
PRESIDENT'S NOTES

by Anne Savery, President, AWRA Washington Section

Most of you will remember the Supreme Court ruling in January 2001 on the *Solid Waste Agency of Northern Cook County v. Army Corps of Engineers* (SWANCC) case that limited federal Clean Water Act authority over isolated wetlands. The Court determined that the Army Corps' use of the presence of waterfowl to define what constitutes a federally regulated water body to be too broad. Since then, lower courts have made rulings based on their interpretations of the Supreme Court decision. Recently, the Bush Administration, through the Army Corps of Engineers and the Environmental Protection Agency, has proposed new rules on the scope of the Clean Water Act. Environmental groups are blasting the Administration for making unwarranted rules, which will remove federal protection from an estimated 20% of the nation's wetlands.

The Bush Administration response to the 2001 U.S. Supreme Court decision in SWANCC is to propose new rulemaking on the definitions and scope of waters regulated by the Clean Water Act. The proposed rulemaking can be viewed at the following website and comments are due by April 16, 2003: <http://www.epa.gov/owow/wetlands/swanccnav.html>. The documents provide the Bush Administration's interpretation of the Supreme Court's decision in the 2001 court case and addresses several legal issues concerning CWA jurisdiction and the definition of navigable waters.

The Clean Water Act prohibits filling in wetlands unless the Army Corps of Engineers grants a permit. In those cases, the permit holder must either restore the wetlands or create a replacement as compensation. Typically, the Army Corps has required a mitigation ratio of larger than 1:1 in order to fulfill the original 1989 Bush plan of 'no net loss' of wetlands. Last year, two separate reports by the Natural Resources Council of the National Academy of Sciences¹ and the General Accounting Office² concluded that a large portion of wetlands replacement projects are failures and are not well tracked by the Corps.

By rulemaking, the Bush Administration will free developers from the burden of replacing wetlands that are filled during construction. The argument goes that these temporary and isolated wetlands do not have an important function and are therefore negligible. When considered on a cumulative basis, these wetlands provide refuge for migrating waterfowl and a level of flood abatement. Recent research in Montana reveals that deepwater wetlands in floodplains of alluvial rivers provide a cooling effect to adjacent streams during low flows. American Rivers and the Natural Resource Defense Council claim that other water bodies will be at risk as a result of the changes, due to the fact that many states do not have wetland resource protection programs and rely on the Federal government to protect these areas.

A recent report by the US Fish and Wildlife Service provides descriptions of the functions and names of isolated wetlands at <http://wetlands.fws.gov/Pubs/Reports/isolated/report.htm>. In the Pacific Northwest, these are generally floodplain wetlands, vernal pools and forested wetlands.

If you have concerns over the proposed changes in the jurisdiction of the Army Corps over the permitting of changes to wetlands, please send your comments to the EPA.

1. Compensating for Wetland Losses under the Clean Water Act. 2001. Natural Resources Council of the National Academy of Science. National Academies Press p. 348.
2. Wetlands Protection. Assessments needed to determine effectiveness of in lieu-fee mitigation. May 2001. GAO-01-325. Report to Congressional Requesters. Washington D.C. p. 75.
3. Tiner, R.W., H.C. Bergquist, G.P. DeAlessio, and M.J. Starr. 2002. Geographically Isolated Wetlands: A Preliminary Assessment of their Characteristics and Status in Selected Areas of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Northeast Region, Hadley, MA. <http://wetlands.fws.gov/Pubs/Reports/isolated/report.htm>

Save The Date!!!

AWRA Washington Section Dinner Meeting

Geology of Puget Sound Lowland Streams"

Derek Booth, UW

April 17, 2003

<http://earth.golder.com/waawra/>

Possible Effects of Global Warming on the Inflow to Chester Morse Reservoir

by Pascal Storck, 3TIER Environmental Forecast Group

On February 20, 2003, Washington State joined New York, Massachusetts, Connecticut, New Jersey, Maine and Rhode Island in filing notice to sue the Environmental Protection Agency (EPA) over the EPA's inaction regarding carbon dioxide emission standards (Welch 2003). Carbon dioxide is a primary greenhouse gas, the accumulation of which is expected to alter the earth's climate leading to warmer temperatures. When asked about the reasons for the filing, David Mears, senior assistant attorney general for Washington included concerns about the adverse effect of warmer temperatures on Washington State's snow pack. This concern is not new nor is it unfounded. Anthropogenic factors, such as green house gas emissions, have been isolated as the cause of current changes in our climate. (IPCC, 2001). Furthermore, the scientific community has clearly established the cause and effect relationship between greenhouse gases and warmer temperatures (IPCC, 2001). The Climate Impacts Group at the University of Washington has published numerous studies that describe the impact of the expected warming on the Columbia River's snow pack (Miles et al, 2000). More recent work at the University of Washington has focused on the effects of climate change on the smaller watersheds on the west side of the Cascade Mountains which serve the major population centers of the Northwest. Results pertaining to the city of Portland Oregon water supply were presented at a recent AWRA dinner meeting and were briefly described in a previous WAAWRA bulletin (Thalweg, 2002).

This paper briefly examines the effect of expected levels of global warming in 2025 and 2045 on the inflow to the city of Seattle's main water supply, the Chester Morse Reservoir in the Cedar River Watershed. This study was initially conducted in support of the research described above and was undertaken while the author was a research scientist at the UW.

Method:

A four step process was used to assess the effect of climate change on Chester Morse inflow.

Step 1: Develop a physical model of the watershed so that snow pack and reservoir inflow can be simulated from meteorological records. The distributed hydrology soil vegetation model, which was developed at the UW specifically for application to mountainous watersheds, was used for this purpose.

Step 2: Establish a benchmark simulation of the watersheds snow pack and reservoir inflow based on the historic meteorological record of the water-

shed. For the Cedar Watershed, the period from 1987 to 1996 was simulated, which includes the drought of 1992.

Step 3: Alter the historic meteorological record to incorporate expected changes in the PNW climate. The average expected changes in the temperature and precipitation patterns by month for the PNW region from a consensus of 4 global climate simulations were transferred to the historic meteorological record. Two future time horizons of climate change were used: 2025 and 2045. For 2025, the net effect was a winter (October to March) warming of 1.6 degree C with an 8 percent increase in winter precipitation. For 2045, the net effect was a 2.4 degree C winter warming with a 7 percent increase in winter precipitation.

Step 4. Rerun the benchmark time period with the altered meteorological records. These new simulations can be thought of as a sensitivity analysis of the benchmark simulation in which the effect of changing mean monthly temperature and precipitation is examined.

Results:

The effect of expected levels of climate change on the hydrology of the Chester Morse Reservoir are dramatic. Figure 1 shows the patterns of seasonal snow accumulation and melt in the Chester Morse watershed with the current climate and the altered climates of 2025 and 2045. The simulation based on the current climate clearly shows the low snow accumulation (approximately 300 mm Snow Water Equivalent (SWE)) during the drought of water year 1992. By 2025, nearly every year simulated has snow accumulation at or below 1992 levels. By 2045, the snow pack from the 1992 benchmark simulation is indicative of a good water year.

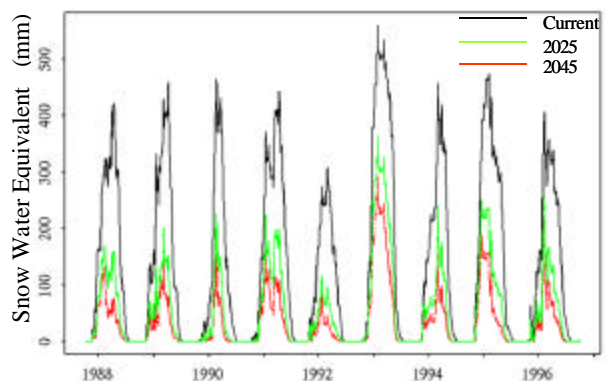


Figure 1. Effect of climate change on seasonal snow accumulation and melt in the Chester Morse watershed. The period from 1988 to 1996 was used as a benchmark.

Figure 2 shows the changes to Chester Morse Inflow due to expected levels of climate change by 2025 and 2045. Although the annual inflow increases by approximately 6 percent, the most dramatic changes are seen in the timing of the runoff and the total inflow during the April to July refill period. Reservoir inflows during the winter increase due the combination of increased winter precipitation and higher freezing levels. The bulk of reservoir refill occurs significantly earlier and the total amount of refill during the April to June period is significantly reduced. The average refill from April to July with the current climate is approximately 126,000 acre-ft. By 2025, it drops to 90,000 acre-ft and decreases to 78,000 acre-ft by 2045. The reduction in inflow volume by 2025 is roughly equivalent to the active storage capacity of the reservoir (37,000 acre-ft).

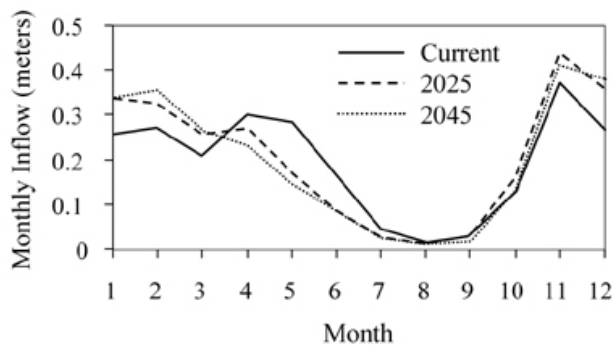


Figure 2. Effect of climate change on mean monthly inflow to Chester Morse reservoir using the period from 1988 to 1996 as a benchmark.

Conclusions:

The effect of expected levels of climate change on the hydrology of the Chester Morse reservoir is sig-

nificant. The shifts in the timing of runoff are dramatic. Future inflows during the traditional refill period will be significantly reduced while inflow during the winter period will be increased with an overall net increase in annual runoff. Therefore the overall issue of climate change on the Chester Morse reservoir is not one of water shortage, but one of water storage. An additional complication of climate change is that the refill period overlaps the flood season. Therefore the management of the reservoir for flood control and water supply becomes more complicated as both objectives may need to be addressed simultaneously.

IPCC: J. T. Houghton, Y. Ding, D.J. Griggs, M. Noguer, P. J. van der Linden and D. Xiaosu (Eds.), *Climate Change 2001: The Scientific Basis: Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, UK. pp 944 Available from Cambridge University Press, The Edinburgh Building Shaftesbury Road, Cambridge CB2 2RU ENGLAND.

Miles, E.L., Snover A.K., Hamlet, A.F., Callahan, B., Fluharty, D., *Pacific Northwest Regional Assessment: The impacts of climate variability and climate change on the water resources of the Columbia River Basin*, *Journal of the American Water Resources Association*, 36(2), 399-420, 2000.

Welch, C., Washington, other states plan to sue feds over power plant emissions, *The Seattle Times*, February 21, 2003.

Thalweg, J., *Climate Change in the Pacific Northwest: Not If Change?, But How Much Change?*, *Bulletin of the Washington Section of the American Water Resource Association*, vol. 2, 2002.

From: <http://www.wa.gov/wdfw/do/weekendr/weekendr.htm>, (3/09/03):

Bigger birds in the region that can still be seen include thousands of snow geese in the lower Skagit Valley near Fir Island, conspicuous knots of trumpeter and tundra swans scattered throughout the agricultural areas of Skagit and Whatcom counties, and plenty of fencepost-sitting raptors in search of their next meal.

Trout enthusiasts can enjoy the prospect of 7,500 brown trout released recently in Lacamas Lake near Camas, while Klineline Pond in Hazel Dell is scheduled to be planted with 4,200 catchable-size browns this week.

Chinook catches on the lower Columbia continue to improve as the season progresses, the water clears and the smelt clear out. About half the chinook caught to date have clipped adipose fins indicating they are hatchery-produced and may be kept.

The recreational crab fishery is closing March 9 because of softshell condition in areas of North Puget Sound and the North Olympic Peninsula. In the latest test dig of razor clams around the Olympic Peninsula, domoic acid levels are still well above the threshold of 20 parts per million (ppm) considered safe for human consumption. Kalaloch had the highest count (102 ppm), followed by Copalis (83 ppm), Twin Harbors (69 ppm), Mocrocks (63 ppm) and Long Beach. New tests are conducted every two weeks.

UW Students Trek through Costa Rican Streams

by Christina Aviolia and Susan Bolton, University of Washington

This past December and January, fifteen graduate and two undergraduate students from the College of Forest Resources and the College of Civil and Environmental Engineering at the University of Washington had the opportunity to participate in watershed research within Costa Rica's newest national park – La Cangreja (Spanish for “The Crab”). Nestled in the Pacific foothills of Central Costa Rica, La Cangreja maintains some of the last stands of virgin forest in the county of Puriscal. It is home to over 2,500 different plant species, two of which can only be found in La Cangreja. It is for this reason that the local Costa Rican agencies such as the NGOs (Fundacion Ecotropica and InBio) and the federal agency that oversees parks (MINA, the Ministry of Environment and Energy) hope to protect the area from future development.

Although La Cangreja has been an official Protected Zone since 1987 and was declared a National Park in 2002, much of the park's boundaries still overlap with small farms. Local families have worked these farms for generations, yet their farming and livestock management practices are posing increasing threats to water quality and the local hydrologic regime. Cattle frequently wander through the streams and some homes have wastewater draining directly to the creeks. Deforestation and crop development have already contributed to decreases in annual water flows. Efforts are being made to purchase some farms and to teach more sustainable agricultural techniques that limit the extent of physical and biological disturbance on farms that remain adjacent to the park. There is still much controversy surrounding forest protection and farmer relocation, but hopefully the new park will minimize future harm to the diverse and threatened species within La Cangreja watershed.

While surrounding political issues are being resolved, professor Susan Bolton (University of Washington College of Forest Resources) is working in collaboration with the Costa Rican government and other entities to establish an environmental education and scientific research station at Rancho Mastatal (www.ranchomastatal.com) adjacent to the park boundary. This site would allow scientists and students to conduct on-going research on the hydrology, biology, and geology of the La Cangreja watershed. The UW students that traveled to Costa Rica this winter established baseline watershed information to support future and on-going research endeavors.

During this recent visit, our objectives were to establish permanent stream and riparian reaches as monitoring sites to identify the habitat and species

that inhabit the area and to learn how they interact and change over time. Once general system-wide information is gathered, we will be able to compare an undisturbed lower section of the stream to the section just downstream running through an agricultural area. Eventually, as information is collected over time, we hope to be able to assess the impact that preserving the forest within the national park might have on the water resources of the watershed.

To map the stream systems and identify stream morphology and habitat types, we walked the streams using hip chains, compasses, and clinometers to measure stream lengths and aspects, locations of tributaries, and reach slopes. Two main quebradas (Spanish for “streams”) - the Quebradas Grande and the Chires – feed into larger rivers that eventually drain to the Pacific Ocean. Once the stream network was mapped, more detailed habitat surveys were performed on the Quebrada Grande. Two or three randomly selected reaches in 5 distinct segments of the Quebrada Grande had permanent riparian and stream plots installed. Each stream unit was characterized physically and biologically. Using seine nets and day and nighttime snorkeling we identified 10 species of fish in 8 different families. Surber samplers and drift nets were used to collect aquatic insects. Algae growing on rocks (periphyton) were sampled in 4 sections of the Quebrada Grande. We sampled riffles from the headwaters down the system to an agricultural area. As the collected information is processed, we will assess drift behavior by comparing those taxa drifting in the water column with those collected from the substrate. Finally, we will study the changes in community composition from headwaters to the lower reach as a response to changes in discharge, slope, substrate, and riparian cover.



While completing these field surveys, we reveled in the unique challenges and experiences that only working in the coastal foothills of a Central American country could provide. Bright blue morpho butterflies would flitter above our heads and

occasionally, toucans and aracarís would fly by almost to mock our relatively slower pace! We would frequently encounter the bright green and black speckled poison dart frog leaping across trails in front of us. Despite their name, these beautiful amphibians posed no threat to humans. Rather, we were more wary of confronting

the Fer-de-Lance or other poisonous snakes. Although these aggressive snakes are also known for their awesome markings, we tried to keep our distance, knowing that the closest antivenom was at least four hours away!

As we walked upstream to collect field data, the reaches became increasingly defined by bedrock with waterfalls around just about every bend. Rock-climbing and swimming through pools, once sought-after rarities, became daily adventures! In addition, the lush rain-forest vegetation would grow thick around the channel, providing a feeling of connectedness to the precious natural environment that completely surrounded us.

Current and future University of Washington students feel fortunate to have the opportunity to learn about a watershed that is so unique and beautiful. Professors Susan Bolton, Sally Brown, Chuck Henry all from the College of Forest Resources, will

be offering a three-week course in the summer for more students to travel to La Cangreja. A 10-week course in Costa Rica is also being developed for Spring 2004 through the International Program at the UW. Those students will learn about conducting scientific research and making environmental assessments. They will learn about how to create sustainable communities that preserve and protect remaining natural areas. And they will begin to restore areas that have already been degraded. Just like the UW students that have already traveled to Costa Rica, they will create memories of living and working in a place that they will never be able to forget. ☺



Climate Change: Long-Range Water Resource Planning

April 30, 2003, Seattle, Washington

Research on the hydrologic impacts of climate change on western U.S. and Canadian water resources project potentially significant changes in seasonal precipitation patterns, winter snowpack, the timing and volume of spring runoff, and summer streamflows by the 2020s. In many areas, these changes will further strain existing water resource management challenges.

Many water resource managers are now beginning to consider how climate change may affect their operations and how to best manage for those projected impacts. To support these efforts, the University of Washington's Climate Impacts Group and several other western U.S. and British Columbia climate research centers are hosting a one day workshop on April 30, 2003, in Seattle, Washington on interpreting and integrating climate change scenarios into long-range water resources planning. The meeting will provide participants with an overview of:

- Observed and projected hydrologic consequences of climate change in the west,
- New methods for incorporating climate change information in water resources planning and decision making, including a web-based tool for developing streamflow scenarios that reflect projected climate change over the next century, and,
- Case studies demonstrating the integration of climate change information into long-range water resources planning. Discussion sessions on technical needs and key issues in hydrologic scenario development and planning are also scheduled.

http://tao.atmos.washington.edu/PNWimpacts/Workshops/Apr03_Scenarios_water/Index_April03.htm

Registration is required by Friday, April 11, 2003. There is no registration fee for the meeting.

We hope to see at the April 30th workshop. In the mean time, please do not hesitate to contact me or Philip Mote (206-616-5346, philip@atmos.washington.edu) with any questions about the meeting.

MEMBERSHIP APPRECIATION PARTY

The AWRA Board is pleased to announce that we will be hosting an AWRA member appreciation party for our 2003 members. We have not yet finalized a date or location, but we are looking at May 28 or 29 at the University of Washington. We view this as an opportunity to socialize and to gauge your interest in establishing a formal annual meeting.

High Elevation Lakes Contaminants in Washington's National Parks

by Patrick Moran and Robert Black, US Geological Survey, Tacoma, Washington

Recent studies have demonstrated a trend of increasing concentrations of some contaminants with increasing elevations at remote locations far from sources (Blais et al, '98, Carrera et al '02, Schuster et al '02). In such situations, contaminants are generally transported through the air and differentially deposited through a process referred to as "cold condensation". This process involves the volatilization of organic chemicals from warm environments followed by deposition of those chemicals in colder environments. The consistent cold temperatures and large amount of precipitation in the Olympic and Cascade ranges of Washington State are locations where this process of cold condensation is expected to occur. Also, studies of glacier ice cores have demonstrated that glaciers can serve as 'sinks' for air pollutants (Blais et al, 2001, Schuster et al '02).

The Washington Science Center, in co-operation with the Olympic, Mt. Rainier, and North Cascades National Parks, is conducting a study of selected contaminant concentrations in high mountain lakes within the parks. Mercury and organochlorine compounds were identified as contaminants likely to undergo the cold condensation process and were chosen for analysis. Given the tendency of these compounds to preferentially bind to lipids and organic matter and their expected low concentrations, adult male trout were selected as an appropriate surrogate for sampling. Lightweight gillnets were used to collect trout from fourteen lakes, at elevations from 3300 to 6800 feet, in the summer of 2002. Lengths and weights were measured in the field, and composite, whole fish samples were analyzed by the USGS's National Water Quality Lab.

Of the samples analyzed to date, trout tissue concentrations of mercury were all above the detection limit, near the national average for brown trout (<http://www.epa.gov/waterscience/fishadvice/mercurypd.pdf>). In at least one location, concentrations suggest the cold condensation process may be occurring. Further work during the summer of 2003 will include an expanded sampling of biota from about five lakes with the highest tissue concentrations, plus one lake with the lowest concentrations for comparison. Samples will be collected from bottom sediment, benthic and pelagic invertebrates, and fish. The potential for bioaccumulation of the subject contaminants in these lakes will be evaluated. In addition, the USGS will work to develop a marker of immune system function in fish to evaluate the potential effects these contaminant levels may have on fish health. ❧

Patrick Moran is a Biologist with the US Geological Survey in Tacoma, Washington. Robert Black is the Section Chief for the Washington section of the National Water Quality Assessment Program, Tacoma, Washington. For additional information please contact Patrick Moran at pwmoran@usgs.gov.

Blais, J.M., Schindler, D.W., Muir, D.C.G., Kimpe, L.E., Donald, D.B., Rosenberg, B. 1998. Accumulation of Persistent organochlorines in mountains of western Canada. *Nature* 395:585-588.

Blais, J.M., Schindler, D.W., Muir, C.G., Sharp, M., Donald, D., Lafreniere, M., Braekevelt, E., Strachan, W.M.J. 2001. Melting Glaciers: A Major Source of Persistent Organochlorines to Subalpine Bow Lake in Banff National Park, Canada. *Ambio*, 30:410-415.

Carrera, G., Frenandez, P., Grimalt, J.O., Ventura, M., Camereo, L., Catalan, J., Nickus, U., Thies, H., Psenner, R. 2002. Atmospheric Deposition of Organochlorine Compounds to Remote High Mountain Lakes of Europe. *Environmental Science and Technology*, 36:2581-2588.

Schuster, P.F., Krabbenhoft, D.P., Naftz, D.L., Dewayne, C., Olson, M.L., Dewild, J.F., Green, J.R., Abbot, M.L. 2002 Atmospheric Mercury Deposition during the Last 270 Years: A Glacial Ice Core Record of Natural and Anthropogenic Sources. *Environmental Science and Technology*, 2002, 36:2302-2310.



4th Symposium on the Hydrogeology of Washington State

April 8-10, 2003

Sheraton-Tacoma Convention Center, Tacoma

PROGRAM AND REGISTRATION ANNOUNCEMENT

You are invited to attend the 4th Symposium on the Hydrogeology of Washington State on April 8-10, at the Sheraton Convention Center in Tacoma.

The goal of the Symposium is to bring together scientists, regulators, consultants, students, and other groundwater professionals to learn and exchange ideas. The program includes 60+ speakers, two panel sessions, three keynote speakers, 20+ posters, commercial and nonprofit exhibitors, two workshops and three field trips.

Featured keynote speakers are Richelle Allen-King, Frank Chapelle, and Nadine Romero. Dr. Allen King, a professor at Washington State University, is the NGWA 2003 Darcy lecturer. Her talk is titled "Ground and Surface Water Contributions to Chemical Mass Discharge: Field to Basin Scales." Dr. Frank Chapelle, from the USGS, will present "Estimating Time of Remediation Associated with Monitored Natural Attenuation." Ms. Romero will speak about "Global Water Resources and the Role of Science in Public Policy."

Two oral sessions will run concurrently over three days. Topics include Geochemistry, Hydrogeology, Water Availability, Surface-Ground Water Interaction, Modeling, Database/Decision Support, Water Quality, Public Policy, and New Technology. Posters will be available for viewing during the entire Symposium.

We have two panel sessions - one on Water Rights and the other titled "The Contemporary Hydrogeologist." There will also be an informal evening Forum on Geology - a big hit in previous years.

Two workshops will be held in conjunction with the Symposium. The first will be an 8-Hour Hazardous Waste Safety Refresher Course on Monday. The second workshop will be "Estimating Remediation Using Natural Attenuation," taught by Frank Chapelle on Thursday afternoon.

Three field trips will be offered for Symposium attendees only. The first will explore the Hydrogeology of the Hanford site. The second will tour the Columbia Basin Groundwater Management Area. Both of these will occur on Sunday and Monday before the Symposium. The third field trip will visit two Superfund sites in the Tacoma area on Thursday afternoon after the Symposium.

The Symposium cost is \$250 (early registration, \$200 ended March 7). The rates for students and exhibitors are \$150 and \$450, respectively. Each registration includes two lunches, one dinner, and break refreshments.

For the complete Symposium schedule, details on workshops and field trips, and registration information, please visit our Web site at: <http://www.ecy.wa.gov/events/hg>.

If you would like print copies of the Symposium flyers to distribute, please email Sandy Williamson at: akwill@usgs.gov.

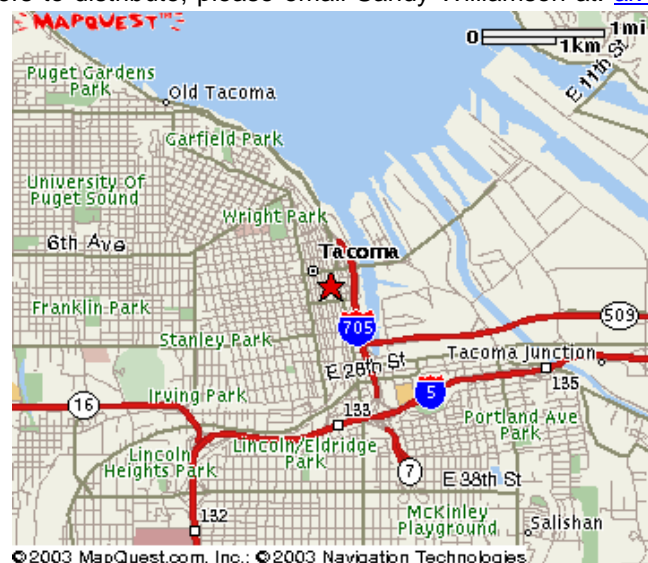
Sandy Williamson, Symposium Chair, U.S. Geological Survey, Tacoma, WA (253) 428-3600 ext 2683, (253) 428-3614 fax, akwill@usgs.gov

Jim Goodrich, Symposium Vice-Chair, AGWA/AGWSE Past Chair, Vancouver, WA, (360) 202-7073, moonspun@earthlink.net

Organized by: U.S. Geological Survey, Washington State Department of Ecology, Washington Hydrologic Society, Pacific Northwest National Lab, National Ground Water Association, and others

Mailing Address:

4th Symposium on the Hydrogeology of Washington State
Washington State Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775



Upcoming Events

The Washington Section AWRA holds regular dinner meetings, including a social hour, dinner, and a speaker. Other meetings and conferences are listed on our website, <http://earth.golder.com/waawra>.

March 24-28, 2003. SERNW/SWS Joint Regional Conference. **The Restoration Toolbox.** Oregon Convention Center, Portland, Oregon. <http://216.119.67.178/2003conf/>

April 8-10, 2003. 4th Symposium on the Hydrogeology of Washington State. Tacoma, WA. <http://www.ecy.wa.gov/events/hg/index.htm>

April 17, 2003. WA Section AWRA dinner meeting. **Geology of Puget Sound Lowland Rivers** Seattle, WA. <http://earth.golder.com/waawra>

April 30, 2003. University of Washington. **Climate Change: Long-Range Water Resource Planning.** Seattle, Washington. http://tao.atmos.washington.edu/PNWimpacts/Workshops/Apr03_Scenarios_water/Index_April03.htm

May 12-14, 2003. AWRA **Agricultural Hydrology and Water Quality.** Kansas City, MO. AWRA 2003 Spring Specialty Conference. <http://www.awra.org/meetings>

June 23-26, 2003. **World Water and Environmental Resources Congress 2003.** Philadelphia, Pennsylvania. <http://www.asce.org/conferences/ewri2003/>

June 29-July 2, 2003. AWRA 2003 International Conference, **Watershed Management for Water Supply Systems.** New York City, New York. Abstracts due November 15, 2002. <http://www.awra.org/>

September 29 – October 1, 2003. 4th Joint Conference of the International Association of Hydrogeologists (Canadian Chapter) and Canadian Geotechnical Society. **Prairie Hydrogeology, Radioactive Waste Management, or Groundwater Management and Protection.** Winnipeg, Manitoba <http://home.cc.umanitoba.ca/~cgsman/cgs2003/>

October 19-22, 2003. American Institute of Hydrology 2003 Annual Meeting and Conference: **“Achieving Sustainable Water Resources in Areas Experiencing Rapid Growth,** Atlanta Georgia.

October 29-30, 2003 Washington State University **“Getting It Done: The Role of TMDL Implementation In Watershed Restoration.”** <http://www.swwrc.wsu.edu/conference2003/index.html>.

November 2003. WA-AWRA Fall Conference. **“Water In Land Use Planning”** <http://earth.golder.com/waawra>

AWRA national, regional, and state conference meeting schedule <http://www.awra.org/meetings/>.

Northwest Geological Society (<http://www.scn.org/nwgs/>) Meetings and trips.

Washington Hydrologic Society. Monthly meetings. Brian Drost at (253) 428-3600 ext. 2642 (bwdrost@usgs.gov) or Llyn Doremus (360) 592-2632 (ladoremus@aol.com).

WA-AWRA Board Members

President: **Anne Savery**
(360) 651-4486
asavery@tulalip.nsn.us

Vice-President: **Joe Mentor**
(206) 676-7008
mentor@mentorlaw.com

Newsletter Editor: **Chris V. Pitre**
(425) 883-0777
cpitre@golder.com

Secretary: **Peter Sturtevant**
(425) 453-5000 ext. 5284
psturtev@ch2m.com

Treasurer: **Catherine Drews**
(206) 370-8109
catherined@prestongates.com

Past-President: **Steve Hirschey**
(425) 649-7066
shir461@ecy.wa.gov

Director: **Cindy Baker**
(206) 522-5758
baker.lexington@attbi.com

Director: **Philip Beetlestone**
(425) 883-0777
pbeetlestone@golder.com

Director: **Scott Bender**
(425) 881-9627
bender.consulting@verizon.net

Director: **Carolyn Butchart**
(425) 453-5000, ext. 5297
cbutchar@ch2m.com

Director: **Brian Drost**
(253) 428-3600, x2642
bwdrost@usgs.gov

Director: **Tim Flynn**
(206) 780-9370
tflynn@aspectconsulting.com

Director: **Tom Martin**
(425) 482-7803
tmartin@fwenc.com

Director: **Stan Miller**
(509) 477-6024
smiller@spokanecounty.org

Director: **Cynthia Walcker**
(206) 324-5858
cwalcker@hotmail.com

Director: **Paul Wetherbee**
(206) 325-1753
pwetherbee@3tiergroup.com

UW Student Rep: **Jon Honea**
(206) 963-9943
jhonea@u.washington.edu

April Dinner Meeting:
"Geology of Puget Lowland Rivers and Streams "

Featuring: Derek Booth,
University of Washington
Thursday, April 17, 2003

5:30 Social and Dinner, followed by the Program at 7:00 p.m.

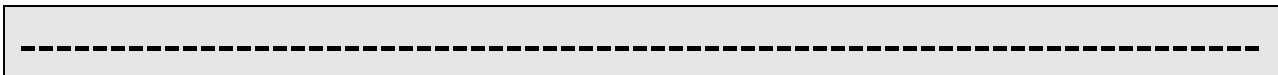
At Hale's Ales Brewery and Pub, 4301 Leary Way NW (in the Fremont neighborhood of Seattle)

On-line directions can be found at <http://www.halesales.com>.

In January, the Center for Water and Watershed Studies and the University of Washington Press, published a new book, Restoration of Puget Sound Rivers. The motive for this volume stemmed from the substantial interest in the scientific basis for river restoration in the Pacific Northwest as a result of the listing of Pacific salmon under the Endangered Species Act. Millions of dollars in state and federal funding have been programmed for habitat restoration efforts to stem the decline of salmon populations in the region. This book addresses the need for a solid understanding of fluvial processes and aquatic ecology in order to predict both river and salmonid response to restoration projects.

The Restoration of Puget Sound Rivers examines geological and geomorphological controls on river and stream characteristics and dynamics, biological aspects of river systems in the region, and the application of fluvial geomorphology, civil engineering, riparian ecology, and aquatic ecology in efforts to restore Puget Sound Rivers. They should be of interest to geomorphologists, aquatic biologists, civil engineers, planners, and all those interested in the interface of science and policy in addressing one of the fundamental environmental challenges of the twenty-first century.

Derek Booth, one of the editors of this volume, is our guest speaker for the AWRA dinner meeting, Thursday April 17th. He will be focusing on the second chapter, The Geology of Puget Lowland Rivers. He is a research associate professor with joint appointments in the departments of Civil & Environmental Engineering and Earth & Space Sciences; he is also licensed as both a professional engineering and a professional geologist.



AMERICAN WATER RESOURCES ASSOCIATION, Washington Section
DINNER MEETING REGISTRATION FORM

Registration is (please circle those that apply): \$22.00 (members), \$27.00 (non-members), \$10.00 (student members) if received by April 10. There is a \$12.00 no dinner option. Late fee is an additional \$5.00. If using a complimentary corporate sponsorship, please enclose certificate. All registrations must be received by April 14 to guarantee dinner.

Name: _____ Total \$ _____

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Detach and mail with payment (**checks payable to AWRA, Washington Section**) to AWRA – Washington Chapter P.O. Box 2102 Seattle, WA 98111-2102 Inquiries: Anne Savery (360) 651-4486 or asavery@tulalip.nsn.us

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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.

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