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Editor:
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LAKE WISE

A Voice for Quiet Waters

The newsletter of the Oregon Lakes Association

Where to Begin?

The summer solstice is getting close. The day to night ratio is currently 15.5 to 8.5 hours. As spring comes to an end, the lake season is already well under way. Consider these events:

The **HAB Workshop** that OLA sponsored on April 15th drew about 40 participants from a variety of agencies and interest groups. The attendees will take the information they gathered in the full morning of presentations and afternoon lab session, back to their organizations and so further increase the understanding of these bloom species. Only a few of those registered were OLA members, which means most of the participants won't be able to review the presentations that are archived on the active member section of the OLA website.

After Governor Kitzhaber signed SB 602, **Waldo Lake** again became off-limits to sea-planes. The measure was signed on May 16th and took effect on the date of its passage.

Your chance to catch **Cabalas's million dollar fish** has passed for this year, but the contest for lesser prizes continues for anglers at Henry Hagg Lake and South Twin Lake until July 7th. Register on-line or at the Cabala's store in Springfield.

In early April, the Columbia River Basin Team of the 100th Meridian Initiative held a two day mock exercise at Prineville to test how a discovery of *Dreissena* mussels in an Oregon water body might be remedied. Regardless of whether it was zebra or quagga mussels that were found, the news would mobilize a prompt and multi-level response. Robyn Draheim, Assistant Aquatic Nuisance Species Coordinator at the Center for lakes and Reservoirs, reported 17 agencies or organizations participated. The drill gave the specialists the chance to practice working within the Incident Command System, which would be used to coordinate their roles and authorities. The drill also proved the value of engaging stakeholders and local officials for their knowledge of local roads, waterways, and access points. The results of the exercise will be incorporated into "**Oregon Driessenid Response Plan**", which is under development by Portland State University, ODFW, and OSMB.

Will this be the year the Response Plan is needed? On May 15th, the second day of operation this year, the **Boat Inspection Team** at Ontario found a quagga infested boat coming from Lake Mead. How is it possible that Lake Mead boaters are unaware that quagga mussels in Lake Mead are attracted to their motors and hulls? Are they relying on the state Inspection Teams in Nevada, Idaho, Montana, California, Oregon, and Washington to decontaminate their boats? It seems more logical to require mandatory decontamination at whatever site where *Dreissena* mussels have become established.

The Center for Lakes and Reservoirs has announced the training schedule for **Oregon Lake Watch** volunteers. The six hour sessions will focus on Secchi depth, temperature profiles, and watching for 13 plant and 9 animal aquatic invasive species. The sessions get underway on June 6th at Portland, and move to Salem on June 8th, Grants Pass on June 9th, and Bend or Sisters on June 22nd. Consult the Oregon Lake Watch option on the CLR website, www.clr.pdx.edu, for locations and other details.

Planning continues for the joint, **OLA/WALPA Conference** at Vancouver WA during October 16 – 18. The theme of the meeting is "Collaborative Lake Management". The first day will be pertinent workshops, and will be followed on Thursday and Friday by technical and poster sessions. If you have a project that would be of interest at the Conference, contact Rich Miller at richm@pdx.edu.

The first fish of this year's **sockeye run** passed Bonneville Dam on May 25th.

A New Look for Faraday Lake

The Oregon Department of Environmental Quality has set water temperature goals for Oregon streams in order to comply with the mandates of the Clean Water Act. In the Clackamas River, these target criteria are

13.0 °C. during time and location of salmon and steelhead spawning.
16.0 °C. during time and location of core cold water habitat identification.
18.0 °C. during time and location of salmon and trout rearing and migration.

These thresholds are exceeded in the lower reaches of the river, downstream of River Mill Dam, which is near River Mile 23. This section of the river was placed on the CWA 303(d) list as impaired in 1998. Upstream from the River Mill Dam, Portland General Electric uses the Clackamas River and its Oak Grove Fork extensively for hydropower generation. The six impoundments included in this system do contribute to warming the river, even though the impoundments themselves are within the ODEQ temperature limits.

The Federal Energy Regulating Commission license allowing PGE to utilize the Clackamas for hydropower expired in 2005. PGE had preparations to renew their license well under way by 2000. This work included collecting water quality data from Timothy Lake, at the headwaters of the Oak Grove Fork, down to the mouth of the river, on the Willamette. The monitoring showed that significant temperature increases occurred at the confluence of the Oak Grove Fork and the river's main stem at RM 53, and at the confluence of Eagle Creek at RM 16.5. Three main tributaries in the Oak Grove Fork are Crater, Oak Grove, and Cooper Creeks, which all have year round temperatures of less than 12 °C. This fork of the Clackamas is dominated by cold, consistent, ground water inflow. The watershed of the Clackamas main stem above the Oak Grove confluence relies on rainfall and snowmelt, and so shows a more pronounced seasonal variation in temperature. Also, Austen Hot Springs is a tributary of this reach of the main stem, and the flow from Bagby Hot Springs reaches the Clackamas via Hot Springs Fork of the Collawash River. So while much of the temperature regime in the Clackamas River is beyond the influence of PGE, there are improvements that PGE can make to minimize the impact from their facilities. Modifying the structure of Faraday Lake is one of these refinements and this project was completed last summer.

Faraday Lake is a constructed water body conceived by the Oregon Water Power Railway Company in the early 1900's. The name of this hydropower diversion was purposely chosen as an appropriate "tip of the hat" to Michael Faraday, the English physicist who in 1831 demonstrated how mechanical energy could be converted into an electrical current by the relative movements of a conductor in a magnetic field. Since this dignified beginning however, the naming of the elements within the Faraday complex has become confusing. The name Faraday Lake is recognized by the Geographic Names Information System. But the GNIS also recognizes the more descriptive name, Faraday Forebay for this same water body. Similarly, the dam or bulkhead containing Faraday Lake/Forebay is known in the GNIS as both Faraday Dam and Faraday Forebay Dam. Cazadero Dam does have a GNIS identification number, but Faraday Diversion Dam and the pool behind it does not.

Regardless of the names associated with this project, the topography of the site was a good fit for the intended purpose, although it had poor access. A rail line from Portland was built to solve this short-coming and it soon took on excursion travelers as well as freight and building materials for the hydropower project. There were stops at what was to become the town of Estacada, and the construction sites at Faraday and Cazadero. A park and picnic areas were developed in the vicinity, and both the Estacada Hotel and the Estacada Post Office opened in 1904.

The project was placed into service on 26 February 1907. By that time the Oregon Water Power Railway Co. had merged with a Portland General Electric Co. and the Portland Railway Co. to form the Portland Railway, Light and Power Co., which marketed the power produced at the Faraday project for street lighting in Portland. A detailed description of the project was printed in the 27 June 1907 issue of *Engineering News*, and another appeared in the 4 January 1913 issue of the *Journal of Electricity, Power and Gas*. From these accounts, we learn water was diverted from the Clackamas River, at RM 28, by Cazadero Dam, an 84' high, earth and rock filled, log crib structure with a 176' by 238' footprint, and a top length of 400'. The spillway was 153' wide and crested 31' above the river's low water level. The dam formed a pool reaching about 2.5 miles upstream and added about 138 acre feet of storage, when 3' flash boards were in place. A fish ladder provided passage over the west end of the dam.

The diversion flume was also on the west bank of the river. Its cross-section area was 450 ft^2, and it ran in a downstream direction for 2800'. The flume emptied into a 3500' long canal with a trapezoidal cross-section of 810 ft^2. Faraday Lake proper was about 3000' long and covered an area of about 50 acres to an average depth of 20'. Its basin was formed by the hillside along its southwest shore and a 20-23' high embankment along the opposite, river side. The sides were joined by a 290' long, reinforced concrete bulkhead wall, 33' high, with an overflow spillway and five penstocks. The penstock head gates could be operated electrically or manually. Four of the penstocks were 8' in diameter, and the fifth had a diameter of 9'. The penstocks were 145' long and dropped at a 45° angle to the power house at river's edge, just upstream of RM 26. The power house measured 178' x 53' and eventually held six generators, which were operated at an effective head of 138'. Just three 5000 hp generators were on line when power production was started. A 150 hp generator provided the power to run the facility. A 5500 hp generator was added in 1909, and the 6200 hp unit was put in place in 1910.

The work and cost of the Faraday complex has proven to be a good investment. It is still a reliable part of PGE's generation capacity and is rated at 46 MW. The Cazadero dam was irreparably damaged during the flood in the winter of 1965-66 and has been replaced. The new dam is known as the Faraday Diversion Dam. The fish ladder at the Faraday Diversion Dam has also been reconfigured, and the original diversion flume has been replaced with a 23' diameter tunnel. Faraday Lake is now about half the size of the earlier 50 acre lake. Residence time in the lake is short and the volume of water that passes through it makes sedimentation an on-going problem. The Clackamas River flow past the Faraday diversion has been set at no less than 120 cfs and monitoring water temperatures between the Faraday Diversion Dam and the outlet of the Faraday power house has found that this volume of flow is not always adequate to keep temperatures below the ODEQ temperature limits. There is also measurable warming that occurs in Faraday Lake, although not so much to exceed the ODEQ limits. While the flow in the "lake" is forceful enough to justify the ban on boating, there are shallow areas where temperature can rise up to 3 °C. above that of the water entering the diversion.

The temperature increases that occur in the Clackamas River's Faraday reach provide an opportunity for PGE to work toward their mandated temperature reductions. The main channel flow that by-passes the diversion point will be increased to between 250 to 270 cfs to address the warming that occurs there. Some water for this increased flow will come from changes to the operating protocols of PGE's hydropower facilities upstream of the Faraday Diversion Dam. Changes to Faraday Lake will also help accommodate this increased flow. The lake was drained last summer to reconfigure its bottom contours. The 40-50' flow channel that had formed down the spine of the lake was widened to a defined 108', and deepened to 12' at the upstream end and 33' at the dam. The new channel was lined with rock and a concrete dike was added at the top of the lining along both edges. At full pool the top of the dike walls will be 2' under water. There are multiple gates in the dike that can be opened to deflect water from the channel area to assure good circulation in the perimeter shallows. During

the warm summer months, the water level will be maintained within the dike walls to minimize residence time. The overall size of the lake was reduced by filling in some of the shallow areas.

Faraday Lake is full and operational again. ODFW placed 1500 legal sized rainbow trout in the lake in mid May. Bank fishing is permitted there year round. While awaiting a strike, anglers can join PGE staff, Oregon regulators, and many others who are eager to discover if the hoped for benefits from this $2 million project will be attained.

Reservoirs with Reservations

Every five years, ODFW issues a report that identifies obstacles to fish passage, which is approved by the Fish and Wildlife Commission, and then made public as the Statewide Fish Passage Priority List. The first of these lists was completed in 2007 and identified 67 barriers in different sub-basins across the state. The barriers can be dams, but culverts, levees, fords, and other types of hindrances are also considered. In the time since this first ranking was announced, 17 of these barriers have been removed or remedied by the construction of an approved fish passage facility.

The second Statewide Fish Passage Priority List was released last March and was headed by obstacles ranked within the Top Ten of the 534 barriers identified. Curiously, there are eleven members of this year's Top Ten, but the Hells Canyon Dam on the Snake River is owned by the Idaho Power Company and so may be viewed as an honorary selection. The other ten barriers are all dams, but will be listed alphabetically here as reservoirs because that format should be better recognized by *Lake Wise* readers.

Cottage Grove Lake - USACE flood control dam on the Coast Fork Willamette River.
Detroit Lake - USACE flood control dam on the North Santiam River.
Fielder Dam - private pond on Evans Creek in upper Rogue River drainage.
Foster Lake - USACE flood control dam on the South Santiam River.
Laurance Lake - Middle Fork Irrigation District reservoir in MF Hood River drainage.
Lookout Point Reservoir - USACE flood control dam on Middle Fork Willamette River.
McKay Reservoir - Bureau of Reclamation irrigation reservoir in Umatilla River drainage.
Opal Springs Diversion Dam - Deschutes Valley Water District hydropower diversion on Crooked River.
Unity Reservoir - Bureau of Reclamation irrigation reservoir on Burnt River.
Wimer Dam - private pond on Evans Creek in upper Rogue River drainage.

Most of these barriers are obviously not threatened with removal and already have fish passage improvements underway. The four dams not owned by Federal agencies however might anticipate some scrutiny.

Laurance Lake is the most significant of these and it is included in the printed *Atlas of Oregon Lakes*. It captures the confluence of Pinnacle Creek with Clear Branch Creek, 1 mile upstream of the junction of the creek with MF Hood River and about 5 miles southwest of Parkdale OR. The dam is a 109' tall, clay core, rock fill structure with an upstream rock face. It has a reinforced concrete spillway and impounds up to 4000 acre-feet of water. The dam was completed in the late 1960's to provide irrigation water for area farming, but also serves as a recreation destination and has been used for fish culture. It blocks four threatened or endangered species from migrating to a watershed area of 9 square miles, although there is one other barrier upstream.

The Opal Springs Diversion Dam is in the canyon, about 3.5 miles upstream of the bridge across the Crooked River arm of Lake Billy Chinook. It is a hydropower diversion dam that directs essentially all of the river to a powerhouse about 1500' downstream, where the water is returned to the river channel. The dam was rebuilt in

1985 and is now a 20' structure. The fish passage obstacle it presents is both a barrier and a discontinuity in the river. The dam blocks the migration of two threatened or endangered species from a substantial watershed. The Opal Springs powerhouse is at River Mile 7 of a stream that is over 100 miles long. The USGS gauging station 14087400 is within a few hundred feet of the power house and the watershed area above it is given as 4557 square miles. There are other barriers upstream of the Opal Springs Diversion Dam, the largest of which is Prineville Reservoir at RM 70.

Fielder Dam and Wimer Dam are serial impoundments on Evans Creek, which flows into the Rogue River at the town of Rogue River OR. Fielder Dam is the downstream member of this pair and is located just above the confluence of Fielder Creek, which is at Evans Creek RM 3. The dam is a 25' structure that dates from 1934, and has formed a pool about 200' wide and reaching about a mile upstream. There is a fish ladder in place, but it requires a level of overflow to function effectively. There is no apparent use of the stored water, although an abandoned flume along the west shore of Evans Creek suggest an irrigation history. The dam blocks one threatened fish species from migrating up Evans Creek, whose main stem is sizable but is blocked by four other barriers upstream of Fielder Dam.

Even before Fielder Dam made the Top Ten of the Fish Passage Priority List, WaterWatch of Oregon was working to negotiate the dam's removal. In April, after their negotiations with landowners could not find agreement, they filed suit seeking a court order to enforce the provisions of the Endangered Species Act. More delay in removing the dam or providing adequate passage could render the issue moot as the creek is inching around the dam's west abutment.

Wimer Dam is at RM 10 of Evans Creek, about a mile upstream of Wimer OR and 6 miles upstream of Fielder Dam. The dam is not shown on the WRD Rogue basin map, but there is a flume shown that begins at the approximate location of the dam. It is a concrete structure 8' high and about 70' wide. It blocks a single threatened species from using the 26 miles of Evans Creek's main stem above the dam, although there are three other barriers upstream.

The attention the Fish Passage Priority List brings to individual barriers is a good exercise because each instance can be judged on its particular merits. The ensuing discussions should be helpful to both dam owners and fish passage advocates.

OHA Issues Green Advisory for Rainbow Trout

In June of last year, the Oregon Health Authority issued its first ever Green Advisory for hatchery rainbow trout in Cottage Grove and Dorena Lakes. People who read and contemplated the first ever Green Advisory would understand it was an endorsement of rainbow trout fishing in these two reservoirs, which have very high mercury levels. People of all ages are told they can safely eat nine meals in a month of rainbow trout less than 12" from Cottage Grove Lake, and 13 meals if the trout come from Dorena Lake. Even nine rainbow trout meals in a month must approach a world record status of feasting, so the OHA recognizes that trout grown in a hatchery have not been exposed to mercury and have not accumulated it into their tissue prior to being placed into these reservoirs. These hatchery trout would have to grow to a length greater than 12" before their residence time in these reservoirs would allow them to accumulate sufficient mercury to present a health hazard.

But regardless of what color is invoked, placing the word "Advisory" next to rainbow trout carries a negative connotation for the fish and it undermines the accepted understanding of advisories as well. Furthermore, does stating this policy for Cottage Grove and Dorena Lakes mean that it is not applicable elsewhere? The message is worthwhile, but it seems misplaced. Green Advisories are a new category of communication from OHA and if this "first ever" example is representative, similar messages to follow might benefit from being presented as Health Impact Assessments, which are already established as OHA bulletins on health matters.

A Win/Win Watershed Survey in Polk County

At their meeting on April 13th, the City Council for Dallas OR received a Natural Resource Inventory for the Rickreall Creek Watershed from the Polk County Soil and Water Conservation District. The project began in August 2010 and cost $50,000, $30,000 of which came from an Oregon Department of Human Services grant. The council chamber was surely full of smiles. The City Council was pleased to have the PCS&WCD's appraisal of the watershed, and the PCS&WCD was pleased to have a baseline dataset that will serve them far into the future. In fact, the project included donated labor from the Conservation District.

Rickreall Creek arises on the south slope of Laurel Mountain in the Coast Range. It flows 33 miles to join the Willamette River west of Salem. The watershed encompasses 98 square miles between the elevations of 3589' atop Laurel Mountain to 130' at the confluence with the Willamette. The upper watershed is steeply forested, it is urban/industrial in the middle section, and the lower section is low relief farmland and residential. Dallas, the county seat of Polk County, is the only substantial city in the watershed, and the city draws its municipal water supply from the Rickreall drainage. The principal water supply is Aaron Mercer Reservoir, a 1550 acre-foot impoundment at River Mile 26 on Rickreall Creek. This reservoir, like Portland's Bull Run water source, has essentially no other users above the inlet to the Dallas distribution system. As a drainage on the west slope of the Willamette Valley however, the Rickreall is not as an abundant supply as is Bull Run.

Water released from the Aaron Mercer Dam is diverted into the Dallas municipal intake at RM 20, which can produce low flows in the downstream creek channel during late summer. The creek has an in-stream water right to 5 cfs at RM 19.1, but this water is over appropriated and claim priority is used to arbitrate disputes. The Dallas protocol to address prior water rights in the lower reaches of the stream is to release sufficient water from the reservoir for the municipal diversion plus the volume of water flowing into the reservoir. There have been instances when releases greater than this calculated volume have been used to augment low natural flows.

Land ownership in the upper watershed is by private timber companies and some BLM property. The city of Dallas owns just 14.5 acres of the 13,000 acres above Aaron Mercer Dam. The Natural Resource Survey examined 364 privately owned timber stands throughout the Rickreall basin. Multiple plots in each stand were examined in detail following a standardized checklist. Timber, soil conditions, fish and wildlife habitat, streams, invasive plants, recreation opportunities, water quality, fire risk, and cultural and historical resources were all considered in the Polk County Soil and Water Conservation District's evaluation. The PCS&WCD report then has a wealth of information that can be used to fashion informed decisions about land management questions. This is precisely the data that the Dallas City Council was seeking when they commissioned the report. They now have a tool that allows them to identify and prioritize areas of concern, within the context of the larger watershed.

Is Aaron Mercer Reservoir Ready for the *Atlas of Oregon Lakes*?

The on-line Atlas of Oregon Lakes, http://aol.research.pdx.edu, is a repository of data from Oregon water bodies. It is the long term goal of the Atlas to expand its selection of entries.

Any discussion about Aaron Mercer Reservoir must begin by reconciling its name controversy. The reservoir is recognized in the GNIS as Aaron Mercer Reservoir, ID #1158100, which includes listing Mercer Reservoir as a Variant Name. The USGS topographical map of the Socialist Valley quadrangle shows the full name for the reservoir while just the shortened form appears on the Oregon Water Resource Department basin map for the Mid Willamette River. The Dallas City Council, which built and owns the dam and reservoir, used the name "Dallas Reservoir" when they made their original request to OWRD for water rights in 1959. Later, on 21 April 1969, they passed a resolution to call the facility Mercer Reservoir, and used this name on the OWRD paperwork to enlarge the dam in 1971. Aaron Mercer was the city engineer and water commissioner for Dallas during the planning stages of the reservoir, and a city councilman for years after the dam was built. The official decision to use his full name for the reservoir minimizes confusion with Mercer Lake, the dendritic dune lake in Lane County to the north of Florence.

The original dam was built around 1960. It was an earthen dam with a concrete spillway. The dam measured 100' wide at stream level and was 400 x 17' at the top. Water releases are made through a 30" reinforced drain pipe with a sliding 24" head gate. The upstream dam face used heavy rock as wave protection. The dam was enlarged to its present size in the early 1970's by building up the downstream face. It is now 79' high and has top dimensions of 480 x 20'. The enlargement raised the height of the dam by 13' and lifted the spillway crest by 16'. The spillway is 240' across and configured as a concrete labyrinth weir, which has the appearance of triangular ramparts projecting back into the pool. The spillway is set at 764' of elevation. The enlargement increased the capacity of the reservoir by 790 acre feet to its present level of 1550 acre feet.

At full pool, the reservoir covers an area of about 60 acres. Maximum depth is 71' and mean depth is 27'. The pool is about a mile long and 0.1 miles wide. The undulating, parallel shore lines reflect the steep terrain of its location. The drainage basin above the dam is just more than 20 square miles. In addition to Rickreall Creek, the reservoir receives input from Rockhouse Creek. Precipitation in the drainage basin typically ranges from 85 to 120" per year, although the total was 206" in 1996 atop Laurel Mountain, the highest spot in the watershed.

The Aaron Mercer Dam is a complete barrier for upstream fish passage. Cutthroat trout are native in Rickreall Creek and largemouth bass have been illegally introduced into the reservoir. Public access and fishing is not prohibited, but the road to the reservoir is privately owned and gated. The gates are irregularly opened and closed, mostly for truck traffic. Anglers beware.

The drainage basin had a wildfire in 1987. It ignited on 18 October and continued for eight days, burning 5000 acres, 3000 acres severely. The entire shore of the reservoir was affected and raised concerns about increased silting. An emergency response was devised and had been put into place by 24 November. The plan called for annual grass seed to be sown on barren slopes, and 19 sediment dams to be constructed in 7 known creek beds. These measures did mitigate sediment movement and were also beneficial for the lessons they provided. Optimal weather after the fire allowed the grass seed to sprout and stabilize some slopes. But the resultant plantings later hampered the timber cultivation of the property owner. The compromise approach would limit grass planting to slopes immediately adjacent to established creek beds. Sediment dams can be effective but are very prone to being washed out or undermined. The best results using straw bales occurred when 850 pound

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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.

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Aaron Mercer Reservoir . . . (cont.)

bales, measuring 39 x 96 x 48", were placed in streams lengthwise, and anchored over a foundation of sand bags that sealed the dam's base. Smaller straw bales seldom withstood the peak flow they were subjected to. These temporary dams work more to delay the siltation after a fire rather than as a preventative measure. Increased siltation rates were observed for several years after the fire. Another fire effect was an increase in water temperature from the loss of riparian shading.

Public records of reservoir water quality data are elusive, if they exist at all. *Lake Wise* is grateful to the Polk County Soil and Water Conservation District for making available the 2001 "Rickreall Watershed Assessment", by Kim Mattson and Andy Gallagher. This report has gathered what monitoring data there were, but the most relevant sampling site listed for characterizing Aaron Mercer Reservoir was ten miles downstream of the dam, where the creek approaches Dallas. These results are displayed below:

RICKREALL CREEK WATER QUALITY AT RM 16.7									
Temperature	Dissolved Oxygen	Turbidity	pH	Conductivity	TDS	NO-2, NO-3 N	Organic N	Ortho P0-4	Chlorophyll α
° C.	mg/L	ntu		µmhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L
8 - 18	9.5 - 12.0	1 - 4	7.5 - 7.8	117 - 214	65 - 102	0.03 - 0.04	0.17 - 0.20	0.01	1

These numbers only approximate what measurements from the reservoir might be. There are tributaries entering Rickreall Creek between the dam and the sample point, and the values above are said to be representative summaries of the raw data. Still, the only concern from these numbers center on the elevated turbidity, conductivity, and total dissolved solids. Siltation is a recognized problem for the reservoir and could explain these peculiarities. A more perplexing problem for Polk County residents is that there is not more water of this quality available.