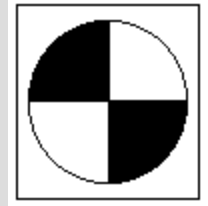


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Editor:
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LAKE WISE

A Voice for Quiet Waters



The Oregon Lakes Association Newsletter

Harmful Algae Blooms Gain Prominence

It is becoming increasingly commonplace to see brief announcements of cyanobacteria blooms in newspapers across the state for this lake or that reservoir. These harmful algae blooms bring health advisories that discourage water contact, and that last until two weeks after the algae have disappeared. Health advisories cut into recreation plans and the economic well-being of businesses serving vacationers. The warnings are justified however by the ill effects the algae can produce if the serious toxins they can generate are released into the water. Certain of Oregon's lakes are more prone to these episodes but few are completely immune. The disruption from these blooms was accentuated last year by the prolonged presence of the algae in Lost Creek Lake, a flood control facility on the upper Rogue River; Siltcoos Lake, a natural sand dune lake south of Florence; and Willow Creek Reservoir, a flood control and irrigation impoundment at Heppner. Advisories for these diverse and widely distant water bodies were posted in September or October and persisted until December or January. Previously, it was rare for a cyanobacteria advisory to extend into December. Unusual occurrences such as these prolonged blooms are a good example of why it makes sense to do systematic lake monitoring. Finding the cause of an atypical event requires some knowledge of normal cycles.

The unified response that state and local health agencies have adopted to deal with cyanobacteria blooms have increased public awareness of these harmful algae. The current protocol for cyanobacteria surveillance and advisories dates to 2004. The improved understanding of the problem among lake users, and the experience gained by lake managers using the protocol makes it timely to consider whether improvements to the process are becoming evident. Accordingly, Laura Boswell, who coordinates the Oregon Health Division's Harmful Algae Bloom Surveillance Program, convened an initial meeting of agency lake managers on March 12th to discuss this issue. Representatives of the US Army Corps of Engineers, Bureau of Reclamation, Forest Service, Geological Survey, Oregon Department of Fish and Wildlife, and Department of Environmental Quality attended.

The Cyanobacteria Task Force Meeting's three hour agenda described the Health Division's focus on national tracking of health issues. The Centers for Disease Control initiated this policy which, by collecting incident reports from 13 member states, can provide improved insight on the extent and seriousness of environmental health concerns. The risk posed by harmful algae blooms in drinking water sources is being fast-tracked in this program to determine if counter-measures are especially needed for these incidents. Ensuing discussions on cyanobacteria surveillance in Oregon identified some areas that could be polished, but no revisions that warrant changing the protocol for the coming season. These changes will be part of a Harmful Algae Bloom section, now under development, on the Public Health Division's website as part of their outreach plans to lake managers across Oregon. A general meeting for all those concerned with these incidents is also being scheduled for sometime after new newspaper announcements of water contact advisories appear for lakes experiencing cyanobacteria blooms.

Belated News of Emigrant Lake

Lake Wise has only recently noticed that a fish advisory was posted for Emigrant Lake on January 18, 2006. This warning to limit the consumption of resident fish from Emigrant Lake is due to the elevated mercury concentration these fish were found to contain. Mercury in fish was last discussed in the August 2004 issue of *Lake Wise*. At that time there were 11 Oregon water bodies with these health warnings. Emigrant Lake has been the only addition to this list.

The Oregon Health Division sweep that spotlighted Emigrant Lake was facilitated by a grant from the Centers for Disease Control to demonstrate the benefits of building a national network to track environmental health issues. This money allowed the OHD Environmental Toxicology Program to look for mercury residue in bass and trout from previously untested reservoirs in Jackson County. The investigation found fish from Agate, Fish, and Howard Prairie Lakes also had detectable levels of mercury, but only bass from Emigrant Lake had levels great enough to warrant an advisory.

Mercury is an abundant element that is readily volatilized by natural and societal processes, and falls from the atmosphere all over the world. Naturally occurring deposits are common in the soil and rocks throughout Oregon. Gravity and the force of flowing water can concentrate elemental mercury in low spots, like lake bottoms and river beds not subject to scour. In such out of the way places, anaerobic bacteria converts elemental mercury to methylmercury, a form that can be metabolized by higher life forms. When these organisms enter the food web, the mercury they contain bioaccumulates as it passes from one trophic level to the next. This mechanism of concentration is most pronounced for the top predator within a given habitat. Bass hold this role in Emigrant Lake. They were found to have an average mercury concentration of 0.82 ppm, well above the national health threshold of 0.35 ppm. This concentration is a very high mercury level and carries the warning that children under the age of 6, and women of child bearing age should not eat resident fish from Emigrant Lake. Other healthy adults should limit their intake to no more than 8 ounces of these fish per month. This advisory does not pertain to rainbow trout because they are raised in hatcheries elsewhere and planted in the lake. The average mercury concentration in Emigrant Lake trout was close to just half of the health threshold. The largemouth bass, bullheads, perch, bluegills, crappie, and crayfish also found in the lake were not specifically tested, but are included in the advisory because their lifetime exposure to the lake's food web would be expected to have raised their mercury concentration to a level of concern.

In 2006, the EPA concluded its National Chemical Residue in Lake Fish Tissue Study (see March 2006 *Lake Wise*), which randomly surveyed 500 lakes of all sizes across the contiguous 48 states. The study examined predatory and/or bottom dwelling fish for a wide range of chemicals. Mercury was found in fish from all of the lakes surveyed, in concentrations that ranged from 0.023 to 6.605 ppm. The Emigrant Lake findings are well within these extremes, but are elevated in comparison to other Jackson County, and most Oregon lakes. The source of Emigrant Lake mercury is unknown, but the reservoir is the uppermost impoundment of the Emigrant and Hill Creek subdrainages, so the source could be natural deposits there. Or it could be a point source amalgam spill from a careless 1850's gold prospector.

A Close Look at Emigrant Lake

Emigrant Lake was formed in 1926 when water began backing up behind the dam built across Emigrant Creek. The 110' high, concrete arch dam created an 8500 acre foot reservoir covering 230 acres to provide additional water for the Talent Irrigation District. The TID itself had been organized in 1916 to meet the irrigation needs

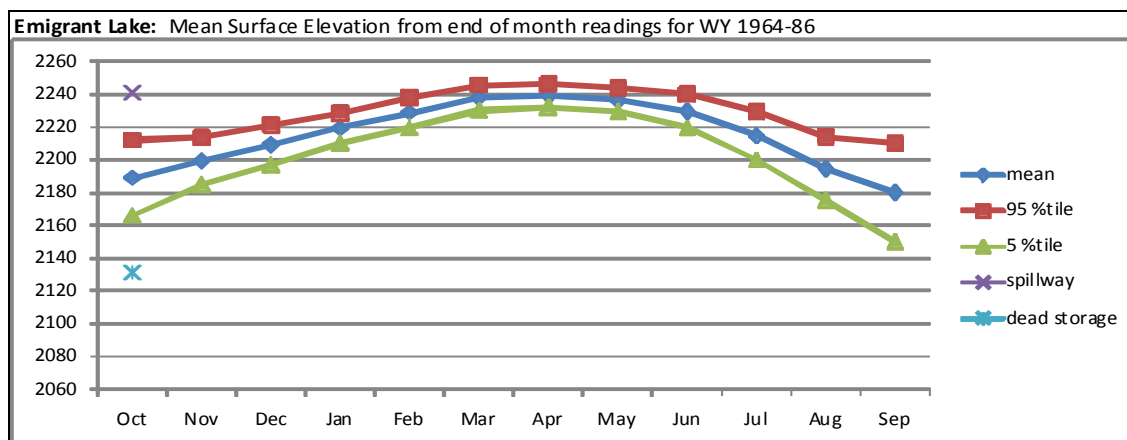
of the orchards of the greater Bear Creek Valley area in light of the 1915 ruling of the State Engineer to withdraw all of the unappropriated direct flow of the Rogue River and its tributaries above Raygold for purposes of irrigation, power, domestic use, and storage. The area orchards had been increasing in acreage and diversity ever since 1887 when the railroad from Portland to Ashland was linked with the line coming from San Francisco, California. The railroad made it possible to get fresh fruit to the marketplace and it also made Jackson County an easy place to move to. Between 1880 and 1890, the population of Ashland rose from 842 to 1784. Ten years later it was 2634, and by 1930 it had risen to 4554. But the Depression years were not a good time for agriculture. A loan from the Reconstruction Finance Corporation was needed in 1935 to keep the TID out of bankruptcy.

Interest in expanding agriculture and irrigation capacity further had to wait until after WWII. By then reservoirs were considered for their capabilities for flood control, hydropower, and recreation as well as irrigation. The Bureau of Reclamation presented a study in 1953 to expand water supply for irrigation, provide flood control for Bear Creek, and generate hydropower for southwest Oregon. Contracts for this plan were signed in 1956 and led to the construction of Howard Prairie Dam, Keene Creek Dam, and the enlargement of Emigrant Dam.

Since 1960, Emigrant Lake is a 40,500 acre foot reservoir covering 878 acres. The earth fill dam was built over the intact original dam and rises 204' above the streambed. There is no hydropower generation at the dam. The lake has an inverted "U" shape due to the dam site location just downstream of where Hill Creek merges with Emigrant Creek. Water supplements can also be received in the Emigrant Creek arm via the Ashland Lateral Canal from Keene Creek Dam. Outflow is divided between Emigrant Creek, a tributary of Bear Creek, and the TID's East Lateral Canal.

The shore of the lake is entirely controlled by Jackson County as the Emigrant Recreation Area. There are three boat ramps; one on the Emigrant Creek arm and the others at the County Park on the Hill Creek side of the dam. The park has full RV hookups, tent sites, ADA facilities, swimming and a waterslide, and picnic areas. ODFW regularly stocks 3000 to 4000 legal sized rainbow trout in March, April, and May, and some excess steelhead as well. The Oregon State Marine Board ranks Emigrant Lake as the state's 39th most popular boating destination.

The park is operated all summer, even after irrigation withdrawals in late summer strand the boat docks and ramps. The drawdown is maintained from 1 October to as long as 30 April to provide flood control capacity before the lake is refilled for the recreation season. This fluctuation is shown in the graph below, which shows the expected range of water surface levels for 95 per cent of the time, for each month.



“Emigrant Lake” was the official name selected for this reservoir by the USGS Geographical Names Information System after considering it along with “Emigrant Creek Reservoir” and “Emigrant Reservoir”. There is also an Emigrant Lake in Lake County and an Emigrant Reservoir in Harney County, but both of these water bodies are small and should not be confused with the Jackson County reservoir.

Emigrant Lake is considered eutrophic for the warm temperatures that occur during drawdown, the cyanobacteria that thrive during this period, the turbidity that results from wave action on the exposed, fine sediments of the lake bottom, and the water’s elevated calcium and magnesium concentrations. The reservoir was sampled as part of the National Lakes Survey and the results of those analyses will become available by month’s end at the EPA/NALMS lake conference in Chicago.

Coal Creek Reservoir (Historical)

Last September, yet another small dam was removed without generating any discernable problems, either at the site or downstream. This particular dam impounded Coal Creek Reservoir, which was located on a tributary of the Kilchis River in Tillamook County. The 30’ high, 80’ wide concrete dam was built by the Tillamook County Creamery Association in 1949 to provide a water supply for their operations and the nearby community. The 7.6 acre foot reservoir served this role into the 1970’s, when new supply lines became available. The 12” water line from the dam continued to find uses until it failed in the late 1990’s.

Without a purpose, the dam became a liability to the TCCA, and it blocked fish runs from the 1 mile of prime upstream habitat. Plans and partnerships were formed to remove the dam, which was done explosively early last September. A few rainstorms later, Coal Creek had reformed a channel through the former dam site and was open to the chum, coho, Chinook, cutthroat, and steelhead known to frequent the 1.7 mile reach downstream to its junction with the Kilchis River. The successful conclusion of this project however, did not rely on serendipity.

The list of steps that were completed prior to the dam removal is impressive. Historic and recent stream habitat surveys helped to justify the project’s expense by showing good fish counts. The sediment behind the dam had been evaluated for volume, composition, and chemical pollutants. Adjacent roads, culverts, and other improvements associated with the dam were removed if they were unneeded. Plans were made to restore the scoured channel below the dam to add complexity and facilitate the retention of spawning gravels. Temporary barriers above and below the reservoir were constructed to dewater and keep fish out of the project area, and to capture demolition debris. The reservoir was seined to relocate resident fish before it was drained. Fine sediments were excavated down to gravels and cobbles from the exposed lakebed. Disturbed areas were seeded and mulched to minimize erosion after the work was finished. Subsequent monitoring will document the value of this care in carrying out these dam removal projects.

Is There a Crayfish in Your Future?

As Spring beckons *Lake Wise* readers away from their comfortable hearths, an encounter with a crayfish may be the reward for a stroll along the shore. Biology books refer to these creatures as crayfish, but the names crawfish, crawdad, and mudpup generally refer to these same decapod crustaceans. The choice of names seems

to rely on regional preferences, but like the many species of crayfish themselves, the range where one name or species prevails has become muddled.

The phylum Arthropoda is broadly divided into jointed-leg animals with or without jaws. The Crustacea are shelled (or crusty) animals in the former group, and its members include various forms of both marine and freshwater zooplankton, as well as the larger decapod shrimps, crabs, lobsters, and crayfishes. As their name says, decapods have ten walking feet, although the claws are counted in this category. Taxonomists have enjoyed working with crayfishes and have described 350 species and subspecies among twelve genera within the US. There is much greater diversity to the east of the Rocky Mountains. Oregon has but one native genus, *Pacifastacus*, and two others that have been introduced. Still there are but eight or nine species known in Oregon. One of these species is extinct (*P. chenoderma*); three are non-natives (*Procambarus clarkia*, the red swamp crayfish; *Orconectes neglectus*, the ringed crayfish; and *O. rusticus*, the rusty crayfish); and three of the remaining five are subspecies of *Pacifastacus leniusculus*, the signal crayfish. The final two are *P. connectes* and *P. gambelli*, and are known as pilose crayfish due to a roughened area on their otherwise smooth claws.

Casual observers do have a chance for a field identification if more than a glimpse is available. Geography, size, and distinctive markings must be kept in mind. The native signal crayfish is found throughout Oregon, they can be >4" from head to tail, and their smooth claws have a white spot at the hinge. *Pacifastacus connectes* is limited to the Snake River area, and *P. gambelli* has a range that crosses the Continental Divide into Idaho and Montana. The red swamp crayfish is found along the coast and in the Willamette Valley. It prefers slow moving waters and is known to burrow. Its carapace and claws are tubercled and speckled, and its abdomen has a black, wedge shaped marking. The ringed crayfish is known in flowing waters of the Rogue and John Day basins and has claws with an orange tip above a black band. The rusty crayfish has been found along the south coast. It has oversized claws and dark rusty spots on the sides of its carapace.

ODFW has considered crayfishes in their Invasive Species and Wildlife Integrity Rules, and has prohibited importing, possessing, selling, purchasing, exchanging, and transporting any crayfish other than *Pacifastacus* species. The red swamp crayfish is extensively grown in Louisiana as a specialty food and likely became introduced here in that role. The rusty crayfish is a native of the north, central U.S. in the Illinois/Indiana area where it is used as bait for fishing and has been introduced elsewhere in bait buckets. The ringed crayfish is native to the mid Mississippi drainage where it is also used as fish bait. Its means of introduction to Oregon is unknown.

As a group, the crayfishes are opportunistic and have had success in a substantial variety of habitats with sufficient moisture for breathing with gills. This respiratory requirement and their susceptibility to freezing are the chief limitations for their distribution. They are solitary animals but lake population densities of 15/square meter are well documented. As omnivores, they are active on multiple trophic levels and so keep organic matter cycling in the food web. Their young are prey for fish and predatory insect larvae. Shards of crayfish exoskeletons are common components of both raccoon and otter scats so the adults also contribute to the food web in this manner.

A hearty meal of crayfish attracts two-legged diners too, although crayfish are included in the warnings of mercury advisories. ODFW reports the commercial harvest for crayfish in 2007 was 65,917 pounds, with Jefferson, Clatsop, and Yamhill Counties supplying most of this catch. There is a debate among diners who favor either the red swamp crayfish featured in Louisiana or the Northwest's signal crayfish. Aquaculture supplies most of the red swamp crayfish for Louisiana cuisine and it takes the typical two years for this species

to reach their adult size of about 4". The signal crayfish found for the table are harvested from the wild. They require six years to reach full size, which at 6" invites a broader range of serving possibilities.

Just as the memory of tasty Bourbon Street crayfish feasts has led to the introduction of the red swamp crayfish beyond their normal range, the large size and equally tasty signal crayfish has also had their distribution extended internationally. Many of these introductions are not viewed favorably. The hard shell, large size, and the long life span of the signal crayfish make it a formidable competitor of indigenous species. Crayfishes are solitary animals and confront each other in combative mode where size often determines the outcome. The signal crayfish also has a reproductive advantage from participating in more breeding seasons during its longer life. It is a comfort to know *Pacifastacus leniusculus* is not among the alien invasive species in Oregon.

OLA to Meet at Lincoln City in September

OLA's wandering annual conference will show up this year on September 11-12 at Lincoln City's Union 50 hall. This date is the first Friday-Saturday after Labor Day so the beach crowds should have diminished and the weather should still be good. A trip to, or along the coast is always pleasant, and Lincoln City is a worthwhile destination. Devils Lake is there of course and the installation of SolarBee circulators is sure to be a discussion topic. Have you ever seen the grass carp? There are plenty of other things to do there as well. A stroll on the beach can be done all along the coast, but only in Lincoln City can you explore the "D" River from the ocean to its source. Shoppers can visit the Outlet Center or poke about in the one-of-a-kind shops where you might find something truly unique. The Chinook Winds Casino offers a variety of indoor adventures. Meeting details are still being planned so mark your calendar and watch for news.

Marina for Foster Lake Seeks Input

There are plans now under review to build a new, privately owned marina on Foster Lake, the regulating reservoir on the South Santiam River downstream of Green Peter Lake. Both of these flood control reservoirs are US Army Corps of Engineers projects and the proposed marina would require the USACE to extend a commercial concession lease should the plan be approved. The plan for the marina, and the impact it would have on the area are described in a draft Environmental Assessment, which can be viewed at http://www.nwp.usace.army.mil/pm/e/en_plan_asses.asp.

Both the USACE and the city of Sweet Home support this proposal. It fulfills an obligation of The Corps to promote recreation at their facilities, and Sweet Home stands to gain from increased tourism. A 1991 feasibility report for a Foster Lake marina concluded a stand alone operation would not be cost effective, but the present plan is an extension of the RV Park adjacent to the marina site, which is just southeast of Foster Dam, along the shore where Highway 20 veers away from the lake. This location was found to be the best option for a marina in the 1991 feasibility study.

The Oregon State Marine Board ranks Foster Lake as the 18th most popular boating destination in Oregon, based on their tally of boater days. These records show the lake is the 7th most popular location for water skiing and the 29th for fishing. Foster Lake has only three boat ramps. The ramps do get busy during the peak of the season, but a new ramp is not included in the marina plans. The EA concedes that the marina would increase boating use on the lake. The lake has a public moorage now at the Linn County Park, on the lake's Middle

Santiam River arm. This moorage has slips for 38 boats. These spaces can be rented during the full pool season, which usually goes from May to November.

The plan for the marina appears to be well thought out. It claims that the Best Management Practices of the OSMB's Clean Marina Program will be followed in the design and operation of the marina. Construction would be completed in two phases, beginning with dock space for 80 boats. The completed marina would include an on-water boat fueling and sanitary waste pump-out service. It would use a chain counterweight anchoring system that requires no pilings and allows the floating structure to rise and fall with the reservoirs changing water levels. The perimeter boom will enclose an area of 3.9 acres of the 1220 acre reservoir. The preferred alternative in the EA describes a main dock with two laterals on either side containing 148 boat slips, of which 108 could still be used at low pool. There would be 12 spaces for courtesy moorage and the remainder could be rented at daily, weekly, monthly, or seasonal rates.

The Environmental Assessment document is 50 pages long, plus appendices. The comment period closes on April 13th.

Iwetemlaykin State Park to Open by Year's End

This new State Park is in Oregon, but it will be a different kind of place. It is located at the north end of Wallowa Lake, on the Marr Ranch property, which is northwest of the Old Chief Joseph Cemetery and the lake's outlet dam, between the Wallowa River and Highway 82. After years of contention, the 61.93 acre plot was purchased by the Oregon Parks and Recreation Department in August 2007. Funding came from Oregon Lottery money available for state parks, and a donation through the non-profit Oregon State Parks Trust from the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Colville Reservation (see January 2005 & August 2007 *Lake Wise*).

Planning for this new park quickly received a lot of input. These ideas led to the adoption of the park's name at a Parks Commission meeting last January. Iwetemlaykin has the meaning "at the edge of the lake". The five syllable word is pronounced ee weh TEMM lye kinn, and will appropriately identify the park as an Oregon Heritage Site. The theme selected to guide the development of the park states, "*The Wallowa country provides a bounty and beauty that inspires great passion in all who dwell there*". Accordingly, the park's planned improvements will minimize disruption to the natural setting. The work to be done before the park's September ribbon-cutting will build access from Highway 82, restrooms, a trailhead, and a trail network. Unobtrusive, interpretive signs are intended to outline the traditional lifestyles of the Tribal legacy, the formative geology of the land, the indigenous flora and fauna, and the changes brought by Euro-American settlement. Visitors will have the opportunity to ponder all these perspectives of the park. There may not be a better place for Oregonians to contemplate the essence of the Earth, and those who trod upon it.

More Renovations Underway at Cougar Dam

Compelled by the courts to restore fish passage at Cougar Dam by 2014, the US Army Corps of Engineers has begun building a fish ladder there to meet the upstream requirement for spring Chinook and bull trout. The \$9.7 million contract was awarded to the Natt McDougall Company of Tualatin, who also worked with The Corps to notch the Elk Creek Dam in the Rogue Basin, and who re-built the Marmot Dam on the Sandy River in 1989, and demolished it in 2007.

LAKE WISE

The Oregon Lakes Association

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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

Cougar Dam is a flood control facility with a 25 MW hydropower capacity on the South McKenzie River. It was completed in 1963 with provisions for fish passage, but they were abandoned when discharge from the reservoir changed the water temperature cycles downstream and thereby disrupted the natural fish runs. For a time, the construction of the Leaburg trout hatchery and the McKenzie salmon hatchery was considered adequate mitigation for the disrupted natural runs. When the hatchery fish did not boost the dwindling number of salmon returning to spawn, it was decided to see what could be done to restore historic water temperatures below the dam. Designing and constructing the 350' temperature control tower proved to be a \$50 million project that was completed in 2005. The tower allowed operators to blend water from different levels of the thermally stratified reservoir so the water released matched the historical temperatures of the South McKenzie River. The tower successfully corrected the temperature disruption and salmon again appeared at the base of the dam on their spawning runs. This engineered solution helped to justify the \$108 million investment for a similar fix at Lake Billy Chinook (see June 2008 *Lake Wise*).

Fish ladders are an effective way of moving fish runs upstream, over a barrier. But they are less effective when the barrier is 400' high and the water level on the other side fluctuates over a vertical distance of 100', as is the case at Cougar Dam. At high head, flood control facilities, it is more common to use a trap and truck approach to keep the runs moving upstream. The fish ladder at Cougar Dam will be built along the east shore of the tailrace. It will just move fish from the base of the dam up to a height sufficient for tank trucks to drive underneath. Water flowing down the ladder will attract fish to swim "upstream" into sorting tanks, from where they can be moved into the trucks. Water for the ladder will be pumped from the dam's tailrace. The trucks will disperse the fish among the streams in the 208 square mile drainage area of Cougar Reservoir. If this plan proves to be effective at returning the obstructed upstream habitat back into natural fish production, then there will be lots of other high head dams in Oregon and beyond interested in knowing the details.