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LAKE WISE

A Voice for Quiet Waters

The Oregon Lakes Association Newsletter

News from the Back of the Fridge

It is often beneficial to make use of left-overs, and this maxim also applies to newsletters. *Lake Wise* left-overs grow better as they age. Consider these tidbits:

Harmful Algal Bloom Advisories

When the November issue of the newsletter went to press last year, there were still six of the 19 lakes listed in 2010 with active advisories. Gerber Reservoir, the Bureau of Reclamation irrigation impoundment about 36 miles east of Klamath Falls, was the first of these six to be declared free of HABs. The advisory there was lifted on December 1st, after104 days.

December 13th was liberation day for Haystack Reservoir. It is the Bureau of Reclamation regulating reservoir 10 miles south of Madras, which helps maintain flows in the irrigation canal system stretching from Mirror Pond in Bend to the Agency Plains area, 6 miles northeast of the Pelton Dam.

Willow Lake, the Jackson County multi-purpose reservoir 21 miles ENE of Medford, remained on its second advisory of the year until December 15th. The first advisory was put in place in April and lasted 120 days. The lake spent 184 days under advisories in the last lake season, making it the most severely impacted water body from HABs last year.

Lost Creek Lake's 106 days under HAB advisory ended on January 4th. The facility is the US Army Corps of Engineers' flood control reservoir on the Rogue River, 26 miles north of Medford. Since the Gold Ray dam was removed last year, the dam at Lost Creek now marks the beginning of the Rogue River's 157 mile, free flowing run to the Pacific Ocean.

The advisory at Tenmile Lake was lifted on January 13th, after 112 days. This dendritic, sand dune lake, 10 miles south of Reedsport, was under an advisory for 74 days last year.

Fairview Lake is a shallow, developed, flood control impoundment in east Multnomah County, just north of Gresham. It made its first appearance this year among the lakes with HAB advisories, and remained on this list for 175 days. The advisory there was lifted on January 18th.

Mann Lake Goldfish

As previewed in the June 2010 newsletter, the rotenone treatment at Mann Lake was carried out in September. An estimated 197,000 goldfish and just 3 cutthroat trout were killed in the operation. In surveys performed prior to the treatment, the lake bottom was found to be devoid of vegetation and aquatic insects, although both were plentiful along the shoreline. The extent of the goldfish problem was highlighted when a week of trap netting, gill netting, and angling to save as many trout as possible before the treatment, captured only 7 trout. The survey showed that none of the fish in the lake were eating regularly, but the goldfish were still reproducing.

The treatment was carried out with a grant from the Fish Restoration and Enhancement Program of the ODFW, a donation from the Salmon Trout Advisory Committee, and the help of 30 volunteer fishermen and

members of the Burns Paiute tribe. Everyone involved with this project was disappointed when a post-treatment survey found two adult goldfish that had survived the treatment.

A crew was reassembled in November for a follow-up rotenone application. This second treatment was completed just before the lake iced over and produced a kill of about 200 goldfish and no trout. Nine gillnets set for 48 hours last February caught no goldfish. ODFW will continue monitoring for goldfish through 2011. There is an opportunity to use gill nets again before the lake is restocked in April, but trap nets will be used afterward to prevent trout mortality.

Klamath Hatchery has 16,000 Lahotan cutthroat trout they have been rearing since the spring of 2010 ready for Mann Lake. Some of these fish are approaching 11 inches in length now, but the 8 inchers are more common. The lake will get an additional stocking of fingerlings in late spring. Mann Lake is open for fishing but harvested fish must still be 16 inches. Perhaps by this autumn, it will be worthwhile for expeditions there to include a frying pan in their supplies. Fishing in 2012 should be great. Again.

NPDES Pesticide Permits

Updating this story requires some effort because for all the news it generates, there is little actual change. *Lake Wise* coverage goes back to the August 2003 issue, which described the events leading to the *Headwaters, Inc. et al v. Talent Irrigation District* lawsuit, and the resulting 9th Circuit Court of Appeals ruling that pesticide applications required a National Pollution Discharge Elimination System permit, as specified in the Clean Water Act.

Since then, the EPA decided a permit would not be required so long as the application followed the label instructions for Federal Insecticide, Fungicide, and Rodenticide Act approved pesticides. In 2009, the 6th Circuit Court of Appeals reaffirmed the earlier decision of the 9th Circuit Court, and gave the EPA until April 9, 2011 to set up the NPDES permits. An overview of the proposed permits appeared in the June 2010 newsletter.

As the April 9th promulgation date approaches, the EPA has requested the Court to grant a six month extension. At the same time, Congress has proposed HR 872, the Reducing Regulatory Burdens Act, to amend the CWA and FIFRA and clarify Congressional intent that NPDES permits should not be required for registered pesticides applied in conformance with FIFRA labeling.

As Lake Wise goes to press, the bill has been approved by the House Agricultural and the House Transportation and Infrastructure Committees. The bill next moves on for consideration from the full House.

Hebo Lake and Laurelhurst Pond

As described in the June 2010 *Lake Wise*, the reconfiguration planned for Hebo Lake is now complete, and is ready for public inspection. The Laurelhurst Pond renovations described in the November 2010 issue are not yet complete, but remain on schedule.

DEQ is Developing a Harmful Algal Bloom Strategy

by Andrew Schaedel, ODEQ Water Quality

Harmful Algal Blooms (HAB) are a proliferation of microscopic algae that can affect human health, other organisms, and the environment by the production of toxins. The blooms are often caused by cyanobacteria, or blue-green algae. Over 40 waterbodies in Oregon have had Health Advisories issued by the Oregon Public Health Division due to HAB since 2004. A summary of waters with advisories can be found on the Environmental Public Health section of the Oregon Human Services Department website, or in previous issues of *Lake Wise*. Based on an analysis of the Department of Environmental Quality (DEQ), the number of lakes that could be experiencing HAB or other extensive aquatic growth (e.g. macropytes, other forms of algae, etc.)

in Oregon could include 25% of the lakes and reservoirs greater than 50 acres, or 104 of the 412 waterbodies of this size.

The DEQ is currently developing a HAB Strategy to help the agency better identify and address these blooms. The purpose of the document is to provide a characterization of HAB in Oregon, review elements in the DEQ's Water Quality Program that relate to preventing or addressing HAB, and to develop and recommend an overall strategy for DEQ to undertake. A working draft strategy has been developed with the final draft due by the end of June 2011.

The following are some of the likely recommendations from the February 2011 Working Draft.

Surveillance Program: Maintain current partnership approach as a minimum, but look for upgrades. Additional funding could increase sampling for algal identifications and toxin production. The future use of genetic tracking and satellite imaging are other options that could improve surveillance. All agencies with lake management responsibilities should uniformly watch for HAB to increase the consistency of the program.

Standards and Assessment: The "visible scum" criteria for issuing HAB Advisories will continue, and listed lakes will appear on the DEQ 303(d) list. DEQ will explore the potential for developing nutrient standards in the next triennial standards review.

Restoration/TMDLs: The present program of developing pollution controls, aims to restore lake water quality by assigning TMDLs, and then making the changes needed to meet these limits. This process would benefit by having a lake/HAB specialist on the TMDL staff. Improvements might occur quicker if the factors considered in developing and implementing TMDLs are similar enough for lakes with common features, to allow a categorical processing of HAB lakes.

Implementation Programs: For nonpoint sources, Load Allocations for nutrient TMDLs should continue to be addressed through existing protocols. Exploring the need for phosphorus in lawn fertilizers could aid in meeting specific TMDL targets, similar to the restriction of phosphorus in detergents. Fish populations and sediment controls are additional areas where something might be done to lower nutrient levels from internal recycling.

Septic system effluents remain the chief concern of on-site nutrient sources. Requiring evaluations at property transfers and during clean out pumping would help in ensuring that these systems are being maintained. Establishing a fund for loans or grants to repair, replace, or decommission septic systems, or to develop community sewage disposal systems could prove to be cost effective.

The current policy of permitting "no discharge of wastewater" into lakes or reservoirs should continue, as should incorporating specific TMDL Load Allocations in relevant permits. A review of the lake management actions that require permits could be worthwhile.

Protection Programs: Drinking water suppliers, along with irrigation and recreational interests, all have concerns about HAB. Drinking water suppliers often collect information on their source water. These data are useful for helping to identify supplies that are at-risk, and where additional technical assistance and grants from the Drinking Water Protection Program can be of great assistance.

HAB prone waterbodies could benefit if Instream Water Rights in their feeder streams were adjusted to assure a maximum possible flow to high risk portions of rivers, and perhaps to reservoirs as well.

Funding: HABs are clearly a threat to Oregon's waters and may potentially occur more frequently with climate change. Sustainable sources of funding will be needed for surveillance, education and management of HABs.

Andy Schaedel, at (503) 229-6121 or Schaedel.andrew@deq.or.us, is developing the strategy for DEQ and is interested in getting any feedback, comments, or ideas you may have. Please contact him if you would like more detail on the strategy, to provide any comments, or if you are interested in reviewing the working draft. It is still a work in progress but should completed by June 2011.

Sturgeon in Lake Oswego

The long held rumors of sturgeon in Lake Oswego were confirmed early last November when several of these fish were found dead there. The lake was in an advanced drawdown to facilitate the construction of a new city sewer system and the sturgeon fell victim to this work in progress. The planned maximum drawdown of 24 feet was achieved on October 4th. The central pool of the lake has a full pool depth of 55 feet and it was thought that this remaining reservoir would provide an adequate refuge for the lake's fish. While the news of the sturgeon was met with universal sadness, there are some observations of interest from this discovery that can be inferred from what is known about sturgeon and the lake.

Lake Oswego is a privately developed, natural lake with a surface area of 403 acres and a volume of 10,310 acre-feet. It occupies an ancient channel of the Tualatin River, just west of the Willamette River, in the northwest corner of Clackamas County. The rushing waters of the Missoula Floods deepened this channel and left an upstream debris pile that forced the Tualatin into its present course, about 3 miles to the south. A canal connecting these two water bodies has been in place since 1871. Traffic on the canal did not begin until 1873 because of insufficient water levels for navigation. Perhaps it was this delay that led to the construction of the low head diversion dam, downstream on the Tualatin. The Lake Oswego Canal has served a number of purposes over time, but is now maintained to augment lake levels by diverting water from the Tualatin when necessary.

The sturgeon were said to be between 5 to 8 feet long. Reports of fish measurements are not always accurate, but it is safe to conclude that these sturgeon were big fish. There are two species of sturgeon known to inhabit the Pacific Northwest, the green sturgeon, *Acipenser medirostris*, and the white sturgeon, *A. transmontanus*. The green species is the smaller of the two, but still it can attain a length of 7 feet. It is most commonly found in the ocean and in estuaries however, so there is some doubt that a specimen would be found so far inland as Lake Oswego. The white sturgeon can grow to lengths up to 20 feet, and they are commonly found in freshwater. Both species are anadromous, but not strictly so. Land locked populations of white sturgeon are known to persist in the pools behind the dams of the Columbia and Snake Rivers. It is not surprising then that Lake Oswego would provide an adequate habitat. However, these landlocked populations are not thriving. It is only the sturgeon population below Bonneville Dam that is considered stable, and this stability is due to the recruitment of new individuals coming from the ocean.

It seems likely that the Lake Oswego sturgeon were purposely planted by someone in an unofficial capacity. Wrestling a big fish of any kind is too much of an adventure for all but the most determined schemers, so transplants are typically smaller fish. A six foot white sturgeon is thought to be about 25 years old, so the Lake Oswego group must have been residents for well over a decade. In this time frame, there is a scant likelihood

that an anadromous white sturgeon could swim up Oswego Creek to the lake from the Willamette because dams of improving quality began appearing at the Lake Oswego outlet during the Civil War. The Lake Oswego Canal from the Tualatin River would also be a doubtful access route for the present sturgeon because they would have been blocked at the Tualatin River diversion dam, which has been in place since at least 1937.

Finding multiple, large sturgeon suggests they could be reproducing in the lake. If this is true, it is possible there are smaller sturgeon still in the lake that survived the incident. Sturgeon reach sexual maturity near the age of 11. The ODFW retention rules for white sturgeon do not allow keeping fish greater than 54 inches. This restriction is meant to protect the brood stock of this species. White sturgeon eggs are ideally laid among the rocks in a river with strong current. The fish congregate in late spring to early summer at suitable sites and broadcast spawn. The eggs are adhesive and stick to the cobbles and gravel of the streambed. The larvae hatch after just a week or so, and begin active feeding about 25 days later when their yolk sac is depleted.

Sturgeon would have a hard time finding such spawning conditions in Lake Oswego. They don't even have the benefit of the tailrace at the upstream dam that is available to the landlocked populations in the Columbia. But sturgeon do breed successfully in lakes. The lake sturgeon is a recognized species, *Acipenser fulvescens*, which is known in the Great Lakes, Missouri River, and up to Hudson Bay. It spends its entire life in fresh water and spawns in the shallows and the ripples of small streams. Sturgeon as a group are an ancient fish, little changed from their fossil record spanning millions of years. As such, they must be highly adaptable.

Lake Oswego began refilling in early February. Will the rising waters produce new rumors that there are still sturgeon in the lake?

Reed Lake Emerges from the Brambles

Reed Lake, not surprisingly, is on the campus of Reed College in Portland. It is a spring fed water body that was formed by the damming of Crystal Springs Creek, which arises just upstream in Reed Canyon. From this source, the creek flows almost 3 miles through the Eastmoreland and Westmoreland neighborhoods before merging with Johnson Creek, about a half mile upstream of its confluence with the Willamette River. The lake has a 23 acre-foot volume occupying a surface area of 5 acres. It has a roughly linear shape that conforms to the contours of Reed Canyon. Its 12 foot maximum depth is immediately behind its 10 foot dam.

Reed College's first class began their studies in 1911. Prior to this event, the lake was evidently an unnamed feature in the pasture of William M. Ladd's Crystal Springs Farm. He donated this 40 acre parcel for the college in 1908, during the period when he was liquidating the family estate. A traditional day of service was quickly established by the college to perform some needed work for the campus and canyon. College archives state that on Canyon Day in 1915, a swimming hole was excavated in the creek. On Canyon Day in 1924, preparation began for the construction of an in-ground, concrete swimming pool. According to newspaper accounts, it was just prior to June 1926 before the pool was completed.

The origin of the lake is uncertain. It may have been a beaver pond, a stock pond, or both. Photos in the Reed archives show that a land bridge across the creek, with some ponding upstream, was in place before the land was donated for the college. The work creating the 1915 swimming hole pulled logs from, and deepened this pond.

The concrete swimming pool was clearly anchored by an upstream dam. The pool was located just downstream of the dam in the former streambed of the creek, which was rerouted to the north side of the pool. The outlet of the dam was a culvert to a pool, set above the level of the creek's receiving waters. This configuration did establish a barrier to fish passage, but anadromous migrations were not a concern in 1924. Initially, the pool relied on water diverted from the springs, but was later plumbed to the municipal supply. It is a reflection of the times that Crystal Springs Creek and Reed Lake were considered assets to be developed for the good of the campus early on, but now they are being restored into campus assets.

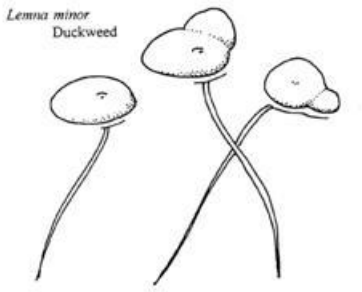
Interest in restoration of the canyon grew along with the environmental consciousness of the 1970's. Passage of the Clean Water Act and the Endangered Species Act brought recognition to the vital nature of Reed Lake and Crystal Springs Creek. The entire Johnson Creek drainage became "critical habitat" when local runs of steelhead, and coho and Chinook salmon were placed on the list of threatened species. The Reed community has never neglected the canyon, but not all the attention it has attracted has proved beneficial. A systematic inventory of canyon conditions got underway after the college received a dedicated, $35,000 alumni donation in 1999 that specified canyon remediation. This initial study found the canyon contained a good variety of established native and invasive species under a well developed tree canopy. Years of burning underbrush had made the hillsides susceptible to non-native plants that had been dumped there as landscape prunings. The rogues list of undesirables included garlic mustard, thistles, clematis, hawthorns, teasel, English ivy and holly, morning glory, reed canary grass, Japanese knotweed, nightshade, and of course Himalayan blackberry. It is still hard to hate tasty blackberries, and escaped ornamentals were formerly tolerated better than they are today. Encroaching brambles kept trails narrow, and allowed urban cast-offs and trash to accumulate.

With a better understanding of the problem, an enhancement strategy was formulated and student crews began removing trash, upgrading trails, replacing alien species with native plants, and making improvements to the riparian zone. The historic images on Google Earth capture the removal of the swimming pool in views of August 2000 and July 2001. The construction of a multiple step fish ladder restored fish passage from the creek over the dam when it was inaugurated in November 2001. Subsequent water quality monitoring demonstrates the importance of the Crystal Springs drainage to the Johnson Creek watershed. The springs are fed by water percolating through 100 square miles of Portland Terrace silt deposits adjacent to the canyon. This water collects in an underlying gravel layer and returns to the surface when the land slope toward the Willamette River cuts across this aquifer. The spring water has a year round consistency that is not typical of surface water. Its flow is not seasonal, it is essentially free of suspended solids, and it has a temperature of 13 °C. Total nitrogen is about 5 mg/L and total phosphorus hovers around 0.08 mg/L. These nutrient levels are somewhat elevated, perhaps from residential lawn care leachings, and contribute to the regular appearance of duckweed on Reed Lake. Nevertheless, the water quality of Crystal Springs Creek improves that of Johnson Creek when they merge.

The college's interest in Crystal Springs Creek was extended in June 2007 when a 1.5 acre family farm, farther downstream of the dam and on the northwest edge of the campus was purchased. This reach of the creek became fish friendlier last year when City of Portland crews enlarged the culvert conveying the creek under SE 28th Avenue, the western boundary of the farm property, and Reed students completed riparian plantings and returned the channelized stretch of the creek to natural meanders, with woody debris and and pools. Additional culvert work continues in the downstream neighborhoods, along with refinements in storm water management. The benefit of these combined watershed enhancements are marked by increased sightings of anadromous fish in Reed Lake.

Reed College students are also now attracted to the canyon and the lake in increased numbers. Just as the area provides rearing habitat for local fauna, it provides a refuge for reflection for nearby residents. The now accessible resource has entered into the college curriculum and has produced student papers and class projects. The rising esteem of this campus feature has won the restoration and maintenance of Reed Canyon an established place in the annual budget of the college.

Time for a Closer Look at Duckweed



Lemna minor, or lesser duckweed, is an aquatic flowering plant without a stem or leaves, and with tiny blossoms that are best viewed with magnification. Its flat thallus, or frond, floats on the water surface with a short, hair-like rootlet dangling below for added nutrient absorption. It is commonly seen blanketing the surface of still ponds or along the edges of slow moving streams. To the uninformed, these blankets can resemble Harmful Algal Blooms, and while they do indicate abundant nutrient levels where they appear, duckweed actually inhibits the growth of algae by their utilization of available nutrients, and by shading the pond waters below.

The plant gets its name from its association with pond ducks. Ducks, and many other pond creatures, eat duckweed and by adhering to feet and feathers, it can be spread by ducks as they move from pond to pond. Duckweed is a perennial plant that reproduces both sexually and asexually. As the water warms in the spring, duckweed turions, deposited on the pond bottom the previous autumn, become buoyant and sprout on the water surface. Budding of the single thallus can produce plants with multiple thalli, or they can separate into individual plants. Mother thalli die after producing 6 daughter buds. In the fall, budding can give rise to the overwintering turions. The duckweed flowers bloom unpredictably in a pocket on the thallus margin, and produce seeds in a utricle that resist prolonged desiccation. The seeds germinate quickly under favorable conditions. This life cycle makes it difficult to eliminate duckweed once it becomes established.

The growth of duckweed can proceed at an explosive rate. It can double its biomass in 24 hours. In doing so, it quickly extends many advantages to the host pond. Shading the water keeps it cool and therefore better able to maintain dissolved oxygen levels. It provides cover for fish, frogs, and invertebrates while inhibiting mosquito breeding. It minimizes evaporation, and as a foodstuff, it is a rich source of digestible starch and protein for the entire food web, including humans. A measure of nutrient removal can be achieved by harvesting duckweed from a pond for composting, animal feeds, soil amendments, or salads. It must be noted too that a pond with abundant nutrients is going to grow some kind of aquatic plant or algae. Duckweed is but one option on this menu.

The food use of duckweed is of interest. The natural plant consists of about 90% water. There is little fiber because the plant does not require structural support. When dried, the protein content can range between 25-45%. The protein content however varies with the nutrient concentrations in the pond and it can also vary over time in harvests from the same pond. The amino acid content in duckweed is comparable to that in alfalfa. As a food or fodder supplement, duckweed's greatest potential is as a local source of protein. It can be grown where it is needed and in less space than is needed for cereal grains.

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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

Duckweed . . . (cont.)

A blanket of duckweed is not always a monoculture. A close look can reveal some related species that are known in the Pacific Northwest. Lesser duckweed is easily distinguished from giant duckweed, *Spirodela polytricha*, by size. The thalli of giant duckweed have a length of 3-10 mm, 5-15 veins radiating from a nodal point, and 5-21 rootlets. Lesser duckweed thalli are but 2-6 mm long and have just 3 veins.

Forked, or ivy-leaf duckweed, *L. trisulca*, floats just below the water surface. Its thalli have a paddle appearance because of a basal stalk. They have a length of 4-16 mm, 3 veins, and a single or no rootlet. The watermeals, or *Wolffia* sp., are a third genus of local duckweeds, but their small size of just 0.3-1.4 mm keeps them safe from casual observers.

There is enough international interest in duckweed to produce a program that has sequenced the genome of giant duckweed. Genetically engineered duckweed variants are being marketed. Duckweed is being dried and pelleted for use as biomass fuel, fertilizer, and fodder. There are wastewater plants that include duckweed ponds for secondary treatment. And a major market niche exists for products or processes to remove duckweed from aquaria or watercourses.

NALMS is Meeting in Spokane this October

OLA's parent group, the North American Lake Management Society, will hold their annual meeting this year on October 26-28 at the Spokane Convention Center. The Symposium will focus on Diverse and Sustainable Lake Management. Abstracts are due May 13th. Details are at www.nalms.org and www.walpa.org.