



PRESIDENT'S NOTES

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

These are my last presidential notes, since the winter newsletter will see Tyler Jantzen of CH2M HILL as the new president. I'm looking forward to Tyler's presidency, since his combination of engagement and organizational skills is formidable, and he has a few ideas up his sleeve. He and I have had many great conversations about AWRA-WA this year, and I look forward to stepping into the position of past president and playing a supporting role next year.

For 2015, we say goodbye to three outgoing board directors. Thank you to Becky Crompton of Golder Associates, who was our volunteer webmaster and email launcher. In that position she was involved with nearly every AWRA-WA committee and project, since so much of what we do is online, and she was tireless and accurate every time. Thank you also to Dustin Atchison of CH2M HILL, who was past president this year and is stepping aside to open a slot for a new director in 2015. And thanks also to Rachel Moss, who was a heavy hitting volunteer in 2013 and who then took on a new and very busy position in the environmental sector in 2014 and so is also stepping aside as board director.



The board is thrilled to present three new candidates to replace the outgoing directors. They are listed in this newsletter, and we encourage you to learn more about them. We have been pursuing all sorts of diversity for the 2015 board, and we got it. Erin Thatcher has long been involved with AWRA-WA as a UW graduate student and now a civil engineering at CH2M Hill. Rabia Ahmed of Environ brings a background in econom-

ics and international experience, specifically in Pakistan and Bangladesh. And Terry Smith was a lawyer for King County, so she brings a welcome legal perspective as well as municipal experience. All of this better rounds out the board's expertise and collective Rolodex. Plus, all three bring welcome energy and interest in participating in a "working board".

Meet the new candidates, and the other 13 continuing members of the board, at the combined board and dinner meeting on Thursday, December 11th at Fado Irish Pub in Seattle. Instead of having a dinner speaker this month, we'll focus on planning for the new year and then socializing, which is something that we often say we should do more of. The 2014 board will have an abbreviated meeting from 5:00 pm to 6:00 pm, and as usual, anyone is welcome to join us. At 7:00 we will present the three nominees for the 2015 board, lead a membership vote on the 2015 board, and then have a social hour.

Feel free to bring your ideas, questions, and energy. We are an all-volunteer organization, and we are always looking for more people to get involved, whether it's with conference logistics or outreach efforts. As always, students have free admission, which includes dinner and one drink ticket.

I hope to see you there!

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AWRA-WA 2014 STATE CONFERENCE IN REVIEW

KEYNOTE ADDRESS: JAY MANNING

By Stan Miller, Inland Northwest Water Resources

Speaking on The Yakima Basin Adjudication and Integrated Management Plan, Jay Manning presented the keynote address for the 2014 WA-AWRA state conference. Manning, former Director of the Washington Department of Ecology and Chief of Staff for Governor Chris Gregoire is currently a partner with the Cascadia Law Group.

Manning began by outlining some history of key events in Washington water resources science and policy as a the Boldt Decision in 1974 allocated the rights to ½ of the salmon returning to Washington Rivers to the local treaty tribes. The Yakima River fell under this ruling and the Yakima Tribe became a key player in the ongoing story. Resource managers came to see the Boldt Decision as the first phase of at least two phases. By implication, the award of fish to the indigenous people means that the habitat to support fish must also be provided. Providing that habitat while satisfying the many other demands for water in the Yakima Basin formed the basis for the Yakima Adjudication and the eventually creation of the Yakima Integrated Plan.

In the early 1970's the Washington Department of Ecology set out to establish minimum instream flows for rivers in the state. Often the science used to establish these flows was simplified (for example the instream flows set for the Little Spokane River were set at 80% of the historic average for the season of interest). As the science improved, for example by considering actual habitat needs in the channel, the recommended flows got higher.

In the 1990's the courts further refined water law by acknowledging that groundwater and surface water were usually interconnected; over use of water from one of these components of the system would result in a shortage of water in the other. The 1993 Elkhorn case affirmed the Department of Ecology's right to link water quality with stream flow or water quantity. In most states where water quality and water supply are administered by different agencies a decision of this nature would create significant interagency tension and dispute. In Washington where the Department of Ecology administers both water quality and water supply programs the decision created intra-departmental tension, but those tensions can be resolved by the department Director.

The final element in the states legislative and litigation history that helped formulate water policy today was the 1992 Growth Management Act. Among the many elements of the Act was the requirement for concurrency of infrastructure (e.g. water supply) availability and

Continued page 5: Keynote

SESSION 1: MULTIPLE OBJECTIVES HISTORY AND NEW CONCEPTS

By Erin Thatcher, CH2M Hill Inc.

Tom Ring of the Yakama Nation kicked off Session 1 of the conference by discussing the implications of climate change, court decisions, and Tribal treaty rights in Washington. He described the "Cascade curtain" as a division in opinions on infrastructure needs and on responsibilities to pay, such as for fish passage improvements.

Mr. Ring also discussed the importance of the "Battle" of Dosewallips, in which the Supreme Court affirmed the relationship between instream flows and water quality under the scope of the Clean Water Act's Section 401 water quality certification. In our current political and financial environment, Mr. Ring identified the new paradigm as a "retrofit and fix" approach to water resources infrastructure.

Rhys Roth of the Center for Sustainable Infrastructure at Evergreen State College focused on how to adequately fund and support these fixes in a world where funds are limited, needs are growing, and the topic of (and even just the word) infrastructure is arguably seen as boring by the general public.

Rhys reviewed several highlights from a special report (see page 7 of this newsletter) that distills insights from interviews with several innovators working on infrastructure issues. Convincing the public to care is one of these key principles, and questions from conference

participants centered on this issue. Mr. Roth made the case for tackling public apathy at least in part by highlighting innovation and demonstrating how these investments improve our quality of life.

Finally, Bob Carey of the Nature Conservancy rounded out Session 1 by giving an example of innovation in action – the Conservancy's new floodplain management program that seeks to meet multiple objectives through private-public partnerships designed to solve problems at the local scale as well as provide benefits at the river corridor scale. The Floodplains by Design program will also include an effort to measure and track results of floodplain projects.

Today's paradigm for floodplain management includes "smart" development, and a greater focus on the benefits floodplains can provide, while still managing the risks from flooding. Mr. Carey described the Fisher Slough project, a multi-objective floodplain project that managed to overcome political barriers and invest funds in drainage and flood protection benefits.



Keynote Speaker Jay Manning Discussed the history of resource infrastructure in Washington State; setting of legal precedents; and the experience of arguing before the U.S. Supreme Court to open the conference.

AWRA-WA 2014 STATE CONFERENCE IN REVIEW

SESSION 2: RETROFITTING, RELICENSING, AND REPLACEMENT

By Jason McCormick, Aspect Consulting

Session 2 focused on the approach agencies and utilities have taken to adapting, for better and worse, existing anthropogenic fixtures in the State's waterways and rivers to their respective environments. These four speakers took an in-depth approach to describing their respective problems and how they worked (and are working) to solve them. Each situation was unique and presented insightful lessons learned for fellow water resources professionals.

On Tacoma Power's Cushman Dam, Steve Fisher discussed how the utility approached Federal Energy Regulatory Committee (FERC) relicensing while working directly with the Skokomish Tribe (Tribe) to meet the needs of fish and power generation. Ultimately, the Tribe and Tacoma Power settled on a plan to restore fisheries and continue generating power for the utility.

With the Culvert Replacement Program, Paul Wagner discussed the obligations facing Washington State to remove and replace fish impeding instream road crossing features under State ownership. In *United States v. Washington*, 2013, ("Culvert Decision") United States District Court Judge Martinez ruled against Washington State, citing that the "presence of barriers is a violation of Treaty Rights." The State is currently replacing features through the Culvert Replacement Program, partnering with other state and federal agencies, and the State is seeking an appeal on the initial ruling.

In the Yakima Basin, Yakima County Public Services, Flood Control Zone District, Joel Freudenthal is diligently working to restore significant sections of floodplain along the Yakima River and Naches River for ecosystem health and reduce flood risk to Yakima County and City. The subject river reaches are prone to significant channel aggradation and levee failures. In Joel's words, Yakima County is working with its Yakima Basin partners, including the Yakama Nation, to "...not put it back the way it was, let's do this right and make things better."

US Army Corps of Engineers (USACE), Marian Valentine, is working to maintain an aging marine lock system at Ballard Locks in urban Seattle. Construction on the locks was begun in 1854 by Thomas Mercer and is presently used for light commercial and recreational navigation. The locks face a number of challenges due their age and condition. USACE is vetting options to move forward while maintaining an aging piece of infrastructure.



Recipient of the AWRA Outstanding Achievement Award Derek Sandison discussed the history and elements of the Yakima Basin Integrated Plan, which continues to be held up as a model for what can be achieved when formerly opposed parties work together towards a common goal.

SESSION 3: NEW INFRASTRUCTURE PROJECTS AND PROCESSES

By Eric Buer, Ridolfi Inc.

The final session of scheduled talks focused on new infrastructure projects and processes. Scott Spahr kicked off the talks with a review of Snohomish County Public Utility's Sunset Falls Fish Passage and Energy Project, one of three "green field" projects that the utility identified through consultation with a wide variety of stakeholders including Federal and State agencies as well as Tribes and non-government organizations. The project takes advantage of a stable, self-cleaning pool above Canyon Falls to divert water through an intake tunnel that will pass through fish screens before diving under the Skykomish River to reach the new power house.

Lorin Reinelt delivered the second session talk on key elements of the Green River System-Wide Improvement Framework (SWIF). The SWIF was designed, and is being implemented by King County Flood Control District with approval from the U.S. Army Corps of Engineers to address levee system improvements while also maintaining eligibility for Federal levee funding. In keeping with the conference's multiple benefit and multiple discipline themes, Reinelt highlighted four key points regarding the SWIF. 1) The framework is a multi-objective planning and project implementation process. 2) The framework is grounded in the best available science and knowledge available on a system-wide basis. 3) The level of protection from flood-

ing is determined based on risk tolerance and expected annual damages. 4) Implemented solutions are part of a collective vision shared by diverse project partners. The SWIF is currently focusing on alternatives analysis to achieve the desired level of protection along the lower Green River and is scheduled for submittal to the U.S. Army Corps of Engineers in February, 2015.

Derek Sandison presented the final talk in Session 3 on the Yakima Basin Integrated Water Resource Management Plan (YBIP). The Plan has been held up as a model of what can be achieved when disparate parties are able to compromise and work together towards a set of mutual common goals. In the Yakima River Basin, where available surface water has been over appropriated and historical anadromous fish runs have been reduced to a fraction of their former size there was a unique opportunity to to just that. To meet the needs of all stakeholders the Plan included conservation elements such as habitat and watershed protection as well as supply elements such as additional surface storage and enhanced water conservation measures.

AWRA-WA 2014 STATE CONFERENCE IN REVIEW

SESSION 4: RETROFITTING, RELICENSING, AND REPLACEMENT

By Megan Kogut, PhD, Board President

Amy Carlson of CH2M HILL moderated four panelists: Steve Greenwood, Deputy Director of Oregon Programs, National Policy Consensus Center; Mo McBroom, Director of Government Relations, The Nature Conservancy; Scott Merriman, Director of Policy and Legislative Relations, Washington State Treasurer's Office; and Alan Stay, Attorney, Muckleshoot Indian Tribe.

Steve Greenwood led off with advice about bringing diverse stakeholders together for an interdisciplinary water project. As always, this has to do with the level of risk and the magnitude of potential changes, and so the issues matter. But, logistically, a neutral forum makes everyone more comfortable personally, so location and facilitator matter. Involving high level individuals adds importance to the issue and solution, raising the discourse from personal issues to community ones.

Mo McBroom acknowledged a recent increase in funding for water resources, especially for floodplain management. However, there is not enough public understanding of the problems, and other legislative issues such as education, transportation, and mental health compete with the issue of water resources. She suggested that we ask a different question: rather asking for support for smaller individual problems, we should ask if we can be successful going big with a coalition of interests and asking for a multi-billion dollar package. While being a part of building such a coalition and package, she has witnessed several hopeful situations that broke ground getting to yes, with people crossing political barriers and groups from eastern and western Washington cooperating.

Scott Merriman provided context for the upcoming state budget and apologized early for not having a very rose outlook on the future of funding for water resources. Pressures on the legislature are the biggest he's in 20 years. The cost of upcoming known new expenses is over 10% of the current biannual budget. The revenue system is broken, and the state needs a new way of collecting money to pay for all its priorities.

Allen Stay urged everyone to work with Tribes because they

are instrumental in the process and have stronger rights than many parties. Tribes have different values and see their right to fish and hunt as a right to survive. They take great risks when they go to court because they could lose those rights. The Tribes, in pursuit of fulfillment of their right to fish salmon, decided to pursue the issue of the state's 800-900 culverts. In 2007 the Martinez Decision decided that the culverts hindered salmon passage and must be replaced with salmon friendly infrastructure. That principle – that infrastructure can affect Tribal rights – could apply in many other situations. But this is better for everyone, not just Tribes. Similar issues for Tribes are docks affecting fish habitat, and identifying a realistic fish consumption rate, which is used to set the screening levels for pollutants in fish tissue. If the tribes could match the fish consumption rate to their traditional lifestyle, then everyone would benefit from the improvements in water quality.

The first question was for Steve and it was, "What is the elephant in the room; what is it and what should we do about it?" His answer was an example from the Columbia River: certain irrigation interests didn't think that uncertain future ecological benefits were comparable to immediate and tangible water benefits today. For those types of deals, you have to acknowledge that the different needs are not symmetrical. Alan Stay said that the elephant in the room is foresight; most people and politicians think of only today. The Muckleshoot tribe thinks seven generations ahead.

Scott was asked for his opinion about ideas for equitable and politically feasible ways of funding water projects. He recommended equity will be based on consumption of water, no matter what type. How to raise money is more complicated – we are low on revenue currently, with initiatives and court cases that require more spending on other priorities. Do we increase utility rates? Property taxes? Sales taxes? We need an overhaul of the

tax system. Mo McBroom supported the need for an overhaul, adding that we need to set up new ways to fund our future in times other than a time of crisis.

What message should we take home to our friends, neighbors and family who aren't a part of the choir already? You've got to be willing to participate. You have to face the fact that the Pacific Northwest is only going to see a lot more people in the future, and climate change only complicates planning for that.



Session 4: From left to right, Amy Carlson, Steve Greenwood, Mo McBroom, Scott Merriman and Alan Stay discuss the "elephant in the room."

AWRA OUTSTANDING ACHIEVEMENT AWARD

By Stan Miller, Inland Northwest Water Resources

Each year the Washington Section recognizes a member of the state's water resource community for their Outstanding Contribution to Washington's Water Resources. The award recipient receives a commemorative plaque, and a contribution of \$500 is made by AWRA-WA to a charity of his or her choice to promote work on water resources problems around the world.

This year's award recipient was Derek Sandison, head of the Washington Department of Ecology's Office of the Columbia River (OCR). For more than three decades Derek has been a champion for progressive water management in the state. Derek graduated from Central Washington University (CWU) in 1974. He began his career in the Water Resources and Chemical and Physical Hazards Section of the Tacoma – Pierce County Health District in 1979. In 1983 he was appointed to serve on the Pierce County Water Utility Coordinating Committee where he helped craft agreements on water use among the County's many water supply utilities. By 1985 he was busy implementing a management plan for mitigating the solvent contamination problems in the Chambers/Clover Creek aquifer.

Derek left the Pierce County Health District in 1986 for a short stint as an Environmental Specialist for the Washington Department of Ecology. In 1987, Derek helped found Adolfson Associates, Inc., where he served as Vice President of Technical Services. While at Adolfson, Derek completed a Masters in Natural Resources Management at CWU in 1993. In 2001 Derek left Adolfson to return to Department of Ecology.

Derek was head of the Shorelands and Environmental Assistance Program in 2003 when he was assigned the role of Director for Ecology's Central Regional Office (CRO) in Yakima. At the CRO, managing the Yakima River Adjudication was one of Derek's main tasks. In February 2009, Derek was appointed head of Ecology's new "Office of Columbia River" to be headquartered in Wenatchee. The OCR was established to implement the Washington State Legislature's 2006 initiative to develop and manage water supplies for the Columbia River Basin.

Derek's work responding to the challenges addressed at the OCR has been widely recognized within the water resources community. Charged with the literally impossible task of "making" more water for the Columbia River Basin, managing the OCR meant coaxing cooperation among a number of Tribes; Federal, State and local agencies; conservation groups; and private water users. Under Derek's guidance, the OCR is moving toward reaching its goals. A number of water infrastructure projects have been completed or are underway; water users are moving toward more efficient use of agricultural water, and most agencies operating cooperatively.

We applaud Derek Sandison for his accomplishments and service benefitting the water resources of Washington State.

Keynote: continued from page 2

land use change. A significant number of challenges to expanding urban growth boundaries without consideration of the range of the utility and finance needs have resulted in a body of case law on water supply.

The Yakima Integrated Management Plan has developed under this umbrella of case and statutory law. Summer low flows that blocked salmon passage in the Yakima River was one of the key driving forces for the Integrated Plan. In order to meet the flow needs for fish while still providing irrigation water to farmers in the lower basin, new storage seemed to be the answer. One of the first ideas floated for achieving this was the Black Rock Reservoir. In this scheme a 1.3 million acre foot reservoir located in eastern Yakima County would provide water for both lower Yakima Basin irrigation and Yakima River flow adequate to support fisheries as mandated by the Boldt decision. A number of factors led to the rejection of this idea, but a key element was raising groundwater under the Hanford Nuclear Reservation. The one to ten foot rise in groundwater under Hanford would result in mobilization of radionuclides in the soil under the site and increased flux of radioactive contamination to the Columbia River.

Ultimately, the plan focused on conservation and increasing the storage in the upper basin as the desired approach to "increasing water supply." Upper basin storage plans involved three elements. Increase the capacity of existing reservoirs, develop new reservoir storage and protect land to enhance the continued availability of water from the so called "sixth" reservoir – snowpack. Protection of upland forest areas from development will also ensure that spawning habitat in tributaries will be protected.

In order to support the financing needs of the Yakima Integrated Plan and other water resources needs in the state, the legislature is considering a \$200 million annual revenue source to fund \$3 billion in bonds to be split evenly among storm water management, water infrastructure, and flood control projects.

Finally Manning touched on another problem we face in water resources management today: the change in leadership that is occurring at all levels of government and in the private sector. These changes lead to a loss of institutional memory and threatens to throw many long term projects off track. Manning identified the Dungeness River is an example of what can happen in this situation. Changes in membership on the Dungeness River Management Team are in part responsible for it taking from 1988 until this year to get an instream flow proposal for the Dungeness River on the table.



Rhys Roth discussed sustainable infrastructure (see page 7).

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NEXT YEAR'S CONFERENCE

We're already planning for next year's conference, and considering all of the great feedback we received in the survey handed out during this conference about the program, future topics, venue and catering.

Do you want to be on the conference committee? We always welcome program and logistical support. Please contact Megan Kogut at mbkogut@gmail.com if you're interested.

Thanks to everybody who helped make this year's conference such a success, especially our sponsors. You can find presentations and the program for this and other past conferences on the AWRA-WA website.

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AFFORDABLE, RESILIENT, SUSTAINABLE AND INTEGRATED:

INGREDIENTS FOR 21ST CENTURY INFRASTRUCTURE INNOVATION

By Andrew Gordon MacLean and Rhys Roth, Center for Sustainable Infrastructure, Evergreen State College

As AWRA celebrates its 50th birthday, the Center for Sustainable Infrastructure (CSI) at The Evergreen State College is releasing a new report exploring innovative new strategies to meet the complex challenges of building enduring infrastructure solutions in the Pacific Northwest.

The report is called *Infrastructure Crisis, Sustainable Solutions: Rethinking Our Infrastructure Investment Strategies*. It distills the insights from 70 of the Pacific Northwest's top infrastructure innovators and thought leaders interviewed by CSI to uncover strategies to transform how we invest in our vital infrastructure systems, including water resources.

The implications of our infrastructure investment choices for our economy, our environment, and our communities are huge and long-lasting. The bottom line reality is this: we are going to have to spend many billions of dollars on our infrastructure just to keep our society and economy functioning. The question is: How do we get smart about where we'll invest that money?

The purpose of Infrastructure Crisis is to provide inspiration and guidance to the region's current and future infrastructure leaders, policymakers, and agents of change. If we do it right, our infrastructure investments will help us create healthy, prosperous, beautiful, and cohesive communities, and overcome some of our most pressing environmental challenges.

Massive Investment Needed

Water professionals know all too well the stark contrast between the need for investment in infrastructure and the current availability of funds. The World Resources Institute estimates that globally \$10 trillion will be needed to be invested in water infrastructure over the next 15 years. In 2011 the American Society of Civil Engineers (ASCE) estimated the costs of fixing deteriorating drinking water and wastewater treatment infrastructure in the US could exceed identified funding sources by \$84 billion by 2020. The American Society of Civil Engineers' 2013 Report Card for America's Infrastructure assessed the state of the nation's infrastructure, delivering an overall grade of D+ (a D grade is 'Poor') Washington and Oregon fare only marginally better, with C and C- grades, respectively. While ASCE estimates \$3.6 trillion is needed nationally by 2020 to achieve a B grade, only about \$2 trillion in funding sources are currently in place.

Given this gap between needed and available resources, infrastructure managers and engineers are doing an extraordinary, if unsung, job keeping aging systems operating reliably. But the public may be largely unaware of the growing urgency of this infrastructure deficit.

Recognition is growing among infrastructure professionals that innovative and creative new approaches are needed to inspire smarter infrastructure investment and foster public support. "We're making decisions today that we'll live with for 50 years. We can't keep doing things the way we always have," says Peter Binney, 2011 winner of the ASCE President's Medal. Indeed, infrastructure represents not only a shared long-term investment, but a crucial intergenerational legacy. In order to

deliver a heritage to be proud of infrastructure design needs to address rather than ignore 21st Century challenges.

New infrastructure practices that are emerging include rigorous analysis of alternative approaches early in the 'pre-design' phase to leverage new technologies and techniques that will deliver the best return for the invested dollar. Public education, transparency, and accounting for a broader set of costs and benefits can help win public support, and the associated funding to pay for new infrastructure systems.

Drivers of Innovation

New technologies are driving change across infrastructure sectors. For example, advanced electronics, wireless communications, and new GIS tools offer transformative potential. "Our public works infrastructure will make up much of the Internet of Things," says Liz Kelly of CH2M Hill. "Consider the changes we have experienced with smart phones in the past decade and imagine similar efficiency gains with infrastructure operations."

Climate change is another driver both in terms of the need to mitigate greenhouse gas emissions, and to design and build new systems that are more resilient to new weather extremes. As Bobby Cochran of Willamette Partnership said, "Cities typically design and size storm drain systems to handle the 10 year storm, but with a changing climate, we don't know what a 10 year storm is anymore."

What does sustainable infrastructure look like?

AWRA was one of the first institutions in the US to look at water management from an interdisciplinary perspective. The future of sustainable infrastructure will increasingly blur boundaries between our water, energy, transportation, and waste systems to implement complementary strategies that benefit more than one system. But today, for the most part, our communities' infrastructure systems are developed and managed separately, by separate utilities and agencies. Among our most important, and difficult, challenges will be reforming these institutions and their funding mechanisms to enable and incentivize integrated, whole-system solutions that offer multiple benefits to our communities and management agencies.

Integrated

"We've got to break through institutional silos and find innovative solutions that connect systems for the greatest community-wide benefit in the long-term." Nan McKay, former Chair of the Puget Sound Action Team

Many of the innovators that CSI interviewed stressed the importance of integrating different systems to save money, water, and provide additional benefits. Steve Moddemeyer, Principal with Collins Woerman, who led an evaluation of options for integrating infrastructure in Yesler Terrace in downtown Seattle identified systems that would enable the new neighborhood to reduce its draw on City water supplies by 45% and send 70% less wastewater to the County treatment plant, at a net savings of \$300,000 a year

Continued page 8: Infrastructure

Infrastructure: continued from page 7 . This involved onsite wastewater treatment, graywater reuse, improved energy efficiency, and thermal loop system for heating and cooling that utilized solar power and excess heat in the City sewer.

Wastewater utilities have made great progress working with industry and commercial businesses to reduce toxics entering their system. In addition, biodigester technologies are becoming more affordable and efficient, and are able to create new streams of revenue, converting organic wastes into energy and enriching soil. The Association of Oregon Clean Water Agencies is convinced that the state's wastewater utilities can become energy independent, through a combination of energy efficiency, use of digester gas as well as solar and gravity based hydro.

Natural and Affordable

Natural infrastructure, an interconnected network of natural areas, open spaces, and constructed features such as green roofs, green streets, bioswales, and constructed wetlands, planted in rich water-retaining composted soil, is likely to play a major role in sustainable water infrastructure.

The World Resources Institute studied six US cities that managed to save 60% on water infrastructure investment by using natural infrastructure strategies, while actually increasing the lifespan of conventional systems. As Callie Ridolfi, President of Ridolfi Inc., an engineering firm specializing in sustainable practices, points out, natural infrastructure is able to reduce the need for water filtration plants, reservoirs, dikes and levees, as well as improve the performance and adaptive capacity of conventional or "gray" infrastructure.

The City of Spokane faced a daunting price tag to comply with Clean Water Act regulatory requirements to prevent untreated stormwater and sewage from flowing into the Spokane River during storm events. Nearly 55 million gallons of combined sewage and stormwater, and a billion gallons of untreated stormwater, enters the Spokane River annually. The standard response, building a bigger water treatment system, would have cost \$450 million. Instead Spokane developed an Integrated Clean Water Plan with major investments in green infrastructure. The Plan commits the City to deliver a cleaner river sooner, but at a savings of about one-third the original price tag.

Smart

Smart technologies utilizing automated and remote instrumentation, controls, feedback and communications have begun to integrate with traditional systems and are poised for further advances. These technologies will enable valuable efficiencies, rapid response to changing conditions, remote control and adjustment of systems, and more sophisticated system planning. Jesse Berst, Chairman of the Kirkland, Washington-based Smart Cities Council says that Europe is leading the way. For example, irrigation systems built into Barcelona's parks monitor soil moisture and turn on sprinklers only when water is needed which the city expects will cut its water bill 25% and save \$60 million a year.

Restorative

King County manages almost 500 levees on its rivers and is actively looking for opportunities to move levees back and free

up the floodplain. On the Green River, for example, a major flood could cause more than two billion dollars in damage. According to Mark Isaacson, Director of the County's Water and Land Resources Division, bolstering the levee systems in place could cost \$300-400 million over the next 20 years, so the county is exploring alternative ways to spend that money that restore floodplain function and protect property, while creating new recreational facilities and natural habitat.

A Model of Regional Cooperation

To become a leader in sustainable infrastructure, northwest states have much to gain from greater regional coordination in infrastructure development. With this goal in mind, the West Coast Infrastructure Exchange was formed in 2012 to draw new investment into climate smart infrastructure. Its objectives include fostering collaborating with industry experts and innovators to improve project outcomes, bundling similar projects and allow smaller projects to qualify for different financing options, and providing expertise and data to agencies with limited capacity to innovate in project finance and design. The Exchange is drawing on the Partnerships BC model, a provincial consultancy which has managed to raise over \$17 billion for infrastructure projects in British Columbia from private and public sources since its inception in 2002.

Other key areas of focus include the need to fix the disincentive for efficiency and conservation, to price carbon, and to upgrade the bond rating methods to recognize natural assets

Five Big Goals for 2040

Drawing inspiration from the interviews with thought leaders and innovators, CSI offers Five Big Goals in the report as a conversation starter for a sustainable infrastructure vision for Washington and Oregon in 2040:

1. Ace the state infrastructure report cards; lead the nation in innovative projects
2. Convert 95% of all types of energy use to renewables; fully deploy efficiency to cut demand 60%
3. Wring out water waste by 60%; integrate across water-wastewater-stormwater silos
4. Upgrade 75% of neighborhoods to "Very Walkable"; connect cities with high speed transit
5. Ensure 90% of products are managed by producers after use, and most 'waste' material is recovered by local industry

Next Steps

A major focus for the Center going forward will be on communicating the urgency of our infrastructure crisis, the opportunities to realize much greater financial, social, and environmental return from our infrastructure investments, and the strategies that can get us there.

In the coming months the Center will convene advisors and allies to consider new programs, projects, and partnerships to build capacity in the region to innovate and lead.

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SEPTEMBER DINNER MEETING REVIEW WATER MANAGEMENT AT THE BAKER PROJECT BY JOHN CHANDLER, P.E., PUGET SOUND ENERGY

By Megan Kogut, PhD, AWRA-WA Board President

AWRA-WA met at Ivars Salmon House listen to John Chandler talk about his job balancing a number of relatively new Federal Energy Regulatory Commission (FERC) licensing requirements, electrical generation, local needs and desires, and the weather for the Baker River Dams and the corresponding 297 square mile watershed in northwest Washington.

The Baker River Dams see about 20% of the Skagit River flows on average. The

Upper Baker Dam is a 312 foot high gravity dam with two turbines with maximum flow of about 2,500 cfs each and 105 MW total capacity. The Lower Baker Dam is a 285 foot high arch-gravity dam with two turbines with a total maximum flow of 6,200 cfs and 115 MW total capacity. Both are under the jurisdiction of FERC. Both are also deemed high hazard dams because failure of the dams would have devastating consequences for communities downstream. Last but not least, they are next to Mt. Baker, which is an active volcano.

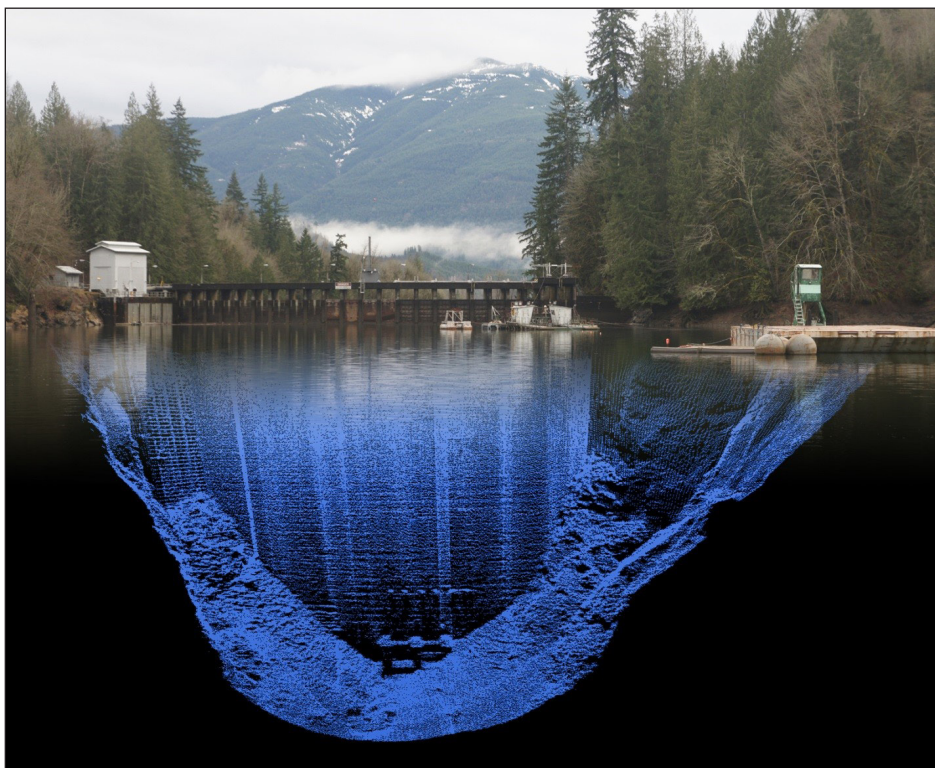
John considers a number of things: dam safety (FERC Part 12D), flood control/lower lake levels (Water Control Manual, Article 107), environmental issues (Article 106, Water Quality Certification), recreation/higher lake levels (Article 106), power production (a utility obligation), grid reliability (NERC-WECC), support projects such as maintenance, and miscellaneous other issues, as well as hydrology, economics, risk management and not breaking the equipment.

John's usual office is the main PSE office in Bellevue with the power marketers, far from the dams, and remote from the Load Office, where the turbines are turned on or off. In his office, John depends on a number of online and offline sources of information: projected inflows (Northwest River Forecast Center), river flow (USGS and PSE gauges), lake level (USGS, PSE gauges), rain/snow/temperature (NOAA weather stations), snow depth and rainfall (SNOTEL), hydrology (USGS gauges, historical information), general weather (PSE meteorologist), flow in the turbines (ultrasonic instruments in the penstocks),

and energy market conditions. Some of this information is of crude resolution, and the ability to measure certain values is limited.

For example, inflow predictions are updated once a day for 10-day periods and are, of course, sometimes wrong. John also uses an in-house Excel-based routing model, the Informed Routing of Inflows Simulator (IRIS), to create a best estimate

and boundaries for inflows. There is a daily version for normal operations and an hourly version for flood events. Inputs include the 10-day prediction and the initial lake levels for both reservoirs. John runs this model for about 90 days using the driest, 90% exceedance, median, 10% exceedance, and wettest conditions from an 85 year record. John also has a few shortcuts based on experience. For example, a day of a net inflow of 2,000 cfs into Baker Lake will raise the lake about one foot, depending on lake level. This knowl-



Bathymetry below the Lower Baker Dam superimposed over a photograph looking downstream.

edge comes in handy for quick decisions.

The trick to using the model is not thinking about how much water is already behind the dam, but rather how much space there is left for more water. And to think about how to best use that space with multiple constraints and demands. There is rarely an optimal solution. There are solutions that work and solutions that don't work. John provides a 7-10 day focus, including discussions about outages, lake level boundaries, and so on, to the marketers downstairs from his office, the load office, and the plant crew at the dams.

John uses different parameters for each of the types of people he works with; traders and operators talk about generation, while ecologists and biologists talk about flow, for example he talks with the marketers, load office, and plant personnel two or three times a week. He also communicates with compliance and licensing groups "a lot", and economists, the Army Corps of Engineers, and other Settlement Agreement Parties as needed. The Settlement Agreement is for the life of the license, until 2058, so communication early and often is important.

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AWRA-WA SECTION ANNUAL MEETING

The AWRA Washington Section will convene its annual meeting and conduct elections for the 2015 Board of Directors at the **December 11, 2014 Chapter Meeting** in to be held at Fado Irish Pub in Seattle.

The Board of Directors consists of up to fifteen directors, plus the past president. All members are welcome to attend the annual meeting and to nominate other candidates.

Board members are expected to actively participate and support the following activities:

- Attending monthly board meetings
- Refining section policies
- Running dinner meetings
- Organizing the annual conference
- Securing articles for newsletters
- Supporting the student chapter and establishing new student chapters
- And other activities.

**THE 2014 BOARD OF DIRECTORS PRESENTS
THE FOLLOWING CANDIDATES FOR THE 2015 BOARD**

- Rabia Ahmed
- Eric Buer
- Tyson D. Carlson
- Tyler Jantzen
- J. Scott Kindred
- Felix Kristanovich
- Allison MacEwan
- Jason D. McCormick
- Stan Miller
- Steve Nelson
- Tom Ring
- Jennifer Saltonstall
- Terry Smith
- Erin Thatcher
- Stephen D. Thomas

Board candidate biographies are presented on pages 11 through 13 for review by the membership.

Goals: continued from page 8

Among the roles the Center will consider are:

- Developing and sharing practical tools for infrastructure decision makers
- Convening leaders and innovators to collaborate to address key challenges
- Galvanizing support for a compelling long-range vision for regional leadership, and for rethinking the

infrastructure finance and policy in the region

- Creation of new professional development training programs and strategic consulting services

With its principles of "Community, Conversation, and Connections" AWRA-WA will undoubtedly play an important role in advancing infrastructure innovation in Washington, providing vitally needed inspiration, information, and leadership.

We invite members to download the report, join our mailing list, and donate to the Center at www.evergreen.edu/csi.

BOARD OF DIRECTORS 2015 CANDIDATES



Rabia Ahmed

Rabia is an economist currently working with ENVIRON International Corporation in Seattle. She has over twelve years of experience in water and natural resource economics, policy, and regulatory economics, litigation support, and international development. She graduated with an MS degree in Economics from Portland State University in 2005. Rabia's primary expertise in the water sector includes studying water laws and water markets, assessing and valuing surface and groundwater rights in that context, conducting assessment of water rights, and carrying out water rights applications process. She has conducted a number of water rights valuation projects in Washington for both public and private clients. She also has many years of experience in the international development sector, and worked directly with communities in remote areas of Pakistan and Bangladesh. In her spare time, she enjoys hiking and sailing with her family.



Eric Buer

Eric is a hydrogeologist and geomorphologist at RIDOLFI Inc. He has been working in private consulting since 2006. After graduating with a M.S. in Geology from the University of Washington Eric began his professional career in underground construction before moving over to environmental consulting in 2008. He has worked on a wide variety of projects performing groundwater characterization work, fluvial geomorphologic assessments, and environmental monitoring. When he's not crunching groundwater data or performing sediment bedload transport analysis he enjoys skiing in the Cascades and following the winter snowpack into the many excellent rivers of Washington State in his whitewater kayak.



Tyson Carlson

Tyson is an Associate Hydrogeologist with Aspect Consulting with 15 years of experience specializing in water resource development and water rights. Serving private and public sector clients, Tyson has a BS in Soil, Water, and Environmental Science and a MS in Hydrology from The University of Arizona. Tyson's water rights experience includes both new appropriations and transfer/change of existing rights, including use of the State's Trust Water Right Program for purposes of instream flow, habitat, and mitigation through water banking. Tyson has a strong background in analytical and numerical groundwater modeling and larger scale hydrogeologic characterization. These skills are also used in Tyson's work on well hydraulics, aquifer sustainability, saline intrusion, determining regional tunnel alignments, and other work. Outside of the office, he can be found skiing the deepest of Cascade powder, on his bike, or fly fishing his favorite waters.



Tyler Jantzen

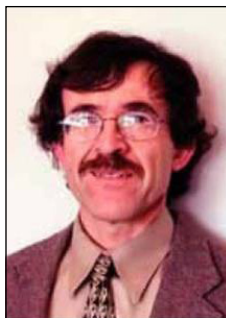
Tyler is a professional engineer with 7 years of experience working for CH2M HILL. He has served on the chapter's Conference Committee for the past five years, as well as serving as chapter Secretary in 2013 and Vice President in 2014. He has experience in a wide variety of water resources engineering topics, including hydrologic and hydraulic modeling, flood risk management, stream restoration, climate change adaptation, storm water planning and design, and Superfund cleanup. Tyler is especially adept at using state-of-the-art models, tools and software to analyze complex water resources issues. He has a MS in water resources engineering from the Univ. of Texas at Austin and a BS in civil engineering from Gonzaga Univ. His thesis covered the implementation of a statewide hydrologic information system for Texas. Outside of work, Tyler enjoys time with his family, hiking, biking and playing lawn games.



Scott Kindred

Scott is a hydrogeologist with 20 plus years of consulting experience, primarily in the areas of hydrogeology, stormwater infiltration, and environmental site assessment and remediation. His clients have included numerous cities and counties, industrial and mining facilities, private and public developers, nuclear facilities, PRP groups, and military installations. With expertise in hydrogeology, contaminant fate and transport, geotechnical engineering, and civil stormwater design, Scott provides a unique multidisciplinary perspective in addressing the range of issues associated with stormwater infiltration. Scott has a Bachelors degree in geology from Brown Univ. and a Masters degree in civil engineering from MIT. He is a registered P.E. in Washington State. Mr. Kindred is currently working on climbing the 100 highest peaks in Washington State, an objective that he should have started much earlier when he was younger and stronger.

BOARD OF DIRECTORS 2015 CANDIDATES

**Felix Kristanovich**

Felix is a senior water resources manager with ENVIRON in Seattle, Washington. He has 25 years of professional experience in the United States and abroad where he has worked on numerous watershed analysis and streamflow restoration projects, water quality monitoring programs, environmental impact studies, hydrologic field investigations, floodplain analysis, and design and modeling of storm water systems. Recently, Felix has been working on application of ecosystem services in floodplain management, streamflow and habitat restoration, and sustainable development in Central America and the US. Felix has been actively involved in AWRA-WA, where he has served on the Board for the last five years as Secretary, Treasurer, and President. Felix and his wife June enjoy backpacking, hiking, and telemark skiing with their two fantastic dogs here in the Washington Mountains, and sea kayaking around Puget Sound and in Alaska.

**Allison MacEwan**

Allison is a Principal Engineer with RIDOLFI Inc. in Seattle, Washington. She has 30 years of professional experience working in the Pacific Northwest and across the United States on projects related to watershed planning and management, ecosystem restoration design, levee systems, flood risk management, water rights, water supply and drought management. She is a registered Professional Engineer in Washington, and a Certified Floodplain Manager. Allison holds a BA in Engineering Science from Dartmouth College and a MSE in Civil and Environmental Engineering from the Univ. of Washington. Allison enjoys hiking, river rafting, and exploring the Pacific Northwest.

**Jason D. McCormick**

Jason is a water resources professional and Certified Water Rights Examiner in Central Washington with 10 years of experience. He specializes in creative water resources problem solving, administrative permitting, GIS analysis, water rights acquisition and markets, trust water, mitigation banking, representing water rights buyers and sellers, basin-scale water rights planning and assessment, conservation funding, and managing portfolios of water rights. Jason's professional experience includes working with the Washington State Legislature, Department of Ecology, Washington Water Trust, and Aspect Consulting. His experience has enabled him to efficiently serve the needs of private, public, and non-profit clients. Jason holds a B.A. with honors in Geography and Land Studies from Central Washington University. When he isn't working, he enjoys spending time with his family, pursuing steelhead and salmon with a fishing rod in hand.

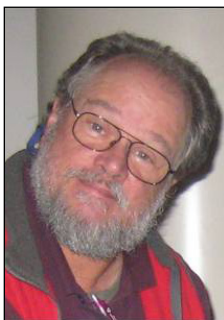
**Stan Miller**

Stan is semi-retired, and currently consulting as Inland Northwest Water Resources. Prior to venturing into retirement, Stan held the position of Program Manager for Spokane County's Water Resources Section in the County Public Works Department for over 20 years. The prime focus of Water Resources is the regional aquifer protection program. As Program Manager he worked toward integrating the groundwater protection efforts of all municipalities and water purveyors using the Spokane Valley-Rathdrum Prairie Aquifer. Stan has developed technical information and conducted local studies on the potential impacts of storm water infiltration on ground water quality, and the hyporheic interactions between surface and groundwater. Stan is a long-time member of the AWRA Board and a past-president of the Chapter. Away from work, Stan enjoys canoeing, backpacking, running, and restoring a turn-of-the-century home.

**Steve Nelson**

Steve is a hydrogeologist and engineering geologist at RH2 Engineering, Inc., and holds licenses in Washington and Oregon. Steve has 25 years of experience involving water resource assessment, development, management, remediation, and protection. His project experience includes characterization of groundwater systems for groundwater supply; water reuse; water rights evaluation; aquifer testing; and modeling of groundwater flow, contaminant fate and transport. Steve evaluates geologic, groundwater and geohazard conditions for siting, design, and construction of water resource infrastructure; and supports design and operation of stormwater infiltration and construction dewatering systems. Steve earned Bachelors and Masters of Science degrees in Geology at Cal State Long Beach and Univ. of Arizona. Depending on the season, find Steve trail running, skiing, climbing in the Cascades or Sierra, and/or fly fishing.

BOARD OF DIRECTORS 2015 CANDIDATES

**Tom Ring**

Tom is a hydrogeologist with the Water Resources Program of the Yakama Nation. He has held this position since 1990 and, in that role, has worked on a variety of projects involving groundwater and surface water quantity and quality, water rights, irrigation and fisheries issues and planning for future water needs. Previously he worked for the Water Resources Program at the Washington Department of Ecology. Tom has Bachelors and Masters of Science degrees in geology from Central Washington Univ. and Northern Arizona Univ. respectively. He has taught geology and hydrogeology classes at Central Washington Univ. and is a licensed geologist and hydrogeologist in Washington State. When not working, he enjoys hiking, climbing, and skiing in the mountains of the west.

**Jenny Saltonstall**

Jenny is hydrogeologist at Associated Earth Sciences, Inc. with 16 years experience in hydrogeology, geology, and geologic hazards assessments for both private and public sector clients. She has expertise in geologic mapping of complex stratigraphy; sustainability through storm water infiltration; developing conceptual ground water flow models; surface water – ground water studies; aquifer recharge; and ground water monitoring programs. She is a regular contributor at technical conferences and has been an invited speaker on infiltration components for green storm water management seminars. She received her bachelor's degree at Pacific Lutheran Univ. in Geosciences and is a licensed Geologist and Hydrogeologist in Washington State. Jenny enjoys spending time with family doing all things outdoors, keeping up with her kids and growing vegetables the kids will eat.

**Terry Smith**

Terry Smith is a licensed and retired attorney with a background in environmental law. she has worked for King County's Wastewater Treatment Division for twelve years, where she was responsible for permit applications and negotiations with federal and state regulatory agencies. She is also well versed in in water quality regulations and legislation. Prior to working with the County, Terry worked in private practice representing clients as both plaintiffs and defendants on environmental issues. Working in both the private and public sectors has given her insight into the needs and issues of regulators, businesses, and the public. She recently became interested in water rights laws and issues as well as the importance of water use, along with water quality, to the future of the state and the country.

**Erin Thacher**

Erin is a water resources engineer with 8 years of experience working with CH2M HILL. She has a B.S. in Environmental Science from Seattle Univ. and M.S. in Environmental Engineering from the Univ. of Washington. Erin started her career as a staff biologist and transitioned into civil engineering over the last few years at CH2M HILL while earning her M.S. as a part-time grad student. She works on a wide variety of projects, including stormwater planning, drainage design, water quality studies, NPDES and other permit compliance, wetland delineations, and habitat restoration. Her key skills include low-impact development feasibility assessments, ArcGIS spatial analysis, outfall dilution modeling, and wetland assessments. She also enjoys technical writing. In her spare time Erin enjoys hiking or snowshoeing with her dog, attempting to garden, playing the piano and guitar, watching the Seattle Seahawks game, and country line dancing.

**Stephen D. Thomas**

Stephen is a hydrogeologist in the Seattle office of Shannon & Wilson, Inc., where he manages the firm's groundwater group. He has 22 years experience in the areas of geologic and water resources. He manages and performs technical aspects of hydrogeological investigations for groundwater resources development, wellhead protection and groundwater management, groundwater contamination and waste disposal, dewatering, mining and environmental projects. A native of the United Kingdom, Stephen moved to Seattle in 2001, having previously lived in Los Angeles since 1992. He holds a BSc in Geology from the Univ. of Cardiff and a MSc in Hydrogeology from the Univ. of Birmingham, and is a licensed hydrogeologist in the states of Washington and California. Stephen enjoys many outdoors activities, particularly rugby, football, cycling and open-water swimming, and annoying his neighbors with his guitar playing.

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