



PRESIDENT'S NOTES

By Megan Kogut, PhD, University of Washington, AWRA-WA President

It may seem a little early to be thinking about 2015, but the AWRA-WA bylaws require advertising the nominated candidates for the AWRA-WA board a month before the election. We have only another one or two newsletters remaining to publish this year, and so this month we've started the process of forming next year's board.

The first step of the process is to ask current board members if they wish to continue on the board for the following year. We have low turnover. The board is 15 members, and generally one to three people move on each year. The president is always removed from the board once he or she steps down from the role of president because the bylaws state that the past president is a non-voting position. Sometimes board members move out of Washington or move on to other professional goals. A few of our board members have been on the board for decades.

We are a really well-behaved board, and we certainly would like to keep it that way by bringing on new board members who work well in a team environment. I realized just how well-behaved we are about a year ago, when I volunteered to be part of a panel for a class on non-profit management. I was the only panel member who was not complaining about managing board dynamics. In fact, instead I told the class that I look forward to our monthly board meetings. We eat dinner together beforehand. We are all respectful and mostly to the point. We often make jokes. Everyone contributes to the discussion, even the board members who usually call in. Of course it helps that our mission is relatively constant from

year to year and does not include advocacy, so that we don't often wade into new projects and we don't find ourselves in heated arguments about political issues.

As I've mentioned before in a newsletter, this year especially we seek nominees who add to the diversity, professional and otherwise, of our board. Of 15 board members, all but three are involved in environmental consulting, including the "semi-retired" board member. We'd like to see more representation from non-profits, agencies and municipal planners. We'd also like to see more representation from regions outside of the Seattle area. Board meetings have a call-in option, and many committee roles can be accomplished anywhere.

If you're interested in being included in the list of potential board nominees for 2015, please send an email with a summary of your background and interests to me at mbkogut@gmail.com. I am also happy to answer any questions about the organization and the board, including the level of commitment and the types of things we do. And of course, if you want to be involved with AWRA-WA in some other capacity besides board member, I am happy to discuss our committees with you. We are an all-volunteer organization, so we always love more volunteers!

Election night will be in November or December at an end-of-year social dinner meeting. All are welcome to the dinner meetings, although only AWRA-WA members may vote in the election. We will advertise this and other dinner meetings via email, newsletter, and website as usual.

**It's COMING! REGISTER NOW FOR THE AWRA WASHINGTON SECTION
ANNUAL CONFERENCE
OCTOBER 23, 2014 AT THE MOUNTAINEERS EVENT CENTER**

THIS YEAR'S TOPIC:

**WATER RESOURCES INFRASTRUCTURE
EMERGING FRAMEWORKS TO MEET MULTIPLE OBJECTIVES**

KEYNOTE SPEAKER: JAY MANNING, CASCADIA LAW GROUP

**LEARN ABOUT INFRASTRUCTURE ISSUES AND CURRENT PROJECTS IN THE PACIFIC NORTHWEST
IMPRESS YOUR CO-WORKERS WITH YOUR RESULTING KNOWLEDGE OF CURRENT AFFAIRS AND PROJECTS
NETWORK WITH YOUR FELLOW PROFESSIONALS**

SEE THE PROGRAM ON PAGE 3

UPDATING WASHINGTON'S WATER QUALITY REGULATIONS

By Erin Thatcher, CH2M HILL

By the end of this year, the Washington Department of Ecology (Ecology) will adopt a new surface water quality rule designed to better protect public health from toxic pollutants, such as mercury. Ecology has been working since 2011 to develop the new human health criteria and regulatory implementation tools for WAC-173-201A. The process has required gathering and interpreting data and information about fish and shellfish consumption in the state, as well as other potential types of exposure to toxic chemicals in our surface waters.

As a result, industries and municipalities around the state may soon face stricter limits on discharges of wastewater and stormwater. As Ecology acknowledges, these limits may present a challenge while we technology catches up with the science. To help smooth the transition, Ecology is developing advanced regulatory tools designed to help permittees stay in compliance while working toward the technology necessary to achieve these limits (Ecology Publication No. 13-10-009).

The process for establishing an updated fish consumption rate, which is used to determine human health criteria for toxics like dioxins and mercury, is complex. It requires consideration of several disparate factors such as:

- How fish consumption varies among geographic regions and subgroups within the State's population;
- How toxicity may vary among fish species and life stages and;
- How toxic pollutants are distributed in the aquatic environment and throughout the state's waters (Fish Consumption Technical Document).

This July, Washington Governor Jay Inslee issued a directive

to the Department of Ecology and proposed raising the daily fish-consumption standard from the current standard of 6.5 grams per day to 175 grams, or nearly a dinner-sized serving of 8 ounces.

Inslee's proposed standard is the same as Oregon's current fish consumption standard. Governor Inslee also proposed legislation, to be included the State Legislature's upcoming session to give the Department of Ecology authority to ban certain toxic chemicals from use. (*Inslee proposes new water-quality standards* Seattle Times, July 9, 2014).

These human health criteria have a direct impact on the amount of dilution a discharger must achieve through outfall design and retrofits, treatment technologies, and pollutant source control. Also, achieving the existing human health criteria are already a challenge for some permittees. On the other hand, some public comments have expressed concern that resulting water quality criteria and regulatory implementation may still not be protective enough ("Feedback on Current Rule-Making", <http://www.ecy.wa.gov/programs/wq/swqs/whatpeoplesay.html>).

Whatever the final outcome, the new rule will have important implications for industries, municipalities, regulators, and public health. Several more opportunities for public and stakeholder input will occur before the final rule and implementation tools are released.

For updates on the rule-making, supporting technical documentation, public forum dates, and implementation tools (anticipated in the next few months), go to <http://www.ecy.wa.gov/toxics/fish.html>.

UNIVERSITY OF WASHINGTON SPEED NETWORKING UPDATE

As the 2013-2014 school year was drawing to a close, approximately 30 students and professionals met at the University of Washington for a speed networking event. This joint meeting with the AWRA State and Student Chapters allowed students to get one-on-one time with professionals. Like speed dating, participants rotated every 5-10 minutes to allow students to network with all of the professionals. Following the speed networking, a panel of young professionals discussed successes and challenges they experienced entering the workforce.

Throughout the event, students asked questions about resumes, strategies for getting an interview, responsibilities of particular jobs, and career goals. Students received this career guidance while professionals got a peek at new talent entering the workforce. Students were encouraged to join the AWRA-WA mentoring program that pairs students with experienced water resources professionals.

The AWRA-WA mentoring program is ongoing. If you would like more information or want to know how to join as a mentor or mentee, visit <http://waawra.org/GetInvolved/Mentoring>.



2014 AWRA-WA Annual State Conference

Water Resources Infrastructure

Emerging Frameworks to Meet Multiple Objectives



October 23
Seattle, Washington
 American Water Resources Association Washington Section

Details and registration at
www.waawra.org

Keynote Speaker: Jay Manning, Cascadia Law Group

Session 1: Multiple Objectives - History and New Concepts

Existing Infrastructure, New Objectives

Bob Freitag, Director, University of Washington Institute for Hazards Mitigation Planning and Research

Principles for Sustainable Infrastructure Innovation

Rhys Roth, Director, Center for Sustainable Infrastructure at The Evergreen State College

Floodplains by Design

Bob Carey, Director of Strategic Partnerships, The Nature Conservancy

Session 2: Adapting Existing Infrastructure - Retrofitting, Relicensing, and Replacement

Tacoma's Cushman Dam

Steve Fischer, Assistant Generation Manager, Tacoma Power

Culvert Replacement Program

Paul Wagner, Environmental Services Biology Branch Manager, Washington State Department of Transportation

Dike, Floodplain, and Infrastructure Work in Yakima County

Joel Freudenthal, Senior Natural Resource Specialist, Yakima County Public Services

Ballard Locks

Marian Valentine, Locks Operations Project Manager, Seattle District, U.S. Army Corps of Engineers

Session 3: New Infrastructure Projects and Processes

Sunset Falls Fish Passage and Energy Project

Scott Sphar, Manager, Generation Engineering, Snohomish County PUD

Green River System-Wide Improvement Framework

Lorin Reinelt, Managing Engineer, River and Floodplain Management Section, King County DNRP/WLRD

Yakima Basin Integrated Water Resource Management Plan

Derek Sandison, Director, Office of Columbia River, Washington Department of Ecology

Session 4: Panel Discussion - Lessons Learned and Paths Forward

Register now at www.waawra.org

Questions? Contact Allison MacEwan, allison@ridolfi.com

The Water Report is a Media Sponsor for the Conference

WANAPUM DAM

MANAGING A DISRUPTION IN WATER INFRASTRUCTURE

By Steve Nelson, RH2 Engineering, AWRA-WA Board Member

BACKGROUND

Wanapum Dam is operated by Grant County Public Utility District (PUD) #1 and located on the Columbia River, six miles downstream of Vantage, 18 miles upstream of Grant PUD's Priest Rapids Dam, and 38 miles downstream from Chelan PUD's Rock Island Dam. The 185-foot-high concrete and earth dam was constructed from 1959 to 1963 and stretches more than 8,600 feet across the Columbia River to create the Wanapum Pool behind the dam. Wanapum Dam generates more than 1,000 megawatts of hydroelectric power for the citizens of Grant County and the Pacific Northwest.

On February 24, 2014, Grant PUD staff observed an apparent offset in the steel guardrail and curbing alongside the access road atop the dam (see photo, this page), which led to investigation and discovery by divers of a horizontal concrete fracture on the upstream side of one of 13 spillway concrete piers near the center of the dam. The 65-foot long fracture ran the length of the pier with a maximum aperture of 2 inches. Upon discovery, Grant PUD notified State and Federal authorities and upstream and downstream dam operators and began drawing down the Wanapum Pool. Several days of drawdown sufficiently reduced the hydrostatic pressure on the concrete pier, which reduced the fracture opening and restored the pier close to its original position.

The Wanapum Pool was lowered by 26 feet to facilitate investigation and repair. The reservoirs behind Priest Rapids Dam downstream and Rock Island upstream were initially drawn down by less than 10 feet to accommodate the rapid drawdown at Wanapum, until the dam operations could be balanced and synchronized. Pools behind these two dams soon recovered to normal conditions.

INVESTIGATION

The Grant PUD used data from detailed core drilling into the concrete pier and underlying bedrock, ground-penetrating radar and echo-location to characterize the fracture orientation and geometry, the bedrock condition, and to evaluate the potential forces acting on the pier that may have caused the fracture. Core drilling was conducted using barges upstream of the dam and small rigs attached to the downstream spillway face. The investigation led to Grant PUD's conclusion that only one of the 13 piers had apparently fractured and shifted, and spillways next to the damaged pier experienced only slight surface damage.

Part of Grant PUD's 3-month investigation included a thorough review of dam construction designs, calculations, and as-built

records. Grant PUD discovered evidence in design calculations that led to their determination that the damaged pier included a weak section of unreinforced concrete. Calculation of the concrete weight and strength was underestimated, and subsequent design included steel reinforcement only in the upper portion of the concrete pier, above the horizontal fracture. The miscalculation led to the design assumption that unreinforced concrete portion had sufficient strength to resist the hydrostatic force of the Wanapum Pool acting on the spillway.



Deflection visible at the top of Wanapum Dam (PUD #1)

The hydrostatic pressure exceeded the concrete strength, leading to the fracture and displacement of the pier. Other data also suggested that concrete placed in the damaged pier section may have lacked sufficient composition or oversight to accommodate the elevated summer temperatures at the time of the pour. The timing of the initial fracturing is still under investigation, although it appears likely the fracture formed gradually. The fracture opening and displacement may have occurred more rapidly, based on the frequent inspections of the dam by Grant PUD staff during normal operation and maintenance.

DAM REPAIRS

After the detailed review, Grant PUD proposed a repair approach that would secure the concrete fracture and anchor the damaged pier into underlying basalt bedrock using steel strands extending from the top of the dam through the concrete structure into bedrock, securing the strands with high-strength grout epoxy and tensioning to the anchored strands to hold the concrete pier in place. This approach is a commonly used elsewhere as a retrofit to strengthen concrete dams. The approach was approved by FERC and the Washington State Dam Safety Office. Because all of the concrete piers used the same calculation method and assumptions, the other 12 piers across the 800-foot spillway section of the dam are receiving the same anchoring treatment. Once in place, the pool level would be raised by 19 feet in mid-September, and the \$61 million repair will be evaluated for performance. Additional evaluation of the fix's longevity and resistance to fracturing and corrosion will also be performed over time. The repair costs included investigation, spillway repairs, fish passage modifications, shoreline protection and power supply costs. During the repairs, Grant PUD has operated the dam at approximately 50 percent of its normal capacity.

EFFECTS OF THE DRAWDOWN

The 26-foot drawdown exposed a significant area of shoreline, much of which has not been seen since 1960. The newly exposed shoreline

Continued on page 5: Wanapum

Wanapum: continued from page 4 was covered in soft silt and sand, which created dangerous footing and boating conditions, and formed unstable slopes. The emerging shoreline exposed previously unknown cultural resources and artifacts, including skeletal remains. The water velocity through the lowered pool and narrowed river increased significantly in several reaches. Grant PUD, who controls all of the Wanapum Pool shoreline, restricted public access along the entire exposed reach including boat launches, recreation sites, and beaches to ensure public safety and cultural resource protection. Several communities along the shoreline were especially affected by the loss of shoreline access, including Vantage, Crescent Bar, and Sunland Estates.

Grant PUD with approval by NOAA, US Fish and Wildlife, and WDFW, retrofitted the existing fish ladders in mid-April to accommodate the lower water level in the Wanapum Pool and the anticipated peak steelhead, sockeye, and Chinook fish runs. Fish counts indicated that the retrofits were highly successful allowing the record-setting fish passage, and that the modifications had little or no effect on fish mortality.

Emergency Permitting for wells and intakes

The 26-foot drop in pool elevation extended the shoreline by tens to hundreds of feet, which affected many irrigators that relied upon surface water intakes installed below the dam's normal lowest pool elevation. Permitting shoreline and in-water work to install or repair irrigation intakes typically requires several months. However, due to the unusual circumstances, Ecology and WDFW worked with irrigators to expedite JARPA

and HPA permits to modify and extend intakes to reach the pool in time for the May irrigation season.

In a similar fashion, water supplies relying upon groundwater wells constructed near the Wanapum Pool were affected by the 26-foot decline in pool elevation. Groundwater levels in wells completed in unconsolidated sand and gravel aquifers with a hydraulic connection to the river drew down immediately, and will be depressed until the pool elevation is restored. For wells that were completed just a few feet into the saturated portion of the aquifer, and the 26-foot drop resulted in a dry well or pump. For most wells that were completed more than 30 feet below the pool elevation, this groundwater level decline did not pose a significant inconvenience. In some cases, pumps were lowered to reach the new static water level, in others, wells required deepening or replacement. The Grant PUD is not obligated to maintain pool level in order to facilitate surface water diversion or groundwater withdrawal even if a water right certificate specifies the source of water as the Wanapum Pool or groundwater in connection with the pool. Several water right holders consequently paid for the pump drop, well deepening, or intake extension.

Groundwater levels in wells completed in basalt below the normal pool level at some locations responded with a decline equal to the drop in pool elevation, some water levels in basalt wells maintained the same static level as before the pool draw-down, and at some wells, the water level partially declined.

UNEXPECTED BENEFITS

The decline in pool elevation actually benefitted Grant PUD and other shoreline

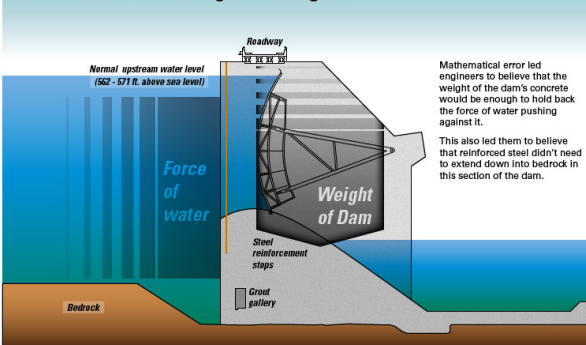
Continued on page 6: Benefits



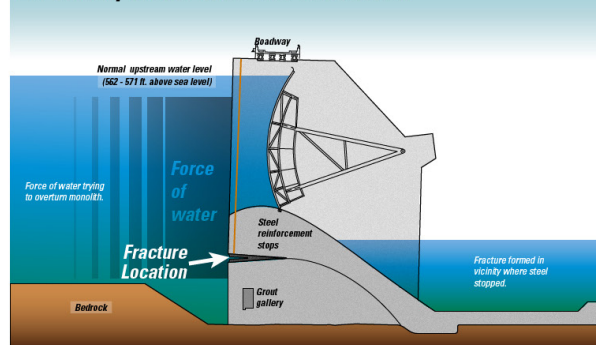
Wanapum Dam Spillway Monolith 4: Sequence of Events

For illustrative purposes only.

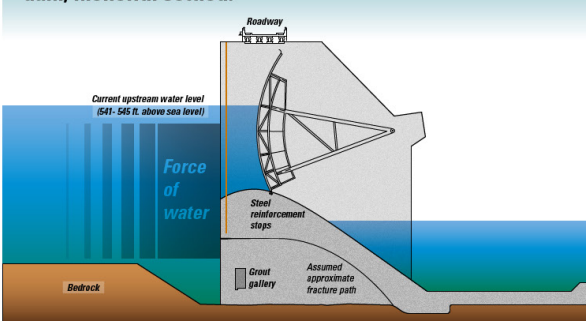
1. As built in 1960 (original design).



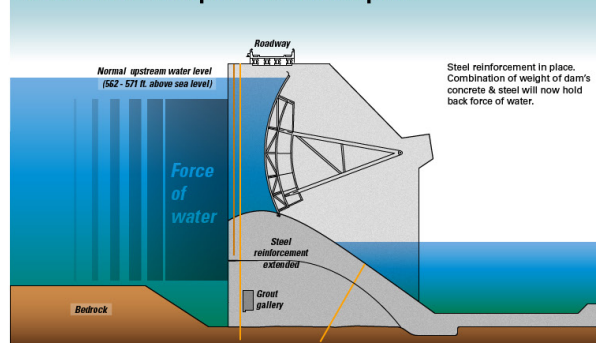
2. February 27, 2014. Fracture discovered.



3. March 4, 2014. Reduced amount of water behind dam, monolith settled.



4. Date TBD. Anticipated monolith repairs.



Benefits: continued from page 5

entities working on water infrastructure construction and repair projects. The increased shoreline exposure and lower water levels resulted in costs, faster paced work, and higher overall quality. The dry shoreline encouraged the acceleration of permitting and construction to take advantage of the abnormally dry conditions and complete projects with fewer permit challenges. Grant PUD estimates that several boat launch and recreation site improvements which included shoreline and sediment excavation, channel dredging at the boat marina in Crescent Bar, and pile construction will cost \$1 million less than initially estimated. Completing these shoreline projects in dry conditions will also likely result in projects that exceed performance targets due to greater ease of access and ability to adjust to conditions discovered during construction.

The next installment of the Wanapum Dam story will describe new insights on the fracture and displacement of the concrete pier; lessons learned about dam construction, inspection, safety and operation; new contingency planning for dam operators; potential impacts of dam operations on shoreline and recreational activities, and water supplies. Hopefully there will be new insights about the effects of abrupt and temporary changes in water level and water flow on sedimentation rates and deposition, shoreline habitat, and the response of river shorelines to rapid exposure and inundation.

Water level data provided by irrigators, water purveyors, and Ecology could reveal interesting hydrogeologic characteristics reflecting the varying degree of hydraulic connection between river and basalt aquifers, and aid in future well locations and water rights transfers.

JOIN AWRA-WA AS DINNER MEETINGS RESUME FOR THE FALL

WHEN: September 10, 2014

WHERE: Ivar's Salmon House on Lake Union (note the new location!)

**401 NE Northlake Way Seattle, Washington (206) 632-0767,
<http://www.ivars.com/locations/salmon-house>**

Dinner Presentation – Puget Sound Energy's Baker River Project

**John Chandler, P.E., Water Resources Technical Lead,
Generation Operations, Puget Sound Energy**

How are lakes and rivers managed? This presentation will cover how water management decisions are made at the Baker Project, a two reservoir, 200 MW facility which is operated by Puget Sound Energy and lies within the Skagit River basin. Taking a holistic view of how to consider several competing objectives are discussed, such as flood control, environmental constraints, recreational opportunities, generating power, providing grid stability, and operating in ways that avoid major damage to the equipment from cavitation and Rheingans phenomenon. Other topics include placing the Baker Project in the bigger picture of running an entire generation fleet, a high level discussion on implementing Baker's new FERC license, and an overview of the different internal and external parties associated with managing the lakes.

John Chandler, P.E., is the water manager at Puget Sound Energy for both of the utility's hydro projects, Baker River and Snoqualmie Falls. He helps to implement the new FERC licenses at both facilities, assists with operational compliance, and supports dam safety. John received his B.S. in Civil & Environmental Engineering from the University of Maine at Orono in 2006 and a M.S. focused on Water Resources and Environmental Engineering in 2008.

Schedule:

Event social 5:30 - 6:30

Dinner 6:30 - 7:00

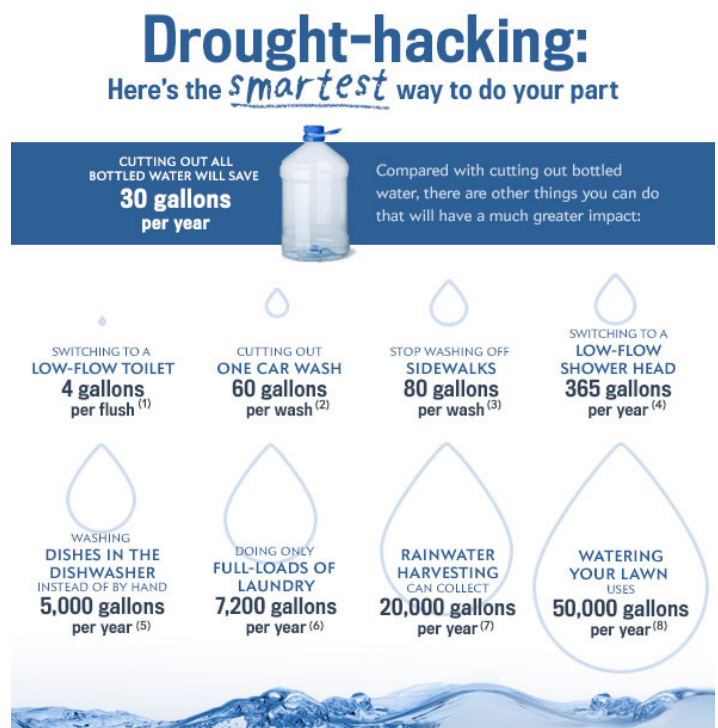
Presentation 7:00 - 8:00

CENTRAL WASHINGTON UNIVERSITY AWRA-WA STUDENT CHAPTER EDGES CLOSER TO REALITY

By Jason McCormick, AWRA-WA Board Member

AWRA-WA Board Member Jason McCormick, Central Washington University (CWU) Student Teo Fisher, and CWU Professor Carey Gazis have been working diligently to establish Washington's second Student Chapter at CWU.

At this point, our CWU partners have gathered support from at least 15 prospective new Student Chapter members, and are in the process of drafting bylaws. Once the bylaws are drafted and prospective Student Chapter members are accounted for the CWU students, Professor Carey Gazis, and myself will petition national AWRA for reorganization. We anticipate that the petition will be ready to send to national by early June 2014.



WATER RESOURCES NEWS ROUNDUP

By Eric Buer, RIDOLFI Inc., AWRA-WA Board Member

Taking up a disproportionate number of column inches in this edition of the water resource news roundup is the ongoing drought that continues to dessicate much of the American West.

As a result of the decade plus drought that has continued to escalate this year, large portions of California are now so dry that they are experiencing isostatic adjustment as a result of the lost water mass.

Using data from 772 GPS base stations, researchers at [U.C. San Diego](#) estimated that the total mass of water that has been lost to date is roughly 63 trillion gallons (or 193 million acre feet). As a result of the reduced mass California's mountains have experienced increases in annual uplift rates of up to 15 millimeters. Average increases in annual uplift rates over the entire west were closer to 4 millimeters.

NASA and U.C. Irvine released a study in July that used satellite measurements of gravitational fields across the nation to measure changes in groundwater mass. One of the most [widely publicized](#) conclusions of the study was the loss of an estimated 53 million acre-feet of fresh water from the Colorado River Basin, which is now struggling through the driest 14 years to be recorded in the last century. Of the 53 million acre-feet that have been lost approximately, 40 million acre-feet were groundwater.

Things don't look much better on the surface though. The USBR [average pool elevation](#) for Lake Mead in July of this year was approximately 1,080 feet above sea level. Federal water rationing is implemented when pool elevations reach 1,075 feet and at 1,050 feet one of the two intakes that supply water to Las Vegas will emerge into open air. Las Vegas is currently building a third intake that has been colloquially referred to as "the last straw" that will intercept the lake at 860 feet, although progress has been [slow and rather expensive](#).

Capitalizing on the thirst (so to speak) for drought news, Mother Jones [published](#) maps in August demonstrating that a majority of bottled water sources in the U.S. are located in regions that have been hardest hit by this year's drought (California). Why are so many bottled water sources located in California the astute reader may ask? Well, the image of drawing water from burbling California streams is certainly appealing, and there are some bottled water facilities in the state that got into the business upwards of 100 years ago and have found the prospect of pulling up stakes to be unattractive. But another big draw is likely because California remains one of the lone holdouts that has yet to implement statewide groundwater pumping [regulations](#).

While scratching bottled water off your shopping list is never a bad idea (bottled water is expensive, poorly regulated, and results in ghastly volumes of plastic going to landfills) it's just a drop in the water-deficit bucket. As Eric Holthaus at Slate.com [pointed out](#), eco-conscious consumers can cut their collective guilt for further parching California by simply foregoing a single steak dinner, which equates to roughly 62 years worth of water consumption (estimated to be 1,845 gallons). Abstain from two steaks in a month and you can enjoy California wine (estimated at 29 gallons per glass) for the rest of the year guilt free.



A marina in Lake Shasta, CA where water elevations have dropped 135 feet (photo by John Mabanglo).

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Special thanks to Associated Earth Sciences, Inc. and Ridolfi Inc. for word processing support on this newsletter.

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(PLEASE CIRCLE AS APPROPRIATE)

Annual membership for the AWRA Washington Section costs \$35.

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2014 Membership Dues: \$35.00.

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