March 2013

Editor:
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LAKE WISE

A Voice for Quiet Waters

The newsletter of the Oregon Lakes Association

It Looks to be a Interesting Year for Oregon Lakes

It is only March and there is already a bounty of news to report, and plans to discuss regarding lakes and reservoirs throughout the state. With so much news to cover, it is a justifiable choice to begin with updates of the unresolved accounts from the newsletter's previous issue. Foremost among these topics is the harmful algae bloom or HAB advisories still in effect when the November 2012 issue went to press. At that time, five of the nine advisories posted last year were still current. It was Fern Ridge Lake where the first of these water contact advisories was lifted. The warning for this reservoir went away on November 14th, and the advisory for nearby Dexter Reservoir was lifted on November 16th. The advisory for Newport Reservoir (or Big Creek Reservoir #1) was nullified on December 12th. Umatilla County's Willow Creek Reservoir remained under its advisory until December 27th. Only one advisory from last year extended into the new year, and that was at the USACE's Lost Creek Lake on the Rogue River, which remained under an advisory from September 14, 2012 until January 24, 2013.

Elsewhere, the USACE continues their work to enhance the protection of endangered Upper Willamette Basin spring Chinook salmon and winter steelhead, which is mandated by the National Marine Fisheries Service's 2008 biological opinion. Upstream migration should begin improving on the North Santiam River in April when the Minto fish collection and sorting facility is expected to become operational. Work is underway on a similar fish facility at the Foster Lake dam on the South Santiam. That project is expected to be finished next February. The USACE approach to bolster downstream migration is discussed in greater detail later in this issue.

The work to install hydropower capability to the USACE dam at Dorena Lake is proceeding on schedule. This project was described in the August 2012 issue of *Lake Wise*. To see a photo looking downstream from the newly excavated borehole in the dam, select "News" at www.riverbankpower.com.

The joint ODFW/ OSMB boat inspection teams are already at work at the Oregon Port of Entry on I-5 near Ashland. Since this program began in 2010, routine inspections have largely focused on the May to September boating season. An inspection schedule of eight hours a day on five days a week was started at Ashland this February after Idaho discovered last year that boats carrying aquatic invasive species were being moved at this time of the year. The other Oregon inspection teams will begin work at Klamath Falls, Lakeview, and Ontario in May. A new team will conduct inspections at Gold Beach starting in July.

In OLA news, the annual conference this year will be a joint meeting with the Washington Lake Protection Association to consider *Collaborative Lake Management*. The meeting is scheduled for October 16-18 at the Hilton Hotel in Vancouver WA. The first day of this conference is a Wednesday and will be devoted to specialty workshops. One of the workshops in planning stages is an aquatic weed course that would be presented by PSU's Center for Lakes and Reservoirs. The following two days will offer a variety of topics in concurrent sessions. Mark the date on your calendar and watch the OLA and WALPA websites for details.

The Center for Lakes and Reservoirs at Portland State University is actively preparing to launch a volunteer lake monitoring program for this summer. Lake enthusiasts and associations are encouraged to look into this opportunity to begin systematic lake surveillance, or to share data from existing monitoring programs with this Oregon Lake Watch start-up. The commitment for volunteers is flexible. The goal is to document simple water quality observations over time, at more lakes throughout the state, and to watch for some problem aquatic species at these locations. Training and equipment will be provided. More information is available by visiting the OLW website, http://tinyurl.com//oregonlakewatch, or Facebook page. Specific questions can be posed by e-mailing OLW@pdx.edu, or by calling (503)725-2937.

OLA will participate in a HAB Workshop again this year. As in past years, the training will take place in Nash Hall at Oregon State University, and is scheduled for Monday, April 15th. There are 60 seats allotted for this course. Registration can be completed on the OLA website, www.oregonlakes.org.

Yes, No, ½ Yes, and Maybe No at Waldo Lake

The headline refers to whether or not Waldo Lake is approved for seaplane landings. This discussion was last updated in the June 2012 issue of *Lake Wise*. Since then, the temporary rule put in place by the State Aviation Board allowing restricted seaplane use of the lake has run its course, and a meeting on January 31st considered the impact of the rule. The number of seaplane landings at Waldo Lake during the greater part of 2012 was between 4 and 6. These specific landings and take offs generated little comment at the well attended meeting in Springfield. The hearing produced thoughtful testimony both for and against continuing the restricted use of the lake by seaplanes. The provisions of the proposed rule were given close scrutiny. After nearly three hours, the Aviation Board adjourned the meeting to contemplate what they had heard. Their decision has not yet been made public.

With the outcome of this controversy in doubt, Oregon State Senators Floyd Prozanski and Lee Beyer, and Oregon State Representative Paul Holvey jointly proposed to settle the issue by adding Waldo Lake to a list of Oregon lakes and reservoirs where motors are not allowed. This legislation has been submitted with a host of co-sponsors as SB 602, and is now making its way through the Legislature. The proposed bill bans the use of motors on the lake, and specifically prohibits the use of a seaplane to land on or take off from Waldo Lake. Public agencies with jurisdiction over the lake are exempted, as are electric motor boats observing the 10 mph speed limit. The OSMB and the Oregon State Aviation Board are directed to cooperate in the regulation of boats that are seaplanes. As *Lake Wise* went to press, the bill had passed the Senate and was headed to the House.

The Drawdown Experiment at Fall Creek Lake Extended to Cougar Reservoir

The factors leading to the USACE decision to draw Fall Creek Lake down to the streambed were discussed in the December 2011 issue of *Lake Wise*. That decision produced a downstream migration of more than 20,000 salmon smolts, most of which passed through the dam during a three day period of the drawdown, which lasted from mid December 2011 to mid January 2012. At the same time, the deep drawdown improved the volume capacity of the reservoir by moving some of the sediment deposits downstream, and did not compromise the reservoir's flood control objective. Water storage was returned to customary levels by early February 2012.

The experiment supports the observation that downstream migrating salmon smolts prefer swimming in surface currents. It follows then that downstream migration through a reservoir might be enhanced by lowering the

reservoir to the elevation of its outlet. This second experiment was carried out this past winter at Cougar Reservoir, where a deeper than normal drawdown lowered the water level to a 1500' elevation, near the dam outlet at 1478'. The USACE reports that the deep drawdown did increase the movement of fish through the dam beyond the numbers noted when the annual drawdown was 32' higher. A repeat of the deep drawdown at Fall Creek Lake also produced downstream migration numbers comparable to the previous year.

The success of this strategy has occurred at two reservoirs with some differences. Cougar Reservoir has a much greater volume capacity and depth, and sits in a moderately bigger drainage basin. Fall Creek Lake is contained behind a 171' dam while the Cougar Reservoir dam is 452' high. The historic drawdown at both reservoirs moves smoothly from a maximum in late spring or early summer to a minimum level in winter. At Cougar Reservoir, the low point is normally in December at about 1532' elevation and raises to a peak in June near 1690'. The Cougar dam can produce hydropower, but only when the reservoir stage is equal to or greater than 1516'. Both dams have a bottom drain.

The dam for Cougar Reservoir is at river mile 4.4 on the SF McKenzie River, just upstream of the confluence of Cougar Creek. The riverbed there is at about 1250' elevation and the dam's spillway crest is at 1657'. The outlet used to regulate the water surface is a 13.5' diameter opening at 1478'. The only other outlet feeds the penstock to the powerhouse. It is an opening with a 10.5' diameter at 1419'. Minimum flow levels in the SF McKenzie River are met by releases from Cougar Reservoir.

Water moving to either the Cougar Reservoir regulatory or the hydropower outlet first passes through the 302' tall, temperature control tower, which was added in 2005 to restore historic water temperatures downstream of the dam. The tower has three, parallel slots running vertically over most of its height. Each slot has three independently telescoping weirs to extract water over a range of depths, which are chosen to meet the desired temperature of the outfall. The tower effectively produces water releases at temperatures attractive to returning fish spawning runs, but also adds a degree of complexity to optimizing downstream migrations. Managing a multiple use reservoir is not a simple task, which makes the continued success of the deep drawdown experiment especially heartening.

Metro Review of Smith and Bybee Bout of Bird Botulism

By Elaine Stewart, Senior Natural Resource Scientist, Metro Natural Areas Program

In early September 2012, a paddler on Smith Lake reported sick and dying waterfowl. The Smith and Bybee Wetlands Natural Area in north Portland was experiencing an avian botulism outbreak. The lengthy period without rain this summer combined with warm temperatures to foster an unusually high level of the avian botulism toxin within the lake complex.

Metro, the primary manager of the 2,000-acre wetland complex, consulted with Oregon Department of Fish and Wildlife (ODFW) veterinary and biologist staff to craft a response. Avian botulism spreads through waterfowl via the “maggot cycle”, where flies lay eggs on dead fish or birds. The larvae are protein-rich food sources for other birds but also accumulate the toxin; as few as one or two larvae ingested can kill a duck. The unfortunate consumer dies, the flies lay more eggs, more birds come to feed on maggots, and the cycle spirals out of control. Even healthy, adult birds that would normally survive exposure to this type of botulism were affected at Smith-Bybee.

The first recommendation from ODFW was to remove infected birds to the extent possible. Together with staff from ODFW, US Department of Agriculture-Wildlife Services (USDA), and the Audubon Society of Portland; and staff and contractors from Port of Portland and Metro, about 4,575 dead or dying birds were removed during the 5-week outbreak. More than 4,000 of the birds were waterfowl, primarily Green-winged Teal. The

remaining birds were shorebirds, dominated by Western Sandpiper. The Audubon Society of Portland provided many hours of daily veterinary and rehabilitation services, and about 150 birds treated at the Wildlife Care Center recovered and were released at nearby Sauvie Island. In all, more than 400 hours were devoted to this task.

In addition to removing as many diseased birds as possible, ODFW recommended hazing healthy birds away from the wetlands. Metro contracted with USDA to oversee all hazing activities and install automated equipment to assist with hazing. Port of Portland airport hazing staff trained Metro staff, donated equipment, and stored all necessary pyrotechnics in their approved and permitted storage unit at Portland International Airport a few miles away. Five Metro staff worked with USDA on pyrotechnic use and equipment operation, and two of them worked overtime for five weeks. Because the pyrotechnics were noisy, Metro sent letters to 3,355 neighboring addresses explaining the situation and current actions. Most neighbors were sympathetic and Metro received few complaints. We believe there were more than 34,000 birds hazed away from the wetlands, although some of these may have been trying to return after previous hazing. There is no doubt that tens of thousands more birds would have died without the hazing operation.

With the high concentration of botulism toxin in Smith Lake, ODFW recommended that Metro reduce the impact of the outbreak by lowering the water level. A series of beaver dams built during the late 2000s was holding water and preventing annual drawdown. In addition to fostering the botulism outbreak, the permanent water impounded and killed native willow, fostered growth of invasive aquatic plants (e.g., parrot feather, water primrose), and provided good habitat conditions for the nutria population to grow. The dams were initially deconstructed by Metro staff and contract crews, but it was necessary to bring in contractors to demolish the dams with explosives. This work was modestly successful and allowed some drainage of Smith Lake.

All of the partners involved had unique expertise and abilities which in combination proved highly successful in managing what could have been an even more substantial loss of wildlife. Furthermore, we established a network to evaluate the impacts of this event, and a planning process for the development of future management practices.

Although the outbreak ended only after cooler temperatures and fall rains stopped the cycle, this outbreak highlighted the complex interactions between beavers, invasive nutria, invasive plants, weather conditions and water quality. Metro will use the lessons learned to develop monitoring and response systems that will enable the continued restoration of Smith and Bybee Wetlands.

What's to Become of the Wallowa Lake Dam?

On February 15th, Governor Kitzhaber's office agreed to make $250,000 available to consider how to increase the supply of irrigation water in the Umatilla Basin. One of the nine proposals under evaluation with this grant is to find funding for the long recognized renovations that are needed for the dam at Wallowa Lake. The present dam was built in 1917 and its height was increased in 1929. It is a concrete structure, but it has no rebar reinforcement or bedrock anchors. It is the weight of the dam that holds it in place. The Oregon Water Resources Department gave the dam a hazardous rating in 1970 out of concern that it did not meet current safety requirements for sliding, overturning, earthquake resistance, spillway capacity, and outlet tunnel condition. The chief response to these concerns by the Associated Ditch Company, the local irrigation jurisdiction that built and owns the dam, was to relieve the pressure on the dam by lowering the pool of stored water by 8 feet.

The OWRD rating was raised to "High Hazard" in 1996, due largely to the growth in population and commerce downstream along the Wallowa River in the cities of Joseph and Enterprise. This increased level of concern

requires more frequent inspections and prompt repairs to noted deficiencies. But while the dam is being maintained at a "best that it can be" level, it is generally recognized that this level is not good enough. There have been several studies describing the existing situation, and a common finding of these reviews is that a remedy would cost more than available funding. A substantial factor contributing to the cost is that any major renovation of the dam would have to restore the anadromous fish runs that have been blocked since the lake was dammed.

The attraction of damming a natural lake is that a low head dam will store water above the existing surface area of the lake. At full pool, this produces a lot of water behind the dam, but all of that water from the original lake is in dead storage – it will not flow freely past the dam. This is the situation at Wallowa Lake. According to the description for the discontinued, USGS Wallowa Lake gauging station #13326000, the point between active and dead storage there is at about 4359' above the National Geodetic Vertical Datum of 1929. The USGS commentary further states that the volume capacity between gage height 0.0' at the sill of the outlet gates, and gage height 26.8' at the spillway crest, is 42,750 acre feet. The dam is a short distance downstream of the lake and the USGS estimates that the vertical drop of this distance is equivalent to another 5300 acre feet of dead storage, so the active storage capacity of Wallowa Lake is 37,450 acre feet, when the lake level is at an elevation of 4382.46'. The water rights of the Associated Ditch Company go to 4384.06'. As a point of reference, the maximum stage recorded in the lake was 4385.51 on June 5-7, 1957, which is equivalent to an active volume of 42,530 acre feet.

The renewed optimism about finding a funding source for the dam renovation is based on recovering the lost storage capacity once the dam can again accommodate a full pool. This plan is not a new idea, but now it is the high value farms in the Umatilla area that is willing to buy the increased Wallowa Lake storage. Previously, it was the thirsty irrigators in the Wallowa valley or along the Lostine River who hoped to benefit from increased water allocations. The Umatilla farmers have met their Columbia River water rights for the period from mid April to October 1st and their water table is dropping, but there is still arable land lying fallow. Water released from Wallowa Lake moves down the Wallowa River to the Grande Ronde River, the Snake River, and then into the Columbia. OWRD will recognize that Wallowa Lake releases can be reclaimed in the Umatilla Basin. The LaGrande *Observer* has reported the Associated Ditch Company thinks a dam renovation would produce an additional 4200 acre feet of water for sale, and a quote in the Wallowa County *Chieftain,* attributed to the Executive Director of the Umatilla Basin Water Commission, claims $150 per acre foot would still be affordable for Umatilla irrigators. The answer to this story problem suggests that about $630,000 per year might be generated by Wallowa Lake water sales to the Umatilla Basin.

The cost of rehabilitating the dam was estimated at $12 million in 2007. The Federal government was willing to pay half of this cost then. The feasibility of completing this project now would have to be based on new numbers, but the discussion merits attention. There are some obvious questions such discussions would address. Would raising the lake level imperil existing lakeshore infrastructure? What would become of Wallowa County water sales if they don't meet the price available from the Umatilla Basin? Would it be worthwhile to excavate sand and gravel from the Wallowa River delta and thereby produce a few more acre feet of storage capacity. What will happen if the dam continues to deteriorate and the stimulus it provides through local water sales, and the protection it provides by flood control is lost?

While questions such as these have significance, they are just details to be sorted out once funding is in place. The bigger question of finding the funding remains to be answered. The dam is a key asset of Wallowa County so a share of the funding must be derived locally. Extending the benefits of a reconstituted dam to the Umatilla Basin would be another reason why all of Oregon has a stake in resolving this matter. Few Oregonians who have visited Wallowa Lake would object to some portion of their tax payments being invested there. Oregon can rightly expect some Federal help as well. If the shareholders can be named then it is just apportioning the size of the shares that must still be done. It is not a simple task. Would the county, state, or country benefit the

most if the historic Wallowa Lake sockeye salmon run could be restored? Would the biggest risk taker earn the biggest reward in the enterprise? Consider too that money for bill payments turns into available revenue once the debt has been retired. The hurdles are no higher now than they've been in the past. Perhaps this time, they can be overcome.

Bradley Lake Boat Ramp and Paleolimnology

There are four water bodies in Oregon called Bradley Lake; one is rumored to be to the west of Marion Peak in Linn County, there is a seasonal BLM impoundment in Harney County, and another is a small lake in the Calapooya Mtns. of Douglas County. But it is the boot shaped lake on the dunes of Coos County which recently had its gravel boat ramp upgraded. The project also added docks to make boat boarding easier and to provide fishing access from the shore, and deepened the narrow channel between the ramp and the main lake body as well. The boat ramp is at the heel of the boot, in the southeast corner of the lake, where the only public access to the lake is owned by ODFW. The project was overseen by ODFW and funded with in-kind contributions, and grants from the USFW and the Oregon State Marine Board. The dedication ceremony was held on January 14th.

Bradley Lake is located on China Creek, about 3 miles south of Bandon on the west side of Hwy 101. The lake is featured on the on-line *Atlas of Oregon Lakes*, at http://aol.research.pdx.edu. It is a steep-sided, 30 acre lake that receives multiple, ODFW deliveries of legal and trophy sized hatchery trout each year. The OSMB ranks it at 134th among Oregon water bodies for its estimated 622 annual boating use days.

In the last decade however, it wasn't just a few fishermen who were enjoying boat activity days on Bradley Lake. In 2003, the USGS published Open-File Report 03-190, by Hemphill-Haley & Lewis, titled, "Diatom data from Bradley Lake, Oregon: Downcore analyses". This research, coupled with a paper by Harvey Kelsey *et al* that was published in the Geological Society of America Bulletin, volume 117:7-8, titled, "Tsunami history of an Oregon coastal lake reveals a 4600 year record of great earthquakes on the Cascadia subduction zone", provide an in-depth look at Bradley Lake. The two studies examined 21 cores taken at random locations throughout the main body of the lake. By noting the assemblage of diatom frustules, and the nature and sequence of sediment layers, the researchers conclude the lake was formed in a channel cut by China Creek at a time when the sea level was about 6 meters lower that the current bottom level of the lake. The creek's path to the sea was blocked 7300 years ago by a tsunami that deposited barriers of sand along the coast. The cores show that the material beneath this initial deposit of sand is freshwater peat, which indicates that previous to this event, there was no lake present at this location to accumulate seasonal sediments. After 7300 years, the lake has accumulated about 6 meters of sediments. Today, the lake is about 10 meters deep and the lake bottom is about 4.5 meters below sea level.

There is little consistency in the sediment layers immediately above the baseline deposit in those cores where it is present. The time span represented by the first of these subsequent deposits is thought to include periods of tectonic uplifting, rising sea levels, and fluctuating elevations of the lake's outlet. These conditions did not stabilize until about 4600 years ago. At this point, the lake was just far enough from, and just high enough above the ocean's edge to still be subject to cataclysmic events, but not to lesser storm or tidal surges. The layering in the cores from this point becomes uniform enough to establish a consistent timeline of events, and differences that can be noted in different cores can be attributed to their relative positioning on the lakebed. The nature and sequence of the core layers conform to seasonal sedimentation in a fresh water lake, with occasional and irregular incursions of sand and marine diatoms that signify saltwater flooding, as would occur in a tsunami. Blooms of marine diatoms after some of these events are evidence that the lake retained a brackish bottom layer for various durations after some saltwater inundations. There are also a few instances of lake wide disruptions where turbidity is increased by sediment re-suspension, bank failure, and /or sideslope slumping, but

without saltwater intrusions. The authors argue that only local subduction earthquakes have the energy to produce these effects.

The long axis of Bradley Lake stretches about 490 meters and is essentially perpendicular to the coast line. The outlet of the lake is now 5.5 meters above mean sea level, which has generally been on the rise during the past 7300 years. A salt water intrusion into the lake then would require a wave crest of at least 6 meters during the recent past, and closer to 8 meters 4600 years ago when the lake outlet stabilized at its present elevation. Tsunami waves of these heights are known to be produced by tectonic plate rupture earthquakes, but only in the locality of the earthquake epicenter. Recent tsunamis from magnitude 9 earthquakes in Chile, Japan, and Alaska have not produced such ocean runups along the Oregon coast, which makes a Cascadia subduction zone earthquake a logical mechanism for the cataclysmic events apparent in the Bradley Lake cores.

Evidence from the cores supports the conclusion that in the past 7300 years, Bradley Lake has experienced 13 tsunami events and 4 earthquakes that may not have produced a tsunami. The most recent of these events was the well documented, Cascadia tsunami of 26 January 1700. There have been 6 events in the last 2000 years.

Mystery Snails are Again a Concern in Jackson County

Within the last three years, ODFW has demonstrated that copper sulfate has a high toxicity for Chinese mystery snails, *Bellamya* (*=Cipangopaludina) chinensis*, but that it is inadequate as an eradication agent. This conclusion came from an attempt to rid two ponds in Jackson County Sports Park, near White City, of a mystery snail infestation in October 2010. The project was discussed in the November 2010 issue of *Lake Wise*. ODFW crews were disappointed when the initial treatment failed to kill all the snails, and were even more so after a second application still failed to achieve complete eradication. The effort was estimated to have killed 32,000 snails in the two ponds.

The population has again reached a bothersome density and in mid March, ODFW began draining the ponds. The plan is to keep them dry over the summer. The combined forces of desiccation, inability to feed, and warm temperature may achieve what copper sulfate could not. Like New Zealand mud snails *(Potamopyrgus antipodarum)*, mystery snails have an operculum that allows them to close their shell under adverse conditions. This feature offers some protection from drying, but may be insufficient to keep them alive over several months. The snails also do best within a temperature range between 0 to 30° C., so summer sun should present additional stress. Draining the ponds may also thwart the establishment of Brazilian elodea, *Egeria (=Elodea) densa*, which has been recently noted in the lower, or southernmost of the two ponds. The concern is that either of these aquatic invasive species could reach Whetstone Creek and then be introduced to the Denman Wildlife Area. There is no hydrologic connection between the two ponds, but they are both up gradient of irrigation canals in the area that could receive overflows during the rainy season.

The snail's rebound in population level shows their potential to become a major nuisance. Populations are made up of male and female snails that have a lifespan of about four years. The young are born live in their shell after their eggs are hatched in the mantle of their mother. Newly born snails are about 5 mm is size and can grow to about 6.5 cm in shell length. A typical clutch size is about 65 eggs, and females produce larger clutches as they age. While they are now illegal to sell or transport in Oregon, they have been a popular aquarium species because they feed on algae, do not graze on rooted plants, don't present over population problems, and can serve as an indicator of aquarium conditions by closing their operculum if water quality is poor. The production of 65 young snails in a year would present a population problem so aquarium snails may be of the same sex or find some fault with the ambiance of the venue.

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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

Jackson County Mystery Snails . . . (cont.)

Like the copper sulfate application, draining the infested ponds is an experiment. If the ponds prove to be spring fed, continual pumping may be needed to keep them dry. The Brazilian elodea will be hand harvested, with the knowledge that it can regenerate from plant fragments. ODFW is also interested in seeing what else lives in the ponds. Out of fear that these inhabitants may be harboring viable snails, fish in the ponds will not be saved. Recent research suggests that our native signal crayfish, *Pacifastacus leniusculus*, does well on a diet of mystery snails.

Save These Dates!

Monday, April 15, 2013
Harmful Algae Bloom Workshop - OSU Nash Hall in Corvallis
Basic information on fresh water cyanobacteria blooms
Public health concerns – Sampling and monitoring
Hands-on microscopic observation of bloom forming cyanobacteria
See registration details at www.oregonlakes.org

Wednesday – Friday, October 16 -18, 2013
Joint Annual Conference of OLA/WALPA
in Vancouver, Washington
Watch for details at www.oregonlakes.org