June 2010

Editor:
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LAKE WISE

A Voice for Quiet Waters

The Oregon Lakes Association Newsletter

Oregon Lakes Association Hosts Harmful Algae Bloom Workshop at OSU

By Karen Williams, OLA President, ODEQ NW Basin Coordinator

Spring blue-green algae blooms at Jackson County's Willow Lake and Lost Creek Lake have already prompted health advisories, with implications for both recreation and drinking water. As we begin to tally up blue-green advisories for the season, we can at least count ourselves fortunate to have dedicated staff at the Oregon Department of Human Services – Public Health Division, an established Harmful Algal Bloom Surveillance state program, and elite academic expertise within our borders.

With the help of several partners, OLA coordinated a technical workshop at Oregon State University in late May about Harmful Algae Blooms. Jennifer Ketterman, coordinator of the DHS HABS Program, was instrumental in securing funding that allowed OLA to offer this workshop for a relatively low registration fee. Last year, OLA welcomed to its membership, world renowned cyanobacterial toxicologist and Wright State University professor emeritus Dr. Wayne Carmichael, who led the two-day workshop. Dr. Theo Dreher, chair of the OSU microbiology department, offered his laboratory space and equipment, the assistance of several of his students, and his own expertise in genetic identification of cyanobacteria.

Workshop registrants represented a subset of the community OLA aims to serve: staff and managers from state and federal agencies, lake managers, public drinking water providers, university researchers, watershed councils, utility companies, and consultants. As with all OLA gatherings, the professional networking proved valuable, especially as we grapple with the interdisciplinary and interagency aspects of managing HAB monitoring, analysis, and communication.

The technical presentations and laboratory work made for a packed two days. Dr. Carmichael adeptly covered a vast topical range including chemistry and health effects of algal toxins, biology of toxin producing algae, treatment strategies, sampling considerations, and analysis methods for measuring toxins. Jennifer Ketterman and Casey Lyon, DHS drinking water specialist, presented an overview of HAB occurrences in Oregon, DHS tracking and reporting of HAB, and DHS communications with drinking water providers. Dr. Theo Dreher presented a glimpse of his laboratory's research into the genetic identification of cyanobacteria.

Workshop participants spent an afternoon in the laboratory gaining hands-on experience with algae identification and measuring toxins. Dr. Dreher's laboratory assistants had set up 35 microscopes and an assortment of samples. Workshop participants were tasked with identifying the algae in the samples by working through a dichotomous key. Drs. Carmichael and Dreher then presented the theory behind the toxin measuring kits, all based on the ELISA method (enzyme-linked immunosorbent assay). Kits are available to measure microcystin, saxitoxin, and cylindrospermopsin, but, unfortunately, not yet anatoxin. With about 20 minutes of sample preparation, one can obtain at least a rough estimate of toxin concentration, if toxin is present

at all. A "dipstick" paper kit allows an assessment "between 1 and 5 micrograms/liter" or "greater than 5 micrograms/liter," but often that may be sufficient information for a lake manager to proceed with more intensive sampling or more expensive analysis. An investment of another 20 minutes and visual comparison with standard samples in test tubes will gain the lake manager somewhat greater precision. With a spectrophotometer, one can quantify these tube samples at a level comparable with results from ELISA plate kits. Dr. Dreher's lab assistants demonstrated the multiple dilutions and replicates necessary for an accurate plate kit analysis.

Watch the OLA website for the technical presentations, reference list, and analytical kit information from the Workshop. Not an OLA member? Visit www.oregonlakes.org and join our community of lake advocates.

Remodeling Underway at Hebo Lake

This three acre pond on Mount Hebo is in the Three Rivers drainage of the Nestucca River basin, about three miles east of Hebo OR. There are camp sites and day use facilities there, which receive substantial use from people attracted by the rainbow trout stocked in the lake each spring by the ODFW. Fishing regulations limiting the size and the number of fish caught were suspended this year for the eight days before May 2nd, when preparations to drain the lake were begun. The schedule for the planned remodeling shows the lake empty by mid May to allow the bottom soils to dry out before excavation to increase the depth of the lake gets underway in the summer. Access to the lake will be closed to the public until sometime in September, when the deeper lake will reopen for public use and inspection of the changes to the campgrounds and trails.

Hebo Lake is thought to occupy the site of a natural lake that had been drained while the property was privately owned. A Civilian Conservation Corps dam re-established the lake after the property came under federal control in 1930. The dam spillway is at 1650 feet above sea level and the greatest lake depth is 9 feet below this level. Lake chronicles note that sometime after 1961, the non-native, invasive nuisance species, fragrant water lily *(Nymphaea odorata*) became established at two locations along the shore. The need for a new outlet valve made it necessary to drain the lake in 1999. The lake can experience low dissolved oxygen during the late summer months, which has led the ODFW to limit their annual stocking to the period from March to mid June. The four, existing fishing platforms are not in compliance with the Architectural Barriers Act, and there are recognized benefits that could be obtained by changes in the layout of campsites, parking areas, and trails.

These observations and limitations have been under consideration for several years, and came together in the Environmental Assessment of the Hebo Lake Access Improvement Project, which was made public in February 2009. The Notice of Decision was issued on 30 April 2009 to proceed with the changes described in the EA. Funding for the project is from the American Reinvestment and Recovery Act, the stimulus bill Congress passed in February 2009.

The principal objective of the project is to increase the average depth of the lake from 2-3 feet to 6 feet. The bathymetry chart for Hebo Lake, displayed in volume 1 of the USGS *Lakes of Oregon* series from 1971, shows a "deepest in the middle" lake with the central depression extending toward the dam. The planned excavation will make it more of a steep sided, flat bottom pond. To protect the integrity of the existing shoreline, no lakebed removals will occur within a 10 foot perimeter zone. The focus of the excavation will be to increase the depth in a 75 foot radius around the four, new and larger, fishing platforms. A fifth platform will be added.

The increased lake volume is intended to improve and extend the fishing season, and discourage the spread of the fragrant water lily patches.

Dry Summer Expected at Thief Valley Reservoir

Thief Valley Reservoir is another Oregon water body enjoying a relaxation of fishing regulations this year. The ODFW announced in late April that minimum size limits could be ignored and the daily limit would increase from 5 to 15 for the remainder of the fishing season. The possession limit of two daily limits and other applicable rules will remain in force. The rainbow trout that are the subject of this inducement to fishermen are thought to be in danger of discomfort and death later in the summer if runoff forecasts turn out as predicted. Less than normal winter and spring precipitation and a subpar snow pack make it likely the reservoir will dry up by the end of summer.

It is not readily apparent why this reservoir should run out of water. The impoundment is located on the lower end of the Powder River, it has a storage capacity of 13,300 acre-feet, and has a drainage basin greater than 800 square miles, which includes the southwest foothills of the Wallowa Mountains and the Elkhorn Ridge of the Blue Mountains. There are points within this watershed that exceed 8000 feet elevation, which is about 5000 feet above the spillway at Thief Valley Reservoir. Phillips Lake, Pilcher Creek Reservoir, and Wolf Creek Reservoir are all upstream of Thief Valley Reservoir, but the water stored in these impoundments is largely allocated to irrigation. Baker City also draws its municipal water supply from this drainage basin. As the downstream component among Powder River water users, Thief Valley Reservoir assures water is plentiful in good years, and faces shortages when runoff is low.

Thief Valley Reservoir became operational in 1932 as part of the Bureau of Reclamation's Baker Project, which splits the Powder River drainage into upper and lower districts. Phillips Lake is also a Bureau of Reclamation facility and since its completion in 1968, it is the principal water supply in the upper district. Coordination of water releases within the facilities of the Baker Project follow an established protocol that will continue to guide decisions during the final months of the present Water Year.

A drawdown curve for Thief Valley Reservoir, based on the midnight water level on the last day of the month, has been compiled from USGS records for Water Years 1980 to 1996. Monthly means were calculated for these 17 years of data, and an estimate of variability from year to year was gained by calculating the standard deviation for these means. The study of statistics has shown that 95% of the variability observed for a mean value is contained within a range of ±2 standard deviations from the mean. This observation justifies placing confidence limits for the mean value on a drawdown chart, which in turn, makes it possible to anticipate the range of future water levels based on historical measurements.

The Thief Valley drawdown chart shows the reservoir's mean water level fluctuates from a 3133 foot elevation high during February to April, to a low of 3110 feet in September. The dam spillway is at 3133 feet in elevation and the lake's minimum pool is at 3090 feet. There is very little variability of the water levels seen in March, but the range of water levels can vary substantially in August and September. Note that it is not unlikely that the water level in these two months can be below minimum pool. The records show the water level at or below 3090 feet in 1992 and 1994. The drawdown level expected later this summer then is not unprecedented.

Goldfish to be Purged from Mann Lake

Early in May, the ODFW announced that planning was underway to treat Mann Lake with rotenone to rid the lake of the problem goldfish there. The announcement has garnered wide support and the promise of volunteer help as the target date in August gets closer. Details are still being worked out, but it came as little surprise that the time for this remedy had at last arrived.

Mann Lake is a shallow, no outlet lake on the east side of the Steens Mountains. It is one of a string of small depression lakes fed by runoff from the mountains. While there are some marshy areas along the lake's south shore, this region in Harney County is largely semi-arid rangeland. Arid region lakes without outlets typically have high mineral content because evaporation concentrates the dissolved ions flowing into the lake. Predictably, Mann Lake has high alkalinity and conductivity. Wind at the base of the mountains can be strong enough to suspend the fine soils of the lake shore with wave action, and raise the turbidity of the lake water.

Since the 1950's, the ODFW has used the lake to produce Lahontan cutthroat trout eggs. These fish can thrive in warm, turbid, alkaline waters and enjoy a good reputation as a sport fish. Anglers using artificial flies and lures are allowed to take two fish per day from this brood stock, if the fish are greater than 16 inches. This prospect made Mann Lake popular enough with fishermen that someone arrived with the idea of using goldfish as live bait. Minnows have also been found in the lake. The introduction of a breeding pair of goldfish around 2001 has produced a population that now competes with the Lahontan cutthroat for space, oxygen, and food. Goldfish were found in Chickahominy Reservoir in this same timeframe, but the problem there was eliminated by draining the impoundment during the 2003 low water year. In Mann Lake, the bottom feeding behavior and schooling tendency of goldfish keep the lake water roiled and increase the likelihood of algae blooms once the macrophytes are gone. Based on multiple reports of 13 inch goldfish coming from the lake, goldfish are untroubled by these conditions. Raising goldfish greater than 12 inches in length might be more lucrative than the market for Lahontan cutthroat, but that is not the business of the ODFW. They recognize too that the Mann Lake trophy goldfish may not be of show quality.

Rotenone is an attractive solution at Mann Lake because all things considered, it is cost effective. The testing to be done to determine proper dosage ensures the likelihood of success. With the exception of draining, a rotenone application has the greatest probability of killing the last two fish of a population on the first try, without lingering side effects. Mann Lake has an area that varies around 275 acres, has a maximum depth of about 14 feet, and has an uncomplicated lake bottom; but a systematic seining effort would require multiple sweeps and still need a wait and see period. Draining is seldom an option for a sump lake. The ODFW has rotenone on hand and continues to gain experience with this management tool.

The list of Oregon lakes where this whole lake treatment could be used to fix problem fisheries would not have so many candidates if people would consider the long term consequences of their actions. Oregon's new law making jail time and a fine the penalty for the unlicensed transport of live fish should help to keep this backlog from growing.

Brownlee Reservoir, and a Great Way to View It

Brownlee Reservoir is the uppermost and largest impoundment of the Idaho Power Company's three dams in their Hells Canyon complex on the Snake River. The 420 foot dam went into service in 1958 and has a capacity to generate 585 megawatts of electricity as a run of the river facility. Reservoir residence time varies from 15 to 70 days. The lake is 58 miles long and has a surface area of 15,000 acres. Oregon's Powder River and Burnt River are the major tributaries flowing directly into the reservoir. A drawdown curve compiled from end of the month stage readings for Water Years 1964 to 2005 shows a mean seasonal drawdown of 31 feet. The curve is unusual in that it peaks in June from a low in March. There is a secondary peak in November that rises from a dip in October. The shorelines of the reservoir are steep but the stability that comes with regulating river flows has made it feasible to make more use of this land at the water's edge. There is a perimeter road along the entire shore of the Oregon side and most of the Idaho side.

Brownlee Dam has no provision for anadromous fish passage, but water releases to facilitate the downstream migration of juveniles is one of the several factors weighed in the day to day operation of the dam. The lake does enjoy popularity for its boating opportunities and as a warm water fishery. The Oregon State Marine Board's 2008 Triennial Report ranked Brownlee Reservoir at 27th among all of the state's waterways for Boat Use Days. Fishing was far away the most reported boating activity for the reservoir. Populations of small and largemouth bass, crappie, catfish, perch, bluegill, and stocked hatchery trout are all found there. Boat fishing is legal with a license from either state, but bank fishing must be done with proper geographic documentation. Charter services and boat ramps are available at both ends and on both sides of the reservoir. Both Oregon and Idaho have issued advisories warning people to limit their consumption of Brownlee fish due to elevated mercury concentrations.

From almost everywhere in Oregon, access to Brownlee Reservoir requires some time on I-84. Huntington OR is a town along I-84, between Baker City and Ontario, and is served by I-84 exits 345 and 353. When stage coaches were the best available mode of transportation, Huntington was already on the main route but was then known as Miller Station. It is on the Burnt River, just upstream of its confluence with Brownlee Reservoir. This Baker County town has a population similar to Arlington or Fossil.

Bill Burley is a Huntington resident who in 2007 came up with the idea to re-establish sternwheeler service on Brownlee Reservoir. At one time or another, there were three such vessels moving people and freight up and down the Snake River in the late 1800's. The thought of this anachronism proved popular and soon, the Snake River Sternwheeler Association had a page on Facebook, a 501 c 3 non-profit registration with the IRS, and a growing membership of 140 people.

Publicity and fundraising for their project was successful enough to make Plan B a reality. On May 22nd, a 40 foot sternwheeled craft arrived in Huntington after a long ride from Wisconsin on a flat-bed truck. The boat is a double-decker, diesel powered vessel with a 12 foot beam and a wood and fiberglass composite hull. It can operate in 20 inches of water. The boat was hand built in1995 at a town just south of Buffalo NY. It has seen service in Assawoman Bay, on the coast of Maryland, and was Coast Guard approved there to carry 45 people. A similar role was planned for the amusement park in Marshall WI prior to the sale to the Huntington group. A Coast Guard inspection is the next step the *Li'l Millie* will face. The necessary renovations discovered in this appraisal will determine the timing of the subsequent phase of the project, but the target is for this new service to begin by Memorial Day 2011.

The current idea is to base the boat at Farewell Bend and provide boat rides up to as far as Richland, on the Powder River arm of the reservoir, or the Woodhead Park area further toward the dam on the Idaho side. Transports, private events, and any other serious engagements will be given consideration, and travel to the boat from Huntington can be a part of the deal. Ship captains can solemnize successful marriages. The boat is trailerable and can serve as an attraction throughout the greater Brownlee Reservoir area. The goal of the Snake River Sternwheeler Association is for their boat to spur tourism in the region by offering an additional perspective to the history and resources of this part of Oregon and Idaho.

EPA Issues Their Pesticide Permit Proposal

The continuing litigation to define the intent of the Clean Water Act was further advanced in early June when the EPA released their proposal to issue permits for the discharge of pesticides into the waters of the United States. This action was made necessary by the ruling of the 6th Circuit Court of Appeals against the 2006 EPA decision not to require National Pollutant Discharge Elimination System (NPDES) permits for pesticide applications that complied with the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) labeling requirements for the pesticide. The 6th Court requirement for this additional NPDES permitting must be in place on 10 April 2011.

The EPA response to this court mandate creates a Pesticide General Permit (PGP) that covers the application of biological or chemical pesticides that leave a residue for four Pesticide Use Patterns (PUP): mosquito and other flying insect control, aquatic weed or algae control, aquatic nuisance animal control, and forest canopy pest control. PUP other than these four classes must seek an individual or alternate general permit. An individual or general permit must also be obtained for pesticide applications to waters already impaired with those specific pesticides or their degradants, to national outstanding resource waters, and to terrestrial applications to control pests in agricultural crops or forest floors that are near waters if the United States.

The entity responsible for obtaining the PGP is the person who decides the application is warranted, the person who finances the application, or the person who ensures the application complies with the FIFRA labeling requirements. The holder of a PGP is required to minimize pesticide discharges by selecting the lowest effective concentration, avoiding leaks and spills, and calibrating the application equipment. Adverse incidents that occur during the application must be reported. Integrated pest management practices, which take into consideration the life cycle and susceptibilities of the problem pest, must be implemented. A pesticide discharge management plan must be prepared. There are requirements too for annual reports and the maintenance of pertinent records. Like all NPDES permit applications, a PGP has a 30 day comment period in its approval processing.

Another requirement of a PGP holder is to file a Notice of Intent (NOI) if a pesticide application is expected to exceed an annual treatment application threshold. This requirement identifies exceptionally large treatment areas or specific land areas receiving multiple treatments within a calendar year. For the PUP regarding flying insects or forest canopies, the threshold area is 640 acres. For the aquatic weeds or algae PUP, the threshold is 20 acres. For the aquatic animal PUP it is 20 acres or 20 linear miles along the water's edge. The water's edge threshold would be met by treating both sides of a 10 mile ditch, or both sides of a 5 mile ditch twice within a calendar year.

The NOI must be filed electronically at least 10 days before the planned treatment. The NOI filing must include the responsible party's contact information, the activities to be carried out, and the location of the intended application. The application can proceed within 10 days after the EPA acknowledges the NOI filing. Provisions are also made for an emergency NOI, which can be filed up to 30 days after an application.

The comment period for this proposal ends on 19 July 2010. A more detailed explanation of the proposal is available at www.epa.gov/npdes/pesticides. In Oregon, it is the Department of Environmental Quality that is the permitting authority and they can impose additional elements to this proposal.

Maintenance Drawdowns Announced by U.S. Army Corps of Engineers

The wisdom of preventive maintenance is well accepted and dams are among the mechanical devices that benefit from this attention. It is little surprise then that the USACE will purposely lower the water levels in late July and August at Falls Creek Reservoir, Hills Creek Reservoir, and Lookout Point Reservoir to extend the time available for inspection and repairs.

What makes this routine announcement of interest is the opportunity it presents to demonstrate the value of having drawdown records. There are 40 years of readily accessible, USGS drawdown readings available for Hills Creek and Lookout Point Reservoirs, and 37 years of data for Falls Creek Reservoir. Monthly means and 95% confidence limits calculated for the stage levels at these, Middle Fork Willamette River, flood control reservoirs, show similar, smooth, sinusoidal curves that peak in May or June from lows in November or December. These values are based on a single reading per month, taken at midnight on the last day of the month. Charts created with a different methodology would differ in minor details but would be little different in the trends depicted.

Water surface levels that peak in May or June are already falling by mid July so purposeful releases in late July will not reverse a trend. Knowing the typical drawdown pattern helps in the selection of a drawdown target that will be useful for the planned maintenance, but will not be overly disruptive to the reservoir's other uses. At all three reservoirs, the USACE target drawdown level is just below a level that is the lower limit for 95% of the historical readings. The target levels are at the 99% limit, which is a value equal to 3x the standard deviation subtracted from the mean.

Fall Creek Reservoir will be lowered to 780' by early August. The drawdown chart shows that for 95% of the time, the water level is expected to be no lower than 804'and declining at the end of July. The 99% limit for this date is 794', but the historical variability of water levels is greater during August so it is not unreasonable to expect the USACE target to be attained by "early" August.

At Hills Creek Reservoir, the target level is 1490' by mid to late August. The drawdown chart shows that 95% of the time, the water level will be higher than 1494' at the end of August. At the 99% limit however, the water level is expected to be above 1479', so the USACE target a week or two earlier is readily attainable.

The water level will be lowered to 855' at Lookout Point Reservoir by August 1st, and the drawdown chart shows that at the 95% limit, the expected stage is greater than 874' on July 31st. The 99% limit is 857', which is very close to the USACE target for the next day.

LAKE WISE
The Oregon Lakes Association
Newsletter 2010 #2

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OLA Mission: The Oregon Lakes Association, a non-profit organization founded in 1990, promotes understanding, protection, and thoughtful management of lake and watershed ecosystems in Oregon. For additional information on OLA, write to the address above, or visit our website.

OLA welcomes submissions of material that furthers our goals of education and thoughtful lake management in Oregon, and is grateful for the corporate support that helps sustain the organization. Corporate members are offered a one-time opportunity to describe their product or service to Lake Wise readers. These descriptions are not endorsements, and opinions appearing in Lake Wise are not OLA policy statements.

Visit our website: www.oregonlakes.org

Maintenance Drawdowns . . . (cont.)

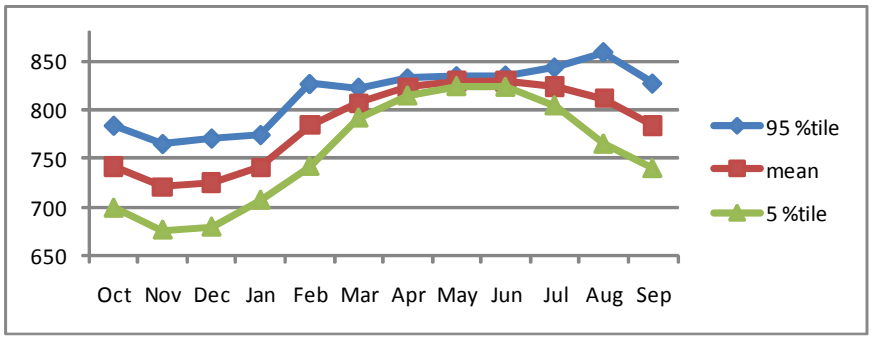
Drawdown is every bit as much a feature of lakes and reservoir as are temperature profiles and residence times. Drawdown patterns are dependent on management decisions but over time, these year to year management options become a part of a lake's drawdown history and of the variability observed in the seasonal rise and fall of the water level. It is apparent that the USACE is well aware of the stage level fluctuations in their facilities.

Come to Corvallis for the OLA Conference

This year's annual Conference will occur on Friday and Saturday, September 10-11th in Corvallis. The weekend is an off date for the local football team so there should be a good selection of over-nighting options. OLA looks forward to extending its connection with Oregon State University and the reverence they have for beavers there.

The focus of this meeting will become more apparent as presentation topics are received by our planning committee. All submissions will be considered and are welcomed. Summaries can be sent to the OLA POB 345 in Portland, or through the website. Presenters selected for the Conference will be asked for an abstract as the Conference date approaches. A topic that will receive attention is the results of the Oregon portion of the National Lake Assessment that was performed in 2007. The report from the national perspective was released earlier this year and the Oregon report is expected this summer. The review and the discussion of this report are of some importance because a second round of sampling for the NLA is scheduled for 2012. A thorough evaluation of the 2007 survey is needed to provide the greatest benefit from future assessment surveys.

Fall Creek Lake: Mean Surface Elevation from end of month readings for WY 1966-2003



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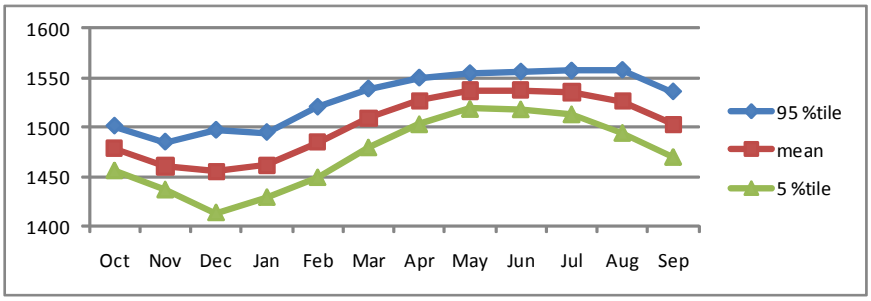
mean	741.6	721	725.3	740.9	784.3	807.1	823.3	829.3	829.2	823.9	811.9	783.4
5 %tile	699	676.5	679.5	707.2	741.9	791.4	814.2	823.9	823	804.2	764.7	739.7
Std. Dev.	21.32	22.24	22.92	16.86	21.2	7.85	4.55	2.69	3.08	9.85	23.59	21.88

Hills Creek Lake: Mean Surface Elevation from end of month readings for WY 1964-2003



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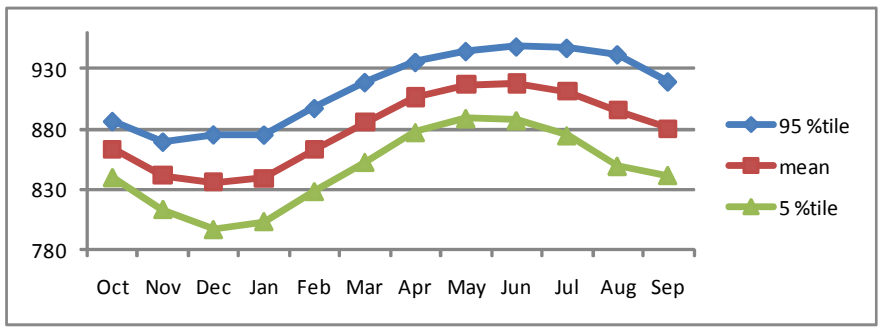
mean	1478.8	1460.8	1455.2	1461.8	1484.9	1509.3	1526.6	1536.8	1537.4	1535.3	1526.3	1503.1
5 %tile	1456.4	1436.8	1413.5	1429.1	1449.3	1479.8	1503.4	1519	1518.6	1513.5	1494.6	1470
std. dev.	11.2	11.99	20.84	16.38	17.8	14.79	11.64	8.93	9.42	10.91	15.86	16.52

Lookout Point Lake: Mean Surface Elevation from end of month readings for WY 1964-2003



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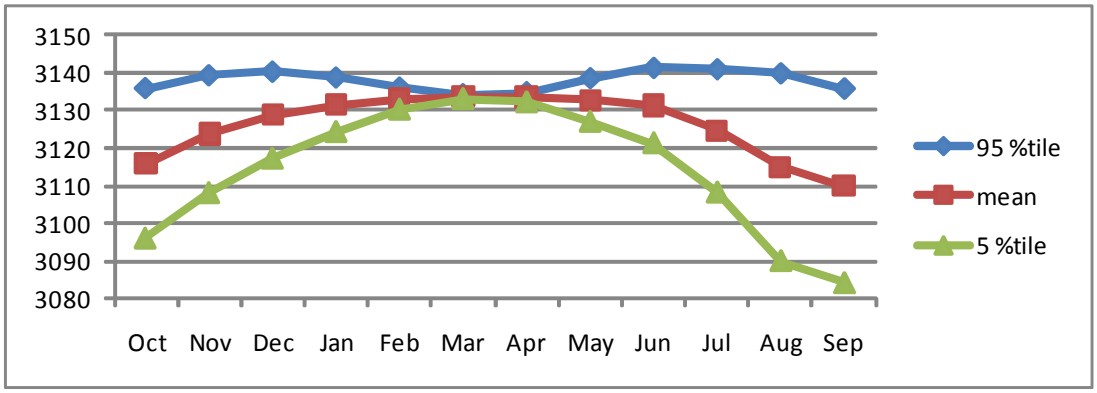
mean	863.4	841.6	836.2	839.4	862.9	885.8	906.6	916.9	918	911.1	895.7	880.6
5 %tile	840	813.4	796.6	803.2	828.2	852.6	877.5	889.2	887.4	874.8	849.4	841.7
std. dev.	11.7	14.1	19.8	18.11	17.33	16.6	14.55	13.88	15.29	18.13	23.15	19.49

Referenced Drawdown Charts

Thief Valley Reservoir: Mean Surface Elevation from end of month readings for WY 1980-1996



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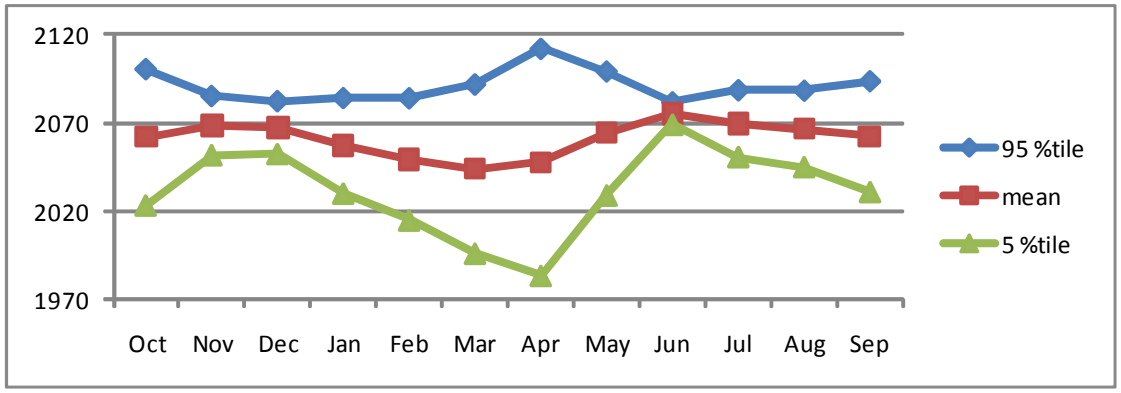
mean	3115.9	3123.7	3128.8	3131.5	3133.1	3133.6	3133.4	3132.7	3131.3	3124.6	3114.9	3109.9
5 %tile	3096	3108	3117.2	3124.3	3130.2	3133	3132.1	3127	3121.3	3108.2	3090	3084.2
std. dev.	9.94	7.82	5.78	3.61	1.42	0.28	0.65	2.88	5	8.18	12.46	12.87

Brownlee Reservoir: Mean Surface Elevation from end of month readings for WY 1964-2005



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
95 %tile	2100.5	2085.1	2082.2	2084	2083.9	2091.7	2111.9	2099.1	2081.6	2088.4	2088.2	2093.6
mean	2061.9	2068.5	2067.4	2057.1	2049.4	2044	2047.7	2064.1	2075.3	2069.6	2066.7	2062.3
5 %tile	2023.4	2051.9	2052.5	2030.1	2015	1996.2	1983.5	2029.1	2069.1	2050.8	2045.2	2031.1
std. dev.	19.26	8.31	7.43	13.46	17.22	23.89	32.1	17.52	3.11	9.4	10.75	15.62