon history. The city did recover and recorded a population of 1661 in the 1960 Census, but memory of the flood lingered. The US Army Corps of Engineers completed a flood control study for Willow Creek in 1962, and Congress authorized the construction of a dam in 1965. Discussions of dam design continued until 1981 when work was started. The pool behind the completed dam began filling in February 1983.

The dam continues to attract attention. The 160 foot high structure is located just downstream of the Balm Creek confluence and looms large above the Main Street of Heppner. There is also considerable interest in the dam being the first to be built of roller-compacted concrete. This method was developed during the 1970's and proved popular because it allowed quicker and simpler construction, which lowered construction costs. The chief difference from conventional concrete construction is that roller-compacted concrete is mixed with a different proportion of ingredients and is put into place much drier than normal concrete. Both formulations use portland cement, sand, and water, but fly ash has shown it can reduce the amount of cement needed, and limiting the volume of water in the mix changes the aggregate from a slurry to a paste. This paste must be pushed into place, but because it is drier, it cures faster, does not need complex forms, and does not produce as much heat from the slaking reaction of hydrating the lime in the cement. The diminished need to cool the mass of curing concrete simplifies construction.

Initially, roller-compacted concrete was primarily used in paving and foundation projects. The aggregate was trucked to the site, put into place with bulldozers, and compacted with vibratory rollers. Willow Creek Dam is essentially a stack of 160, 1 foot layers of roller-compacted concrete, up to 1800 feet long. The interior of the gravity dam has a 900 foot maintenance tunnel. The dam was built on schedule and was completed for far less than its $50 million budget. But as the reservoir began to fill, it was apparent that the dam leaked. Injecting grout into a series of top to bottom holes drilled through the dam reduced leakage to 3 cubic meters/minute, and this rate has since slowed to less than 1 cubic meter/minute. The dam withstood its most severe test on June 6, 2011, when the reservoir crested at 2092.44 feet elevation during a storm. This maximum stage level was well below the spillway crest of 2113.5 feet, and had a volume less than the reservoir's capacity of 13,250 acre-feet. Stage data from Water Year 1983 through 2005 show little fluctuation in water level. Monthly means of surface elevation for this period only vary from 2058 feet in November to 2069 feet in May.

It was USACE limnologist Doug Larson who performed much of the early water quality monitoring of Willow Creek Reservoir. His findings characterized a lake that stratified soon into the summer, and had developed an anoxic hypolimnion by mid-summer. Nitrogen and phosphorus enrichment entered the lake from farming and cattle ranching along both Willow and Balm Creeks, contributing to dense cyanobacteria blooms. Willow Creek Reservoir has been posted for HAB advisories in every year, and often twice in a year, since 2006, when the Oregon program watching for HAB got underway. Decaying algae joined the organic particulates swept in by the creeks to produce ample substrate for anaerobic bacteria on the lake's bottom. Within years after the dam's completion, workers entering the maintenance tunnel had to wear respiratory protection for the hydrogen sulfide and methane detected there. Artificial aeration was added to the lake in 2004 and SolarBee circulators were installed in 2009.

The Oregon State Marine Board's 2008 survey of boat use ranks Willow Creek Reservoir at 157 among boating destinations in the state. For the survey period, the reservoir placed between Coffenberry Lake (Clatsop Co.) and Big Lake (Linn Co.), at 375 annual boat use days. Fishing was the principal purpose of these excursions, and natural populations of large-mouthed bass, black and white crappie, small-mouth bass, bluegill, pumpkinseed, brown bullhead, and perch are found in the reservoir. ODFW annually adds legal sized rainbow trout as well. There is a concrete boat launch, and facilities for tent camping and RV hookups are nearby.

Crayfish Homework; Exam is Optional

Before embarking on shoreline excursions this spring, take a moment to review the wonderful poster displaying Oregon crayfish at the ODFW website, www.dfw.state.or.us. From the home page, navigate to Wildlife Viewing, Wildlife Species, Invasive Species, Crayfish, and then to the factsheet. There are principally, just one native and three introduced species recognized in Oregon and the color poster points out the field marks that distinguish each from the others in this limited selection. Remember that a positive identification can also be made by the absence of field identifiers, by ruling out one or more candidates.

Lake Wise reviewed the Oregon crayfishes in the April 2009 issue. The ODFW continues to be interested in hearing about sightings of the non-native species to better understand the range they have established.

Just 5 Weeks Remain Before the National Monitoring Conference in Portland

The National Water Quality Monitoring Conference, which will be at the Portland Convention Center on April 30 to May 4, will present quite a contrast to the low key OLA Conferences. Rather than the single series of presentations on a Saturday, which is the chief attraction at an OLA Conference, the 8th National Monitoring Conference boasts 9 concurrent, full day sessions from Tuesday to Friday, and a choice of field trips to Hood River, the Oregon coast, Bull Run, or Willamette wineries on Monday. There will be numerous poster summaries to review and even more exhibitors eager to explain how their technology can assist with your water monitoring concerns. The scheduled luncheons and breaks are meant to aid your nutrition and encourage informal exchanges between attendees. An optional excursion to view Portland's strategy for storm runoff has been scheduled for Tuesday afternoon, and on Wednesday afternoon there is an opportunity to visit the Advanced Wastewater Treatment Plant in Durham, where Crystal Green phosphate fertilizer is being produced by the Ostara Nutrient Recovery process (see August 2009 *Lake Wise*).

The complete agenda and registration information are available on the NALMS website, www.nalms.org. Full registration is $475 for the 5 day meeting. Single day registration is $310, and prices increase after April 20th. As described in the December 2011 issue of *Lake Wise*, the National Water Quality Monitoring Council was formed in 1997 to address the USGS and the US EPA's common interests about water quality monitoring. The selection of Portland for their annual conference allows OLA members to attend a national meeting without the expense of distant travel. These minimal travel costs for Oregon attendees makes it likely that more local lake enthusiasts will be present than there would be at distant meetings. Registrations have already exceeded 800. Do consider joining us there.

Lake Selection Underway for this Summer's NLA Survey

It is always easier the second time. ODEQ staff is gearing up for their second summer of lake sampling at 29 or more sites around Oregon as part of the US EPA National Lakes Assessment. The first of these surveys was performed in 2007 and visited 30 named lakes, reservoirs, or ponds. The top candidates for the 2012 survey need not have a name, but must still be non-saline and at least 1 m deep. The minimum surface area for the 2012 survey lakes is 2.5 acres (1 hectare), which is a change from the 10 acre requirement for 2007. There are

other considerations too, such as permission to access the lake if it is privately owned. The lakes chosen for the survey will be the first 29 locations that meet the selection criteria on a randomly ordered master list of Oregon water bodies. The selection process is expected to be completed by the end of April.

The 13 lakes topping the list are almost certain to be selected as they are among the lakes sampled in the 2007 survey. These lakes anticipating a re-visit are Mann Lake, Moon Reservoir, Sparks Lake, Fern Ridge Lake, Phillips Lake, Smith Reservoir, Lake Edna, Junipers Reservoir, Waldo Lake, Cooper Creek Reservoir, Baca Lake, Beulah Reservoir, and Emigrant Lake. Mann Lake will be one of the two Oregon sites to be examined twice this summer. The next 16 listed lakes are likely to meet sampling criteria, although one has already been rejected. The list has 124 entries so it is far more than ample to make up for other rejections or for an ODEQ decision to sample additional lakes. Sampling more than the 29 site allotment approved for Oregon in this national survey would improve the statistical relevance on the state level, but at an estimated sampling and analyses cost of $8000 per lake, this decision will be given careful consideration.

The sampling protocols for this summer have not yet been finalized, but little change from 2007 is expected (see *Lake Wise*, June 2007). Grading the ten perimeter sites for physical habitat will be more detailed at half of the sites, and will likely include more guidance on how to compensate for drawdown. Samples will be collected at the index site and the final physical habitat site this year for chlorophyll α, algal toxins, and phytoplankton. The fecal indicator sample from the final physical habitat site will be analyzed for *E. coli* this year rather than *Enterococci* sp. This bacteriological test may be dropped altogether because of sampling difficulties and quality control questions that arose from the 2007 data.

A primary objective of the National Lakes Assessment is to provide a robust, statistically valid set of lake data for better management. The 2012 survey will visit 904 randomly selected sites in the contiguous 48 states, and revisit 96 of them to produce a dataset of 1000 lake profiles. This substantial sample size is a key factor in assuring the validity of the national survey. The 1028 profiles from 2007 were grouped into subsets of lakes or reservoirs and then further broken down by the nine categories at the Level III Ecoregions found in the 48 states. Doing the math demonstrates that 514 lakes or reservoirs produce optimal groups of 57 similar profiles for comparison among the nine ecoregions. Of these nine ecoregions, only Western Mountain and Xeric areas are found in Oregon. The 2007 survey then compared 13 Western Mountain lakes, 12 Western Mountain reservoirs, 3 Xeric reservoirs, and 2 Xeric lakes from the 30 Oregon samples. The Oregon sample set was too small or too skewed to provide a meaningful comparison of the Xeric water bodies at the state level, but was an important part of the national evaluation of Xeric lakes and reservoirs..

While the NLA objective to provide a statistically valid dataset for lakes may suffer at the state level, the states do gain from these recurrent surveys. The national objectives to promote collaboration across jurisdictional boundaries, build capacity for sampling and analyses, and develop baseline information are all fully achieved at the state level. The 2007 survey made public the lake profiles of 11 water bodies not included in Oregon's primary source of lake information, the *Atlas of Oregon Lakes*. These data, for Baca Lake, Clear Creek Reservoir, Ice Lake, Junipers Reservoir, Lake Edna, Lucky Reservoir, Moon Reservoir, Officers Reservoir, Piute Lake, Powers Pond, and Van Patten Lake are now displayed along with a growing number of other lakes on the on-line *AOL* at http://aol.research.pdx.edu. Just one of the remaining 15 lakes on the second tier of the master list is already displayed on the on-line *AOL*, so the 2012 NLA will also make a robust contribution to the baseline information of Oregon lakes.

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The Oregon Lakes Association
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OLA Mission: The Oregon Lakes Association, a non-profit organization founded in 1990, promotes understanding, protection, and thoughtful management of lake and watershed ecosystems in Oregon. For additional information on OLA, write to the address above, or visit our website.

OLA welcomes submissions of material that furthers our goals of education and thoughtful lake management in Oregon, and is grateful for the corporate support that helps sustain the organization. Corporate members are offered a one-time opportunity to describe their product or service to Lake Wise readers. These descriptions are not endorsements, and opinions appearing in Lake Wise are not OLA policy statements.

Visit our website: www.oregonlakes.org

Harmful Algae Bloom Workshop at OSU on April 9th

Almost anyone who regularly works at the water's edge could benefit from this workshop on harmful algae blooms. The agenda ranges from basic information about blue-green algae, or cyanobacteria, and the toxins they can produce, to the identification of the common species. Monitoring for HAB will receive special emphasis and changes to HAB advisory protocols will be discussed. The workshop is scheduled for Monday, April 9th, from 9:30 AM to 3:00 PM, at Nash Hall on the OSU campus in Corvallis.

The workshop is being sponsored by the Oregon Health Authority, the US Forest Service, and the US Army Corps of Engineers. The Oregon Health Authority is looking out for the health of Oregonians. As managers of many Oregon lakes and reservoirs, the US Forest Service and US Army Corps of Engineers want to increase public knowledge and awareness of HABs. And OLA benefits when understanding of lake processes increases the public's appreciation of lakes.

There is no fee for the workshop, however seating is limited and so it is essential that participants pre-register by e-mailing an RSVP to ajohnson@fs.fed.us. Confirmations will be sent to acknowledge completed registrations. Additional details of the workshop are prominently displayed on the OLA website, www.oregonlakes.org.