
PRESIDENT'S NOTES

By Steve Hershey, President, AWRA Washington Section

Otto J. Helweg articulated one of my favorite definitions of water resource planning long ago. Otto said, "Water resource planning is to make optimum use of available water resources so as to achieve the correct balance between conservation and depletion, between use and misuse." Often one person's use is misuse to someone else. Perhaps nowhere is that more evident than instream flow management where achieving the correct balance between conservation and use of water has proved elusive. For over fifteen years we have struggled to resolve both policy and scientific issues in the evaluation of instream flow needs. After watching the debate surrounding water legislation this past Legislative session, it appears we continue to struggle. This newsletter has several articles that focus on projects regarding instream flows that will constructively add to the debate.

Even with the lack of Legislative leadership to resolve policy issues related to instream flow management, more public money (from a statewide perspective) is being focused on instream flow issues today than any time in our history. Perhaps the listing of various salmonid species is the leading factor, but I'd hope that our collective recognition of stewardship obligations and our desire for a healthy environment is also pushing instream flow issues. Currently thirty-one Water Resource Inventory Areas have requested \$100,000 dollars per basin under the Watershed Planning Act (ch. 90.82 RCW) to evaluate and plan for instream flow management. King County's Normative Flow Studies Project appears to be the most ambitious effort in our state to better understand human induced impacts to stream flows and to then incorporate that knowledge into land use decisions. What I find exciting about the King County project is the proposal to better articulate the connection between instream flow and ecological impacts. King County's project may help all of us move from focusing on just the instream flow related to fish habitat to a more holistic approach. Within the implementation of the Cedar River Habitat Conservation Program (HCP), Seattle Public Utilities is pushing the scientific understanding of flow and impacts to various life stages of salmonids in the Cedar River system. Under the adaptive management approach sanctioned by the HCP, the flow regimes may change if flows more beneficial to critical salmon life stages can be determined. Look within the newsletter for articles on those projects. Folks in the Nooksack basin are proposing as an aggressive and comprehensive evaluation of water resources management as I've seen. The URL to see what they are up to is <http://www.wria1project.wsu.edu/>.

Most people acknowledge that our collective actions have changed instream flow regimes in the basins across the state. How much have the flow regimes changed and what, if anything to do about it are questions that are being addressed anew. How much water to leave in a stream to ensure abundant fisheries resource is a question that begs a sound scientific foundation. Why do we or would we want an abundant fisheries resource or a more natural flow regime is a social policy question to be addressed in our political organizations. It is exciting to see the money and energy being focused on instream flow issues and with a better scientific foundation, perhaps we can make progress on the policy issues surrounding instream flows. ☺

What this State Section is All About!

The WA State Chapter of the AWRA fosters educational and professional development. **Student support** is provided in the form of two annual student fellowships, sponsorship of a student chapter at the University of Washington, underwriting of a special meeting in the late spring hosted by the student chapter, and other subsidies. **Interorganizational support** is fostered with local, interstate, national, and international organizations. A **bimonthly newsletter** is published containing in-depth analysis and editorials on current issues. Several **dinner meetings** are held throughout the year providing good food and good company followed by a presentation by featured guests. **Brownbags** are organized on special issues as they arise. The annual climax is the **Annual Section Fall Conference**; the next one will be held November 14, 2002. The Conference is the principal funding vehicle for many Section activities, including providing financial support to the Section's Student Fellowship program. A **dedicated board** of approximately 18 members meets regularly to plan, organize and facilitate events. If you wish to learn more about your Section and/or wish to participate more in Section activities, you will be warmly welcomed. Please contact any of the board members listed on Page 6.

Instream Flow Management: Balancing Certainty and Flexibility on the Cedar River, King County, WA

By Rand Little, City of Seattle

Introduction

Efforts to conserve natural resources are often struggle to create the proper blend of prescriptions that increase certainty of protection and those that help retain sufficient flexibility to adapt and improve management activities in the future. This challenge is becoming increasingly important in the management of regulated rivers (Stanford et al. 1996, Richter et al. 1997). This brief summary examines an approach to balancing certainty and flexibility under a recently adopted instream flow management regime for the Cedar River, the largest subbasin of the Lake Washington watershed in King County, Washington.

A new instream flow management regime was implemented in the Cedar River as part of the recently approved Cedar River Watershed Habitat Conservation Plan (HCP) (City of Seattle, 2000). In early 1994, the City of Seattle began working with state, federal and tribal resource managers to develop a habitat conservation plan for the City's water and land management activities in the Cedar River basin. The plan was approved in April of 2000 under Section 10 of federal Endangered Species Act. The HCP covers 83 species and lays out a 50-year plan to protect and restore upland, riparian and aquatic habitat in the Cedar River Watershed while continuing to provide 2/3 of the municipal water supply to more than 1.3 million people in the Seattle metropolitan area.

Development of an acceptable instream flow management regime for the lower 34 miles of the Cedar River downstream of Chester Morse Reservoir was one of the most difficult tasks in the 6-year development of the HCP. Much of this difficulty, especially during the later stages of development, arose from the need to provide an appropriate balance between certainty and flexibility. State, federal and tribal resource managers desired measures to increase certainty that instream resources would be protected, but also recognized the need for flexibility to adapt management practices in response to new information and changing conditions. Municipal water supply managers desired certainty for a major regional water source, but also sought to preserve sufficient flexibility for future decision-makers dealing with continued population growth and economic development.

Geographic context

The unique geographic features of the Lake Washington basin provide an interesting and important context for Cedar River instream flow management. Historically, the Cedar River was not a tributary to Lake Washington, but rather flowed south into the Duwamish River a short distance above tidewater. Between 1912 and 1917, the Cedar

River was rerouted into Lake Washington, doubling the average annual flow into the lake and providing additional water for the Lake's newly constructed western outlet through the Lake Washington Ship Canal and Hiram Chittenden Locks (Ballard Locks). This relatively dramatic early alteration has been followed by a continuing series of anthropogenic changes that have affected aquatic resources in many ways.

Partially as a result of some of these changes, populations of Chinook, Coho, and sockeye salmon and steelhead trout have generally been declining in the basin in recent decades. A number of regionally based efforts are currently underway to protect and restore Lake Washington anadromous fish populations and the habitats upon which they depend. The Cedar River is typically the largest source of naturally produced salmon and steelhead in the Lake Washington Watershed. The management of stream flows in the Cedar River is an important element in regional efforts to protect and restore aquatic, riparian and upland habitat for the benefit of basin's anadromous fish.

Historical Context

Instream flow in the Cedar River has been the subject of study for over 30 years. Early studies by the Washington Department of Fisheries, the United States Geological Survey, and the University of Washington, Fisheries Research Institute led to the promulgation of a minimum flow regime for the Cedar River by the Washington Department of Ecology in 1979. Continued disagreement over this flow regime led to the formation of the Cedar River Instream Flow Committee (CRIFC) composed state, federal and tribal resource managers and representatives from the City of Seattle.

The CRIFC directed the development and implementation an instream flow study project on the Cedar River from 1986 through 1991 (Cascades Environmental Services 1991). In 1993, the committee began developing and negotiating a new instream flow management regime for the Cedar River using the results of the five-year study program as a primary information source. In early 1994, the development of the instream flow management regime was included as a component in a more comprehensive initiative to develop a habitat conservation plan for the Cedar River Watershed. Additional study and analysis was conducted almost continuously during the negotiation process between 1993 and early 2000 when the HCP was approved. A large body of information was accumulated and used to inform the development of the HCP instream flow management regime. Despite the accumulation of this substantial information base over a 14-year period, the parties to the negotiations recognized

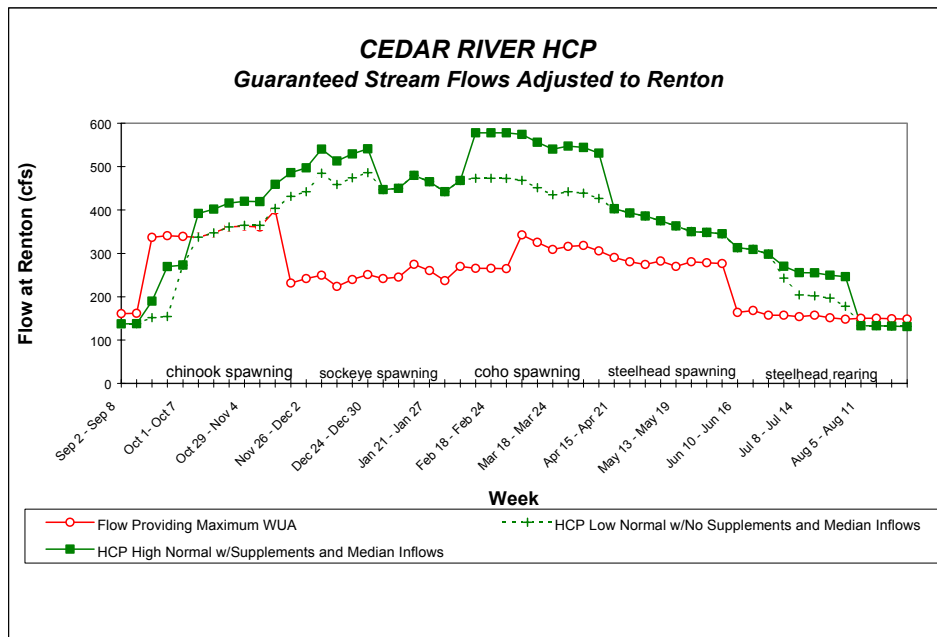
negotiations recognized that they still faced several potentially important areas of uncertainty. They also recognized that our present understanding of the role of stream flow in aquatic ecosystems was likely to evolve in the future. This acknowledgment of the need to balance certainty and flexibility resulted in the inclusion of a number of provisions in the HCP to help support an adaptive approach to instream flow management on the Cedar River

Elements of the HCP Instream Flow Management Program

A number of elements in the new instream flow management program increase the level of **certainty** that instream resources will be protected. The foundation components of the program that provide certainty for instream resources are:

- **Guaranteed flow regime** that more closely follows the shape of the natural hydrograph, includes beneficial minimum flows (levels below which stream flows will not be allowed to drop), and supplemental flows provided in addition to minimums and according to actual hydrologic conditions and biological need (Figure 1).

Figure 1: HCP Guaranteed Flow Regime adjusted to the mouth of the river in the City of Renton assuming 50 percentile accretion flows in the lower 20 miles of river downstream of the Landsburg flow compliance point.



- **Downramping prescriptions** that limit the rate at which stream flows can be reduced to reduce the risk of fish stranding.
- **Relocation of the flow measurement point** upstream approximately 20 river miles to provide better protection for the upper portions of the river and encourage more natural patterns of flow variation in the lower river.

- **Funding commitments for:** habitat **protection and restoration** in the lower Cedar River downstream of the City's ownership boundary; **fish passage and water efficiency improvements** at the Ballard Locks; **fish and flow protection facilities** at the Cedar Falls powerhouse; expansion of Seattle Public Utilities' **water conservation** program.

These elements were developed using information assembled by the CRIFC and the HCP negotiating parties prior to and during the development of the HCP. The biological information focused primarily on the all life stages of the four anadromous salmonids in the Cedar River; Chinook, sockeye and Coho salmon and steelhead trout. During the later stages of negotiations, it became clear to the parties that these earlier studies had perhaps not adequately addressed several unique aspects of the Cedar River and Lake Washington with respect to juvenile Chinook salmon. Representatives of the Muckleshoot Tribe were especially concerned with developing safeguards that would ensure sufficient flexibility to meet future needs of instream resources. And although the Tribe did not ultimately sign the HCP, their representatives contributed substantially to the development of innovative tools to preserve management flexibility.

The Cedar River Chinook salmon population is an ocean-type race. Ocean-type Chinook do not typically spawn upstream of large natural lakes. Be-

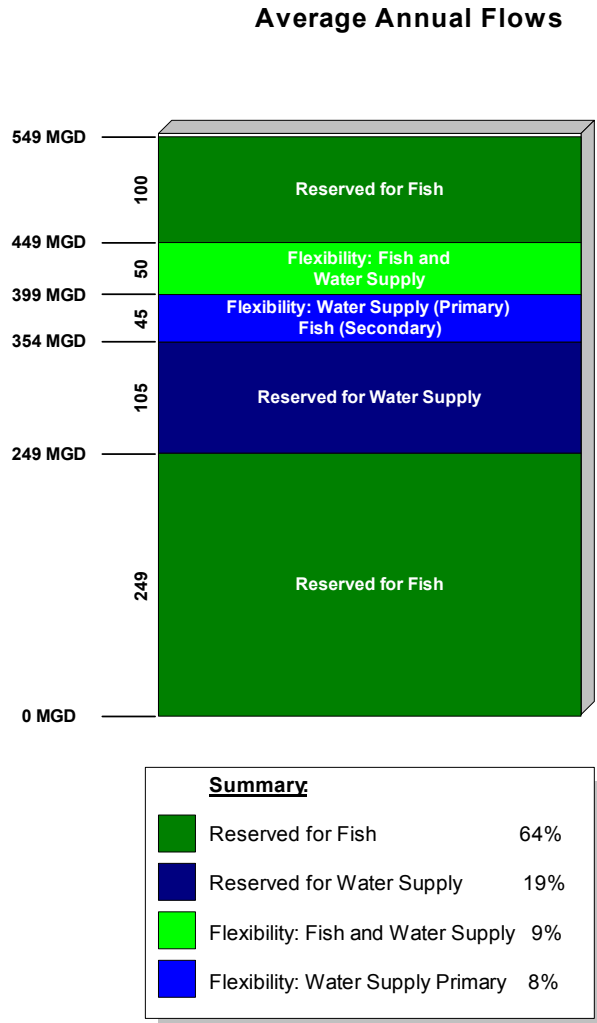
cause juvenile ocean-type Chinook migrate into the marine environment shortly after emergence from their redds, the introduction of a large natural lake into their migration pathway poses a number of interesting and unanswered questions. In addition to these questions about juvenile chinook salmon, the parties recognized that recent developments in the applied science of stream flow management suggest the need to more carefully consider the role of stream flow in

the broader biophysical processes that shape and maintain the stream ecosystems (Poff et al. 1997, Instream Flow Council 2002). Methodologies for addressing the role of stream flow in ecosystem processes are still in the developmental stage. The parties to the HCP negotiations wished to reserve sufficient flexibility to accommodate new information on this topic as it became available. Therefore, the HCP includes a number of features

designed to reserve sufficient management **flexibility** to adapt future instream flow management practices, including:

- Dedication of 1/3 of **Seattle's present water claim** to the river (see Figure 2)

Figure 2: Generalized annual water distribution in the Cedar River



- **Flexible allocation of summer supplemental flows** shaped according to the results of HCP funded in-season biological monitoring
- Seattle's commitment to manage its facilities to **maintain diversions** on the Cedar River at or below present annual average levels for the next 5 to 10 years
- Funding for a **research and monitoring program** to address several specific concerns related to chinook salmon and to investigate the application of emerging analytical approaches for examining the role of stream flow in the ecological processes that shape and maintain aquatic and riparian habitats.

- Establishment of the **Cedar River Instream Flow Commission** to oversee real-time instream flow management and direct the development and implementation of the instream flow monitoring and research program.

Program Implementation

The Cedar River Instream Flow Commission (Commission) is composed of representatives from state, federal, Tribal and County natural resource management agencies and the City of Seattle. The Commission was convened in the summer of 2000, shortly after approval of the HCP. The group meets once per month, or more often if needed, to help guide both real-time stream flow management and to develop and implement the research and monitoring program. Fairly soon after its formation, the Commission was challenged with the fall/winter drought of 2000/2000. Commission members were very actively engaged in the management of the Cedar River and their efforts paid-off in a number of ways including a very successful municipal water use curtailment program and the largest recorded production of Cedar River sockeye salmon fry.

In 2000 and 2001 Seattle used its HCP funds to help the U. S. Army Corps of engineers install fish passage flumes at the Ballard locks to substantially improve emigration conditions for juvenile salmonids. The first HCP acquisition of downstream habitat for protection and restoration is scheduled for this year. Seattle City Light will construct fish and flow protection facilities at the Cedar Falls powerhouse this summer.

Although challenged by the 2001 drought, the Commission was able to develop a research and monitoring program composed of nine study elements and nineteen study questions. Several elements of the program are presently underway including investigations of the effects of stream flow on steelhead spawning distribution and incubation success, spatial and temporal distribution of chinook spawning activity, and juvenile chinook rearing habitat. Later this year, the Commission will launch a study investigating the degree to which managed stream flows in the Cedar differ from flows that would have occurred under pre-development conditions. This investigation is viewed as the first step in a much more complex analysis of the relationships between hydrology and natural ecological processes in the Cedar River. These studies, in addition to others identified by the Commission, will inform the manner in which the management flexibility reserved by the HCP is applied to stream flow management.

Climate Change In The Pacific Northwest: Not If Change?, But How Much Change ?

By J. Emerson Thalweg, UW AWRA Student Chapter Volunteer Coordinator

At the AWRA dinner meeting on February 28, Dr. Amy Snover (JISAO Climate Impact Group, University of Washington) spoke about recent work modeling climate change as a result of global warming and potential impacts on Pacific Northwest (PNW) climate. The group's findings show that global warming IS a reality and that we can expect increased temperatures of 1-4 °F globally and 3-6 °F regionally in the PNW by the year 2040. The expected changes are a result of a doubling of CO₂ concentrations by 2040, a 150% increase in methane and increases in atmospheric water vapor.

Global Climate Models (GCM's) and regional meso-scale models were combined with local distributed watershed hydrology models to predict changes in watershed flow regimes and seasonal water supply. The results show that the timing, magnitude and form of precipitation will change in the PNW. While winter precipitation is predicted to increase, warmer temperatures will produce less snow spatially, especially in lower elevation watersheds. Regional snow packs are *the major* water supply reservoir for agriculture, hydropower and municipalities. Increased winter rain and decreased winter snow translates into less available water and higher summer drought frequencies, which are estimated to increase by two to four times by 2040. More summer droughts will result in a higher demand for water during a time when it is least available.

The City of Portland funded a study to determine how warmer temperatures will impact their drinking water supply. The Bull Run watershed, the city's primary water source, is primarily a rain-dominated system, but supplemented by significant higher elevation snow. Results indicate that increased winter temperatures will result in less high elevation winter snow and increased winter rain runoff. Higher winter flows and smaller spring snowmelt peaks will provide less

water during the summer, when demand for water is at its highest in the City of Portland.

Predictions are also bleak for skiers, snowboarders and winter recreationalists. Models predict less snow, later opening dates for the season, an earlier closing date, and more rainy days in between. So you better get your days in now since they are going fast.

And then there are fish, which will have to contend with changes in their habitat. Higher winter peak flows caused by reduced snow pack buffer capacity will make winter conditions harsher for most salmonid species, which spawn in the fall and are susceptible to winter scouring flows. Lower summer base flows and warmer stream temperatures will also affect adult migration and juvenile survival.

It doesn't get any better. Dr. Snover also reported that we should expect a period of dramatic climate change after the period of relatively little change. We are currently experiencing a cool, wet phase of the Pacific Decadal Oscillation (PDO), which is masking the effects of global warming in the PNW. Once this wet phase ends, significant change is expected.

So what can we do management-wise to prepare for global warming? Of course, conservation in all sectors is a MUST, but broader management policies are also needed. Developing management policies based on past climate variations and model predictions are key. Perhaps by transitioning to drought-tolerant agricultural products in drought-guaranteed regions such as the Yakima basin, we can reduce demand. Shorter-term climate forecasts can also be used when making management decisions. For example, lowering reservoir levels to prepare for floods during a dry winter can be avoided, such as occurred in 2001. More information can be found at:

<http://tao.atmos.washington.edu/PNWimpacts/Backgrnd.htm> ☞

This newsletter is a publication of the **Washington Section of the American Water Resources Association**. It is published bi-monthly or quarterly. This is a forum for members to share ideas and opinions; opinions expressed in the AWRA Newsletter are those of the authors and do not necessarily represent the official position of the WA Section of AWRA. Comments on articles are welcome.

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Submissions are welcome for the March - April, 2002 newsletter. The submittal due date is March 20 2002. The editor reserves the right to make changes for reasons of length, grammar or clarity. Contact Philip Beetlestone at (425) 883-0777, or send submittals directly to pbeetlestone@golder.com (most document/graphic formats are acceptable). Recent newsletters are available on: <http://earth.golder.com/waawra/>

King County Normative Flow Studies Project Description for AWRA

By Steve Hershey, President, AWRA Washington Section

King County implements numerous programs and projects that in major and minor ways affect and/or respond to flow regimes. These programs and projects include, for example, the development and use of reclaimed water resources, the maintenance of flood management facilities like levees and dikes, and implementation of water quality measures to meet TMDLs. In the context of local and regional salmon recovery efforts, flow regime will be a key factor in any jurisdiction's ability to play a constructive role to achieve salmon goals: the success of habitat actions for salmon often depends on a supply of an appropriate amount of water at a certain time.

King County has an ongoing interest in understanding the effects of its actions on flows in rivers and streams that support salmon, and the effectiveness of these actions in protecting or restoring a flow regime that supports salmon recovery and ecosystem integrity goals. In these capacities King County, like other local jurisdictions, expects to be challenged to minimize the harm to salmon from its ongoing activities, to contribute toward fisheries and habitat restoration planning and implementation, and to show the effectiveness of its activities and expenditures toward these goals.

King County is launching a Normative Flow Studies Project to learn more about the importance of a range of flow regime parameters to the sustainability of salmon and other native species and to apply that learning to our actions. "Normative flow" means a flow regime that resembles the natural flow regime sufficiently to sustain all life stages of a diverse suite of native species, including salmonid populations. A normative flow approach stresses the importance of pattern and temporal variation in flow attributes—magnitude, frequency, duration, timing, spatial distribution, rate of change of flows, etc.—in creating and sustaining the complex instream and floodplain conditions to which naturally spawning salmon have successfully adapted over centuries of evolution.

In 2002 the project team will initiate activity directed at its first five objectives:

- Develop a valid and defensible river and stream assessment method, employing and testing Normative Flow concepts, for use in King County rivers and streams.
- Develop new analytical tools (e.g. models, databases, etc.) and/or adapt existing tools to support the assessment method.
- Provide the analytical tools to WRIAs and other interested parties for consideration and use as needed to fill gaps in technical programs.
- Develop and employ educational tools that improve understanding of Normative Flow analysis and its relevance to policy and program development and implementation.
- Apply the assessment method to evaluate the efficacy of current or proposed flow regimes for ecosystem and conservation objectives.

The remaining project objectives, more focused on translating study findings into policy and program options specific to King County actions, will be pursued subsequently. The project team expects to provide regular updates in project activities to interested parties through the respective watershed planning processes now underway in King County watersheds. ☾

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Upcoming Events

June 6 & 7, 2002, 2002 Environmental Conference of Washington, Seattle WA
<http://www.ecwashington.org/>

June 11-14, 2002, Allocating and Managing Water for a Sustainable Future: Lessons from Around the World, Boulder, Colorado, <http://www.colorado.edu/law/NRLC/2002Conference.html>

July 1-3, 2002, Groundwater/Surface Water Interactions, Keystone, Colorado.
<http://www.awra.org/meetings/Colorado2002/>

September 8-13, 2002, 9th International Conference on Urban Drainage (9ICUD), Portland, Oregon. For additional conference information email Cindy Gold or call 1-800-548-ASCE.
<http://www.asce.org/conferences/9icud2002/>

October 23-26, 2002 U.S. Committee on Irrigation and Drainage Water Management Conference - Helping Irrigated Agriculture Adjust to TMDLs, Sacramento, California For additional conference information call (303) 628-5430, http://www.uscid.org/~uscid/i_tmdlprg.html

November 3-7, 2002, 2002 AWRA Annual Conference, Philadelphia, Pennsylvania
<http://www.awra.org/meetings/Philadelphia2002/>

November 14, 2002, 2002 Washington Section AWRA Annual Conference, Seattle, Washington,

November 13-16, 2002, National TMDL Science and Policy Conference, Phoenix, Arizona,
<http://www.wef.org/pdf/files/TMDL2002flyer.pdf>

AWRA holds National, Regional, and State Conferences. Further information on future meeting schedules can be found on the AWRA Website <http://www.awra.org/meetings/>

The Northwest Geological Society (<http://www.scn.org/nwgs/>) holds meetings or field trips. A list of the planned meetings and trips is <http://www.scn.org/nwgs/joust/calendar.htm>

The Washington Hydrologic Society holds monthly meetings. Further information is available from Brian Drost at (253) 428-3600 ex. 2642 (<mailto:bwdrost@usgs.gov>) or Llyn Doremus (360) 592-2632 (<mailto:ladoremus@aol.com>).

New Water Legislation:

Engrossed House Bill 2993 provides tools for completing and implementing local watershed plans and secures several important steps forward for improved water management in Washington. The Bill:

- Affirms the legislature's intent to:
 - secure sufficient water for people, farms and fish through strategies developed at the local watershed level; and,
 - provide tools to assist local watershed planning.
 - Allows the reuse of industrial process water to enhance water supplies for nonpotable uses. The bill provides all industries with the opportunity to secure an exclusive right to reuse their treated industrial wastewater.
 - Expands the state's trust water rights program by providing additional opportunities to secure water for fish through donation, lease or purchase. It creates simpler and safer means for water right holders to preserve their water right in the trust program.
 - Simplifies permitting for water storage projects by combining permit applications and water right permits for water storage. Expedites storage permits where the source of the water to be stored has already been permitted. Allows existing storage facilities to be used more efficiently.
 - Directs the Department of Ecology to seek voluntary compliance with water laws by providing information and technical assistance to water users. Where impairment or harm is occurring, requires the department to secure compliance by formal means where voluntary compliance is not achieved. Directs the agency to deploy watermasters and other compliance personnel evenly throughout the state to support locally-based water management.
 - Immediately creates an account to collect proposed federal funding dedicated to improving water efficiency and reliability for agriculture. ☺
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2002 Membership Application / Change of Address Form

(⅂ please circle, as appropriate ↗)

Annual membership in the state chapter costs \$25.

(If you attended the 2001 November Conference, you are already a member for 2002 – Welcome!)

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 one of the board members.

2002 Membership Dues: \$25.00. **Checks only.** Please make check payable to **AWRA Washington**

Section.

Mail to: AWRA, Washington Section
c/o Laura Landauer,
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Seattle, WA 98112

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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