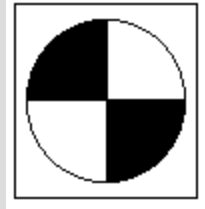


June 2009

Editor:
Roger Edwards

LAKE WISE

A Voice for Quiet Waters



The Oregon Lakes Association Newsletter

Fish Stocking Plan for Diamond Lake Under Review

There was still a level of uncertainty about how everything would turn out when the FEIS for the rotenone treatment at Diamond Lake was finalized in 2004. This uncertainty can be seen in the decision to delay planning for the fish restocking program until the lake had time to stabilize after the treatment. The time of this delay is now over and the Oregon Department of Fish and Wildlife has released their draft Diamond Lake Management Plan for review. The Plan was crafted in consideration of the environmental, biological, economic, and community values of the people of Oregon. Comments will be accepted through September 4th.

The draft Plan describes a return to the Basic Yield hatchery trout fishery, like that which was in place before the tui chub infestation became a problem, but with a few twists. Diamond Lake has recovered from the September 2006 treatment that killed an estimated 95 million chub, essentially repeating the course of events that occurred after a similar rotenone application in 1954. Recent stocking strategies have included legal and trophy fish to provide an immediate opportunity for fishing success, and to provide a piscivorous threat to chub or other unwanted fish species. Big fish are expensive however, due to the time and care they require to reach this size. Lake monitoring has shown the food web in the lake is again able to support stocking fingerling trout in the spring and letting them achieve legal size before trout season ends in the fall. Hold-overs will be available for anglers on Opening Day the next April. This Basic Yield program has served Diamond Lake and Douglas County very well for decades, and it is a relief to have evidence the formula should have continued success in the future.

The modifications to the established Basic Yield formula will delay the spring stocking of fingerling trout until mid June, and will continue adding large, piscivorous trout to the lake. Moving the fingerling stocking date back from late May reduces the time these small fish will feed on zooplankton, and reduces the time they might be devoured themselves by the hungry piscivores cruising about in the lake. The diet preference of fingerlings changes to benthic organisms as they grow so the lake's zooplankton benefit by the stocking delay. The zooplankton population includes filter feeders that ingest algal cells and so provide a check on algae densities getting out of control. Monitoring of the benthic community has shown that it can accommodate the pressure of stocking the lake with 300,000 to 400,000 fingerling trout.

The continuing need to keep predatory fish patrolling the lake looking for 3-5" prey became evident in July 2008 when golden shiners were discovered. By the end of the year, ODFW had trapped or electro-fished 639 shiners from the lake. These fish are not welcome in Diamond Lake. They are established in Howard Prairie Reservoir and Emigrant Lake, and were known to have been in the lake before the rotenone treatment. They are also sold as minnows for live bait in northern California, but the use of live bait is not legal in Oregon fresh waters. How they came to be in the lake is unknown, but this possible show of disrespect for Oregon

community values has led the North Umpqua River Foundation to post a standing reward for information leading to the conviction of anyone who unlawfully brings live fish to Diamond Lake. The Oregon Wildlife Heritage Foundation paid to have the Diamond Lake shiners analyzed to detect their origin. In addition to their fish stocking proposals, ODFW has made invasive species education, monitoring, and enforcement a high priority part of their Diamond Lake Management Plan.

Stimulus Money to Evaluate Grant County Reservoir

The ODFW completed construction of a 53' high, rock fill dam in the headwater region of Canyon Creek in October 1963. The impoundment was named Canyon Creek Meadows Reservoir and was intended to store 400 acre feet of water for recreation and fish culture. It is located on the southwest slope of Strawberry Mountain at an elevation of 5000', and is southeast of John Day, where Canyon Creek joins the John Day River. As the reservoir began filling however, a leak at the dam's left abutment became apparent and repair attempts in 1966 and 1983 failed to remedy the problem. Since 1997, the 18" diameter outlet pipe has been locked open out of concern for the dam's stability.

The "Go Oregon Plan" assembled by this year's Oregon Legislation from available stimulus funding included a \$200,000 allocation to investigate whether the dam should be repaired or removed. Selection of a contractor was to be announced in May. The successful bidder will design a plan to carry out his recommendation, which will include a cost estimate. No money has been allocated for any construction activity at the dam.

Lake Enthusiasts and Webmasters Take Note!

Career advancements assure a regular turnover of the volunteers serving on the OLA Board of Directors. The end of each year brings a change in the people directing OLA's activities, and the roles these people hold. Executive offices are generally filled by people who have served previously as Directors, which provides continuity for OLA policies and projects. Serving on any volunteer Board is a good career experience because non-profit organizations face many of the same decisions and requirements of commercial enterprises. There is an added advantage for OLA Board members in that their service follows their interest in lakes. Interest in lakes is the chief requirement for OLA Board members.

Lake enthusiasts with special skills or talents are especially welcome on the OLA Board. The ready access to specialized expertise expedites business dealings. Expertise that OLA has grown to recognize as essential is a webmaster. This position will become open in September so there is an opportunity available for a lake enthusiast with Dreamweaver® knowledge and some extra time for a two year Director's term.

The OLA website is hosted by Easy Street online services. It requires monthly updating to post the Board meeting minutes, quarterly posting of the newsletter, and annual changes to accommodate the various announcements for the Conference, and corporate member recognition. There are several additions that have been identified for the website and the webmaster must help with their formatting to ensure their usefulness. These features are presently Word, Excel, and Access documents. Their addition should attract more visits to the website and may make it attractive to advertisers. OLA is a fine example of a 501(c)(3), non-profit

organization, but recognizes the webmaster is the most worthy of its officers for remuneration. Website advertising fees could provide a source for this payment.

Because the OLA website holds such importance to the organization, its design must be comprehensible to a succession of webmasters. OLA is not committed to the present website, but must be convinced of the advantages of proposed upgrades. Similarly, redesigning the site must meet standards of utility and lucidity. Individuals interested in these duties, or simply serving as an OLA Director are encouraged to contact our webmaster at www.oregonlakes.org.

OLA Members Eligible for NALMS Offer

OLA's parent organization, the North American Lake Management Society, has offered a free, Electronic Lake level NALMS membership to all members of its Affiliate chapters. This trial membership will last for three months after verification of the applicant's Affiliate status. The offer provides access to the "Members Only" section of the NALMS website, where electronic browsing of *LakeLine* and the peer reviewed journal, *Lake and Reservoir Management* is available. The offer also includes member discounts at the NALMS mercantile. The value of a NALMS membership lies in the better perspective of lakes that is available there. NALMS actively seeks observations of lake features from North America, and beyond as well, in order to present in-depth discussions on a broad range of topics in their periodicals, position papers, web pages, and texts. Their website is currently being revised but still is worth a visit for insight on lake related questions, or to help in the decision of whether a trial membership would be useful. The trial application procedure is fully described at www.nalms.org. OLA membership can be completed at www.oregonlakes.org.

Hills Creek Reservoir Gets 2009 Cyanobacteria Season Underway

It was May 21st when the water contact advisory went back up at Hills Creek Reservoir. The reservoir, on the Middle Fork of the Willamette River, has been a consistent player in this annual saga. It has been the first advisory posted in each of the last five years. Its earliest posting was on May 11, 2007, and the latest occurred on June 24, 2005. The advisory lasted for 20 days in 2006 and for 62 in 2008.

The combination of conditions needed for cyanobacteria blooms are obviously in place at Hills Creek Reservoir, but how can we assess the health risk of these annual events? A brief scan of the NALMS blue green algae web page revealed a link to the USGS paper, "Preliminary Assessment of Cyanotoxin Occurrence in Lakes and Reservoirs in the United States," by Keith Loftin *et al.* The paper summarizes the cyanobacteria testing of the National Lakes Survey, which sampled 34 lakes in Oregon and 1238 nationwide during 2007. For this study, a 1 L. sample was collected from the lake's photic zone, at a point above the lake's greatest depth. Detectable microcystin was found in 5 of the Oregon lakes and in 32% of the national samples. There were 9 (0.7%) lakes in this sample that exceeded the WHO 20 ppb threshold for recreation contact and 143 (12%) above the WHO 1 ppb limit for drinking water. In a companion study that sampled cyanobacteria accumulations in 23 lakes in KS, MO, IA, and MN during one week of August 2006, all had detectable levels of microcystin. All but 2 of these lakes had mixtures of multiple cyanotoxins. The mean concentration of

microcystins in the bloom study was 600 ppb compared to just 3 ppb in samples from the National Lake Survey. In the cyanobacteria bloom study, 17% of the lakes exceeded the WHO recreation guidelines and 78% were above the WHO drinking water standards for microcystin.

It follows then that the presence of a cyanobacteria bloom significantly increases the risk of cyanotoxin poisoning, and therefore, posting water contact advisories for lakes with blooms is justified. It is also true that lakes with visible scums of cyanobacteria should be avoided whether or not a Health Division warning is evident. An additional observation about cyanobacteria at Hills Creek Reservoir is that it was included among the Oregon lakes tested in the National Lake Survey. The sample collected there on August 27, 2007, when there was no active advisory, was negative for microcystin.

Our Man in Chicago

Report from the 22nd Annual National Conference on
Enhancing the States' Lake Management Programs

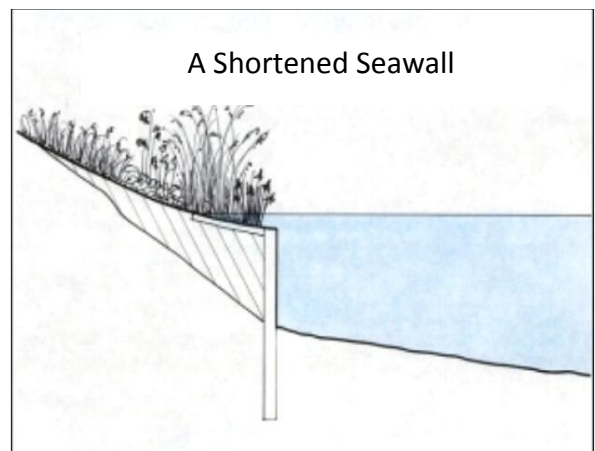
by Mark Rosenkranz, Water Resource Specialist, Lake Oswego Corporation

The week of April 13th saw over 125 lake enthusiasts gather in Chicago for the annual conference sponsored by the Chicago Botanic Garden, US EPA, and NALMS. The theme this year was "Enhancing Ecological Integrity of Shorelines." Talks varied from how to restore shorelines, how to measure impact to shorelines using various biological indicators, and the social impact of decoupling lakes from shoreline habitat. A healthy shoreline environment provides habitat for fish and waterfowl, reduces shoreline erosion, and helps suppress wave action. These are all desirable goals for any lake.

The primary means of shoreline restoration is reducing its slope as it enters the water. This is accomplished by cutting back the shoreline and grading it to a more gentle slope. This new contour is planted with native vegetation that has dense enough root structure to hold soil in place. For shorelines that do not have seawalls, this change provides protection against erosion and helps to diminish wave action. This is common practice on stream bank and lakefront restoration projects. It is also applicable for seawalls with only slight modifications.

The Chicago Botanical Garden totals 385 acres, but it has 81 acres of waterways and six miles of shoreline. They have an ongoing project where they are restoring shorelines to create near-shore habitat and demonstrate native aquatic and emergent vegetation. The Garden applied an interesting treatment to areas that were historically protected by rigid seawalls. The seawall was cut down below the water line and the soil sloped back to grade. This provides shoreline protection in circumstances where there is not enough land to slope the shoreline back from the full water depth. The seawall will hold soil back, but the upper few feet above the shortened seawall are allowed to taper gently back to grade. Their applications have held up well over the years and provide beneficial habitat right to the water's edge.

The obvious benefit of a healthy shoreline is erosion



prevention but the loss of shoreline vegetation can also limit nutrient availability for aquatic organisms. Insects living among shoreline vegetation fall into the water, providing food for fish. This transfer of nutrients from the terrestrial to aquatic environment is an important component of a healthy lake. Unlike the dissolved nutrients that run off urban lawns to feed plants and algae, these insects help maintain a healthy population of top predators. When a lakeshore is planted with grass right up to a seawall, this transfer of nutrients is greatly reduced. The benefits of implementing a shoreline restoration project are ecological and educational. The ecological benefit has been discussed, but to further the goal of a healthy lake it is necessary to remind people that a lake is a natural environment and not a swimming pool. Creating soft shorelines with native vegetation, which blends the lawns and upslope areas into the water's edge, removes the hard, unnatural transition so common around a highly developed lake. The goal would be to have the lake viewed as a natural environment that has plant and animal diversity, and not a body of water that should be devoid of anything that may inconvenience recreational use. The more people realize that living in harmony with nature is not a scary idea, the more likely they will be stewards of our lakes and streams.

The Saga of the Opossum Shrimp

Among the discussion topics raised at the OLA Conference last September was the intentionally introduced, mysid shrimp population in Wallowa Lake. It was out of concern for the kokanee fishery there that provided the context for the discussion. Wallowa Lake has been Oregon's premier location for kokanee fishing for some time as evidenced by the State record, 6 pound, 12 ounce kokanee caught there in 2001. The prior record was 4 pound, 14 ounces and also came from Wallowa Lake. Well before these trophy catches, Native Americans and early settlers both relied on the annual harvest of sockeye salmon or kokanee at the lake. But while there are still good sized kokanee in Wallowa Lake, the trend is that kokanee of any size are becoming harder to catch.

This situation parallels the experience in Montana's Flathead Lake and others where mysid shrimp have been introduced. The introduction changes the makeup of the zooplankton assemblage and seldom as predicted. Instead of becoming prey for targeted predatory fish, the mysids often compete with these fish for the prey that they were to replace, and then avoid predation themselves by following a daily vertical migration based on their sensitivity to light. Big fish can continue to thrive under such conditions, but recruitment into their size class is reduced as fewer juveniles make their way there due to the enhanced competition for food and survival.

Mysid shrimp, or *Mysis relicta*, are commonly known as opossum shrimp for their abdominal brood pouch where females hold their eggs and young. They are crustacean arthropods but are deemed closer related to the scuds (Amphipoda) and sow bugs (Isopoda) than the crayfishes (Decapoda) and true shrimps (Euphausiacea). The mysid shrimp are relics of the Ice Age and are thought to have evolved from the marine species *Mysis oculata*, a circumpolar organism of the Arctic Ocean. By adapting to the bounty of freshwater coming from melting glaciers, opossum shrimp were able to populate many of the newly-formed, oligotrophic lakes of the northern latitudes, where they still persist. In North America they are more commonly found east of the Continental Divide. They are opportunistic omnivores that are equally capable of filter feeding on phytoplankton in the water column or the detritus that settles to the lake bed, or preying on pelagic zooplankton. They attain a length of about 1 inch as an adult, and are efficient reproducers during their 1-2 year life span. Opossum shrimp prefer well oxygenated water in deep, cold lakes. Their sensitivity to light causes them to seek the depths during the day, but they migrate higher in the water column at night. Their preference for cold temperatures makes it unusual for them to rise above a well established thermocline. Their ability to move

horizontally is limited, but they are subject to passive movement by water currents. Their colonization of downstream lakes is well documented. Extremes of temperature, dissolved oxygen, and light can be tolerated for short periods, but these factors have been known to concentrate opossum shrimp outside of their preferred range, where they can experience heavy predation by planktivores that they normally avoid.

In lakes with natural populations of opossum shrimp, they are an integral part of the food web. As voracious predators, filter feeders, and scavengers, they have a profound effect on nutrient cycling within their habitat, and their good size makes them an attractive prey for visual predators. Studies of fish diets have found opossum shrimp are routinely eaten by a variety of fish species. Smaller or younger fish show the greatest utilization of opossum shrimp as a food source, but these same fish are also represented in the diets of game fish so these mysids do make both a direct and an indirect positive contribution to natural fisheries.

As the role of the opossum shrimp in natural food webs came to be understood, it was natural to wonder if there would be a benefit to introducing them into other lakes. The inevitable experiment was begun in July and October of 1949, when bottom trawls of Upper Waterton Lake in Alberta, Canada produced sufficient *Mysis relicta* and the amphipod *Monoporeia affinis* for the transfer to Kootenay Lake, 300 miles to the west in British Columbia. The process was repeated in June and September of the following year. A total of 25,000 individuals of the two organisms were moved in the four transfers. By 1960, Lake Kootenay was producing trophy kokanee and the opossum shrimp introductions were considered to be a contributor to this success. The lake began receiving the wastewater stream of a fertilizer plant in 1953 and this high nutrient effluent also had a role in producing the prized kokanee fishery. This kokanee population crashed in the 1990's however and it was then realized that the longer term effect of the mysid introduction was not so beneficial.

Mysis relicta introductions were fashionable throughout the 1960's. The introductions that occurred in the northwest states are summarized in the table below:

Mysid Shrimp Introductions into NW Lakes									
OREGON				IDAHO					
	1965	1966	1967		1965	1966	1967	1968	1969
Cultus	26,000	90,000	100,000	Priest	295,000	400,000	300,000		
Timothy	20,000	98,000	60,000	Upper Priest				100,000	100,000
Waldo	119,000	200,000	200,000	Coeur d'Alene				200,000	200,000
Wallowa	130,000	130,000	130,000	Pend Oreille		50,000	210,000	300,000	300,000
Crescent		100,000	100,000	Payette		100,000	100,000	94,500	
Detroit			100,000	Upper Payette					75,000
Fourmile			75,000	Anderson Ranch	30,000	100,000	100,000		
Ice			20,000	Redfish		50,000	60,000	52,500	
Odell			125,000	Alturas		50,000	60,000	42,000	
Olive			20,000	Stanley		50,000	40,000	31,500	
Miller			20,000	Pettit			40,000	31,500	
				Salisades				115,500	210,000
WASHINGTON				PALISADES					
	1968	1969	1970	1971					
Chelan	500,000	525,000		550,000	Warm				75,000

This summary comes from a report published in 1975, by Merrill Gosho, entitled "The Introduction of *Mysis relicta* into Freshwater Lakes." The report is focused on the mechanics on the transfer with the goal of

improving the survival of the shrimp in the receiving lake. It also presents the results of the initial follow-ups that followed the introductions. Of the Oregon lakes, only Wallowa Lake had produced live mysids by 1973. Juveniles were in the 1972 catch there, which was proof the lake's opossum shrimp were reproducing. In Idaho, they were found in 1972 trawls of Priest Lake, Upper Priest Lake, and the south end of Pend Oreille. A population of opossum shrimp was established in Hayden Lake after a 1974 introduction there. Random checks of about 500 sport caught kokanee, rainbow trout, and cutthroat trout from Washington's Lake Chelan in 1973 found no evidence that these fish were feeding on opossum shrimp.

Further introductions of *Mysis relicta* were discouraged in the relevant literature published after 1980. All of the Oregon lakes except Ice Lake and Fourmile Lake were rechecked in the 1980's and opossum shrimp were found at Wallowa, Cultus, Detroit, and Olive Lakes. There was evidence that they might have persisted in Miller Lake as well. Lost Lake and Twin Lake, in the Elkhorn Mountains southwest of Baker City, are also said to contain opossum shrimp. Allan Vogel, who is a professional authority on local zooplankton, adds that there is a natural population of the related mysid, *Neomysis mercedes* in Woahink Lake. It has a more limited, coastal range than *Mysis relicta*, and is also found in Seattle's Lake Washington.

On the basis of mysid monitoring update reports, only the Wallowa Lake population is causing any disturbance in Oregon. The threat to the kokanee fishery there has led to the development of a study, now underway, to characterize the population so plans can be developed that will best serve the endangered fishery.

Progress at Cove Palisades Marina and a Set-Back at Round Butte Dam

Good news coming from Lake Billy Chinook includes the Oregon State Marine Board's recognition of Cove Palisades Marina for their use of best management practices in the operation of their facilities. Cove Palisades is the 36th marina to meet the requirements of the Clean Marina program, and is the 2nd Oregon lake marina to achieve this status. The business practices at Odell Lake Resort qualified them for the recognition in July 2007. The OSMB program was launched in 2006 and continues to reduce impacts at the land/water interface. Cove Palisades Marina, located on the Crooked River arm of the reservoir, is a multi-service facility so most of the provisions of the 80 item checklist would have been in play for their certification as a Clean Marina.

The construction of the PGE/Confederated Tribes of Warm Springs' Selective Water Withdrawal Tower for Round Butte Dam suffered a set-back on April 11th. Sections of the 140' tall, 40' diameter conduit separated as it was being moved into place and the lower part of the conduit fell in pieces to the lake bottom. In the finished structure, the conduit will conduct water from the selective intake at the water surface to the generator intake structure below at the base of the dam. Completion of the tower has been delayed by a minimum of four months as crews must now retrieve and inspect the fallen pieces, and make the repairs or modifications necessitated by the incident. The delay jeopardizes the project's plan to jump-start fish migrations by planting Chinook and steelhead fry in the streams upstream of Lake Billy Chinook. This preparatory work began in 2007 with newly hatched fish from the hatcheries of the Pelton/Round Butte Project. Placing fry in tributary streams of the Deschutes, Metolius, and Crooked River basins will continue annually until adult salmon and steelhead begin returning to spawn. The planted fish fry will spend at least two years in pools, side channels, or similar low current areas until they are ready for their ocean migration. The time is up for the class of 2007 and these smolts will soon be looking for a passage downstream. If attempts to trap the juvenile Chinook now on

LAKE WISE
The Oregon Lakes Association
Newsletter 2009 #2

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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

the move prove successful, the effort will be extended to trap and transport the young steelhead that will show up later in the year. It may prove to be an interesting exercise for later comparison to the completed fish screening intake's trapping effectiveness. As the disrupted work schedules at the dam and just upstream regain their purpose and direction, the habitat restoration projects and placing of fry in the upper reaches of the three basins will continue as originally planned.

What Should the Presentations at the Lincoln City Conference Discuss?

When OLA gathers on September 11-12th at Lincoln City for our annual conference, there are many lake topics that could be pursued. The best way to ensure the discussions focus on interesting subjects is to make those subjects a part of the conference. The agenda is now being developed and anyone with an idea, a question, a progress report, or a breakthrough is welcome to contribute to the proceedings. The Union 50 hall is spacious enough to accommodate poster displays for those of us who strongly feel that a well described picture, table, or graph is much better than 10,000 words spoken in front of an audience. The chances of securing a 15-20 minute slot for an oral presentation are better the sooner they are submitted. Presentation proposals should be addressed to Ben Johnson at benj@pdx.edu or OLA, PO Box 345, Portland OR 97207-0345. Service and product vendors are welcome to display their wares at the conference and should direct inquiries to Karen Williams at WILLIAMS.Karen@deq.state.or.us or the OLA POB. Whether you are a presenter, a speaker, a vender, or an attendee, we look forward to meeting with you at the conference.