



## PRESIDENT'S NOTES

Jacque Klug, WA-AWRA Section President

Happy New Year! As we embark on 2008, I want to reflect on our accomplishments during 2007. Wow, it was quite a year for our chapter! We held several well-attended dinner meetings in the Seattle area and transplanted our successful dinner meeting model to the Olympic Peninsula in 2007, hosting a dinner meeting in Sequim. We published six excellent newsletters highlighting water issues and work in Washington State. We continued to support students in the water field by working with the University of Washington AWRA Student Chapter and providing two fellowships to water students in our state.

We accomplished another "first" in October 2007 by partnering with the British Columbia branch of the Canadian Water Resources Association to hold a joint conference on Transboundary Water Resources. We expanded our typical one-day conference to a two-day event with an evening reception to facilitate networking and information sharing among conference attendees from both sides of the border. It was a great capstone to a busy and successful year for our section!

2007 was quite a year for water management in the state. Restoring Puget Sound was a legislative priority; a new agency, the Puget Sound Partnership, was created to oversee restoration efforts. New general stormwater permits took effect, climate change adaptation planning commenced, and water supply planning for the Columbia River advanced. These are all topics that WA-AWRA has featured in newsletters, conferences, and dinner meetings. Promoting dialogue on complex water management issues like these is a critical goal for our organization and one of the fundamental benefits to our membership. This newsletter features two articles to spur thinking on the Puget Sound Partnership and restoration efforts.

Looking forward, we anticipate an even more productive 2008. We've kicked the year off by hosting a student reception at the University of Washington to meet students, recognize our student fellowship winners, and learn about tribal perspectives on water management. If you missed this great event, you can read about it in this newsletter.

On March 12 WA-AWRA and the Society of Inland Northwest Environmental Scientists (SINES) are co-hosting a dinner meeting in Spokane. See page 3 of this newsletter for more details! We are also focusing on long-range planning for the organization and making our chapter even more successful and vibrant. We are enhancing our support of students by endowing a student fellowship and expanding student chapters to other universities in our state.

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# BOUNDARY DAM RELICENSING AQUATIC STUDIES

Heather Scott, Golder Associates

Seattle City Light (SCL) is relicensing their Boundary Hydroelectric Project. This project is located on the Pend Oreille River in northeast Washington, less than one mile from British Columbia. This peaking project generates up to 1,050 megawatts and was first licensed in 1961. The current operating license will expire in 2011. SCL plans to prepare an application for a new license and file it with FERC by September 2009. This application will include any alternative project operations proposed by SCL as well as plans for resource protection, mitigation and enhancement measures for the term of the new license. The FERC relicensing process requires evaluation of existing water quality conditions in the Project area, along with a determination of whether the conditions meet the Washington Department of Ecology's regulatory standards for 401 Certification.



The relicensing process is entering its second full year of field studies. Another full year of field studies and report development is anticipated to provide the data needed to receive a new FERC license. A variety of aquatic studies related to the relicensing of the Boundary project is briefly described in this article.

## Evaluation of Total Dissolved Gas and Potential Abatement Measures

High TDG levels can impair beneficial uses for fish and other aquatic species downstream of the dam. The goals of this study are to better define the relationship between total dissolved gas (TDG) levels and Boundary Project operations. This information is used to identify and evaluate potential operational and/or structural measures that could reduce elevated TDG levels caused by the project. Seasonal measurements of TDG are currently being collected using Hydrolabs at several locations above and below the project including continuous monitoring of a grid in the tailrace area

## Fish Distribution, Timing and Abundance Study

Fishery resources in the Boundary Project area consist of native and introduced salmonids, native

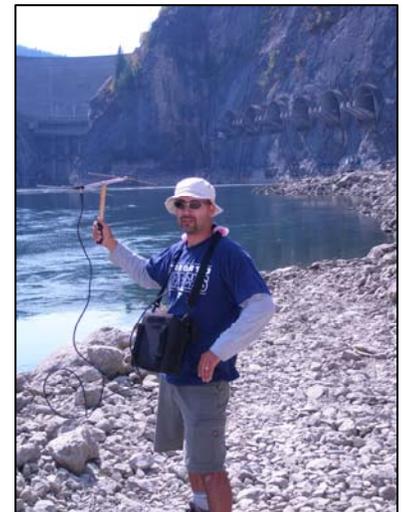
non-game fish, and introduced warmwater sport fish. This study is supporting the assessment of fish distribution in Boundary Reservoir during the late fall, winter and early spring, as well as how the warmwater sport fish interact with native salmonids. This study is designed to provide baseline biological information and supporting information for the Mainstem Aquatic Habitat Modeling Study.

Study goals include filling data gaps in the existing information regarding the abundance, distribution, and periodicity of fish in Boundary Reservoir; providing information to aid discussions of habitat connectivity for native salmonids at the Boundary Project; and obtaining key life history information about the fish in Boundary Reservoir to identify the seasonal timing, distribution and abundance of fish at a variety of locations in and below the project area. Night boat electrofishing is used to sample fish in the project area and biotelemetry using radio and acoustic tags is used to monitor the movements and habitat use characteristics of tagged fish. Internal radio transmitters and combined acoustic radio transmitters (CART) are surgically implanted into target species, which include bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*Oncorhynchus clarkii*), mountain whitefish (*Prosopium williamsoni*), smallmouth bass (*Micropterus dolomieu*), and triploid rainbow trout (*Oncorhynchus mykiss*).

To monitor the tagged fish, a total of 12 fixed radio receiver stations have been installed in the Project area: in Boundary Reservoir (9 stations), in the Boundary Dam tailrace (2 stations), and in Canada in the upper end of Seven Mile Reservoir (1 Station).

## Fish Entrainment and Habitat Connectivity Study

The Boundary Project impounds water behind a 340 foot-high dam and releases it through six large turbines. When flow into the reservoir exceeds the capacity of the turbines, water is released through the dam's spillway structures. Fish moving downstream may be inadvertently passed, or entrained, along with the flow of water. The goal of the Fish Entrainment and Habitat connectivity Study is to estimate the number, size, species, and timing of fish that may be entrained within the Boundary



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Project turbine intakes and spillways. Study results will be used to estimate the effects of Boundary Project operations on hourly, daily, diel, and seasonal entrainment of fish within the Boundary Reservoir.



Hydroacoustic methods are being used to monitor fish passage through the spillways and powerhouse for purposes of estimating entrainment through these routes. Fyke net sampling is being

used in the draft tube gatewells to determine the accuracy of the turbine passage information generated by hydroacoustics and to monitor species composition over time.

#### **Recreational Fishery Study**

Currently, SCL voluntarily contributes to the recreational sport fishery through the purchase and release of triploid rainbow trout in Boundary Reservoir. In addition, SCL voluntarily holds the reservoir pool level within the top 10 feet during the summer recreation season so that boat ramps are accessible during much of the day. This study examines the post-stocking distribution of triploid trout, harvest level, and potential interactions of triploid rainbow trout and native salmonids.

Radio telemetry is being used to identify movements of triploid rainbow trout and to evaluate habitats and fish use characteristics. The project is also identifying positive and negative effects of the stocking program and evaluating patterns of triploid dispersal, growth, and survival. ~~~

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## **Joint SINES / WA-AWRA Dinner Meeting**

### **March 12, Spokane**

Quality Inn, 110 East 4<sup>th</sup> Avenue, Spokane, Washington

### **Professor David Montgomery**

The Washington Section of the American Water Resources Association (WA-AWRA) is sponsoring a presentation by University of Washington professor and writer Dr. David Montgomery on March 12, 2008. The presentation will be at a joint meeting of the Spokane area group The Society of Inland Northwest Environmental Scientists (SINES) and WA AWRA. The meeting will be held the evening of March 12, 2008 beginning with a social hour at 6:30 p.m. followed by the presentation at 7:30 p.m. The Coeur d'Alene office of Golder Associates is sponsoring the meeting and will provide light hors d'oeuvres during the social hour.

Professor Montgomery works on the research faculty of the University of Washington College of Earth and Planetary Science. His presentation will focus on the information presented in his latest book, "Dirt, The Erosion of Civilizations." In "Dirt," Montgomery hypothesizes that the rise and fall of many human civilizations correlates with the quality and treatment of the agricultural soils that fed the culture. This topic is particularly relevant as no-till farming and related conservation measures are being increasingly considered in Eastern Washington.

The joint meeting between SINES and WA AWRA is the first in what is hoped to be several events held in Eastern Washington to raise awareness of the work of the Washington Section.

For more information on the program, meeting location and the SINES organization visit the Society's website: [www.spokanesines.org](http://www.spokanesines.org).

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#### **North Central Washington** (from: <http://www.wdfw.wa.gov/do/weekendr/weekendr.htm>)

Bob Jateff, WDFW fish biologist from Omak, says ice fishing in Okanogan County could be very productive at this time of the year. "Rainbow trout is the main species available and there are a number of lakes that are open to fishing," he said. "Rat Lake near Brewster, Davis Lake near Winthrop, Big and Little Green lakes near Omak, and Sidley Lake near Oroville all provide good wintertime trout fishing."

Patterson Lake west of Winthrop opened Jan. 1 to give anglers a crack at its abundant yellow perch population. Jateff said perch could usually be caught on small panfish lures tipped with a worm and/or maggot.

Rufus Woods Lake continues to produce triploid rainbows, Jateff reported. "Both boat and shore anglers are catching two- to four-pound triploids there," he said. "The daily catch limit on trout is two fish and when using bait, the first two trout caught constitute the daily limit, whether kept or released."

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# Are We Fooling Ourselves? - Can Habitat Restoration in Urban Streams Produce the Desired Biological Benefits?

By Cleve Steward, Senior Fisheries Scientist, AMEC Earth & Environmental, Inc.  
And Ed Zapel, Restoration Engineer, Pacific Hydraulic Engineers and Scientists, PLLC

Every winter, Seattle and other areas of western Washington are periodically lashed by intense winter storms, causing streamflows to rise precipitously and, under severe conditions, to overtop their banks. In many ways the high flows that accompany storm events are beneficial; they flush sediment, rejuvenate wetlands, and create favorable, albeit highly dynamic, conditions to which indigenous plants and animals are well-adapted. However, in urban settings, a significant amount of rainfall is intercepted by impervious surfaces and routed rapidly through man-made conveyance structures to receiving streams. The hydrographic response is well known: peak flows in streams draining urbanized areas are generally higher and occur more quickly than under predevelopment conditions.



*View of completed project before planting*

The results can be catastrophic. For example, a strong storm front moved through the Puget Sound region in December 2006, bringing with it near record levels of precipitation. Stormwater collection and conveyance systems in many urban areas were overwhelmed, resulting in extensive ponding and local surface water flow. Flooding was widespread; no more so than in the Madison Valley area of Seattle, where a local resident was trapped by runoff in her basement room and drowned.

In December 2007, flooding struck again, this time over a large area of southwestern Washington. The region-wide storm killed several people, severed major highways, isolated communities and closed scores of roads and businesses.

While the impact on human property and lives of these types of events has received well-deserved attention, planners do not always contemplate the damage caused by high flows to instream resources, notably salmon and their associated habitat. With the listing of several species of salmon in the Pacific Northwest as threatened and endan-

gered under the Endangered Species Act, considerable sums of money have been poured into stream restoration projects throughout the region. Although the catastrophic effects of floods on salmon, whose eggs are deposited in stream gravels to incubate over the winter, are well-documented, much less is known about their effects on formerly disturbed sections of stream that have been intentionally restored to a natural state. The capacity of these stream restoration projects to create and maintain desired ecological components and functions over the long run hinges on their ability to withstand periodic flooding, pollutant loading and other stresses.

In part due to strong advocacy of local residents, Thornton Creek in north Seattle has been accorded favored stream status by the City. Draining a heavily developed, 11.6-square mile watershed, Thornton Creek still provides sanctuary for a healthy cutthroat trout population, but numbers of coho and chinook salmon are critically low. Thornton Creek has been the focus of extensive restoration efforts, with the City partnering with local residents in an attempt to preserve its legacy as a salmon-bearing stream.



*Landowner Frank Backus with wood pile before installation.*

In 2007, the City of Seattle provided an Aquatic Habitat Matching Grant to the non-profit organization Sustainable Fisheries Foundation to assist north Seattle resident Frank Backus with the stabilization and restoration of the channel and banks of a section of the North Fork of Thornton Creek that traverses his property. The Foundation hired stream restoration specialists from Steward and Associates to come up with a plan to stabilize an actively eroding hillside that was dumping large quantities of sediment into the North Fork during high flow events.

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Working with restoration engineer Ed Zapel, P.E., fisheries and wetland ecologists from Steward and Associates developed a natural hillside stabilization design; conducted critical areas studies; obtained project permits; solicited, awarded and administered the construction work; developed a revegetation plan and coordinated replanting efforts; and performed pre- and post-project monitoring at the project site.

Construction included installing and anchoring a large log crib wall, placing spawning gravels, and widening the creek channel. In addition to the habitat improvement work, a ¾ acre of hillside adjacent to the stream was converted into a conservation easement.



*Installing large wood along the shoreline*

Property owner Frank Backus magnanimously contributed the land for the conservation easement, which will preserve in perpetuity the natural character of the hillside. With help from volunteers from the Thornton Creek Alliance, Frank replanted the disturbed area with native plants, and will participate in monitoring and maintenance activities in the future to ensure that project goals are met over the long-term.

Work on the North Fork habitat restoration project was completed in September and initial results were encouraging. Then the December 2007 storm struck. Hydrologic analysis indicates that streamflows in Thornton Creek exceeded the 25 year recurrence interval. Flooding in low lying areas was prevalent. Nevertheless, the recently completed stream restoration project on the Backus property fared exceptionally well. Observations made during the height of the storm indicated that maximum water depths and velocities did not exceed design values the project. Large wood used

in the project remained in place, no newly planted vegetation was lost, and the reconstructed bank showed no signs of undercutting or erosion. After peak flows receded and visibility improved, it became apparent that sediment from upstream sources had been transported by high flows into the reach, where much of it was trapped by the recently placed wood structures. The project functioned as intended by stabilizing the bank against further erosion, engaging woody substrate in the water column, creating complex riffle and pool habitat, and facilitating the deposition of fine material in adjacent floodplain and riparian areas.

Time will tell whether the Backus restoration project is capable of withstanding the severe hydraulic forces to which Thornton Creek will no doubt be subjected to in the future. For urban stream restoration projects in this and other urban streams to be cost-effective and to continue to receive public support and funding, they must provide measurable biological benefits over a sufficiently long period of time. What constitutes a significant increment of biological value? To quote Iannuzzi and Ludwig (2005), “Every increment is significant. Any restored habitat will provide a focal point for a few individuals or a few taxa that would not otherwise be present in the system.”



*Volunteers replanting native vegetation*

Ongoing development in urban watersheds like Thornton Creek will undoubtedly stymie efforts in the future to restore their streams to properly functioning condition. However, if residents are willing to alter their behaviors, adopt strict protective measures, and contribute resources toward stream restoration, the ecological condition of streams in developed watersheds can be expected to improve. ~~~

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**The Board of AWRA WA seeks to provide through this newsletter a full range of views on water resource issues. Opinions expressed in this newsletter do not necessarily reflect the views of individual Board members, the section membership, or their employers.**

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“The work an unknown good man has done is like a vein of water flowing hidden underground, secretly making the ground green.” Thomas Calyle

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# The University of Washington Water Center

By Debbie Livingstone, Program Coordinator, The Water Center, University of Washington

The Water Center at the University of Washington features a two-decade tradition of addressing water resources and environmental problems with interdisciplinary and collaborative research, education, and outreach. In 2001, the Water Center was formed by the fusion of two long-standing UW centers focused on water issues: the Center for Streamside Studies, created in 1987, to help resolve the controversies concerning the management of forest, fish, wildlife, and water resources in the Pacific Northwest; and the Center for Urban Water Resources Management, established in 1991, to focus on the consequences of urban land development on the region's water resources. These centers showed that a collaboration of students, faculty, and community professionals can improve the value of scientific research and educational outreach on water-resource issues.

The Water Center's mission statement is, "To produce scientific peer-reviewed research that will address key issues, advance understanding, inform decisions, and shape policies concerning water resources in the region and beyond." The Center serves as a catalyst for interdisciplinary research that focuses on the scientific and societal aspects of water—demands and supplies; quality and quantity; physical, chemical, and biological characteristics; time and space variability; watershed processes; and economic, ecological, and equity considerations.

Anne C. Steinemann, Director of the Water Center since 2004, is a professor in both the Department of Civil and Environmental Engineering and the Evans School of Public Affairs. She combines expertise in engineering, policy, economics, and public health, and specializes in water resources, drought management, hazard mitigation, and environmental health. Thirty affiliated UW faculty from ten schools and colleges provide the interdisciplinary focus to the Center's research. To help provide strategic direction, the Water Center draws on the expertise of a widely experienced Advisory Board of over thirty agency and industry leaders. The Water Center is a joint program of the College of Forest Resources, the College of Engineering, the College of Ocean and Fishery Sciences, and

the Evans School of Public Affairs at the University of Washington.

## Launching Professionals

The Center is designed to help students develop both scientific depth and interdisciplinary breadth of knowledge concerning water resources in the region and beyond. In the collaborative setting of the Center, students work together with faculty and other researchers, often teaming up with off-campus professionals and organizations. The Center's educational approach stresses practice-based experience, training students to become effective professionals. Water Center students have a reputation for being excellent employees as they have a broad background based within the context of current Puget Sound environmental issues. According to a local water manager, "the professionals in this region rely on the savvy students coming out of the program, keyed into regional issues at a relevant level to take jobs and keep the conversations moving forward rather than continually restarting." The Center has now trained two generations of scientists who work in public and private institutions.

The Center maintains close ties with the student chapter of the American Water Resources Association, which received the "National Outstanding Student Chapter" award by AWRA in 2001 and 2006. Professor Steinemann serves as the faculty advisor to the student chapter.



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## Conducting Vital Research

The Water Center pursues basic and applied research in a number of important areas: climate change/variability, environmental health, regional sustainability, and hazard mitigation. Among them:

- The Center is leading a comprehensive drought management program for Washington State to minimize the effects of potential future water shortages. Researchers are also developing strategies to reduce vulnerability to droughts and floods given climate changes expected in the 21st century.
- The Center is analyzing the presence and sources of endocrine disrupting chemicals and other emerging contaminants in surface waters and wastewaters in Seattle watersheds. By identifying the compounds and their sources, such as common household consumer products, steps can be taken to reduce the entry of toxic chemicals into our water systems and Puget Sound.
- The Center's award-winning book, *Restoration of Puget Sound Rivers*, provides a definitive guide to restoring rivers and streams in the region.
- A new book co-edited by Professor Steinemann, *Exposure Analysis*, is a comprehensive resource on environmental pollutants that affect human and environmental health. This book provides the basic tools needed to identify sources, understand causes, measure exposures, and develop strategies for improving public health.



## Engaging the Community

The Center's website is known for its usefulness to professionals seeking accessible, pertinent research literature (<http://depts.washington.edu/cwws/>). For example, it is seen as a single point resource by those who use the site to access the latest research related to topics such as urban watersheds and stormwater impacts. Water Center "Fact Sheets" are available on topics ranging from riparian forest and fish ecology to water resource policy. They concisely summarize Center research findings for professionals and the public. Fact sheets are accessible at:

<http://depts.washington.edu/cwws/Outreach/Publications/factsheets.html>

The Center's Annual Review of Research shares the latest academic research with water profess

ionals and the interested public. The day-long Review, held at the UW Seattle campus, is free and open to all. This year's Review, on February 14, 2008, will highlight the breadth of UW research covering such timely topics as urban stormwater, salmon and salmon habitat, droughts and water shortages, climate impacts, sustainable water management, and water and health. The Review is attended by several hundred researchers, professionals, students, and members of the public concerned about the important water issues facing society today. For the schedule of speakers and topics, please see:

<http://depts.washington.edu/cwws/Outreach/Events/AnnualReview/annualreview.html>

The Water Center hosts weekly free public lectures featuring speakers from the UW and the region on special topics related to water and water-related resources. The Water Center Seminars attract an audience of nearly 100 students, faculty, staff, and professionals. The goal of the seminar series is to provide students, scientists, policy makers, and the public in the Pacific Northwest an opportunity to hear some of the region's innovative practitioners and researchers discuss current topics and trends in natural resources protection and management. Audiocasts of most lectures are available on the Center's website. The current schedule of speakers and topics is available at:

<http://depts.washington.edu/cwws/Outreach/Events/Tuesday/tuesday.html>

The Center also maintains an email list which posts seminars and water-related job opportunities throughout the region. To sign up to receive jobs and/or announcements, contact the Center at: [cwws@u.washington.edu](mailto:cwws@u.washington.edu), (206) 543-6920.

## The Future

The Center serves as a national model of providing research with societal impact. With the exceptional expertise of the UW faculty, and the active involvement of UW students, it will continue to address contemporary water issues in a collaborative and interactive way with water resource professionals, policy makers, and the public. Whether it involves new strategies to address stormwater runoff into Puget Sound or to reduce vulnerability to climate change, the Center is positioned to provide the scientific studies in these critical and growing areas. ☺

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# UW Team Returns from Successful Implementation Trip to Bolivia

By Donee Alexander, AWRA-UW Student Chapter

In July/August 2007, six University of Washington students, including three student chapter AWRA members, accompanied by a faculty advisor and two professional mentors, participated in a trip to Yanayo, Bolivia. Yanayo is a small, remote, indigenous village located high in the Andean region of Bolivia with landscape very reminiscent of southeastern Arizona. The villagers are extremely poor, live in thatched roofs, have no electricity, and are subsistence farmers, growing mostly wheat and potatoes. For the past five hundred years, this community of about 100 people has relied on traditional farming for their existence, but recent drought conditions have decreased crop yields, which in turn has forced some villagers to leave their community and look for employment elsewhere.

Engineers Without Borders (EWB) (<http://www.ewb-usa.org/>) was initially asked to help Yanayo with issues of water supply for irrigation; however, after an assessment trip in September of 2006, it was determined that the community was in need of much more. In response to community concerns and needs, EWB-UW worked with community on three main projects: metal roofs, improved stoves and an irrigation system.

## Metal Roofs

Prior to the 2007 implementation trip, most of the houses in Yanayo had thatched roofs. This provides substantial habitat for *Triatoma infestans*, the insect vector that transmits *Trypanosoma cruzi*, the causative agent of Chagas disease. Chagas is a chronic disease, which results in premature death due to congestive heart failure or megacolon. Replacing thatched roofs with corrugated metal is a proven method for reducing the incidence of Chagas by reducing the habitat for *T. infestans*.



During the implementation trip, EWB-UW worked in teams with community members to install roofs for each of the families. This proved to be an onerous task initially, as the community members did not un-

derstand the benefits of working in teams. Although we had requested that the community be arranged into groups before arrival, the initial work on the roofs was done mostly by the EWB-UW Team. This was unacceptable and we soon called an “emergency” town meeting in which the mayor gave a passionate speech about the community’s need to come together; otherwise, the Team would leave the community along with the supplies. At this point, groups were re-established, with EWB-UW team members each joining a team to ensure progress. This proved to be quite a success, as all of the houses were completed before the last member of the EWB-UW team left the community. Perhaps one of the most memorable moments of the trip was when one community member stood up during the farewell ceremony to express his sincere gratitude for learning how to work in teams, saying in Quechua, “I have never worked in a team before, and I did not think it would work, but you guys showed us that so much more can be completed if we just work together.” This statement alone, made the project worthwhile.



## New Stoves with Chimneys

Before installation of the improved cook stoves, the women cooked food on open wood stoves inside their homes. Not having chimneys results in very poor air quality within the homes that contributes to eye damage and respiratory difficulties, especially in women and children who spend many hours indoors. As part of a mechanical engineering senior design project, members of EWB-UW designed an adobe wood burning stove with a metal pipe chimney that dramatically reduces indoor air pollution. Installation of corrugated metal roofs allowed for safe installation and use of the chimneys.

EWB-UW had a completed stove design ready for implementation; however, many challenges ensued upon arrival in Cochabamba – mainly the difficulty in finding the right materials. Although, the stove was

designed to use only locally available materials, many of the materials, thought to be “similar” or “sufficient” were found to be unusable. The first of several redesigns took place over two sleepless nights while team members frantically searched the nearby city of Cochabamba for acceptable replacement materials.

Using the newly-bought materials, team members built the first stove prototype in a community member’s kitchen. While cooking food for the first time with the prototype stove, the team faced further challenges. The ceramic tile that was purchased for the firebox fractured from the cyclical heating and cooling of the stove. This was not supposed to happen as the tiles had been guaranteed to withstand temperatures of over 1000C. Although this posed problems, team members were able to quickly redesign the firebox using a different, yet still locally available, material.

Although team members had built a stove that eliminated indoor air pollution, the work was not yet completed. The next challenge was to maximize the usability of the stove. Through talks with the community, it became evident that the women had some reservations about the stove. Team members went through several design iterations in order to satisfy the community’s issues with the stove while still providing thermodynamic efficiency. One of the major challenges in this type of project is finding a compromise between engineering principles and community needs. This requires broad thinking, creativity and a strong engineering background.

In addition to redesigning the stove to fit community members’ needs, EWB-UW enlisted the mayor’s wife, Jesusa, to hold workshops with each of the women to instruct them on the proper use of the new stoves. For a project to be successful there needs to be communication, compromises, and training programs. Without these essential actions, there is no guarantee that the community will adopt the new technology.

### **Irrigation System**

An irrigation system wasn’t part of the original plan, as rainwater catchment tanks were originally proposed and agreed upon. However, if there is one lesson that should be learned in overseas development work, it is that the community will take any opportunity they have to improve their conditions, even if this means working with several organizations at once. This is exactly the case in Yanayo, where one day, several months before the proposed implementation trip, EWB team members received a phone call informing them that a new tank had been installed in the community by a Spanish NGO that was supposed to provide irrigation water for the entire community. However, no water delivery system leading from the tank had been installed. This left the community at a loss, because the irrigation pipe system would cost upwards of \$3000 to install, and amount incomprehensible for a small village in rural Bolivia.

Upon arrival in the community, EWB-UW began a joint effort with the community to design and implement an irrigation system from a 25-meter diameter, stream-fed tank that would allow the farmers to plant vegetables and other crops in their fields during the dry season. A few team members took the lead in designing a water delivery system. Despite having no information about the system prior to arrival, some members had extensive knowledge of the topic and felt confident that the task was manageable. Although EWB-UW only had a few weeks to complete the system, the team and the community worked together in an amazing effort to design and then install the irrigation system. Day after day, EWB-UW team members walked the along the planned route of the irrigation pipe with the community members to determine placement, fittings, etc.



After the initial planning was completed, every available person in the community (including women and a seventy-five year-old man!) worked tirelessly to dig hundreds of meters of trenches so that the system could be buried upon completion. A total of two kilometers of pipeline were installed down mountain slopes in little more than a week. During this time, several members of the community were educated on maintenance, water supply and availability; and a maintenance fund was put in place. This was done to ensure sustainability of the project. This project is intended to not only improve the health of the villagers, who are accustomed to eating mainly wheat and potatoes, but also provide them with the ability to grow and sell excess crops at the market.

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## What is Next?

Perhaps the theme that best describes the implementation trip is "Nothing ever goes as planned, but through teamwork the problems that arise can be solved and obstacles overcome." From day one of the trip to the final day, there were constant surprises and glitches in the plan. Without team members who could adapt in a flexible and timely manner, the trip would not have been a success. From redesigning the stove in Cochabamba to designing an irrigation system on the ground, the EWB-UW team was constantly working outside of the traditional engineering box. This included living in tents in a temporary group campground set up near the school grounds for the one-month duration of the project. Each day the team faced new challenges; however, with teamwork and communication the team was able to effectively work through the challenges. Although there were many surprises along the way and many things that did not go as planned, the EWB-UW team worked remarkably well together to successfully complete the team's first implementation trip.

After the successful month in Yanayo, EWB-UW decided to continue collaboration with the community

and neighboring communities. During the trip, EWB-UW met with the community to discuss future projects. The community expressed interest in improving the recently-built road into the community so they can continue to use it through the rainy season. This road provides access to schools, health clinics and markets where they can sell their newly grown vegetables. This project is tentatively scheduled for the summer of 2008. After the wide acceptance of the improved cooking stoves, EWB-UW plans to construct stoves in the two neighboring communities, with one community scheduled to receive new roofs and stoves during the summer of 2008.

Thanks to the success of the Bolivia project, EWB-UW is seeing a surge in interest and participation. What once started as a small, five-person group has grown to over thirty active members. Because of the increased participation, EWB-UW plans on taking on a new project, most likely in Suriname. We are also excited to host the 2008 International EWB Conference to be held at the University of Washington on March 28–30, 2008. This is a great opportunity for anyone who is interested to find out more about us and to financially support our future work. ☺

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## ≈ Current Changes ≈

This section is a new addition that will be included regularly to announce transitions made by individual members or member organizations. Please send information to be posted in subsequent issues to Liz Shea ([lshea@golder.com](mailto:lshea@golder.com)).

- Steward and Associates has agreed to merge with AMEC Earth and Environmental (<http://www.amec.com>). The core group of fisheries biologists, policy experts, and wetlands specialists will continue to provide technical, policy, and management assistance in fisheries and aquatic sciences to government, tribal and non-government entities. The group will continue to work out of the Snohomish, north Seattle, and Spokane offices, deriving additional strength and support from AMEC's 100-person Kirkland office. Email sent to Steward and Associates email addresses will be automatically forwarded to the respective AMEC email account.
- Carl Einberger (AWRA State Section Board Member) recently joined Golder Associates. Carl is a hydrogeologist focused on water resource issues in Washington State, with expertise in water rights, water supply development, mine hydrogeology, watershed management, and stormwater management issues. He is based in Golder's Seattle office and will also work closely with staff in the Redmond office.

If you have announcements of interest to the water resources community, please contact [lshea@golder.com](mailto:lshea@golder.com).

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## South Sound Science Symposium

**March 26, 2008, Lacey Community Center, 6729 Pacific Ave. SE, Lacey, WA**

You are invited to join a symposium of ecosystem issues unique to the South Puget Sound. Through presentations, discussions, and poster sessions, we will explore how to identify and relate changes in the health of the south sound's ecosystem.

### Potential Topics

Marine Circulation  
Water Quality  
Marine Biota  
Landscape Changes  
Stormwater Impacts

### Who should attend:

Scientists  
Science Users  
Educators

For more information, visit: [http://www.psp.wa.gov/about\\_us/action\\_areas/aa\\_south\\_sound.htm](http://www.psp.wa.gov/about_us/action_areas/aa_south_sound.htm),

Or contact Mindy Roberts at: 360-407-6804 or [mrob461@ecy.wa.gov](mailto:mrob461@ecy.wa.gov)

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# Puget Sound Partnership: Creating a Roadmap for a Healthy Puget Sound

By David Dicks, Executive Director, Puget Sound Partnership

Governor Chris Gregoire and the 2007 Legislature charged the Puget Sound Partnership to figure out what is wrong with the Sound and establish a plan to fix it. This plan, called the Action Agenda, will be the roadmap to a healthy Puget Sound.

The process for developing the Action Agenda – due in September – depends on everyone who has a stake in Puget Sound to be part of the solution. This includes local, state, and federal agencies, tribal governments, citizenry groups, farmers, foresters, urban and rural businesses, and community members.

Many initiatives are aimed at restoring Puget Sound, and much good has been done, but the work is often uncoordinated and results uncertain. So we are doing something never before attempted. Our Action Agenda is a long-range, broad-based, strategic plan for all of Puget Sound, from the tops of the mountains to the bottoms of the waterways.

Another important distinction is our ability to hold our partners accountable. Think of this as an “audit” of their efforts to clean up the Sound. For example, if a state agency is charged with completing an Action Agenda task, but isn’t doing an effective job or spending the money wisely, that information will be made public. The Partnership will work with the agency to improve performance, but if the situation does not improve, we can recommend to the governor to suspend future funding to that agency.

By including every organization with an interest in Puget Sound, and giving everyone the opportunity to be a partner, we will focus our collective abilities and ensure cleanup and improvement projects are coordinated, prioritized and effective.

Several principles will guide our work:

- Public engagement is critical: **You** are an essential participant in the process.
- Collaboration and cooperation across sectors and interests is vital.
- The Action Agenda creation process will be clear and transparent.
- The process will include a scientific review of proposed actions.
- We will work with existing organizational and decision-making structures rather than create new processes.

Using existing organizations and local knowledge will allow the Partnership to advance quickly and comprehensively. For example, the widely praised work of Shared Strategy for Puget Sound – the collaborative group that spent more than five years developing a federally approved basin-wide salmon recovery

plan – is a cornerstone of the Partnership’s recovery efforts. On Jan. 1, the Partnership officially became the regional salmon recovery organization for Puget Sound salmon. This is an important development given that our work to save salmon and restore the health of Puget Sound go hand in hand. As an agency, the Partnership is structured to develop a realistic, technically sound living document.

Our Leadership Council brings together experienced leaders to guide our Action Agenda: Bill Ruckelshaus, Billy Frank, Jr., Diana Gale, Martha Kongsgaard, Dan O’Neal, Steve Sakuma and Bill Wilkerson.

Our Ecosystem Coordination Board includes local citizens, cities, counties, ports, tribes, businesses and environmentalists in each Action Area – [Hood Canal](#), [Strait of Juan de Fuca](#), [San Juan Islands](#), [Whidbey Island](#), North Central Puget Sound, South Central Puget Sound and South Puget Sound.

Our Science Panel, comprised of experts nominated by the Washington Academy of Sciences, provides independent scientific advice on monitoring, research, modeling, restoration and data management to ensure our decisions are based on fact.

The Action Agenda will offer extensive opportunities for input, dialog and involvement for anyone interested in restoring Puget Sound. It is designed to answer four key questions:

1. What is the status of and what are the threats to Puget Sound's health?
2. What is a healthy Puget Sound ecosystem?
3. What actions must we take to move from where we are today to a healthy Puget Sound by 2020?
4. Where do we start?

The Partnership will conduct a four-phase community involvement process engaging scientific and policy experts, agencies and governments, and community groups and the public to: 1) synthesize existing data and information; 2) conduct a gap analysis to highlight what more is needed; 3) identify priorities, actions and assignments; and 4) roll up, review draft Action Agenda and approve.

The Puget Sound Partnership is a community effort of elected and public officials, tribal and business leaders, scientists, environmentalists, friends and neighbors. It is a comprehensive effort with input from every part of Puget Sound. It is a strategic effort using science to inform decisions and focus limited resources.

The work to develop the Action Agenda is under way. To get involved please visit: <http://www.psp.wa.gov/>. ☞

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## WA-AWRA Student Fellowship Winners!!!

The Washington State Section of the American Water Resources Association (WA-AWRA) offers an annual Fellowship of \$1,500 to full-time graduate students completing an advanced degree in an interdisciplinary water resources subject. Since 1998 two fellowship awards have been given. One award is presented to a member of a Washington Section affiliated Student Chapter. In 2007 the Washington Section declared the Fellowship awarded to the Student Chapter member the Rod Sakrison Memorial Fellowship in honor of Rod's work to establish the U of W student chapter. The other award goes to a student enrolled in a graduate program at any college or university in Washington State.

In addition to the cash award, the fellowship includes a one-year membership in both the State and National AWRA, a one-year subscription to the Journal of the American Water Resources Association, and admission to the Washington State Section Annual Conference.

A committee of four WA-AWRA members selected the two award winners for the 2007–08 year from a field of five applicants. Of the five applicants, three are students at the University of Washington, one attends Washington State University and one attends Central Washington University. As the University of Washington boasts the only student chapter in Washington, the selection criteria requires that the Rod Sakrison Memorial award go to a student from the U of W.

Eric Rosenberg working through the Water Center at the U of W is the 2007 – 08 Rod Sakrison Memorial award winner. Eric's thesis title is, Adaptation of remote sensing data and seasonal climate forecasts for water resources management. Eric's work seeks to address the need for better data needed for water management by adapting advanced technologies for hydrologic prediction in the operational environment.



From Eric's application we find that, "With snowmelt accounting for roughly 75% of the streamflow in the

West, quantification of snow water equivalent (SWE) has historically been the method for predicting spring and summer streamflows, and statistical regression-based models have long provided water supply forecasts for the period of peak demand. Yet these models, which are based on point surface observations of snowpack, may not capture fully the considerable spatial variability in snow properties over large areas. Furthermore, since forecasts are based solely on conditions known at the time of issue, their accuracy may not be better than climatology prior to the onset of snowfall. Even afterwards, significant forecast error can result from uncertainty in the amount of precipitation falling through the end of the target season.

"Remote sensing and seasonal climate forecasts offer the potential for improvements to streamflow prediction. Remote sensing has been studied for decades as a supplement to surface observations, dating from early efforts using aerial photography to more recent applications of satellite imagery. The contrast in reflectance between snow-covered and snow-free areas makes the estimation of snow extent straightforward using visible wavelength sensors, although the need for cloud-free conditions and difficulty identifying snow under trees pose limitations. With the launch of the NASA Terra satellite in 1999, however, focus has shifted to snow extent products based on the moderate resolution imaging spectroradiometer (MODIS), whose higher spatial and spectral resolutions offer improved cloud discrimination and snow detection under vegetation canopies."

The "open" category award recipient is Jeremy Leib. Jeremy is a CWU student working within the schools Resource Management Program. Jeremy's thesis is titled, Historical relationships between climate variability, water resource development, and socioeconomic development in the Upper Yakima Basin. Jeremy's research is focused on developing an accurate account of the historical relationships between socioeconomic development, water resource development, and climate in the Upper Yakima Basin.

From Jeremy's application, "As a result of predicted climate change, increasing growth, and increasing concern for anadromous fish habitat in the basin, fears have begun to grow over future water shortages. Several methods have been proposed to deal with potential water shortages; a favored option included among proposed methods is the addition of new storage reservoirs. Research in support of increasing storage in the Upper Yakima Basin has focused on future predictions for demand and climate change, but has not grounded those predictions with the historic impacts of climate variability and water resource development. The purpose of my research will be to fill this void in historical research on water

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resources and climate, and to assess the historic impacts of water resource development and climate variability and the economy of the basin. This will be accomplished through qualitative and quantitative comparisons of the historic climate variability (temperature, precipitation and seasonality), water resource development and water use, and several socioeconomic indicators, as well as broad socioeconomic changes over time.



“Of particular importance to this research are two currently prominent and inadequately justified ideas: 1) the Upper Yakima Basin is particularly susceptible

to drought and the already serious threat of drought will be exacerbated by predicted climate change; and 2) additional storage and other water resource development will reduce the potential impacts of drought while allowing future economic growth. In actuality the Upper Yakima Basin may be better prepared for drought than is commonly believed. Dunbar found that management agencies in the Yakima Basin as a whole were currently capable of effectively managing for present and predicted future climate variability, while the economic impacts of the worst drought on record in 1977 were not nearly as severe as predicted... Historical trends throughout the western U. S. have indicated that increasing water storage commonly increased water use, thereby offsetting the benefits of increased storage for the reduction of drought risk... My research aims to synthesize that historical information for the Upper Yakima Basin into a single comprehensive source.”

Other projects entered include those of Zain M. Al-Houri PhD candidate from Civil and Environmental Engineering at WSU whose dissertation title is, Proposed modification on the existing design parameters for improved performance of Infiltration Treatment BMPs in cold climate; Joowon Park, PhD candidate in Forest Resources at the University of Washington, Comparison of the Positional Accuracy of Stream Mapping Methods; Considering the effects of Minimum Contributing Area and Spectral Data; and Caroline Paulson, MS candidate at the University of Washington’s Aquatic and Fishery Sciences program, whose thesis title is “Evaluating the effects of hypoxia on the marine community in Hood Canal, Puget Sound. ☺

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## Ecology’s Water Resources Program publishes its Water Resources Annual Report

<http://www.ecy.wa.gov/biblio/0711036.html>

This report tells the story of our past year, presenting the "hard" numbers related to the program's varied activities, as well as feature articles that tell some of the stories the numbers alone cannot. The availability of water determines our quality of life and the success of our farms, businesses and industries—and our competitive position in the global economy. Historically, Washington residents have enjoyed an abundance of water, but with population growth and a changing environment, water availability can no longer be taken for granted. We are working closely with communities around the state to provide sustainable water management, to meet current water needs and ensure future water availability for people and the natural environment. This report highlights some of our recent successes and challenges. Featured are some of the Water Resources Program staff who work every day in support of sustainable water resource management. Permit writers, compliance officers, environmental specialists, computer experts, watermasters, hydrogeologists, and numerous others put hours of research and work into every water management-related decision and recommendation.

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**Eastern Washington:** (from <http://wdfw.wa.gov/do/weekendr/weekendr.htm>)

Wildlife viewing: Drivers may get closer-than-desired views of deer this time of year, said Woody Myers, a WDFW wildlife biologist. “With heavy snows in the mountains, deer are down in lower-lying areas, closer to roads,” he said. “Drivers need to be alert to deer near roadsides to avoid collisions. When one crosses the road, others may follow.”

Recent winter storms also have brought some other winter birds into the region. “Rough-legged hawks are here now,” Myers said. “There might also be snowy owls and gyrfalcons in the area.”

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# AWRA Joint Meeting with Washington State Members and University of Washington Student Chapter

By Theresa Hlavinka, AWRA UW Student Communications & Outreach,  
And Amy Yahnke, AWRA UW Student Liason to the State Board

On Wednesday, January 16, 2008, the Washington state AWRA and University of Washington chapter of AWRA hosted a joint meeting at the Water Activities Center on the UW campus. The event was a great success, with approximately 35 guests, about half of whom were current or former members of the UW student chapter and the other half were state AWRA chapter members, including eight board members. Steve Foster, former board member, and Laura Farwell, the student chapter president, arranged for the liquor license and light refreshments. Jacque Klug, the state board president, announced the student scholarship award winners and introduced our guest speaker, John Konovsky.



Attendees were treated to a presentation on "South Puget Sound Tribal Water Programs" by John Konovsky, Environmental Program Manager for the Squaxin Island Tribe. The presentation placed particular emphasis on the history of local treaties and the importance of their lasting impact on water resources decisions. John began with a description of the Medicine Creek Treaty of 1854 and followed with a memorable video clip from Carol Burn's "As Long As the Rivers Run" (1971) to illustrate the struggles of Northwestern tribes and their fishing rights. Although treaties were made to establish fishing and water rights, regional tribes had to fight to have those rights recognized. The video illustrated one of the last stands in their "fish-in" demonstrations on the Puyallup River in Tacoma.

Through the results of litigation, tribal sciences developed and provided a foundation for fisheries and water management. Subsequently, a coordinated tribal water quality program called the Northwest Indian Fisheries Commission was developed to provide scientific support for the tribes. The Squaxin Water Program is part of that commission and it focuses on water quality, water quantity, and water health of the South Puget Sound region.



John described the program goals, including protecting treaty rights, collecting sound scientific data, and facilitating its use in regulatory and planning practices. He also mentioned special projects such as IFIM, TMDL, water rights litigation, bacterial survival in marine sediments, DNA source tracking for habitat restoration, and pollution remediation. In his discussion of the program elements, John mentioned that he is looking for a hydrologist/hydrogeologist. John also mentioned the South Sound Science Symposium, which will be held March 26, 2008 in the Lacey Community Center. The symposium seeks to connect researchers on changes in algae, nutrients, forage fish, marine mammals, and other water systems, and to draw links to various issues.

The evening concluded with a round of questions for John and a final opportunity for AWRA members to meet and mingle. ☺

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"Phreatophytes are worthless plants, mainly trees such as salt cedars and cottonwoods and willows that produce nothing but trouble. Twice the annual flow of the Colorado is being wasted on these plant-life drunkards.

The only sure way to kill off phreatophytes is to pull their water out from under them. The drop must be rapid, otherwise the roots will keep pace with the declining water table and keep the plant alive until conditions are again stable."

*Unknown, Land Improvement Magazine, Dec. 1954*

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**American  
Water  
Resources  
Association**  
*Washington Section*

**WA-AWRA Dinner Meeting  
February 28, 2007**

**Coho Pre-Spawn Mortality Around Puget Sound**

**Featuring: Nathaniel L. Scholz - National Oceanic and Atmospheric Administration,  
Northwest Fisheries Science Center, Seattle, WA**

**Thursday February 28, 2007**

**Pyramid Ale House**

**1201 First Avenue South, Seattle, WA (Across from Safeco Field)**

**Registration and Social Hour 5:30 to 6:15 pm, Dinner 6:15 to 7pm, Presentation Starts at 7pm**

The **AWRA-WA** is pleased to present Nat Scholz, a research zoologist with NOAA Fisheries, as this year's first dinner speaker. Mr. Scholz manages the Ecotoxicology Program at the Northwest Fisheries Science Center in Seattle.

**Presentation Summary:** Non-point source pollution in the form of stormwater runoff is one of the most important threats to coastal ecosystems in the United States. A wide range of potentially toxic chemicals is found in stormwater, including various pesticides, petroleum hydrocarbons, heavy metals, and other contaminants originating from commercial, industrial, residential, and agricultural land use activities. Chemicals are mobilized from roads, lawns, crops, and other surfaces by rainfall and transported to aquatic habitats via terrestrial runoff. For the past several years, NOAA's national Coastal Storms Program (CSP) has sponsored targeted research in the Pacific Northwest focused on stormwater quality and the health and viability of salmon, including threatened and endangered species. This presentation will highlight major findings, with an emphasis on the recurrent die-offs of adult coho returning to spawn in Puget Sound urban streams.

-----Detach & mail with registration-----  
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**February 28, 2008 Dinner Meeting Registration**

Registration fee (please circle those that apply):

- |                     |                       |
|---------------------|-----------------------|
| \$25 Member         | \$35 Non-member       |
| \$15 Student Member | \$15 No-Dinner Option |

Name \_\_\_\_\_

Affiliation \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip Code \_\_\_\_\_

Phone:(\_\_\_\_\_) \_\_\_\_\_ Fax:(\_\_\_\_\_) \_\_\_\_\_ E-mail \_\_\_\_\_

**Checks only payable to "AWRA Washington Section"** No credit cards or purchase orders, please.

**Please mail checks by February 22, 2008 to:**

AWRA Washington Section, Dinner Meeting  
P.O. Box 2102  
Seattle, Washington 98111

**For questions about your membership or the dinner, please contact Jamie Morin or Steven Hughes by phone or email.**

Jamie Morin: (206) 493-2324 [morin@mentorlaw.com](mailto:morin@mentorlaw.com)  
Steven Hughes: (206) 438-5129 [steven\\_hughes@urscorp.com](mailto:steven_hughes@urscorp.com)

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## 2008 Membership / Change of Address Form

( ⌂ please circle, as appropriate ↗ )

Annual membership in the state chapter costs \$25.

Name \_\_\_\_\_ Position \_\_\_\_\_ Affiliation \_\_\_\_\_

Street Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone(\_\_\_\_\_) \_\_\_\_\_ Fax(\_\_\_\_\_) \_\_\_\_\_ E-mail \_\_\_\_\_ @ \_\_\_\_\_

Please indicate if you prefer to receive your newsletter electronically.

Check if you would like to be actively involved on a committee:  
You will be contacted by a board member.

2008 Membership Dues: \$25.00. **Checks only.** Please make payable to **AWRA Washington Section.**

Mail to: American Water Resources Assoc. WA. Section  
P.O. Box 2102  
Seattle, WA 98111-2102

The American Water Resources Association is a scientific and educational non-profit organization established to encourage and foster interdisciplinary communication among persons of diverse backgrounds working on any aspect of water resources disciplines. Individuals interested in water resources are encouraged to participate in the activities of the Washington Section.

***Special Thanks!***

***To Golder Associates for word processing and graphics support on this newsletter.***

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