LAKE WISE

... a voice for quiet waters

NEWSLETTER FROM OREGON LAKES ASSOCIATION

SEPTEMBER 2021

Connie Bozarth, Newsletter Manager

IN THIS ISSUE

Fall 2021 OLA Conference Sessions

Annual Conference of the Oregon Lakes Association
Reserve 2:30–5:00 pm Wed, Nov 3 & Nov 10
3:00-5:00 pm Wed, Dec 1
From the comfort of your home - with COVID-19 still active, we will offer remote Zoom conference sessions

Continuing high levels of coronavirus circulation make it prudent to hold remote virtual conference sessions again for 2021. Like last year, we will hold late afternoon sessions on separate Wednesdays.

See the full programs below. ***Included in our fall talks will be presentations by recipients of this year's and last year's OLA scholarships, Jamila Baig and Lindsay Collart***. At the start of the November 10 session, we will conduct OLA business (30 minutes), including presentation of OLA's financial status, summary of the last year's activities, thanking outgoing board members and electing a new slate of board members and officers.

To register for Zoom access to these conference sessions, visit the **OLA website**. Access is free for OLA members, donations to the **Scholarship and Outreach Fund** **gladly accepted!** Access is $20 for non-members (or **JOIN UP!** Individual membership costs $35).

Fall Conference Sessions Programs

Abstracts will be available at OLA website

Wednesday, November 3, 2:30-5:00 pm

CyanoHAB monitoring and detection, chaired by ***Dan Sobota***

- Modeling Cyanotoxin Production, Fate and Transport in Surface Waterbodies: ***Bernadel Garstecki***
- Use of peroxyacetic acid (PAA)/hydrogen peroxide in freshwater cyanobacterial control – case study of lab scale trials and treatments in relation to use in field sites: ***Tom Warmuth***
- Proof of concept: use of volatile organic compounds to predict toxic HAB trajectories and species composition in Upper Klamath watershed, OR: ***Lindsay Collart (2020 OLA Scholarship recipient)***
- Detecting Algal Blooms in Small Reservoirs of N. California using Sentinel-2 Imagery: ***Chippie Kislik***
- Three years of comparing satellite imagery with field data on cyanobacteria blooms in lakes and reservoirs of the Upper Deschutes River Basin: ***Daniel J. Sobota***
- Utilizing CyAN for improved detection of harmful algal blooms: ***Alyssa Payne***
- Satellites predict lakes at risk from cyanobacteria and microcystin toxins: ***Amalia Handler***

Wednesday, November 10, 2:30-5:00 pm

2:30-3:00 OLA Annual business meeting

3:00-5:00 Lake physiology and management, chaired by ***Desiree Tullos***

- Toxic *Dolichospermum* cyanobacteria in Oregon lakes: ***Theo Dreher***
- Natural and anthropogenic controls on lake water-level decline and evaporation-to-inflow ratio in the conterminous US: ***Emi Fergus***
- Evaluation of mixing mechanisms in the control of cyanobacterial blooms: ***Desiree Tullos***
- Water Quality Modeling in Lakes and Reservoirs: How Good Should Your Model Be? ***Scott Wells***
- Online Boater Led Check-In/Check-Out Alternative to In-Person Inspections: A COVID-19 Response Pilot: ***Edgar Rudberg***

Wednesday, December 1, 3:00-5:00 pm

Our beautiful lakes: past and present, chaired by ***Ron Larson***

- A multiproxy approach to reconstruct paleotemperature, vegetation change, fire history, and lake productivity in the Pacific Northwest, Gold Lake, Willamette National Forest, OR: ***Jamila Baig (2021 OLA Scholarship recipient)***
- A progression of understanding of turbid, shallow Malheur Lake: Restoration implications: ***Casie Smith***
- Effects of climate change on Lake Abert: Initial results based primarily on ground-acquired data: ***Ron Larson***
- Effects of climate change on Great Basin playa lakes in Oregon: Initial results using mostly satellite data: ***Dorothy Hall***
- We just bought a lake. Now what? ***Judy Sims***

Removing the compost heaps:

Anticipating the effects of dam and lake removal on the Klamath River

Contributed by Desiree Tullos, Department of Biological & Ecological Engineering, OSU
and OLA Board of Directors

Four dams on the Klamath River are scheduled for removal starting in January 2023, resulting in the drawdown and removal of four lakes in Oregon and California: JC Boyle, Copco #1, Copco #2 and Iron Gate. The removal of the hydroelectric projects is motivated by restoration of fish passage, reduction in fish disease, addressing historical offenses against local tribes, improving water quality, and reducing the severity and duration of harmful algal blooms that occur in the impounded reservoirs. The reservoirs seasonally store and release nitrogen and phosphorus, though nitrogen retention is substantially higher than phosphorus storage. In part a result of these changes to the Klamath River water quality, the food web within the reservoirs and downstream of dams has changed. Summer phytoplankton within the lakes and reservoirs of the upper basin (Upper Klamath Lake, Keno) are dominated by *Aphanizomenon (AFA)*, whereas the reservoirs throughout the project reach (JC Boyle, Copco, and Iron Gate) are dominated more by diatoms and *Microcystis*. Farther downstream, studies indicate that the food web in the lower river is dominated by N-fixing periphyton (Asarian et al. 2014), likely a reflection of the reduced nutrient load. In addition, benthic worms in the river, which host the salmon pathogen *Ceratomyxa shasta,* are fed by the plankton and nutrient-rich sediments in the reservoirs.

Figure 1. Plankton net tows at Iron Gate Dam

Removing the nutrient traps from the river is expected to produce substantial changes to the water quality and food web. Over the short term, a pulse release of N is expected as organic material stored in the reservoirs is released. Over the longer term, N delivery to the lower river is expected to also be elevated due to the removal of the N traps in the reservoirs. While a forebay curtain at Iron Gate minimizes the downstream transport of plankton from the project reach, the complete removal of the lentic limnology from the project reach is expected to restore the water quality, temperature, and food web to conditions that reflect more diatoms and other taxa that historically occurred in the river. The remaining upstream dams will continue to host significant populations of AFA, though their transport and survival in the river downstream is limited (Otten et al. 2015). Thus, the reservoir drawdown and elevated N concentrations post dam removal are expected to shift the dominant plankton and periphyton in the lower river, reducing the prevalence of *Microcystis* along the river margins due to the removal of the source populations at Copco and Iron Gate, and the transition away from periphyton that fix N in the lower river. Effects of the dam removals on disease dynamics due to *C. shasta* infections is nuanced and complex, with various impacts derived by changing food web, habitat, and flow regimes. A number of other changes in environmental conditions, including dissolved oxygen, temperature, flow rates, and other variables are also anticipated.

Whether the system responds as we expect it to or follows an unexpected trajectory will be informative, both for understanding recovery on the Klamath and the science of limnology and restoration more broadly. The Klamath dam removals represent an important and exciting opportunity to deepen understanding on the connections between reservoirs and rivers, water quality and food webs, and habitat and hydraulics. A diverse group of scientists, from the tribes, USGS, federal agencies, private consultants, universities, and other groups,

is working to track these changes and connections, building upon extensive existing datasets (see Klamath Basin Monitoring Program) and hard work in a challenging environment.

References

Asarian, J.E., Pan, Y., Gillett, N.D. and Kann, J., 2014. Spatial and Temporal Variation of Periphyton Assemblages in the Klamath River 2004-2012. *www.klamathwaterquality.com/documents/KlamPeriphyton_Phase1Final_20140623.pdf*

Otten, T.G., Crosswell, J.R., Mackey, S. and Dreher, T.W., 2015. Application of molecular tools for microbial source tracking and public health risk assessment of a Microcystis bloom traversing 300 km of the Klamath River. *Harmful Algae*, *46*, 71-81.

Figure 2. AFA abundant at Keno reservoir

Harmful Algae Blooms (HABS) Corner

Contributed by Theo Dreher, President, OLA, Professor Emeritus
of Microbiology, Oregon State University

Wildfires and CyanoHABs in Oregon

It is now a year since we saw catastrophic wildfires in the Cascade foothills and water catchments of reservoirs in the Clackamas, Santiam and Mackenzie Rivers. There has been widespread worry about nutrients released by the fires driving large CyanoHABs.

However, there have been few cyanotoxin advisories this season. Of note was a 77 µg/L microcystin reading in Upper Klamath Lake (UKL) at Eagle Ridge County Park on 26 July, which had declined to 2.8 µg/L by 9 August. However, microcystins were found at even higher levels (up to 910 µg/L) in late August and early September, and UKL now is under an expanded advisory.

Figure 1. A CyanoHAB in Ross Island Lagoon and the adjacent Holgate Channel of the Willamette River is visible in this 15 August, 2021 photo taken by the Sentinel 2

August also saw the typical summer CyanoHAB in Ross Island Lagoon flare up enough to wash material down the Willamette River past downtown Portland. In late August, OHA issued an advisory for the lagoon and part of the Willamette River.

Reports indicate that CyanoHAB events have been relatively mild in other parts of Oregon, perhaps mostly as a consequence of low stream-flows associated with the drought. While this circumstance can lead to warmer waters and longer retention times in pools and reservoirs, both of which would favor CyanoHABs, it also delivers fewer nutrients into the reservoirs where we commonly see HABs. And some of these reservoirs have been drawn down to quite low levels, which may have allowed many of the nutrients present to pass downriver rather than reside in the reservoirs to support CyanoHAB growth. The drought conditions that have suppressed stream-flows are also suppressing regrowth in burned areas, so nutrients will presumably remain mobile for an extended period, and they will find their way into reservoirs when rains resume.

The *Microcystis* HAB in Upper Klamath Lake responsible for producing microcystin has made a quite early appearance this year, perhaps more in line with predictions in a year with low inflows and warmer waters; high microcystin levels were seen already in late July, while in 2020, high microcystin levels did not appear until late September.

Thanks to Dave Donahue (EWEB) and Kevin Bladon (OSU-Forestry) for observations on the 2021 CyanoHABs season.

Newly released CyANWEB app

The US-EPA recently released CyANWEB, an app for tracking cyanobacterial HABs. This is an expansion of an app previously only available on Android systems to one that can be used with the browser on any system. Data collected by European Space Agency Sentinel satellites measuring chlorophyll-a and phycocyanin pigments present in lakes with at least 300 meters of open water are processed to generate an estimate of cyanobacterial cell numbers. These results can be recovered by clicking on a lake in the map-based app, and

trends over time can be graphed. It is anticipated that the most common use will be to monitor increases in predicted cell counts so that when a threshold is reached, a visit to the site for physical sampling can be scheduled. This should make field sampling, which can be costly and time-consuming, more efficient. It should be understood that CyANWEB cell estimates come with some error and that this system does not distinguish between toxic and non-toxic cyanobacteria. Check out CyANWEB *The satellite technology underlying the app is a major theme of the OLA conference session on November 3 (see program earlier in newsletter).*

Action in the 2021 Oregon Legislative session

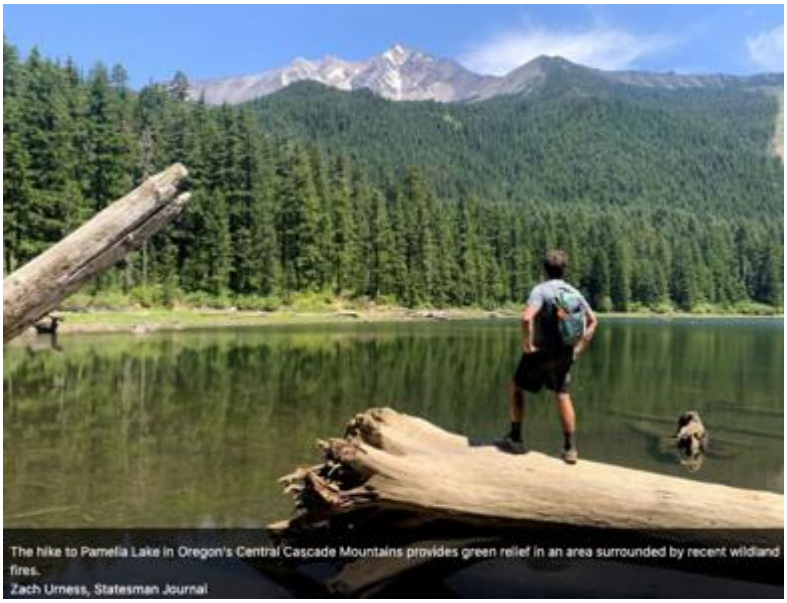
The 2021 session wound up with much legislative action completed, including $530M — yes, half a billion dollars — dedicated to various uses associated with water. While a considerable amount is for infrastructure engineering connected to drinking water and wastewater treatment, there are sizable allocations for addressing issues surrounding water conservation, aquatic natural resources and water quality. This includes funding for several positions at OR Water Resources Department, which will hopefully increase the department's capacity for measuring water availability and usage, something that is becoming increasingly critical to the survival of lakes like Lake Abert as Oregon becomes drier.

With regard to CyanoHABs, HB3093, which would have filled gaps to build a comprehensive CyanoHABs program in Oregon was not funded, but there were some specific actions to provide funds for CyanoHAB work. SB5516 and HB5042 included funding for two new permanent positions for DEQ; funding for a second cyanotoxin ELISA analyzer to ensure DEQ has the capacity to cope with surges in drinking water samples requiring rapid turn-around cyanotoxin assays; and funding to DEQ for a nutrient analyzer to be used in tracking nutrient sources that, amongst other effects, drive CyanoHAB development.

Oregon Lakes in the News

Contributed by Connie Bozarth, Newsletter Manager

First the good news, take a hike!


The hike to Pamelia Lake in Oregon's Central Cascade Mountains provides green relief in an area surrounded by recent wildland fires.
Zach Urness, Statesman Journal

Although the Jefferson Wilderness has been hard hit by fires in recent years, the hike into Pamelia Lake allows you to enjoy an unburned route through an old growth forest with an alpine lake and a mountain peak at the end! Click the picture for article.

Check for trail conditions and obtain a permit before heading out.

Portlanders warned to stay out of the Willamette River

The Ross Island Lagoon and Holgate Channel are under a recreational health advisory due to high levels of microcystin. The Human Access Project has been working since 2015 to reduce the formation of HABS in the river, but climate change is threatening those efforts. Click photo for the article.


An aerial view on Aug. 19, 2021, of algal blooms in the Ross Island Lagoon, to the right of the Willamette River's mainstem.
Brandon Swanson / OPB

On the other side of the Columbia River…

Officials warn of toxic algae blooms on Southwest Washington lakes

Vancouver Lake had microcystin levels about the state guidelines on the two most recent testing dates, really bad news for such an urban lake. For more information about HABS in Washington, check out the [Washington State Toxic Algae Freshwater monitoring website]

OLA BOARD OF DIRECTORS

The Oregon Lakes Association Mission

OLA, a non-profit organization founded in 1990, promotes understanding, protection and thoughtful management of lake and watershed ecosystems in Oregon. Serving entirely through volunteer efforts, the Oregon Lakes Association puts on an annual conference, publishes a tri-annual newsletter, sponsors Harmful Algal Bloom trainings, and works as an advocate for lakes in the legislative arena. For additional information on OLA, write to the address above, or visit our website

OLA and *Lake Wise* welcome submissions of materials that further our goals of education and thoughtful lake management in Oregon. OLA is grateful for corporate support that helps sustain the organization. Corporate members are offered the opportunity to describe their products and services to *Lake Wise* readers. These descriptions are not OLA endorsements and opinions appearing in *Lake Wise* are not OLA policy statements.

Lake Wise
Oregon Lakes Association
P.O. Box 345
Portland, OR 97207-0345