AWRA newsletter
Washington Section
AMERICAN WATER RESOURCES ASSOCIATION
June/July/August

PRESIDENT'S NOTES: IS WASHINGTON STATE PREPARED FOR THE NEXT 12-YEAR DROUGHT?

Scott Kindred, AWRA-WA Section President

I recently finished an excellent book, *The Worst Hard Time,* by Timothy Egan, that provided a detailed and heart-wrenching depiction of the 1930's dust bowl. The lesson that I learned from the book is how water-related policies and practices developed during several decades of relatively moist climate can fail so completely during a period of sustained drought. During a boom period of American agriculture, when much of the mid-west was converted from grasslands to farming, an entire economy and way of life was created on the premise that 20 inches of rain a year was normal. We now have the benefit of 50 to 100 years of weather records but at the time most farmers and even the experts were unprepared for the first year of drought in 1932. The hardships and economic dislocation that occurred after the first year were nothing, however, compared with the utter devastation that unfolded over the next four to six years of drought. It was beyond anyone's imagination or prediction at the time.

Now take a look at this year, as illustrated on Figure 1 below. Approximately 60% of the nation is currently classified as extreme or severe drought. Although we can hope that rains will return to the middle section of our country soon, we should be prepared for the possibility that they may not return for a period of years.

INSIDE:

Now look at Figure 1 again, and notice that the state of Washington is currently blessed with a preponderance of moist conditions. As Colorado forests, grasslands, and homes go up in flames and mid-western farmers watch their fields wither, Washington state farmers are poised to reap the benefits of record harvests and high prices for their corn, wheat, apples, and other crops. Now would not be the time to complain about our recent cool and wet weather.

There hasn't been much talk of drought in Washington State in recent years. Our snowpack in the last two years have been so large that the agencies that manage the Columbia River have been challenged with too much water during the spring and early summer runoff. In fact, it's now been 11 years since the last major drought in Washington State.

(President's Notes continued on Page 10)

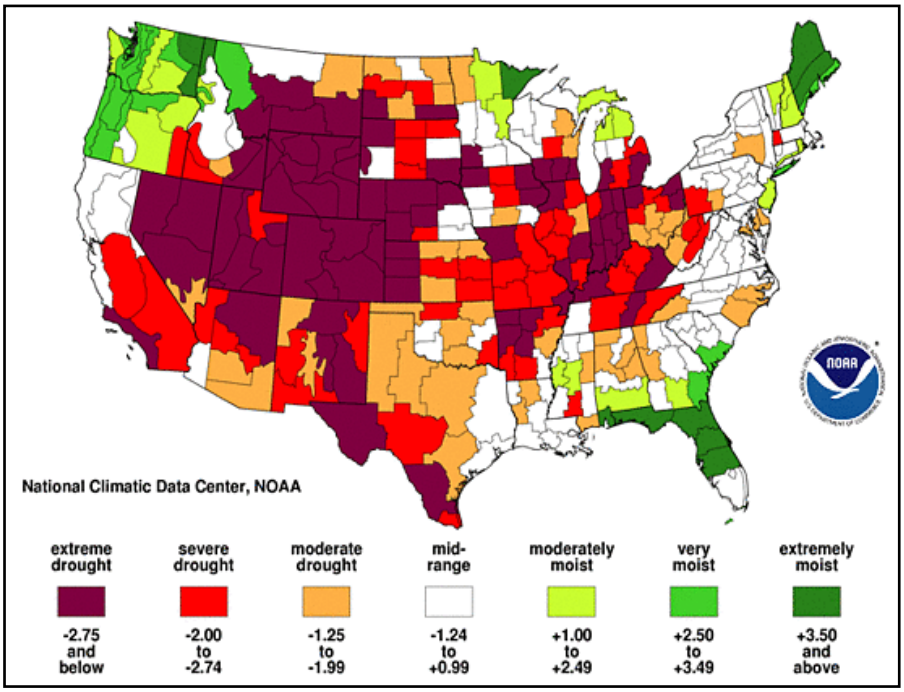

Figure 1. NOAA Palmer Z Index, Short Term Conditions: June 2012
http://www.cpc.ncep.noaa.gov/products/monitoring_and_data/drought.shtml

THE WEATHER OF WINTER 2011-12 AND ITS IMPACT ON WASHINGTON STATE WATER

By: The Office of the Washington State Climatologist

The winter of 2011-12 is reviewed here as it relates to water availability in Washington State. The topics covered include the state of the El Niño-Southern Oscillation (ENSO), temperature and precipitation anomalies for winter into spring, and the corresponding snowpack with its implications for summer water supply and streamflow.

For the second winter in a row, La Niña conditions were present in the equatorial Pacific Ocean, meaning that the sea-surface temperatures in that region were below normal, the easterly trade winds were relatively strong, and that deep cumulus convection was suppressed near the dateline and enhanced in the far western Pacific and over Indonesia. The Oceanic Nino Index (3-month running mean of sea-surface temperature anomalies in the Niño 3.4 region of the eastern Pacific) reached about -1°C from September-October-November through December-January-February, indicating that the La Niña was in the weak-to-moderate category. La Niña events tend to have consequences for the weather during boreal winter for much of the globe. In particular, it is usually cooler and wetter than normal in the Pacific Northwest during an event, especially west of the Cascade Mountains in WA and OR, resulting in an above-normal snowpack by spring.

Temperatures this past winter (October through March) were cooler than normal statewide, as typical during a La Niña. This was especially the case west of the Cascade Mountains, where it was between 1 and 2°F cooler than normal. On the other hand, precipitation in WA did not closely resemble the typical La Niña pattern. While much of the state received a surplus of about an inch of precipitation between October and March, other locations actually recorded a deficit. Specifically, the west slopes of the Cascades, the western Olympic Peninsula, and the central basin in eastern WA received about 6-7", 3-4", and 1-2" less precipitation than normal, respectively. The timing of the precipitation this past winter was also rather unusual: the October-December period was quite dry statewide while the January-March period was rather wet for the state except for the central basin.

The meager precipitation at the beginning of the water year caused the snowpack to lag behind normal into mid-winter. Heavy mountain snow finally began to fall in late February, and persisted through March and April, eventually yielding a much above normal snowpack. As illustrated in **Figure 1**, the snow depth during March 1 and March 15 at Mt. Baker (over 250 inches; black line) was higher than at any other time during the last 12 years (the last 14 years are shown). This comparison was similar for other Cascade stations (see: http://climate.washington.edu/snowdepth/).

Considering the entire data record, the maximum snow depth of 2011-12 at most locations (including Mt. Baker) approached but did not exceed the greatest on record. The 1998-99 season had the greatest snow depth ever recorded at Mt. Baker from Feb 15 through May 1, also plotted on **Figure 1** for reference. **Figure 2** shows the May 3 snow water equivalent (SWE) percent of normal, illustrating much above normal SWE throughout most of WA with the Spokane Basin and Lower Snake basin at near-normal levels. It bears mentioning that the snowpack in WA has been generally higher than normal for the last five winters as a whole, after some sub-par snowpacks in previous years, especially 2000-01 and 2004-05. The copious snows of recent winters can probably be related at least in part to ENSO; 4 out of the last 5 winters have featured La Niña or neutral conditions that were on the cooler side of normal. In general, the variability in the winter weather of the Pacific Northwest over the past few decades has been dominated more by fluctuations on time scales of a year or more than by long-term trends.

The cool and wet weather of late winter and early spring 2012 means plenty of water for the summer. The Northwest River Forecast Center (http://www.nwrfc.noaa.gov/ws/) projects normal to above normal water supply statewide through September. As for hydropower, according to the US Energy Information Administration, the daily average hydroelectric output from the Bonneville Power Administration (BPA) during March through May 2012 has been higher than the 5-year average (2007-2011) (http://205.254.135.7/todayinenergy/detail.cfm?id=6450). In contrast to these "ample water" indicators, the US Drought Monitor (http://droughtmonitor.unl.edu/monitor.html) shows an area of abnormally dry to moderate drought conditions in Douglas, Grant, and Benton Counties. This is attributed to lower than normal precipitation for the water year, rather than a lack of snowpack in the region. Recent rains in early June have helped to scale back this area of dryness, but a longer-term deficit in precipitation remains. Specific impacts, if any, have yet to be reported.

In summary, the winter weather appears to have been impacted by La Niña, with the common outcome of cooler than normal temperatures. Winter precipitation was not as typical, but a late-season surge built the snowpack to much above normal levels, leaving the state with favorable conditions concerning summer water supply, streamflow, and hydropower generation.

To keep current with the weather and climate conditions of Washington state, see the monthly OWSC newsletter at: http://www.climate.washington.edu/newsletter/.

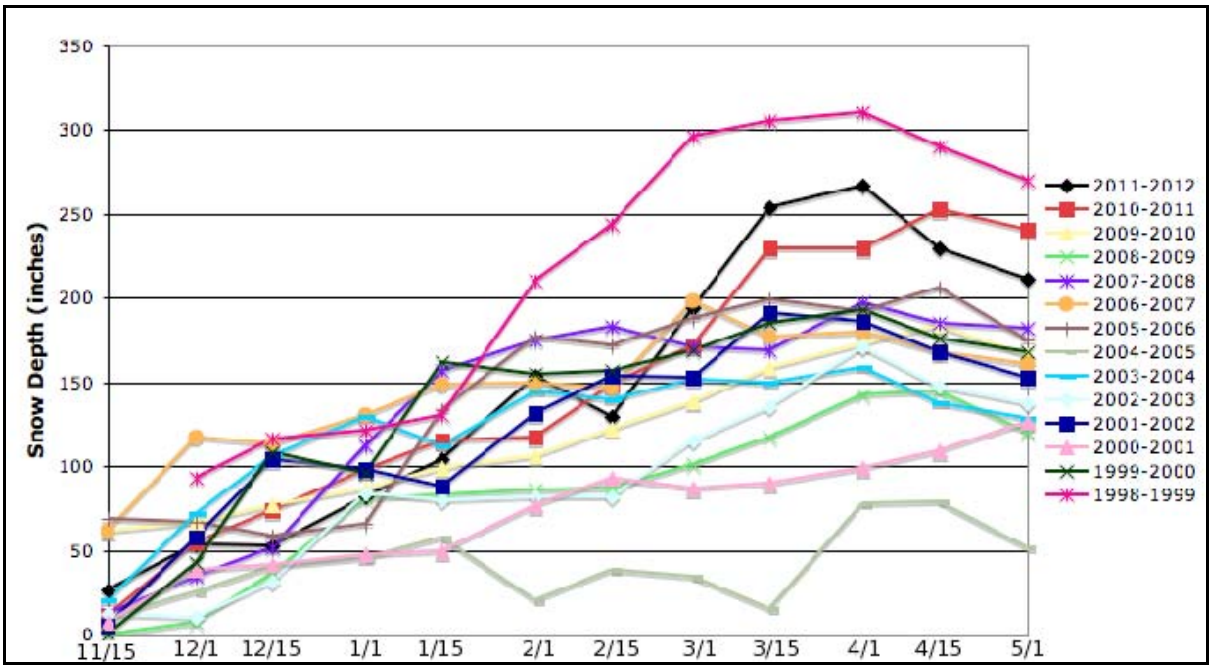

Figure 1: Mt. Baker snow depth (inches) on the 1st and 15th of every month from November 15 through May 1 for the last 14 winter seasons (data from Northwest Weather and Avalanche Center; displayed by OWSC).

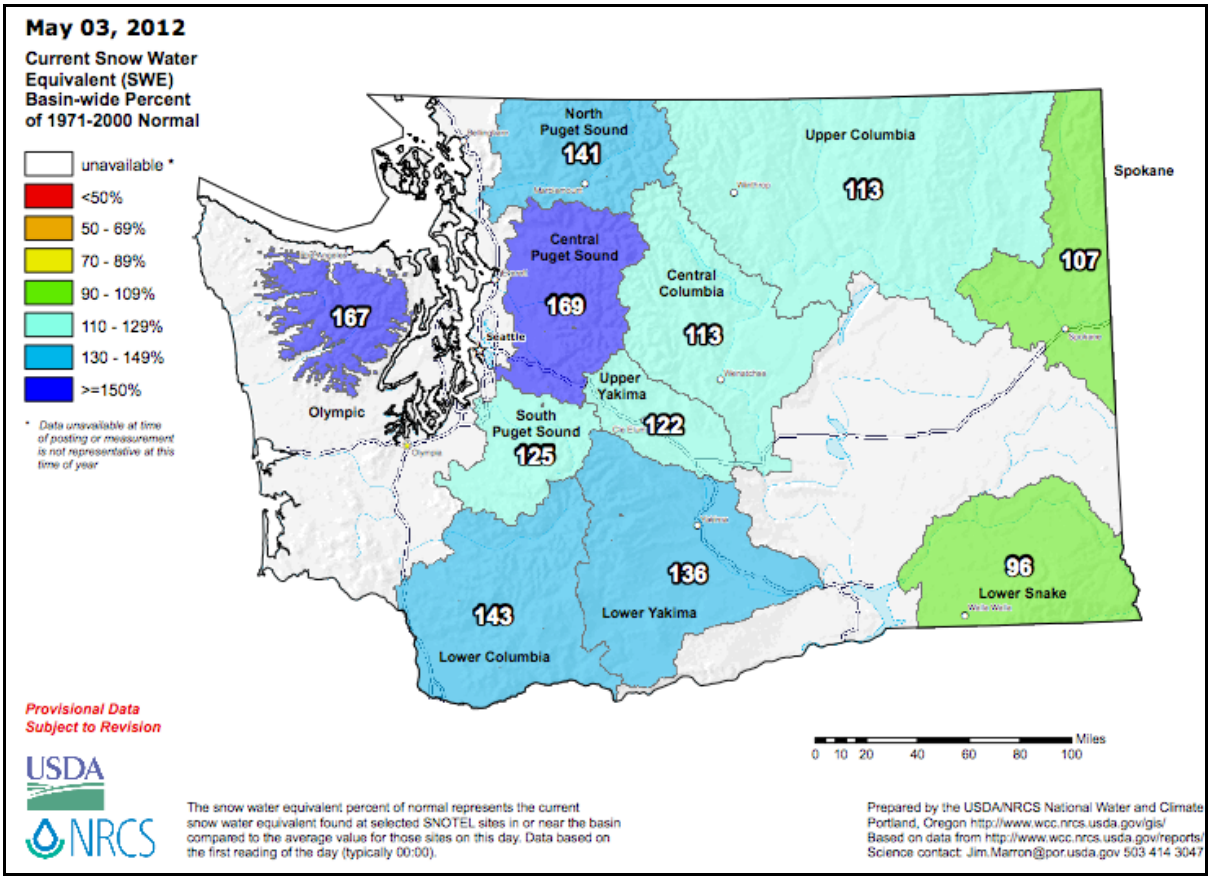

Figure 2: The snow water equivalent (SWE) percent of normal as of May 3, 2012 from the National Resources Conservation Service (http://www.wcc.nrcs.usda.gov/).

2012 AWRA-WA STATE CONFERENCE: THE COLUMBIA RIVER, BASIN AND TREATY

September 11-13, Ellensburg, WA: Register now at www.waawra.org
EARLY BIRD REGISTRATION ENDS AUGUST 17. AFTER THIS PRICES GO UP!
Questions? Contact Tyler Jantzen, tyler.jantzen@ch2m.com

CONFERENCE STATEMENT

The Columbia River and its associated basin are of vital importance to Washington State and the Pacific Northwest region as a whole. The Basin occupies more than 70% of the state and irrigates agriculture valued at over $1.5 Billion/ year. The river is the fourth largest in North America, can generate more than 24,000 MW of hydropower along the main stem, transports 17M tons of freight per year, is a link to over 10,000 miles of stream available to salmon and steelhead, and is a treasured cultural resource. The Basin extends into six other states and British Columbia.

The Columbia River Treaty between the United States and Canada in effect since 1964 may be drastically altered as early as 2024 with notice to do so permitted as early as 2014. The renegotiation of the Columbia River Treaty will have dramatic impact on flood control, hydropower generation, ecological habitat, agricultural water supply, and Columbia River recreational use.

In addition to changes in the treaty and river operations, climate change and population growth are anticipated to compound existing water and land use stresses on basin management. Numerous projects in the basin have been completed and are being considered in an effort to increase water reliability and instream habitat to meet the recovery goals of ESA Listed salmon and steelhead as well as water users needs. These projects are basin-wide.

The 2012 AWRA-WA State Conference will explore these topics, provide an overview of the treaty renegotiation process, and offer perspectives from stakeholders from both inside and outside the Washington border. The multi-day conference includes a field trip to key points of interest within the basin and two days of stimulating presentations, discussion and networking.

KEYNOTE SPEAKER: ROBERT SANDFORD

Keynote speaker Bob Sandford has an extensive list of credentials. Bob, author, historian and water activist, is the EPCOR Chair of the Canadian Partnership Initiative in support of United Nations "Water for Life" Decade. This national partnership initiative aims to inform the public on water issues and translate scientific research outcomes into language decision-makers can use to craft timely and meaningful public policy. Bob also sits on the Advisory Committee for the Rosenberg Int'l Forum on Water Policy, and works to bring broad international examples to bear on Canadian water issues.

Bob is the Director of the Western Watersheds Climate Research Collaborative and an associate of the Centre for Hydrology which is part of the Global Water Institute at the Univ. of Saskatchewan. Bob is also a Fellow of the Biogeoscience Institute at the Univ. of Calgary. He sits on the Advisory Board of Living Lakes Canada, the Canadian chapter of Living Lakes International and is also co-chair of the Forum for Leadership on Water (FLOW), a national water policy research group centered in Toronto. He is also a member of the Advisory Panel for the RBC Blue Water Project. In 2011, Bob was invited to be an advisor on water issues by the Interaction Council, a global public policy forum composed of more than twenty former Heads of State.

Bob's third book on water issues in Canada, *Restoring the Flow: Confronting the World's Water Woes*, was published in 2009. His fourth book on water policy, *Ethical Water: Valuing What Really Matters*, was co-authored with Merrell-Ann Phare and was published in 2011. Bob's next book, *Cold Matters: The State & Fate of Canada's Snow and Ice* will be available in the fall of 2012. Bob lives with his family in Canmore, Alberta.

PHOTO CONTEST - SUBMISSIONS DUE AUGUST 30 VIA EMAIL TO: PSTURTEV@CH2M.COM

Submit your best photos in following categories:

- **Water in the Columbia Basin**
- **Humans and Water (includes infrastructure)**
- **Wildlife and Water**

Recognition will be given for the top 3 overall winners in each category, with each winning a complementary admission to an upcoming AWRA-WA dinner meeting. The winner in each category will receive a **$100 prize**. Category finalists will be displayed at the conference.

Contact Peter Sturtevant at 425-233-3284 or psturtev@ch2m.com if you have questions.

Photo Contest Guidelines:

- Submit photos one at a time (5 photo max/person and 5 MB limit per photo). JPEG format only.
- Photos may have a low pixel resolution in order to meet the 5 MB size limit. Higher resolution photos will be requested from finalists.
- In the submission email, include full name, email, phone number, address, category for submission, and a short caption.
- Each photo file should have a unique name followed by your first initial and last name.

PRELIMINARY AGENDA*

SEPTEMBER 11 – "ICE AGE" FIELD TRIP TO KEY COLUMBIA RIVER TREATY SITES

Conference attendees will have an opportunity to see firsthand the region to be discussed at the conference by attending the field trip and seeing the fish passage features of Grant County PUD's Wanapum Dam. The trip will pass through a large portion of the irrigated area of the Bur. of Rec.'s Columbia Basin Project to see many key features of the water delivery system. Travel through dryland areas will foster comparison of agricultural practices of irrigated lands with those on adjacent dryland farms. The field trip will visit Grand Coulee Dam, the linchpin in the U.S. of the system of dams that produce power, control flooding and store water for irrigation and other uses. Finally, trip-goers will have an opportunity to learn about current and planned operations of the project through a visit with Bureau of Reclamation staff at the Ephrata Field Office. Lunch and beverages will be provided during the day long trip. Departs from/returns to Ellensburg, WA.

SEPTEMBER 12 – THE COLUMBIA RIVER TREATY

- **KEYNOTE - A World Prematurely Dammed: Improving on the CRT & Other Hydrological Anachronisms:** Robert W. Sandford, *see Keynote Bio*
- **The Columbia River Treaty (CRT) in Context:** Professor Barb Cosens, *Univ. of Idaho* and *Universities Consortium on Columbia River Governance*
- **Treaty Review in the U.S. and Canada:** Matt Rea, *USACE* or Nancy Stephan, *Bonn. Power Admin.*; Kathy Eichenberger, *Brit. Col. Ministry of Energy and Mines*
- **Native American Tribal Roles in CRT Review:** Paul Lumley, *Columbia River Inter-Tribal Fish Commission*
- **The Columbia Basin Trust of British Columbia:** Garry Merkel, *Columbia Basin Trust*
- **Post-2012 Expectations for Tributary Headwaters Management:** John Tracy, *Idaho Water Resources Research Institute*; Dr. Michael Barber, *State of Washington Water Research Center*.
- **Fish, Wildlife and Recreation:** Susanne Skinner, *Center for Environmental Law and Policy*
- **Social-Cultural Impacts in British Columbia:** Eileen Delahanty Pearkes, author of *The Geography of Memory*
- **Hydro Power:** Andrew Grassell, *Chelan PUD* and *Columbia River Treaty Power Group*
- **Local Government:** Paul Jewell, *Kittitas County Commissioner* and *Columbia River County Commissioners Policy Advisory Group*
- **Climate Change and the Columbia River Treaty:** Deborah Harford, *Simon Fraser ACT* and Dr. Alan Hamlet, *Univ. of Washington*

SEPTEMBER 13 – THE COLUMBIA RIVER BASIN

- **Yakima Integrated Water Resources Management Plan:** Dave Fast, *Yakama Nation*; Urban Eberhart, *Kittitas Reclamation District*; Michael Garrity, *American Rivers;* Paul Jewell, *Kittitas County Commissioner* and *Columbia River Cty Comm. Policy Advisory Group*
- **Office of the Columbia River Projects:** Derek Sandison, *Office of the Columbia River*
- **New Columbia River Water Rights in Oregon:** Ruben Ochoa, *Oregon Water Resources Department*
- **Aquatic Invasive Species Control:** David Conlin, *GeoEngineers, Inc.* and Carson Keeler, *PUD No. 2 of Grant County, WA*
- **Nez Perce:** Speaker to be determined
- **Restoration in the White Salmon, Klickitat, Methow and Wenatchee Basins:** Bill Sharp and Brandon Rogers, *Yakama Nation Fisheries*
- **Restoration in the Walla Walla and Umatilla Basins: Eric Queampts (invited),** *Confederated Tribes of the Umatilla Indian Reservation*
- **Columbia River Instream Atlas Project:** Jonathan Kohr, *WA Dept. of Fish and Wildlife*
- **Hydro and Wind Power Issues:** Adam Price, *USACE*
- **Water Banking: Yakima and Dungeness Rivers:** Susan Adams, *Washington Water Trust*
- **Instream Flows for Restoration in the Columbia Basin:** Jason McCormick, *Washington Water Trust* and Jason Hatch, *Trout Unlimited-Washington Water Project*
- **Hydrologic Sensitivity to Climate Change:** Julie Vano, *Univ. of Washington*

** Agenda subject to change. Please see the registration website for agenda updates.*

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http://waawra.org/Default.aspx?pageId=1219861

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THE COLUMBIA RIVER, BASIN AND TREATY: BACK-GROUND FOR TOPICS UNDER DISCUSSION AT THE 2012 AWRA-WA SECTION ANNUAL CONFERENCE

Stan Miller, Spokane County Water Resources Program, retired & AWRA-WA Section: Board Member

Background

In 1925 the U.S. Congress passed an updated version of the 1896 Rivers and Harbors Act. The 1925 law directed the U.S. Army Corps of Engineers (USACE) to determine the cost of conducting "multiple-use" studies on the nation's rivers. In 1927 the law was again "updated" with a directive for the USACE to implement the studies described in the 1925 law for a number of river basins, including the Columbia River. During the next decade scores of reports were prepared and published, termed "308" reports after the section of the law authorizing them (USACE, 1932, USACE, 1942). The "308" report on the Columbia River, titled *Columbia River and Minor Tributaries* (USACE, 1932), revealed the potential of that river system for hydroelectric power, navigation, flood control, and irrigation.

In the 1932 report to Congress, the USACE noted 10 sites suited for hydropower development on the Columbia in the U.S. At the time the report was issued the Chelan County PUD was constructing one of those dams at Rock Island a few miles downstream of Wenatchee. The report cautioned that power production should be added in increments so that the supply did not exceed demand. Today all 10 of those dams, plus additional dams in Canada, are in place.

From a navigation standpoint the report divided the river into three sections: the lower (tidewater section to about River Mile [RM] 140), the middle section (from tidewater to the Snake River at about RM 320) and the upper section (from the Snake River to the Canadian Border at about RM 745). Improvements already underway were deemed adequate for the lower section. The Cascade Locks at the Cascade Gorge solved the main problem on the middle section. It was noted however that construction of any dams for hydropower in the middle section should include features such as locks that would improve barge navigation. Finally, the report concluded that the upper section was not suitable for any but local transportation purposes and should not be further considered for federal navigation improvements.

This early report minimized the problem of flooding on the river suggesting that the problem could be solved through local initiatives for levee construction and adding some storage to appropriate hydroelectric dams. This was nearly two decades before the floods of May 1948, when everyone's perception of the hazards of the Columbia came into sharp focus.

The report noted that there were some two million acres of land along the river that could benefit from irrigation. In spite of the fact that locals had been seeking ways to irrigate their land since the early part of the century, the report noted that implementing an irrigation project in the 1930s was not feasible. The benefits gained were far outweighed by the costs. The population base of the region was not big enough to support the kinds of crops that would be grown and the cost of building dams to provide power and storage for an irrigation system was huge. The report did state that in any future power project constructed in an area suitable for irrigation, a portion of the power be earmarked for sale, at the cost of production, for supporting irrigated agriculture.

Early Implementation of "308" Report Provisions

Soon after the 1932 "308" Report was issued, Congress acted on the recommendations for hydropower development. Both Bonneville Dam and Grand Coulee Dam were authorized in 1933. Privately funded, Rock Island Dam, now operated by the Chelan County PUD, was authorized in 1929 and came on line with a generating capacity of 60,000 kW in 1933 (The total capacity today exceeds 600,000 kW.)

Both Bonneville and Grand Coulee were considered part of President Franklin D. Roosevelt's New Deal to help pull the United States out of the "Great Depression." Bonneville Dam's first powerhouse was completed in 1937 and delivered about 525 megawatts (MW) of power. Being a much larger project, Grand Coulee did not deliver power until 1942 just in time to add power to an aluminum and plutonium production binge in the Northwest as part of the WWII war effort.

Coincidental to the initial power output of Bonneville Dam, the Bonneville Power Administration was created to coordinate federal, and to an extent privately produced, power production on the Columbia and to market that power.

In his autobiography *Where Water Falls*, Senator Clarence C. Dill (Dill, 1970) describes his discussions with President Roosevelt concerning the construction of Grand Coulee Dam. Though Roosevelt had gone on record in favor of the dam and the associated irrigation project numerous times, he ended up dragging his feet on the overall high dam / irrigation project. His basis was that the $450M price tag was too high for a dam that would produce nearly 2,000 MW of power in a

Did you know that work is underway to **restore salmon runs** in a big way east of the Cascades? The Columbia River Basin used to have some of the biggest fish runs in the world. On Sep 13 you can learn more about these **projects** and **innovative changes** to improve fish runs.

region with little population. Ultimately Roosevelt compromised, agreeing to construct a "low dam" that would produce a marketable amount of power but would not serve as a source of water or power for irrigation. It was this $60M project that Roosevelt initially funded out of the monies provided through the Public Works Administration.

In May and June of 1948 the river flooded and effectively destroyed Vanport, Oregon, Oregon's second largest city. For over a week, beginning the last few days of May, the Columbia raged with a flow exceeding 900,000 cubic feet per second (cfs); flow peaked at around 1.2M cfs, nearly three times the normal flow for the period. The "308" report of 1932 obviously missed the mark on what was needed to prevent flooding on the lower river. At the time of the flood the USACE was working on a new "308" Report for the Columbia and Tributaries. The new report, released in October 1948 (USACE, 1948), revealed a plan to control flooding by managing flows in the Columbia. The plan called for the construction of reservoirs, primarily in the upstream states of Idaho and Montana that would hold an aggregate of 20M acre feet (ac-ft) of water. This storage target required the construction of nearly 15M ac-ft of new storage to add to the existing 5.1M at Grand Coulee. (Once started, the low dam at Grand Coulee approved by FDR was expanded to include the full blown high dam and irrigation project in a "seamless" construction cycle.) This amount of storage would allow damping of the peak flows like those that occurred in May and June to a point where flooding on the lower river would be avoided.

Given that the flood control storage plan was released less than six months after the flood, it was obvious that the report was already in the late stages of development. The original intent of the plan was to outline the needs for developing the river to its full power production potential outlined in the 1932 report. The wide seasonal variations in Columbia River flow made storage essential to fully use all the water flowing down the system. It was largely coincidental that the storage needed for leveling flow to maximize power production and better fit supply to regional demands was consistent with that needed for flood protection.

To illustrate the nature of the flow variability it is worthwhile to consider a few river flow statistics: Flow for the Columbia at the Dalles averaged about 103,000 cfs for the months of October through February. This is just under one quarter of the average flow of some 490,000 cfs in June. These averages are for the period 1879 through 1969, before significant flow controls were implemented and pre-dating any Columbia River Treaty benefits. Thus they represent the data available during the early years of planning for management of the river. Similarly, at the International Boundary the average monthly flow of the Columbia River ranged from a low of about 39,000 cfs for January to a high of 288,000 cfs for June. Again these averages pre-date the effect of the Columbia River Treaty and represent the years 1938 through 1969.

By the mid-1950s, with five of the eventual eleven main stem dams in the U.S. on line, the conflict between the fall/winter peak demand for power and the peak availability for "run of the river" power in May and June was reaching critical proportions. Direct Service Industries that received non-firm power from the BPA at reduced rates were seeing more frequent and longer periods of curtailment.

In 1954 E.E. Marts (Marts, 1954) from the University of Washington reviewed the information in the 1942 "308" Report: *Columbia River and its Tributaries* (USACE, 1948). In this report the USACE called for the construction of five dams to meet the 20M ac-ft of storage needed for both power "leveling" and flood control: Hells Canyon on the Snake and Albeni Falls on the Pend Oreille in Idaho; Libby on the Kootenai, Hungry Horse on the Flathead, and Glacier View on the North Fork Flathead River in Montana. Grand Coulee Dam on the main stem Columbia in Washington and its 5.1M ac-ft of storage came on line in 1942. The Bureau of Reclamation finished Hungry Horse Dam in 1953 (1.1M ac-ft of storage) and the USACE completed Albeni Falls Dam in 1955 (approximately 3M ac-ft of storage). These three facilities provide a little less than half the needed storage.

But building these dams with their attendant impacts in headwater areas with low populations and little need for power was beginning to draw resistance (Muckelston, 1982). What could or would downstream beneficiaries do to compensate upstream populations for negative impacts? The idea for Glacier View was abandoned when the National Park Service protested the flooding of part of Glacier National Park and the loss of winter elk habitat. Approval of Libby Dam was on hold because the Canadian Government would not agree to flooding over 40 miles of the Kootenay Valley in British Columbia. Only Hells Canyon Dam (completed by Idaho Power in 1971) with its 3.9M ac-ft of storage was still on the table. This still put the "system" some 8M ac-ft short of the storage needed for power leveling and flood control.

Enter: The Columbia River Treaty

With the storage problem stalemated in the U.S. at about 65% of that needed by the goals set for power and flood control, basin water resources managers began to re-think negotiation with Canada. With over half the flow of the Columbia as measured at the Dalles coming from only 15% of the drainage area in Canada (Lang, undated), it made sense to look to Canada for help in managing downstream flow problems. Once again the problem of assessing

Did you know 80% of Washington water withdrawals are for **agriculture**? Learn how **water resources** are being managed in the basin for agriculture, fish and other needs. Find out about **improvements underway**.

downstream beneficiaries for upstream costs and impacts became the key issue. In the case of Canada the problem was somewhat simplified; rather than several states, negotiations only needed to include the government of British Columbia. Here Senator Dill reenters the picture. Dill, who served only one term in the Senate, refusing to run again after successfully completing his mission of getting Grand Coulee Dam started, stayed active in regional water politics through his Spokane based law firm. Among his activities Dill pursued the development of Canadian storage for the purpose of "leveling" power production. He floated the idea that the value of half of the "excess" power produced from water stored in Canada be returned to Canada. He discussed the idea with W. A. C. Bennett, Premier of British Columbia and the leadership of the Grant, Chelan, and Douglas County PUDs, and received a positive response. In return Canada would build storage equal to 15M ac-ft.

These early conversations led to years of discussion culminating in the final Columbia River Treaty (Center for Columbia River History, Undated.) Though the International Joint Commission agreed on the general provisions of the treaty by 1960, it would be 1964 before all the necessary congressional and parliamentary approvals were in place.

In general the treaty called for construction of three dams in Canada: Mica and Arrow Lakes (Keenleyside) on the main stream Columbia, and Duncan Dam on the Duncan River, a tributary of the Kootenay, in southeastern B.C. The treaty also allowed the construction of Libby Dam in Montana and the commensurate flooding of almost 40 miles of the Kootenay Valley in British Columbia. In order to finance the construction the U.S. agreed to provide $254M in advance payment for the extra power produced and $64M for Flood Control. Included in this deal was the creation of over 15M ac-ft of storage in Canada and an additional 3.9M ac-ft behind Libby Dam.

Ancillary Factors

As discussed above, the Treaty deals primarily with power generation and flood control. Though on the face of it the Treaty seems quite limited in scope, the variable nature of river flow demands that any document establishing guidelines for managing those flows be flexible. The Columbia River Treaty handles this through a prescribed process for evaluating snowpack and precipitation annually and creating specific actions to be followed each year. Through these annual negotiations, water for non-specified purposes has been incorporated into the process. Releases to help meet minimum flows for salmon passage and irrigation use have been included in recent years.

The Treaty was enacted with no firm termination date. The Treaty contains a provision that allows either party to terminate the Treaty after 60 years (2024) with a 10-year pre-notification. The pre-notification is less than two years away (2014). Unless renegotiated, the pre-paid flood control provisions of the Treaty lapse and the power payments to Canada cease. From 2024 on, flood control storage could be "purchased" on a yearly basis. There would be no formal umbrella under which needs for power leveling, habitat maintenance or irrigation would be negotiated.

Today the Columbia Basin faces many water supply / water use challenges. These are associated with the Columbia River Treaty, improving the efficiency of water use for a range of practices, and to ways we can adapt to an altered water cycle caused by changing climate. These issues are topics that will be discussed at the AWRA-WA Section annual conference.

Note: All Columbia River flow data used and discussed in this article, unless otherwise credited is from the U.S. Geological Survey website: waterdata.usgs.gov/wa/nwis

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- the entire Pacific Northwest

DINNER MEETING REVIEW: VIRUSES IN SALMON – INTRIGUING TRICKSTERS

Review by Megan Kogut, AWRA-WA Section Treasurer, Featuring Dr. Gael Kurath - Research Microbiologist, USGS Western Fisheries Research Center

June's dinner meeting at Pyramid Brewing Company was not to be missed. A small but very lively group of attendees did as much damage as they possibly could to the appetizers while also chatting, and then settled down for dinner and more chatting. Then, Gael Kurath from the USGS Western Fisheries Research Center presented her very interesting talk entitled "Viruses in Salmon: Intriguing Tricksters".

Gael focused on the three known salmon viruses: IHNV (infectious haematopoietic necrosis virus), ISAV (infectious salmon anaemia virus) and VHSV (viral haemorrhagic septicaemia virus). The first two viruses are endemic, which means that they are present in our Northwest salmon, and the third has recently been suspected, but not confirmed.

Gael focused mostly on the first virus, IHNV, which is responsible for a bit of a continuing mystery/murder story in the Pacific Northwest in the last several decades. In the 1950s, this virus on occasion killed up to 90% of production in some sockeye hatcheries. The virus was originally specific to sockeye salmon, but because hatcheries provided more chance to IHNV to multiply and evolve, IHNV eventually "jumped" species to rainbow trout. This is similar to how the simian AIDS virus was originally specific to monkeys but jumped into humans.

By the 1980s, there were reports of IHNV disease outbreaks in salmon hatcheries along the Columbia River and in the many rainbow trout farms in Idaho, as well as in hatcheries in Alaska, British Columbia, Oregon and California. Samples were collected from many locations and analyzed, and indeed IHNV was the culprit. The results were particularly interesting for two reasons. First, the virus had diversified into upper (Alaska, British Columbia, coastal Washington and the Columbia River), middle (Idaho and the lower Columbia River) and lower (Oregon and California) subgroups. The upper, middle and lower virus subgroups are designated as U, M and L respectively. Second, the M virus had diversified dramatically compared to the U and L viruses, which had diversified only slightly. The hypothesis is that intensive rainbow trout farming, which is the most common source of the M viruses, provided opportunities for the M virus to evolve relatively quickly.

The M virus now occurs in the lower Columbia River but not upstream in the upper Columbia River. This information has been used by fisheries managers to make science-informed decisions about fish transfers from hatchery to hatchery. Obviously, because the M virus is relatively diversified, transferring the M virus from the lower to upper Columbia River should be avoided.

In 2007, the M virus was discovered in coastal Washington steelhead stocks reared on the Olympic Peninsula. Virus typing shows that the virus had spread from the Columbia River basin and there is concern that it could spread further, into Puget Sound and British Columbia. The best method of control is prevention, so the routes of virus transmission are now being studied to determine how to prevent virus introductions. IHNV has also recently been detected in Puget Sound Atlantic salmon netpens, and virus typing shows they got a local virus strain from Pacific salmon, just like catching the common cold. A vaccine for IHNV does exist but it is delivered by injection, which is not feasible on a large scale.

Photo 1 Post-Doc Rachel Life & Dr. Gael Kurath on a sampling trip for IHNV

Gael also discussed two other viruses that have literally been making front page news lately. VHSV is similar to IHNV, and although it is endemic in many Pacific marine fish like herring, it has also emerged recently in the Great Lakes. This is a different virus strain that has caused large-scale fish die-offs in the midwest, so efforts are being made to prevent introduction of the Great Lakes virus strain into our western salmon.

Finally, recent headlines have said that ISAV has been detected in Pacific salmon for the first time. The actual situation is that this has not been confirmed, there has not been any virus isolated and there is no evidence of disease. The reports are based on molecular methods that detect part of a virus gene, so more work is being done to see what this means. Stay tuned for this issue to be in the news again this year.

The next dinner talk is in October, after the 2012 AWRA Washington State Conference on September 11-13. For more information, see the AWRA Washington chapter calendar of events webpage at http://waawra.org/Events/Calendar.

PRESIDENT'S NOTES

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Here's a reminder of what happened in 2001:

- Rainfall and snowpack totals were approximately 60% of normal.
- Streamflows were well below 50% in many rivers across the state and numerous fish passage problems developed that threatened fish stocks.
- Junior water right holders in the Yakima Basin only received 37% of their pro-ratable entitlement, resulting in a loss of $130 million in agriculture revenues.
- 90,000 acres of land were idled in the Columbia Basin Project to reduce energy consumption and maintain river flows.
- Low river flows resulted in a loss of $5.8 billion in hydropower revenue, causing electricity rates to increase by 10 to 58% across the state.
- Job losses in agriculture alone were estimated at 5,600 to 8,900 jobs.
- 2,000-3,000 aluminum smelter workers lost their jobs, in part due to drought-related power rationing.
- Washington's federal, state and private forests had 1,162 fires that burned 223,857 acres.

A similar drought occurred in 1977. These droughts were short-lived and the effects were generally managed without major disaster. A study of tree rings in the Columbia Basin, published in the Journal of the American Water Resources Association by Ze'ev Gedalof and others (December 2004), suggests that the 1977 and 2001 droughts was mild compared to pre-historic dry periods. The study identified six major drought periods over the last 250 years, typically lasting 3-5 years, with the worst period lasting 12 years in the middle of the 19th century. Imagine what a 12-year drought would do to the natural resources and economy of Washington State.

Are we creating water management systems with the flexibility to address prolonged drought? Are we planning for the next 2001 drought, the next 1930's dust bowl, and ultimately, a repeat of the 12-year drought in the 1840's? Will our water management systems sustain us during the periods of drought that will occur in the years and decades to come? Are we factoring in predicted losses in winter snowpack due to global warming? These are important questions that all of us should consider and keep in mind, even during these years of plentiful winter snows and cool summers.

I encourage all of you to attend our fall conference on the Columbia River, Basin and Treaty. As we address the important policy issues and infrastructure investments associated with water management in the Columbia Basin, we are faced with the seemingly impossible task to find the right balance between habitat, power generation, agriculture, and recreation, all while attempting to anticipate climate change. Not an easy challenge under the best of conditions, but even more challenging when we consider the need to prepare for the next 12-year drought. Ultimately, it is our task to achieve the impossible while preparing for the inevitable.

ECOLOGY ISSUES THE 2012 STORMWATER MANAGEMENT MANUAL FOR WESTERN WASHINGTON

On August 1, 2012 Ecology issued the 2012 Stormwater Management Manual for Western Washington. The Manual can be downloaded online at: https://fortress.wa.gov/ecy/publications/summarypages/1210030.html

Key changes in the 2012 Manual include:

- Guidance on Low impact development (LID) requirements for new development and redevelopment.
- Revised guidance on designing infiltration facilities.
- New and revised stormwater source control and treatment BMPs.
- New and revised construction BMPs.
- Western Washington Hydrology Model (WWHM) update and modeling guidance.

To help reviewers understand these and other proposed Manual changes, Ecology compiled a table listing the location, change description, and reasons for the changes. The table indicates if changes are tied directly to language from one of the NPDES general permits or not. See: http://www.ecy.wa.gov/programs/wq/stormwater/manual/ChangeChart.pdf

Note: Western Washington Stormwater Permits effective (August 1, 2013 – July 31, 2018) require use of portions of the 2012 Manual. Other Ecology permits such as the Construction Stormwater General Permit and Industrial Stormwater Permit currently require the use of the 2005 Stormwater Management Manual for Western Washington. When those permits are reissued in 2015 then they may require the use of the 2012 Manual.

In addition, the Puget Sound Partnership issued the final draft of the guidebook ***Integrating LID into Local Codes: A Guidebook for Local Governments*** (July 2012) available at http://www.psp.wa.gov/LID_GLG.php

For more information, please visit this website: http://www.ecy.wa.gov/programs/wq/stormwater/manual.html

Ecology plans to schedule workshops on the 2012 Manual during November and December 2012, after the release of the updated Western Washington Hydrology Model.

For questions on the 2012 Manual, contact Carrie Graul, 360-407-7221 or carrie.graul@ecy.wa.gov

AWRA Events

The Washington Section of AWRA holds regular dinner meetings, including a social hour, dinner, and a speaker.

State Events – http://waawra.org/

State Conference, September 11-13, 2012 The Columbia River, Basin and Treaty, Ellensburg, WA

National Events – www.awra.org

November 12-15, 2012 AWRA National Annual Conference, Jacksonville, FL: Hyatt Regency.

Other Water Resources Events

USGS Tacoma Water Science Seminars: http://wa.water.usgs.gov/seminar/seminar.html

UW Water Seminar 2012, free and open to the public, Tuesdays, Anderson Hall 223, 8;30 to 9:20a.m http://www.cfr.washington.edu/courses/waterseminar_Wtr12.pdf

September 12, 2012, **Best Fest '12,** Portland, OR. More information at: http://oregonbestfest.org

September 19-20, 2012 **Sustainable Stormwater Symposium,** Portland, OR. Sponsored by Oregon Section - ASCE Environment & Water Resources Group and Oregon Chapter of APWA. www.stormwatersymposium.org/

September 27, 2012 **Water Right Transfers Conference,** Seattle, WA The Seminar Group. www.theseminargroup.net

September 28, 2012 **New Water Year Celebration,** Corvallis, OR. OSU. http://water.oregonstate.edu/

September 27-29, 2012 **WA State Ground Water Association Convention**, Pasco, WA. Includes the 2012 NGWREF McEllhiney Lecture.

October 1-2, 2012 **The International Columbia River Seminar,** Vancouver, BC. Law Seminars International www.lawseminars.com

October 1-2, 2012 **Pacific Northwest Climate Science Conference,** Boise, ID. http://pnwclimateconference.org/

December 4-5, 2012 **Northwest Environmental Conference & Tradeshow**. Portland, OR. www.nebc.org

Links To Other Local Water Resources Related Associations

Washington Hydrologic Society http://wahydro.org

Washington Water Research Center: www.swwrc.wsu.edu/conferences.asp

Seattle ASCE Water Resources: http://seattleasce.org/committees/water_resources.html

Center for Environmental Law and Policy: http://www.celp.org/

Northwest Environmental Business Council: http://nebc.org

Washington Water Trust: http://washingtonwatertrust.org

The Water Report: http://thewaterreport.com/

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For Checks: please make payable to **AWRA Washington Section**.

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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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