June 2007

Editor: Roger Edwards

LAKE WISE

A Voice for Quiet Waters

The Oregon Lakes Association Newsletter

Zebra Mussels Visit Oregon, But They Don't Stay

The discovery of quagga mussels last January in Nevada has produced serious discussions about these pests throughout all the western states. Oregon's vulnerability to a zebra mussel infestation was demonstrated on May 7th when an ODFW biologist in Medford spotted a truck from Missouri towing a houseboat on I-5. Lacking probable cause to inspect the craft, it was allowed to proceed to Vancouver, Washington, where it was stopped under authority of the Washington DFW and found to have adult zebra mussels attached. They were dead, likely as a result of the drying they experienced during their journey, but moist areas within the craft may have protected other mussels that had attached to the boat. These areas were flushed with disinfectant and the houseboat continued on its way to Spirit Lake in British Columbia, where it joins two other houseboats that have been recently delivered there.

The incident points out numerous things that might be done better to halt the spread of zebra mussels and other organisms that create problems when moved beyond their natural range. Locations known to harbor such a plant or animal should make facilities available that would minimize their transport elsewhere. Thorough cleaning at these sites is easier because less effort is required to decontaminate wash water. Washing unwanted pests back into a lake where they are already established does not make the infestation worse. Washing at the exit ramp also maximizes the benefit gained by desiccating remaing pests during the drive home. Waiting until arrival back home or at the next lake before washing the boat, trailer, anchor rope, fishing equipment, sampling gear, and other objects that can get wet on an outing means that care must be taken that wash water does not get into live streams or pools, either directly or via a storm drain or drainage ditch.

Suitable disinfection methods can vary somewhat with the organism of concern, but more of the agent being used, applied for a longer period, is generally more effective. If dirt or plant fragments can still be found after washing, especially in the tiny parts that are certain to be exposed, then additional attention is warranted. What kills unwanted pests however is seldom good for other small creatures that have not raised our ire. Some of the available agents can be harmful to the objects being scrubbed too. So some care is needed in this quest to keep Oregon lakes and reservoirs as we have come to appreciate them. As a new concern, methods and facilities are sure to improve as more experience is gained with this problem. Read on for a current status report.

Boaters Asked to 'Never Launch a Dirty Boat'

By Randy Henry, Policy & Planning Coordinator, Oregon State Marine Board

Diamond Lake has the unfortunate reputation now as Oregon's biggest invasive species restoration project – twice. It's not that other water bodies don't have problems with invasive species, it's just that we all know how good Diamond Lake can be, and we've come together twice in the last 100 years to return it to the lake we love.

In the past, it's been all about tui chub, a perfectly nice little fish native to Oregon, but one that just doesn't play fair when introduced into a lake like Diamond. Past efforts have focused on preventing another introduction of chub to the lake, and it worked for 40 years. The "no live fish for bait" law was a direct result of the first Diamond Lake restoration in 1954.

But since the chub found their way back to the lake in 1992 or so, many things have changed. Tui chub are still the most prominent threat to Diamond Lake, but now there are others, and they're slowly creeping towards Oregon and our many treasured water bodies. Quagga mussels are now in Nevada, zebra mussels have been found on boats traveling through Oregon, and hydrilla is present in California and Washington. The only way to stop their introduction is to become active observers and participants in the future of our lakes. Knowledge is key.

The Oregon State Marine Board manages recreational boating in the state. Invasive species cross agency lines – they rarely attend Board meetings and never read the regulations. These critters cause lots of problems for the fish and wildlife, but they often arrive via recreational boats. That's why the Marine Board is actively reaching out to boaters – explaining how best to clean their boat between uses, which species may end up on or in their boat, and what they should do to prevent their spread. We're also training marine officers in enforcement strategies, and we're working closely with ODFW and Portland State University to train people to recognize invasive species threats, inspect watercraft, and sterilize boats.

All boaters must make sure they don't launch a boat that's been exposed to waters infested with any invasive species – at least not before sterilizing the watercraft and related equipment. I spent opening day at Diamond Lake this year and surveyed a number of boaters who were launching boats. I asked questions about where they had boated recently, if they were familiar with invasive species, and if they had any live fish aboard. While asking questions, I was looking at the hull, the trailer, the motor, and inside the boat for any signs of live fish, weeds, mud, or other signs of potential aquatic invasive species. All boaters I talked to were happy that we were looking, and all the boats were clean. It bodes well for Diamond Lake, but we must be vigilant here and at any other lake in the state. As noted, it's not just about tui chub, but quagga and zebra mussels, New Zealand mud snails, hydrilla, any live fish whether native or not, and even species native to the state but perhaps not the basin where the boat is being launched.

Here is what the Marine Board recommends to help prevent the spread of invasive species in Oregon.

- ✓ Keep a clean boat: After boating in any water body – especially in Nevada, Arizona, Utah or any state east of the Rocky Mountains, clean your boat and gear thoroughly.
- ✓ All equipment such as dive gear, boats, trailers and motors should be inspected by sight and by feel for the presence of aquatic species like zebra mussels prior to and after use in any

water body. Additionally, any vegetation attached to this equipment must be removed and left at the site of origin or discarded in a waste can.

- ✓ Drain and flush your bilge, live well, bait buckets, and any other compartments that hold standing water. If you recently boated in infested waters, flush areas of standing water with hot water (140° F) or a solution of 1 cup bleach to a gallon of water. Do this away from any water body or slope above a water body, and don't let the run-off flow into ditches or storm drains where they can end up in local water bodies.
- ✓ Clean and scrub boat hulls, motors, anchors, and trailers, then hose equipment with hot (140° F) and/or high-pressure water.
- ✓ After a thorough washing, all boat equipment should be allowed to remain completely dry for at least 24 hours before being used again. If a thorough washing isn't possible, clean as best you can and allow boat to air dry for at least five days with all compartments open.
- ✓ Some species are harder to kill than others. For more sterilization techniques, check www.protectyourwaters.net.

Quagga and zebra mussels can live in a dark, damp compartment for up to 27 days. New Zealand mud snails can survive in a moist clump of mud on your anchor or boots for many days, too. As you can see, keeping your boat and gear clean will prevent the spread of numerous invasive species. Many of Oregon's most famous fishing waters suffer from aquatic invasive species. Just dumping one bait bucket, flushing your bilge, or allowing species attached to your hull or trailer into the water can destroy a fishery, create tremendous health and environmental problems, and cost millions of dollars to treat or even control.

In a nutshell, never launch a dirty boat. It's really that easy.

Let's Go To Clear Lake This Weekend

There are eleven Clear Lakes in Oregon. One of these is a 148 acre, lava dam lake in southeast Linn County that is the source of the McKenzie River. It is the same Clear Lake that was featured in the March 2007 issue of *Lake Wise*. Its spring-fed, ultraoligotrophic waters continue to provide good fishing, hiking trails, well appreciated scuba excursions, and serenity for visitors stopping by from nearby Oregon Hwy 126. The Santiam Fish and Game Association built, ran, and maintained the visitor accommodations on Clear Lake for over 80 years. This Spring the Association decided to disband after recognizing that they could no longer fulfill their caretaker duties. Their assets were sold to Linn County Park Department for $100,000, which will be donated to the Department of Fish and Wildlife at Oregon State University. Linn County intends to preserve the rustic character of their new facilities, which have no land line telephone connections. Electricity is generated on-site and the domestic water supply is also locally produced. There is a fleet of rental boats and boat ramps, but motors are not allowed on the lake.

The attractive descriptions about this particular lake in the news coincided with this newsletter editor's interest in water monitoring methods. A hastily organized trip provided a chance to experiment with a variation of macroinvertebrate sampling and the use of tube samplers in a very pleasant setting. Macroinvertebrates are the animals without backbones that are visible with the naked eye. Worms and crawfish both fit in this category, but aquatic insect larvae are the dominant organisms found in these surveys. Watch reports coming from Diamond Lake to see the value of checking these populations. The methodology for this test is best for flowing water. A net with a suitable mesh is placed in the streambed and a defined area immediately upstream is

disturbed to send macroinvertebrates there into the net. They are dislodged from the net into a pan of clean water and everything that wiggles is captured and categorized. Defining and capturing the organisms within a specific sample area in lakes with this procedure becomes easier with the use of a readily found 5 gallon plastic bucket, which has had its bottom removed. The bottomless bucket is pushed into the lake shallows, the lake bottom there is disturbed, and the water above is scooped out and poured through a strainer. The captured material is dislodged into a pan of clean water and the wiggler search begins. Plastic 5 gallon buckets have a bottom diameter of 10 inches and so they define an area of 78 square inches or just >0.5 square feet.

The chief attraction of tube samplers is their cost. Plastic tubing of a variety of diameters and wall thickness are readily available at pennies per foot. Hand operated boat pumps cost between $30-40, but this investment for a depth sampler is still modest. Tube sampler users must do arithmetic homework before their expedition. A plastic tube with 13 mm (0.5 inch) internal diameter 30 meters long can hold about 4 L of water. This volume must be expelled each time the tube inlet is moved to a different depth. Measuring the volume pumped on each hand stroke of the pump produces an estimate of how many hand strokes are needed to flush the sampler.

My expedition set out to collect a zooplankton sample and perform a temperature profile. The weighted tube was disconnected from the hand pump and slowly lowered to a depth of 10 m. The pump was reattached and a set number of hand strokes pumped the submerged tube volume and enough more to ensure the sampler was filled with water from 10 m deep. The sampler was raised 1 m and the sequence was repeated there and at 1 m increments up to the water surface. The sampler was drained after reaching the lake surface. All the pumped water was fed into a Cuisinart coffee filter, which has a metal mesh of about 300 μm. Zooplankton nets typically are in the range of 60-250 μm, but the exercise did capture what was likely the battered bodies of harpacticoid copepods. Tube samplers then do show promise as substitutes for zooplankton nets, but peristaltic pumps are contraindicated. The temperature of the water pumped at each increment showed a range of 9-6°C with no stratification. The Secchi depth was 12 m, proving Clear Lake is indeed deserving of its name.

Our Man in Chicago

Report from the 20th Annual National Conference on
Enhancing the States' Lake Management Programs
By Joe Eilers, MaxDepth Aquatics, Inc., Bend OR 97701

The 20th Annual States Lakes Meeting, held in Chicago in April was titled, "Interpreting Lake Quality Data for Diverse Audiences." The meeting was devoted largely to the upcoming EPA national lake survey, including its design, implementation by the states, sampling protocols, and methods of data analysis and interpretation. Most of the participants (including me) were generally favorably impressed with much of the work that is being done with this survey and the opportunity to address lakes in a national framework. However, there were a number of fairly intense discussions on particular topics. Perhaps the one that generated the most discussion was the concept of how representative the survey would be both temporally (sampling from May-Sept) and spatially (especially with the variability associated with reservoirs). Some of the concerns expressed will be dealt with by re-sampling 10% of the sample lakes at various times throughout the "summer". However, no resolution was forthcoming on the spatial variations within lakes. I suspect that some of the states will have additional data on some of these reservoirs that may allow someone to analyze this source of variation after-the-fact. The EPA design only allocated about 30 lakes per state, but many states were adding in their own resources to bring the state sample up to 50 sites so that they could produce population estimates for their state.

Another general area of discussion pertained to indices. EPA anticipates that they will make extensive use of existing or custom indices to express the results of the survey. This is especially the case for biological results. It was unclear it these indices would be multivariate output from aggregates of taxonomical summaries or whether they would be generated from raw data. Regardless, I expect that the report from this project will make more use of biological metrics of water quality than historically has been the case with EPA.

Although the sampling will begin shortly, there were still some field and laboratory issues that had not yet been resolved. This included uncertainty regarding whether sediment cores would be collected and how the taxonomy would be handled for some groups. Most of the taxonomy work (phytoplankton, zooplankton, benthos) was going to be contracted out -- but again, those RFPs had not even been issued. Here's a link to the EPA lake survey (http://www.epa.gov/owow/lakes/lakessurvey/).

In regard to NALMS news, the former state chapters are now considered affiliates. The affiliates are trying to re-define themselves and I think will emerge with a clearer focus and a greater influence on the NALMS as a whole. As I understand it, the affiliates will organize as a committee under NALMS and will have a voting member on the NALMS Board. This individual will be able to better articulate the needs of the affiliates and bring these issues to the attention of the Board. I view this as a healthy change for the chapters.

The NALMS organization appears to be making terrific strides along a number of fronts. The current president, Ken Wagner, is devoting a lot of energy in getting the organization to a new level. One of the developing areas, is the decision by the Board to hire a new executive director. NALMS now has substantial reserves in the bank and they are once again generating revenue with their conferences. The 2007 conference is at Disneyworld in Orlando and the 2008 meeting at Lake Louise are both excellent venues. There is also a marketing campaign to bring in new membership. It would be terrific if additional members of OLA would consider joining the parent organization. Thanks for the opportunity to represent Oregon and OLA at this meeting.

Protocols Are Set For National Lake Survey

Among the many provisions of the Clean Water Act, passed by Congress in 1982 and renewed in 2002, was the directive to conduct research on ways to reduce pollution in the nation's coastal waters, lakes, wadeable streams, rivers, and wetlands. The Lake Survey now under way is a piece of the US EPA response to this directive. The National Fish Tissue Residue Study, featured in the March 2006 issue of *Lake Wise*, is another piece of the response to the CWA. There will be additional studies focusing on the other water body types mentioned in the Act as well. Wadeable streams were the first in this series to be surveyed because there is more experience in the monitoring methodology for these water bodies. The completed report for this survey is expected in 2007.

Planning for the Lake Survey began in earnest at last year's Chicago Lake Conference. The study was designed to:

Determine regional and national trophic status, ecological integrity, and recreational value of lakes;
Promote collaboration across jurisdictional boundaries;
Build state and tribal capacity for monitoring and analyses;

Achieve robust, statistically valid set of lake data for better management;
Develop baseline information to evaluate progress.

The outcome of the study will estimate the percentage of the nation's lakes that are in good, fair, and poor condition for key indicators of trophic state, ecological health, and recreation potential. While individual lakes will be examined, the purpose of the study is to gain a national overview of lake condition. The study will also look at the relative importance of the key stressors that affect lake conditions. By considering what knowledge is gained for each lake characteristic examined, this aspect of the study may provide useful insight on lake characterization strategies.

A lake's trophic state will be determined by analysis of temperature, dissolved oxygen, and pH profiles; water chemistry, chlorophyll α, Secchi depth, turbidity, color, and total suspended solids. An estimation of a lake's ecological integrity will come from sample results for sediment diatoms, phytoplankton, zooplankton, littoral macroinvertebrates, and observation of the physical habitat condition of the shoreline. The indicators of recreation potential are concentrations of enterococci bacteria, microcystin toxins, and sediment mercury. The data from these analyses will be ranked numerically to determine the criteria for good, fair, and poor lake conditions.

For most of the lakes selected for this survey, sample collection should require no more than one day for a pair of samplers. Their day begins with one sampler organizing the forms, equipment, and needed supplies while the other sampler calibrates the data sonde. When all is ready they cast off and anchor at the deepest point of lakes with maximum depths ≤ 50 meters, or at the middle of deeper lakes. Sampler one measures the Secchi depth and collects water for phytoplankton, chlorophyll α and algal toxins, and water chemistry in the lake's top 2 meters while sampler two conducts the temperature, DO, and pH profiles, and collects vertical zooplankton samples with 80 and 243μm zooplankton nets. They work together to obtain a core sample for mercury and diatom analysis, and then begin the shoreline physical habitat survey. These are performed at ten equidistant intervals around those lakes with a surface area less than 5000 hectares. The boat is anchored 10 meters offshore and sampler one notes the plant communities and shoreline characteristics in an area 15 meters wide and 25 meters inland from the boat. Sampler two collects a macroinvertebrate sample with a 1 meter sweep of the lake shallows and bottom using a 500 μm net. At the last of the physical habitat sites the macroinvertebrate samples are composited and the enterococci sample is collected. Back at the dock they preserve, filter, freeze, and otherwise process the samples as prescribed. The water chemistry, chlorophyll α, and mercury samples are mailed to analytical labs as soon as possible. The equipment, boat, motor, and trailer are cleaned and the forms are reviewed before they contact their dispatcher to report on their day's work.

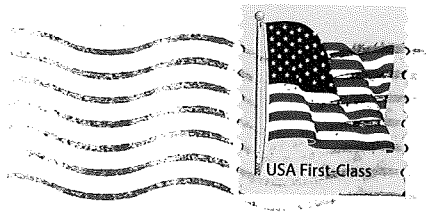
There are 909 lakes, reservoirs, and ponds in the conterminous 48 states that have been selected for this survey. They were randomly selected from the National Hydrological Database of 123,439 named, freshwater water bodies, which excludes the Great Lakes. To provide a comparison to the data from the National Lake Eutrophication Study conducted in 1972-76, 113 of the lakes selected were also sampled in this previous study. To provide a measure of the temporal changes that occur in a lake during a year, 91 of the selected lakes will be resampled, which produces a dataset of 1000 discrete samples. The lakes selected are contained within nine of the 182, Level 3 Ecoregions of North America. All are ≥ 10 acres of surface area and ≥ 1 meter depth. The lakes have been ranked into five categories based on surface area: there are 104 lakes of 10-25 acres, 185 lakes of 25-50 acres, 184 lakes of 50-125 acres, 172 lakes of 125-250 acres, and 264 lakes >250 acres.

The median number of lakes selected within a state is 18, and the range of lakes/state is 4-41. There are 33 lakes in Oregon on this list, but only 30 must be sampled for the Survey. Two of the Oregon lakes will be sampled a second time. The candidates are listed below.

NAME	COUNTY	AREA	DESCRIPTION
Junipers Reservoir	Lake	146	Impoundment behind 25' dam on Muddy Ck, 3 mi S of Cottonwood Res.
Moon Reservoir	Harney	267	Irrigation reservoir behind 38' dam on Silver Ck, 7 mi SE of Riley OR.
Pelican Lake	Lake	227	Southernmost of Warner Lakes, 2 mi S of Crump L.
Powers Pond	Coos	17	Former mill pond by Coquille R in Powers OR.
Clear Lake	Wasco	351	Dammed lake used for irrigation, S of Blue Box Pass & W of Hwy 26.
Cooper Creek Reservoir	Douglas	131	Mult-use Soil Conservation Svc res beh 84' dam, 11 mi N of Roseburg OR.
Van Patten Lake	Baker	17	Natural lake with 14' dam, on NF Dutch Flat Ck, 1.5 mi E of Black L.
Clear Lake	Lane	151	Dunal lake used for water supply, 4 mi N of Florence OR.
Mann Lake	Harney	222	Playa lake with Lahontan trout & goldfish, 29 mi SE of Frenchglen OR.
Hosmer Lake	Deschutes	252	Weedy lava dam lake with planted Atlantic salmon, immed E of Elk L.
Smith Lake	Multnomah	630	Shallow lake immed E of Bybee L, and contiguous with it in high water.
Smith Reservoir	Linn	158	Hydropwr res on Smith R with diversion from McKenzie R, in se Linn Co.
Phillips Reservoir	Baker	2253	Bur of Reclamation res beh 167' dam on Powder R, 17 mi W of Baker City OR.
Beulah Reservoir	Malheur	1771	Bur of Reclamation res beh 110' dam on NF Malheur R, 12 mi N of Juntura OR.
Waldo Lake	Lane	6037	Ultraoligotrophic glacial lake at head of NF of MF Willamette R.
Lake of the Woods	Klamath	1178	On E slope of Brown Mtn, betw Ashland & Klamath Falls OR.
Ice Lake	Wallowa	59	Alpine lake at head of Adams Ck in WF Wallowa R subbasin, 1 mi N of Razz L.
Fern Ridge Lake	Lane	7978	USACE reservoir on Long Tom R, W of Eugene OR.
Lucky Reservoir	Lake	34	Res beh 20' dam on intermitt ck, 5 mi NW of May L & 8 mi SW of Pelican L.
Horsfall Lake	Coos	326	W arm of Horsfall/Spirit L continuum, separating only during dry conditions.
Baca Lake	Harney	674	Just east of Donner und Blitzen R, 7 mi NE of Frenchglen OR.
Torrey Lake	Lane	69	Among cluster of lakes, 2 mi N of Waldo L & just E of Whig L.
Big Lake	Linn	225	Ultraoligotrophic seepage lake to S of Hwy 20 in Santiam Pass.
Sparks Lake	Deschutes	82	Shallow lake with low dam to maintain summer pool, 4 mi NE of Hosmer L.
Hills Creek Lake	Lane	2623	USACE res beh 304' dam at jct of Hills Ck & MF Willamette R.
Emigrant Lake	Jackson	632	Eutrophic Bur of Reclamation res beh 204' dam, 5 mi SE of Ashland OR.
Piute Reservoir	Lake	67	Reservoir behind 40' dam on Piute Ck, 2 mi SW of Barry Res.
Lake Edna	Douglas	34	Restricted water supply dwnstrm & immed S of Clear L, 4 mi N of Lakeside OR.
Officer Reservoir	Grant	15	Res beh 34' dam on Utley Ck, near Harney Co line south of Izee OR.
Strawberry Lake	Grant	32	Landslide lake in glaciated valley, 10 mi S of John Day R & Prairie City OR.
South Twin Lake	Deschutes	101	Round, 0.5 mile diameter seepage lake of volcanic origin, adj to Wickiup Res.
Sturgeon Lake	Multnomah	76	Shallow lake with significant bird pop that dominates Sauvie Island.

Plan on Attending the OLA Diamond Lake Conference on September 21-22

It is June and Oregon lakes are getting warmer. Who knows how these quiet waters will fare over the Summer? OLA's Fall Conference is always a good opportunity to share your lake observations and listen to those of other attendees. It will be of interest to see how Diamond Lake has responded to last year's rotenone treatment, and Joe Eilers is among the speakers scheduled to address various aspects of this restoration project. Blocking the introduction and movement of invasive species in Oregon lakes has become still more urgent as zebra mussels are now at our borders. Randy Henry and others will speak at the Conference about these threats. Additional presentations will focus on other lakes and lake topics. The festivities begin with a discussion about the Association on Friday evening and continue with Saturday's agenda of talks, posters, breaks, and displays.



LAKE WISE
The Oregon Lakes Association
Newsletter 2007 #2

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OLA Mission: The Oregon Lakes Association, a non-profit organization founded in 1988, 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

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There is time to enjoy being away at the lake as well. It is a central location, lodging is available, and the cost is a bargain besides after last year's financial shot to/in the arm.

Updates on Waldo and Woahink Lakes

On April 16, 2007, Willamette National Forest Supervisor Dallas Emch signed the Decision Notice and Finding of No Significant Impact for the Environmental Assessment on Managing Recreational Use on Waldo Lake. The proposed, Alternative 4 was the one selected, but with the modification that the District Ranger of the Middle Fork Ranger District, rather than the Forest Supervisor, would be the approving official for administrative use of internal combustion boat motors, chain saws, and generators. The public use of these tools on the lake's waters and shores will be banned after a two year transition period. Float planes will also be denied use of the lake. The EA drew 310 comments during the 30 day response period. The better perspective and availability of the Middle Fork District Ranger were cited as the justification for the modification of the selected Alternative.

On March 8, 2007 the City Council of Dunes City OR adopted Ordinance 190, which limits the unnecessary inputs of phosphorus from fertilizer and cleaning agents into the lakes, streams, and ground water of the city. The increasing eutrophication and resultant algae blooms in Woahink Lake presents a serious concern to Dunes City because the lake is the domestic water supply for the city and home owners around the lake. The Ordinance is based on OSU Extension Service recommendations and is written to be educational as well as restrictive. Home owners may only use phosphorus containing fertilizer during the first year after seeding a new lawn, or if a soil test from an approved lab shows their soil is phosphorus deficient. The use of cleaning agents containing >0.5% phosphorus by weight are also prohibited. Area retailers will be notified of these prohibitions and encouraged to post a list of approved fertilizers and cleaning agents, which the City Council will maintain.