WASHINGTON STATE DEPARTMENT OF ECOLOGY

Columbia River Basin Water Supply Inventory Report

Submitted to the Washington State Legislature
Pursuant to RCW 90.90.040

December 2007

Publication No: 07-11-022

This report is available on the Department of Ecology website at:
http://www.ecy.wa.gov/biblio/ 07-11-022
For additional copies of this publication, please contact:

Water Resources Program Publications
P.O. Box 47600
Olympia, WA 98504-7600
E-mail: WRPublications@ecy.wa.gov
Phone: (360) 407-6600

Refer to Publication No. 07-11-022

This 2007 Columbia River Basin Water Supply Inventory Report was prepared by:

Dan Haller, LeAnn C. Purtzer, Wendy Valdez, Farida Leek and Tim Hill

If you need this publication in an alternate format, please call the Water Resources Program at (306) 407-6600. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call (877) 833-6341.

2007 Report to the Legislature

December 2007

Columbia River Basin Water Supply Inventory Report

Department of Ecology
Water Resources Program
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Publication No. 07-11-022

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600 • Olympia, WA 98504-7600 • 360-407-6000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

December 7, 2007

The Honorable Christine Gregoire, Governor
and Honorable Members of the Washington State Legislature
Olympia, Washington

RE: Columbia River Basin Water Management Program – Annual Report

Dear Governor Gregoire and Legislators:

In 2006, you created the Columbia River Basin Water Management Program (Program) and directed the Department of Ecology (Ecology) to "aggressively pursue the development of water supplies to benefit both instream and out-of-stream uses" (RCW 90.90.005). I am pleased to report that we will make the first delivery of water within this new framework in 2008. The enactment of this program marked an historic turning point in the Columbia River water debate.

The delivery of new water is driven by Governor Gregoire's determination to make this program a success for the people of the state. Working with affected tribal governments and the United States Bureau of Reclamation, Ecology will make 132,000 acre-feet of water available next year to address critical water supply problems in the Odessa Subarea, to meet the needs of municipalities located on or near the Columbia River, to enhance the quantity of water available instream, and to provide relief for interruptible water right holders in drought years.

This is a major accomplishment. It is the first delivery of a significant quantity of water in the Columbia River Basin in over 30 years, and demonstrates what is possible when the people of our state work toward a common goal.

But it is not the only achievement in the last year. Over the last 12 months, Ecology has also:

- Successfully established a multi-stakeholder Policy Advisory Group to assist the agency as the Program is implemented;
- Continued to fund feasibility assessments needed before water can be delivered to the Odessa Subarea;
- Developed a new project review and funding process;
- Initiated an interactive water resource information and mapping system to support effective Columbia River water management, and
- Began the process of identifying all potential sources of new water supply in the Columbia River Basin.

The foundation of this water supply development program is an inventory of all potential water supply projects, including: conservation, aquifer storage and recovery, the use of existing infrastructure, and surface storage facilities. Under the law, Ecology must provide an updated water supply inventory report to the Legislature each year. On November 15, 2006, approximately four months after the effective date of the legislation, Ecology produced the first Columbia River water supply inventory. We are now pleased to provide to you our second annual report identifying potential water supply projects in the Columbia River Basin.

For this year's report, Ecology had three primary reporting goals:

- First, augment the number of projects in the inventory;
- Second, identify those water supply projects that are best suited to meet the instream use objectives of the statute and which projects are best suited to meet the out-of-stream objectives; and,
- Third, provide a preview of the efforts Ecology is undertaking to update the water supply and demand forecast due in 2011, which will include a comprehensive forecast of climate and population impacts on future water needs.

We have made great progress and accomplished much. I am extremely proud of my staff for their extraordinary work. Yet, despite all we have accomplished, we remain in the early stages of implementing a water supply program in the Columbia River Basin. As a state, we have much to learn and much more to achieve. We must continue to address the need for water in the Odessa. We must improve water supplies in the tributaries, as well as in the mainstem of the Columbia River for both instream and out-of-stream uses; and we must strive to understand clearly the size and scope of the problem at hand. In 2008, Ecology and our partners will pursue new water supplies with the same energy that has characterized our effort since the Legislature passed this historic legislation.

It is my hope that this report helps create a common understanding of the challenges and opportunities we face. Based on the experience and accomplishments of this past year, I am more convinced than ever that the critical water supply needs of our state, both economic and environmental, can and will be met.

Sincerely,

Jay J. Manning
Director

Table of Contents

Executive Summary

Background

In 2006, the Legislature enacted the Columbia River Basin Water Management Program (Program), codified in RCW 90.90. The Program directs Ecology to "aggressively pursue the development of water supplies to benefit both instream and out-of-stream uses" (RCW 90.90.005). The foundation of this water supply development is an inventory of storage and conservation projects that Ecology must develop, update and report to the Legislature each year (RCW 90.90.040(2)).

On November 15, 2006, approximately four months after the effective date of the Legislation, Ecology produced the first Columbia River Water Supply Inventory. The 2006 Inventory was based on three main efforts by Ecology:

- A review of every published account of storage and conservation opportunities we could access, including watershed plans, irrigation district comprehensive plans, water system plans, and water reuse plans.
- A contract with the Conservation Commission and local conservation districts to provide data on other conservation opportunities recorded in their own internal databases or farm surveys.
- A series of workshops, web outreach, and letters to stakeholders to solicit project recommendations.

This effort yielded thousands of conservation and storage projects that could potentially supply millions of acre-feet of water to the Columbia River basin, including:

Agricultural Conservation Projects

- 5,391 projects found
- 1,000,756 acre-feet of potential water savings
- Average estimated cost $523 per acre-foot

Large Storage

- 6 potential large storage facilities
- Each potentially storing over 1 million acre-feet
- Cost of projects ranging from $1,000 to $4,000 per acre-foot

Small Storage

- Numerous small surface and aquifer storage projects
- Most have less than 1,000 acre-feet of potential storage
- Average estimated cost $790 per acre-foot

Columbia River near Vantage

2007 Reporting Goals

Ecology identified three primary reporting goals for this year's legislative report:

- Augment the number of projects in the inventory.
- Identify which water supply projects were best suited to meet the instream use objectives of the statute and which projects were best suited to meet the out-of-stream objectives (e.g. new permits).
- Provide a preview of the efforts Ecology is undertaking to update the water supply and demand forecast due in 2011.

A summary of Ecology's efforts to meet each of these reporting goals is provided in the following sections.

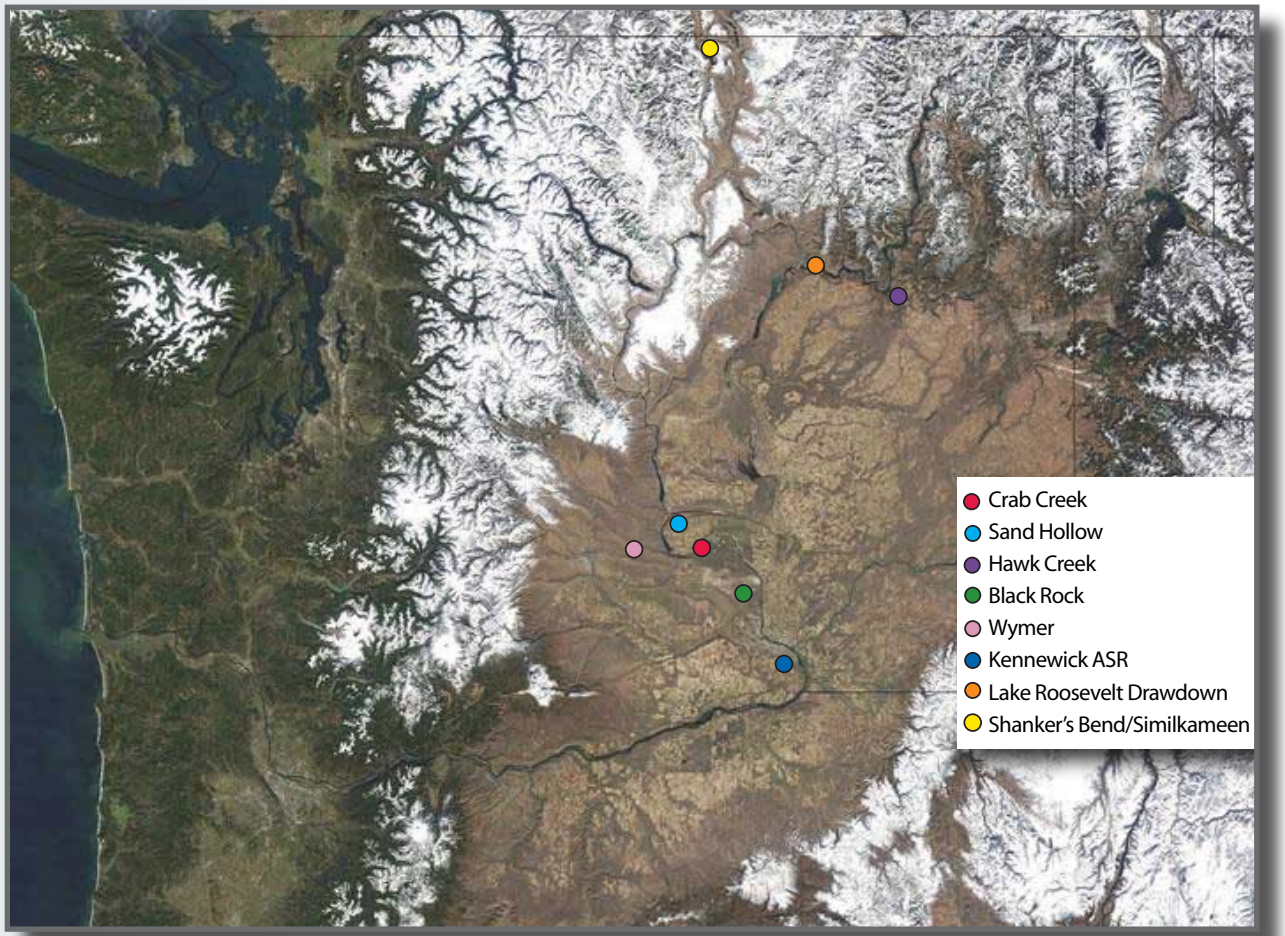
Expanding the Inventory

To expand the number of projects in its inventory, Ecology solicited and investigated projects in a number of ways:

- Evaluating new reports that identified conservation opportunities published since 2006.
- Expanding our partnership with the Conservation Commission and conservation districts to identify non-published conservation and storage opportunities.
- Coordinating with watershed planning units through meetings and mailings to solicit local projects for inclusion in the inventory.
- Providing opportunities for tribes to include conservation and storage projects in the inventory that are located on reservation lands.
- Launching a competitive grant program for water supply projects (conservation and small storage) in October 2007 that is expected to yield additional projects.

Through this continued coordination and outreach, the number of projects in the inventory has increased by approximately ten percent. Conservation projects in 2007 collectively account for approximately 1,000,000 acre-feet of water. Additionally, through continued funding of on-going storage studies, opportunities for large storage (> 1 million acre-feet) have been refined to five active projects (Hawk Creek, Crab Creek, Sand Hollow, Shanker's Bend/Similkameen and Black Rock). Opportunities for small storage (< 1 million acre-feet) have increased in number (48 projects totalling >1.1 million ac-ft), and are still emerging through watershed plan development, various appraisal studies (e.g. Bureau Odessa Study and proposed Ecology Aquifer Storage and Recovery study), and Ecology's first competitive grant program.

The following tables summarize the water supply inventory, including storage opportunities, conservation projects and pump exchange projects.



Columbia River Basin (source: http://www.earthobservatory.nasa.gov)

Table ES-1: Summary of Storage Inventory

Storage Project *	Volume (acre-feet)	Estimated Cost ($)	Cost / Acre-Foot ($ /ac-ft)
Crab Creek	1,000,000 to 3,000,000	$932 Million to $2.4 Billion	$932 to $792
Sand Hollow	1,000,000	$1.6 Billion	$1,642
Hawk Creek	1,000,000 to 3,000,000	$3.6 Billion to $8 Billion	$3,600 to $2,667
Black Rock	1,300,000	$4 Billion	$3,077
Wymer	174,000	$380 Million	$2,184
Shanker's Bend / Similkameen	1,700,000	$260 Million	$153
Kennewick ASR	$\geq$ 318 **	$2,400,000	$\leq$ $7,550
New Incremental Storage Releases at Lake Roosevelt	132,500	Unknown	Unknown

Cost estimates do not include mitigation of environmental impacts that may be identified during environmental review.
All costs estimates are appraisal level and are subject to significant change.
* These storage projects are in various stages of environmental review. Additional small storage sites are also included in the inventory in Appendix C.
** Actual capacity determined after pilot stage.


Crab Creek


Sand Hollow


Hawk Creek


Black Rock


Shanker's Bend / Similkameen

Table ES-2: Summary of Water Supply Inventory for 2006 and 2007

Type of Project	Number of Projects Listed		Projects with Water Savings (Projects with Cost Data)		Projects with Water Savings & Cost Data		Estimated Water Savings acre-feet/year		Estimated Cost		Estimated Cost per acre-foot	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
New Large Storage (> 1 million acre-ft)	6	5	6 (6)	5 (5)	6	5	8,872,000	6,000,000	$13,167,000,000	$10,392,000,000	$1,484	$1,732
New Small Storage (< 1 million acre-ft)	24	104	20 (7)	89 (49)	6	43	40,760	251,240	$32,220,700	$727,952,510	$790	$2,897
Aquifer Storage & Recovery	1	31	1 (0)	6 (10)	0	2	unknown	343	unknown	$3,400,000	unknown	$9,913
Modification to Existing Storage	1	5	1 (0)	4 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Lining/Piping	93	165	79 (89)	109 (124)	79	107	418,526	451,310	$456,740,404	$505,691,321	$1,091	$1,120
On-Farm Efficiency	5,220	5,587	5,197 (5,199)	5,402 (5,410)	5,197	5,399	216,886	259,952	$276,879,143	$338,459,565	$1,277	$1,302
Irrigation Water Management^	1	33	1 (1)	1 (1)	1	1	243,503	243,503	$9,167,184	$9,167,184	$38	$38
Automation & System Control	34	46	21 (34)	21 (40)	21	21	26,307	26,307	$9,757,000	$9,757,000	$371	$371
General Water Conservation *	37	88	3(6)	5 (9)	3	4	11,914	12,914	$7,066,300	$7,196,300	$593	$557
Tail Water Reuse	2	4	2 (2)	4 (4)	2	4	2,900	5,800	$520,000	$1,040,000	$179	$179
Surface to Groundwater Conversion	1	1	1 (1)	1 (1)	1	1	360	360	$200,000	$200,000	$556	$556
Reclaimed Water	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Municipal Conservation	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Partial Season Acquisitions/Leases^	3	9	3 (3)	5 (3)	3	3	80,360	80,360	$6,700,000	$6,700,000	$83	$83
Fallowed Corners/Land Retirement	0	45	0 (0)	31 (31)	0	31	unknown	392	unknown	$392,100	unknown	$1,000
Crop Water Duty Reduction	0	15	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Land Conservation Programs	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Crop Change	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Total (all)	5,423	6,138	5,335 (5,348)	5,683 (5,687)	5,319	5,621	9,913,516	7,332,481	$13,966,250,731	$12,001,955,980		
Total (conservation & acquisition only)	5,391	5,993	5,579 (5,623)	5,551 (5,591)	5,307	5,571	1,000,756	1,080,898	$767,030,031	$878,603,470		

2007 numbers reflect 2006 data with added data from 2007.

* General Water Conservation projects include public education, planning, researching and developing innovative irrigation implementation.

^ Annual cost per-acre feet

Table ES-3: Summary of Pump Exchanges

Pump Exchanges	Volume (acre-feet)	Estimated Cost	Estimated Cost Per Acre-Foot
Walla Walla	Unknown	$264.5 Million	Unknown
Yakima / Wymer	400,000	$2.9 Billion	$500
Yakima / Kennewick Irrigation District	25,000	$50 Million	$2,000
Yakima / Bureau	85,000	$64.4 Million	$757

Understanding the Inventory

The statute directs Ecology to develop water supplies that meet both instream flow needs and the following specific out-of-stream needs (90.90.020(3)):

- Alternatives to groundwater for agricultural users in the Odessa subarea aquifer.
- Sources of water supply for pending water right applications.
- A new uninterruptible supply of water for the holders of interruptible water rights on the Columbia river mainstem that are subject to instream flows or other mitigation conditions to protect stream flows.
- New municipal, domestic, industrial, and irrigation water needs within the Columbia river basin.

Each of the water supply needs above can be met by different water supply sources. Some require permanent, ongoing supplies. Others can be met by short-term water supply projects. Some require offsetting consumptive use reductions to ensure there is no impact to the river and downstream water right holders. Others may be met by projects that reduce withdrawals through return flow savings in particular river reaches or through source substitution projects.

The inventory of water supply projects offers a toolbox of options Ecology can use to meet existing and future demands for water within the Columbia River Basin. One of the most significant efforts Ecology undertook in this legislative report is to identify which water supply opportunities benefit stream flows and the environment and which water supplies could be allocated for new out-of-stream uses (new permits). This distinction is required in RCW 90.90.040(1) so that Ecology can meet the balanced objectives in the statute.

Determining which projects can enhance instream flows or create opportunities for new out-of-stream water use requires an understanding the water cycle in the Columbia River Basin. Water is neither created nor destroyed, but is continuously reused by many different users and uses (e.g. municipal, irrigation, and industrial) in the basin. We think of water use in two broad categories: "non-consumptive use" and "consumptive use".

The storage, conservation and pump exchange projects shown in the inventory do not provide "new" water in the physical sense. Many of the water supply projects are characterized in the law as "new" because they can retime water from times of surplus availability or low demand to times of high demand. In the Columbia Basin, competition for water amongst instream and out-of-stream uses is highest in the summer and lowest in the winter.

2002 photo by Jeff Vanuga, USDA NRCS

Non-consumptive Use: A type of water use where either there is no diversion from a source body, or where there is no diminishment of the source (WAC 173-500-050(9)). Most of the uses in the basin are not 100% efficient and return water (return flow) back to the Columbia River Basin for use by others. Water discharged from municipal wastewater treatment plants and industrial discharges is used in part by irrigators and power generators downstream. Water leaking from irrigation canals is captured by irrigation drains or moves through the ground back to the river for uses downstream. Approximately half of water diverted for flood irrigation returns to the Columbia Basin, either through surface runoff or percolation into groundwater.

Consumptive Use: Use of water whereby there is a diminishment of the water source (WAC 173-500-050(5)). In the context of irrigation, consumptive use includes crop evapotranspiration, and water evaporated during irrigation applications (e.g. spray, canopy and wind losses.) The final component of the water cycle that does not result in direct reuse within the Columbia River Basin is water that is consumed (consumptive use), either through evaporation by the sun or transpiration by plants, or taken together, evapotranspiration (ET).

All of the storage projects have the potential for retiming[1] water from times of relative surplus to scarcity. The pump exchanges offer less retiming potential (unless paired with storage), but provide source substitution resulting in increased benefits (primarily to fish) in tributary streams where habitat is critical. Conservation projects can reduce non-consumptive water use and leave water in rivers longer, which benefits particular river reaches. Some conservation projects can also produce water for out-of-stream uses by reducing the amount of water actually consumed or retiming water. However, as shown in Table ES-4 and ES-5, the vast majority of the projects in the conservation inventory are generally classified as projects with non-consumptive savings. It is possible that projects having instream benefits could be combined with projects providing out-of-stream benefits providing for both requirements in the statute.

Table ES-4: Summary of Projects Primarily Benefiting Instream Uses

Type of Project	Number of Projects Listed		Projects with Water Savings (Projects with Cost Data)		Projects with Water Savings & Cost Data		Estimated Water Savings (acre-feet/year)		Estimated Cost		Estimated Cost per acre-foot	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Lining/Piping	93	165	79 (89)	109 (124)	79	107	418,526	451,310	$456,740,404	$505,691,321	$1,091	$1,120
On-Farm Efficiency	5,220	5,587	5,197 (5,199)	5,402 (5,410)	5,197	5,399	216,886	259,952	$276,879,143	$338,459,565	$1,277	$1,302
Irrigation Water Management ^	1	33	1 (1)	1 (1)	1	1	243,503	243,503	$9,167,184	$9,167,184	$38	$38
Automation & System Control	34	46	21 (34)	21 (40)	21	21	26,307	26,307	$9,757,000	$9,757,000	$371	$371
General Water Conservation *	37	88	3 (6)	5 (9)	3	4	11,914	12,914	$7,066,300	$7,196,300	$593	$557
Tail Water Reuse	2	4	2 (2)	4 (4)	2	4	2,900	5,800	$520,000	$1,040,000	$179	$179
Surface to Groundwater Conversion	1	1	1 (1)	1 (1)	1	1	360	360	$200,000	$200,000	$556	$556
Reclaimed Water	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Municipal Conservation	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Total	5,388	5,924	5,304 (5,332)	5,543 (5,589)	5,304	5,537	920,396	1,000,146	$760,330,031	$871,511,370		

2007 numbers reflect 2006 data with added data from 2007.
* General Water Conservation projects include public education, planning, researching and developing innovative irrigation implementation.
^ Annual cost per-acre feet

Table ES-5: Summary of Projects Benefiting Out-of-Stream Uses (and Instream Uses)

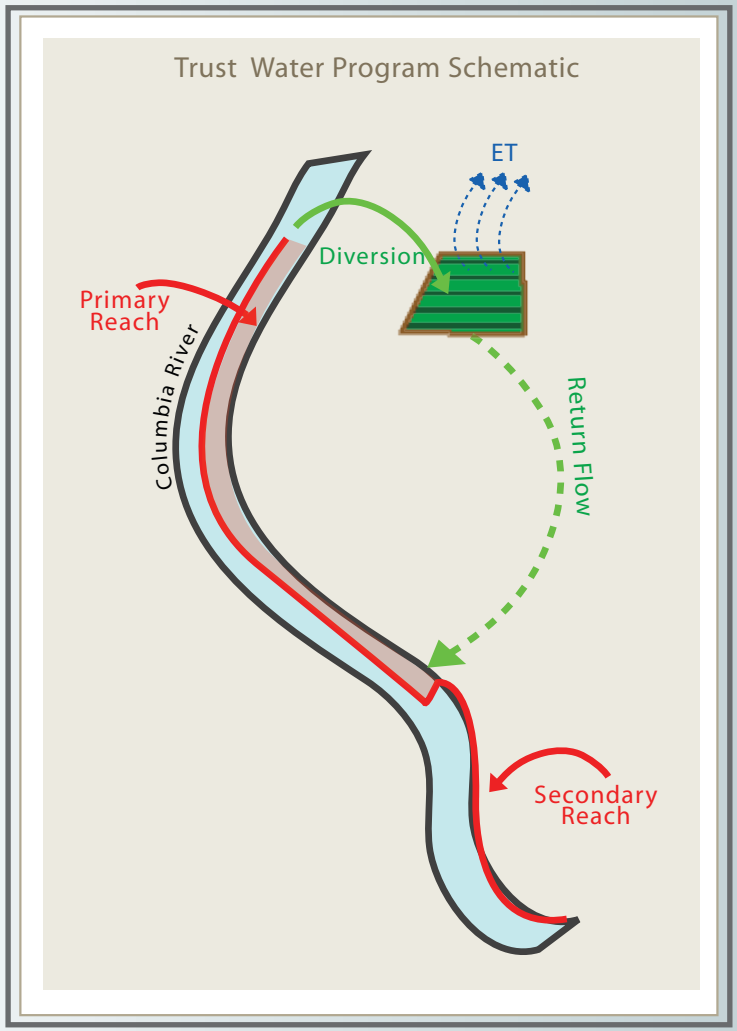
Type of Project	Number of Projects Listed		Projects with Water Savings (Projects with Cost Data)		Projects with Water Savings & Cost Data		Estimated Water Savings acre-feet/year		Estimated Cost		Estimated Cost per acre-foot	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Partial Season Acquisitions/Leases^	3	9	3 (3)	5 (3)	3	3	80,360	80,360	$6,700,000	$6,700,000	$83	$83
Fallowed Corners/Land Retirement	0	45	0 (0)	31 (31)	0	31	unknown	392	unknown	$392,100	unknown	$1,000
Crop Water Duty Reductions	0	15	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Land Conservation Programs	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Crop Change	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Total	3	69	3 (3)	36 (34)	3	34	80,360	80,752	$6,700,000	$7,092,100		

2007 numbers reflect 2006 data with added data from 2007.
^ Annual cost per-acre feet

[1] Reallocating water by diverting during times of surplus & releasing during times of scarcity.

All of the water savings shown in Table ES-5 can benefit instream uses and provide mitigation for new out-of-stream permits. However, the majority of the water savings identified in the table is only available on a temporary basis. Since the majority only provide instream benefit between the point of diversion and the point of return. Thus, most cannot be used to issue new permits. Ecology can use this water to hydrate interruptible water rights in the event of a Columbia River drought. Ecology could also issue permits for a specific "term" (e.g. five years) matched to its lease acquisitions. However, there are fewer permanent projects offering consumptive water savings. Additionally, the costs for both the permanent and lease acquisitions in Table ES-5 are estimations that may reflect more of a "floor" than a "ceiling" as water marketing is still emerging in the State.

While the projects in Table ES-4 are listed as primarily non-consumptive, there is a small portion of the water savings (on the order of five to ten percent, or perhaps about 50,000 to 100,000 acre-feet) that may include direct consumptive savings. For example, an on-farm efficiency project that replaces an overhead impact center-pivot system with a low-elevation drop-tube system could reduce spray evaporative loss and wind drift by approximately ten percent (Ecology, GUID 1210). Additionally, more water could be used for out-of-stream mitigation if, like storage, the savings are retimed from periods of low demand to high demand. However, because retiming of return flows tends to be project specific, it is difficult to estimate the volume. However, we could consider the magnitude of this retiming potential to be on the order of one-third of the total savings (e.g. approximately 300,000 ac-ft) if water is retimed from four months in winter to four months in summer.



With the exception of conserved water diverted to the Odessa, water from conservation savings must be managed in the State's trust water program. Ecology's goal is to manage water acquired in trust for both the instream and out-of-stream objectives of the legislation. As Ecology funds individual conservation projects, it will determine on a case-by-case basis what portion of the project will result in nonconsumptive water savings (protected in the river reach from the point of diversion to the point flow returned, called the primary reach) and what portion of the project will result in consumptive water savings (protected all the way to the Pacific Ocean, called the secondary reach). This process is used today in Ecology's water acquisition program, and with the Conservation Commission through the irrigation efficiencies program.

After reviewing the status of the current conservation inventory, it tends to reinforce Ecology's current investment in storage and the legislature's mandate to spend two-thirds of Columbia River funds on storage-related projects. Even within the conservation portion of the inventory, retiming of water supplies appears to have more promise than conservation based on reductions in consumptive use (ET). However, it is unclear how big a role the "unknown" out-of-stream projects in Table ES-5 may play in the future. Ecology plans to redouble its efforts on this issue in the coming year to bring additional clarity to this issue. Additionally, by next year Ecology will have evaluated the first round of competitive grant funding, which may help us understand how competition for the $200 million in funding will occur among different project types.

Water Supply and Demand Forecasting

A complementary reporting effort to the water supply inventory is Ecology's mandate to produce a water supply and demand forecast every five years. Ecology produced its first legislative report on November 15, 2006 outlining the existing physical, legal and management framework of the Columbia River. The report also describes demands that will need to be met with new water supplies in the next 20 years. Although an update to this report is not formally due until November 15, 2011, Ecology plans to provide annual updates on future demand in its legislative reports on water supply inventories. Ecology is undertaking the following on-going efforts to better understand water supply and demand in the Columbia River Basin:

Ecology, along with other state and federal agencies, will fund a study by the Climate Impacts Group[2] to provide greater accuracy in predicting climate change effects in the Columbia River Basin--with a particular focus on the Yakima, Walla Walla, Methow, and Okanogan watersheds.

Ecology will compile existing data on historic stream flows in order to address in-stream demands. At present, Ecology has obtained Columbia River flow information from Bonneville Power Administration dating from 1929 to present. Ecology will analyze the data to consider seasonal changes and drought occurrences as we work to understand how best to match available water supplies and projected demand. In the same manner, Ecology will assess tributary flow data.

In addition to changing supply, climate change has the potential to change existing crop demands. For example, in Eastern Washington (within the greater Columbia River Basin), US Geological Survey reports approximately 1.7 million acres of irrigated crops. If 20 years from now climate change has resulted in a need for an added inch of water per acre, due to hotter weather and decreasing summer rain, then 140,000 acre-feet more water will be needed to maintain current crop production. There is also 5.3 million acres of non-irrigated agriculture in the basin (e.g. dry-land wheat). Increasing temperatures and shifting of water availability due to climate change may result in some of these lands moving to irrigation to maintain yield and profitability, or a decrease in yield for those that cannot obtain irrigation water. This issue will be included in the next Ecology agricultural demand study.

Ecology plans to initiate a study to improve agricultural demand forecasting, which will improve work begun by Washington State University (WSU) in the 2006 report. In particular, this work will focus on emerging markets such as the fast-paced wine industry in Washington State and renewable fuel crops.

Salmonids in the Hanford reach suffer increased mortality from flow fluctuations caused by dam operations. As Ecology continues to evaluate storage supplies, we plan to consider how storage could be used with existing river operations to reduce these flow fluctuations.

One-third of all new storage is dedicated for instream uses. The 2004 Study by the National Academy of Sciences broadly characterized July and August as the period of greatest risk to fish. Desirable flows actually vary among different fish species and at different life stages--making river management much more complex. Ecology plans to work with WDFW and the Tribes to better understand instream demands and how best to use water supplies as they are developed.

Ecology has begun meeting with Columbia River dam operators to better understand how new storage will affect supply for power generation and demand for additional power generation. Diverting water to a reservoir in the winter can result in lost power production. However, the opportunity to produce power returns when that water is released from storage. There is also a need for more pump-storage in the Columbia River system to give dam operators greater ability to buffer changes in power supplies (e.g. wind power). Ecology plans to work with dam operators in the next year to better understand changing power demands on the Columbia River. For specific storage projects, benefits and impacts to power purveyors will be evaluated in the environmental review documents.

[2] The Climate Impacts Group is an interdisciplinary research group studying the impacts of natural climate variability and global climate change ("global warming") on the United States Pacific Northwest.

Ecology is studying how water marketing can be successful in meeting demand at the basin level (e.g. Yakima) and in the greater Columbia River Basin. In 2008, Ecology will begin to implement a Columbia River acquisition program based on this study.

In the coming years, Ecology plans to work with the Washington State Department of Health to better understand municipal demand and opportunities for municipal conservation.

Adopted watershed plans are the management framework for water resources in a particular WRIA. The Columbia River Program spans dozens of WRIA's in various stages of watershed planning. Ecology plans to continue to meet with watershed planning groups to better understand water supply and demand in each WRIA.

WDFW last updated priority stream reaches in 2003. Since that time, many conservation, habitat and fish barrier improvements have been made through investments by local, state and federal funding partners. Stream reaches also need to be made consistent with federal recovery plans, watershed plans and subbasin plans that have been completed since 2003, which used different methodologies in defining recovery metrics for endangered or threatened fish populations. Ecology is working with WDFW to provide a way to update this information for use in the Columbia River Grant Program, as well as other local, state and federal funding programs.

Ecology plans to work with the Washington State Department of Health to better understand municipal demand and opportunities for municipal conservation. This information will be included in next year's legislative report.

Implementation Issues

Just over a year has passed since RCW 90.90 became effective. In many ways, the Columbia River Basin Water Management Program is a new mandate for Ecology. During our history, we've moved from a water allocation agency (for the first 50 years, 1917 to 1967), to one with a more balanced regulatory role (the next 40 years, from 1967 to 2006). This mission is now augmented with a water supply development role in the Columbia River Basin. While this mandate is a culture change for Ecology, it also is a change for our external stakeholders.

As we've worked to implement this Program in the last year, we've identified several implementation issues that we're struggling to work through. It is too soon to know if these are trends or to propose remedies, but changes may be needed in the future to fully implement this new program.

- **Water for the Columbia River or Water for Tributaries?** Watershed planning units and other stakeholders have expressed concerns about how much Ecology should focus on the Columbia River versus the Columbia River basin, when considering which projects should be funded and which applicants should receive new water supplies. Ecology is working with local groups to try and find common ground on these issues. For example, where should staffing resources, capital expenditures and permitting capacity in the Columbia River Program give way to resources available in other water resources program areas? Ecology has agreed that the Program is basin-wide, but that those projects that benefit both tributaries and the Columbia River itself should be favored. As the Program evolves, Ecology plans to continue to evaluate these issues.

- **Allocating Water Savings.** Programs that try to change behavior work best when those whose behavior changes are rewarded. The "carrot" that Ecology has to encourage conservation and water supply development in the Columbia River Program is $200 million dollars in public funding. Ecology will use this money to develop supplies and use that water to mitigate permits for out-of-stream uses that have been waiting for up to 20 years. However, in the last year, we have heard repeatedly from applicants who want both the money to fund improvements and to benefit from the water savings from those improvements. Allocating water savings to someone other than the originator of the water savings, but who has been waiting longer (in some cases 20 years longer) may be a barrier to program participation. Other conservation incentive programs (e.g. YRBWEP, Irrigation Efficiencies) provide both funding and some allocation of water conservation savings to the proponent. The 2007 Grant Funding Program will be the first real opportunity to see how attractive the funding is to potential project proponents.

As Ecology works to implement the program, we will continue to apprise the Legislature of our progress and include recommendations on how best to meet the balanced objectives of the legislation - develop water supplies for instream and out-of-stream uses.

Columbia River Basin Water Management Program

In 2006, the Legislature passed Chapter 90.90 RCW, Columbia River Basin Water Supply. The Legislature recognized that a key priority of water resource management in the Columbia River Basin is the development of new water supplies. The goal of the act is to meet the economic and community development needs of people and the instream flow needs of fish.

Chapter 90.90 RCW establishes the basis for the Columbia River Basin Water Management Program (Program)[3] . The act directs the Department of Ecology (Ecology) to aggressively pursue development of water supplies to benefit both instream and out-of-stream uses.

The Program's water supply mandate is broad. The Legislature charges Ecology to consider new storage, modification of existing storage, conservation, acquisition, and any other actions designed to provide access to new water supplies.

The act also creates a Columbia River Basin Water Supply Development Account (Account). Funding for this Account can come from legislative appropriations, funds earned through implementing Program components, and other sources. The Legislature provided $200 million in general obligation bonds to fund water supply projects. Ecology's use of this funding requires that those water supplies that are developed be managed by the State in proportion to the Columbia River funding [4].

With the significant state investment in the Program comes routine reporting to the Legislature on the progress Ecology is making to meet the act's objectives. Chapter 90.90 RCW directs Ecology to publish a water supply inventory annually and a long-term water supply and demand forecast every five years.

This is the second annual Columbia River Water Supply Inventory Report. Ecology's goal in this report is to clarify the range of water supply options now available and identify which projects would make best use of the funding made available by the Legislature. As well as informing legislative decisions, Ecology intends this report to provide Program transparency to the public and to aid communication and coordination with other agencies and stakeholders.

[3] In view of the broad range of implementation activities required under the bill, Ecology considers the Columbia River Basin Water Management Program to be an appropriate title for the program. However, other parties may choose to use the title Columbia River Basin Water Supply Development Program title. Regardless of which title is used, ESSHB 2860, codified as Chapter 90.90 RCW, clearly establishes the principal objective of the program as being to aggressively pursue development of water supplies to benefit both instream and out-of-stream uses. The program being developed and implemented by Ecology is closely adhereing to this objective.

[4] RCW 90.90.010(4): "Net water savings achieved through conservation measures funded by the account shall be placed in trust in proportion to the state funding provided to implement a project" and RCW 90.90.020(1)(a): "Water supplies secured through the development of new storage facilities made possible with funding from the Columbia river basin water supply development account shall be allocated . . . Two-thirds . . . available for appropriation for out-of-stream uses and one-third . . . available to augment instream flows and shall be managed by the department of ecology."

2006 Legislative Report

On November 15, 2006, some four and one half months after the effective date of the Columbia River legislation, Ecology submitted its first report to the Legislature. At that time, the Program was still emerging. Ecology was preparing a Programmatic Environmental Impact Statement (PEIS), had just developed its external stakeholder Columbia River Policy Advisory Group (PAG) and was beginning to develop a formal competitive funding program for water supply projects. Ecology's first reporting efforts generated important initial information about the status of storage and conservation opportunities in the Columbia River Basin. The following summarizes Ecology's 2006 Water Supply Inventory.

Supply Inventory

The 2006 inventory was based on three main efforts. First, Ecology reviewed every published account of storage and conservation opportunities it could obtain, including watershed plans, irrigation district comprehensive plans, water system plans and water reuse plans. Second, Ecology contracted with the Conservation Commission and local conservation districts to provide data on non-published conservation opportunities through their own internal databases and farm surveys. Finally, Ecology used a series of workshops, web outreach and letters to stakeholders to solicit project recommendations. This effort yielded thousands of conservation and storage projects that could potential supply millions of acre-feet of water to the Columbia Basin, including:

Agricultural Conservation Projects	Large Storage	Small Storage
• 5,391 projects found	• 6 potential large storage facilities	• Numerous small surface projects
• 1,000,756 acre-feet of potential water savings	• Each potentially storing over 1 million acre-fee	• Most have less then 1,000 acre-feet of potential storage
• Average estimated cost $523 per acre-foot	• Cost of projects ranging from $971 to $4 billion	• Average estimated cost $790 per acre-foot

2007 Legislative Report

This report serves as the first update of the water supply inventory, an annual effort that will show Ecology's progress on developing new water supplies. It summarizes the projects that Ecology is funding to begin augmenting instream flows and supplying new out-of-stream uses. This report both builds on and refines the 2006 report. Close to 620 new projects have been added to the inventory, including information on location, projected water savings, and estimated cost. At the same time, Ecology has begun to screen the projects to understand how best to match water supply generated from the inventory to the types of water demands identified in the act. For example:

- Which projects provide short-term vs. long-term supplies? Short-term water supply projects can benefit the Program by providing water for drought protection, new short-term permits for out-of-stream use, and fish benefit.
- Which projects reduce the water lost to the system (consumptive savings)[5] and so add water to the river all the way to the ocean? These projects provide the greatest flexibility in meeting balanced program demands, including issuance of new permits and long-term fish benefit.
- Which projects reduce return flow (non-consumptive savings) [6] that benefit particular river reaches? These projects can provide significant fish benefit, especially in tributaries where bypass reaches create lower tributary flows. However, these projects have limited usefulness in allowing Ecology to issue new permits for out-of-stream uses.
- Which projects are most cost-effective and provide the greatest return on the publics investment in water supply development?

[5] "Consumed water" is what is lost to evaporation or plant use, or is contained in products or byproducts.

[6] Return flow reduction projects, such as lining or piping canal systems, reduce needed withdrawals but also the measure of water that flows back to the system through the ground. The benefit from these projects only occurs within the stream reach between the point of withdrawal and location of stream recharge from return flow. Where the use is seasonal and return flows are notably delayed, there may also be benefits from the timing of when the water is in the river.

Against these water supply constraints, Ecology must consider the diverse needs for water in the Columbia River Basin. For example, in addition to the mandate in Chapter 90.90 RCW to develop water supplies for instream flow needs, RCW 90.90.020 directs Ecology to focus its water supply efforts on the following out-of-stream needs:

- Alternatives to ground water for agricultural users in the Odessa subarea aquifer
- Sources of water supply for pending water right applications
- A new reliable supply of water for the holders of interruptible water rights on the Columbia River mainstem that are subject to instream flows[7] or other limits to protect stream flows
- New municipal, domestic, industrial, and irrigation water needs within the Columbia River Basin

Each of the water supply needs above can be met by different water supply sources. Some require permanent, perpetual supplies. Others can be met by short-term water supply projects. Some require consumptive use offsets to ensure no impact to the river and others can be met by funding projects that generate return flow savings in particular river reaches. Ecology's goal in this report is to clarify the portfolio of water supply options currently available and which projects can be funded to make greatest use of the funding made available by the Legislature.

This report is organized into five chapters. A description of the remaining chapters is provided below.

Chapter 2 details Ecology's comprehensive communication strategy for public outreach efforts to-date and efforts it will make in the next year. Importantly, this chapter will show how Ecology has developed an "early and often" approach to coordinate with stakeholders and the public to make this Program transparent.

Chapter 3 contains information on Ecology's new funding criteria and procedures that will ensure that Program funds are distributed to the most competitive projects. The first competitive funding window starts in September 2007 and is open to all of the 18 types of water supply projects identified in this report.

Chapter 4 describes the current inventory of water supply projects, updated from the 2006 Report. This chapter provides detailed descriptions of the types of water supply projects and their benefits in meeting specific instream and out-of-stream needs. Additionally, specific examples are provided within the chapter to detail projects and management strategies currently being considered for Program funding.

Chapter 5 provides a preview of Ecology's efforts to provide a comprehensive update to the 2006 long-term water supply and demand forecast, due by November 15, 2011.

[7] A water right "subject to instream flows" means that water use under the right must stop whenever stream flow falls below the level set in rule for that stream. "Instream flows" are water rights for the stream and are protected from impairment—by priority date—under Washington Water Law, just as water rights for out-of-stream uses are. Water rights with earlier priority dates are referred to as "senior," while rights with later priority dates are referred to as "junior."

Chapter 2: Stakeholder Outreach

The people of the Northwest have a tremendous investment in the Columbia River. In Washington State their interests are represented by state and federal agencies, local governments, tribal governments, irrigation districts, conservation districts, watershed planning units, public utility districts, special organizations, businesses, and the citizens themselves.

The Columbia River is also very important to our neighbors. It's an international river, running through both Canada and the United States. It's also a regional river. Its watersheds encompass seven U.S. states including Washington. The Columbia River is a vital economic and environmental resource for millions of people. As such, public outreach and communication is an important component of the Program's work.

Comprehensive Communication Strategy

In recognition of the need to seek input from a large and vested audience, Ecology has developed a comprehensive communication strategy designed to allow stakeholders multiple points of entry into the decision making processes associated with the Program. The key features of this plan include transparency, "early and often" communication with stakeholders and the general public, coordination with other agencies and organizations representing citizens' interests, and numerous opportunities for public input.

The following sections describe Ecology's public outreach efforts to-date and efforts it will make in the next year.

Columbia River Programmatic Environmental Impact Statement

One of the first significant efforts Ecology undertook to provide the public with input into the Program was its completion this year of a Programmatic Environmental Impact Statement (PEIS). The PEIS had three main goals:

1. To satisfy the requirements of the State Environmental Policy Act (SEPA) for implementing a new comprehensive river management program that includes permitting decisions, allocation of resources, and project funding. While the PEIS provided initial environmental review of the Program, Ecology recognizes that a number of the major elements proposed under the Program will trigger additional project-level environmental review under SEPA.

2. To provide an opportunity for the public to comment on 13 major policy alternatives that Ecology identified in the earliest stages of Program implementation.

3. To evaluate the potential impacts associated with three actions identified for early implementation before passage of the Columbia River Water Supply Act. These included new incremental storage releases at Lake Roosevelt, a supplemental feed route to supply Potholes Reservoir, and the proposed Columbia-Snake River Irrigators Association Voluntary Regional Agreement.

2006-07 Program workshops and open houses

From May 5, 2006 through June 5, 2006, Ecology conducted scoping for the Draft PEIS. During the scoping period, interested agencies, tribes, and the public were invited to provide comments regarding what issues they would like addressed in a PEIS for the Columbia River Basin Water Management Program. Comments were submitted by mail, email, online web forms, and again via testimony delivered at open houses held in Colville, Kennewick, Moses Lake, and Wenatchee.

On October 5, 2006, Ecology released the Draft PEIS for the Columbia River Basin Water Management Program for a 45-day public comment period. The comment period ended on November 20, 2006. Comments were submitted by mail, email, online web forms, and again via testimony delivered at open houses held in Colville, Kennewick, Moses Lake, and Wenatchee. Based upon comments received, Ecology released the Final PEIS for the Columbia River Water Management Program on February 15, 2007. Ecology's website contains the Draft and Final PEIS and all comments received.[8]

Policy Advisory Group

A key piece of Ecology's outreach strategy is to provide Columbia River stakeholders and the public with regular, structured access to a conversation with Program staff. The Columbia River Policy Advisory Group (PAG) is one of the mechanisms the Program employs to accomplish this. PAG members represent a combination of diverse Columbia River stakeholders. Ecology will rely on PAG members to help identify policy needs as the Program is implemented. The diversity within the PAG provides Ecology with a range of perspectives on policy choices and priorities. While membership in the PAG may change over time (or alternate PAG members used when scheduling conflicts arise), the current list consists of the following individuals, organizations and governments:

Brenda Bateman, Oregon Water Resources Department

Dale Bambrick, NOAA Fisheries - U.S. Dept of Commerce

Max Benitz, Benton County Commissioner

Gary Chandler, Association of Washington Business

Kathleen Collins, Water Policy Alliance

Jon Culp, WA State Conservation Commission

Dick Erickson, East Columbia Basin Irrigation District

Jim Fredricks, U.S. Army Corps of Engineers

Rick George, The Confederated Tribes of the Umatilla Indian Reservation

Bill Gray, Bureau of Reclamation

Tony Grover, NW Power & Conservation Council

Bob Hammond, City of Kennewick

Mike Leita, Yakima County Commissioner

Joe Lukas, Grant County PUD

Rob Masonis, American Rivers

Michael Mayer, WA Environmental Council

Don Odegard, Columbia-Snake Rivers Irrigation Association

Merrill Ott, Stevens County Commissioner

Gary Passmore, The Confederated Tribes of the Colville Reservation

Lisa Pelly, Washington Rivers Conservancy

Rudy Peone, Spokane Tribe

Phil Rigdon, Yakama Nation

Mike Schwisow, Columbia Basin Development League

Teresa Scott, WA State Department of Fish & Wildlife

Rich Stevens, Grant County Commissioner

John Stuhlmiller, WA State Farm Bureau

Rob Swedo, Bonneville Power Administration

While Ecology needed to limit PAG membership to a workable size, PAG meetings are open to the public. Members of the public are encouraged to share thoughts with the group and Ecology at these meetings.

[8] http://www.ecy.wa.gov/programs/wr/cwp/eis.html.

The PAG generally meets monthly and discusses a range of implementation issues. Meeting information, schedules, agendas, meeting notes, and the PAG charter are available on Ecology's website—as are materials provided for review by the PAG.

Ecology shared a draft of this report with PAG at their September 2007 meeting and major themes were discussed. Comments from the PAG and the public are incorporated into this final report.

Local Government

Local government has an important role in helping Ecology implement the Program. Ecology and Eastern Washington county commissioners developed the County Commissioners Policy Advisory Group (Commissioners PAG) to ensure that local considerations are taken into account during decision-making. Starting in May of 2006, Ecology began regular consultations with the Commissioners PAG to gather their input on Program implementation. The Commissioners PAG is designed so that Ecology can work with the commissioners and watershed planning groups together to develop and make water resource decisions.

Ecology has also discussed numerous water conservation and storage projects with members of local government who have a stake in how the Program will affect their constituency. Much of this report is about using existing sources of data to develop a robust water supply inventory for the Columbia and Snake River basins. Local government has already collected much of the information necessary to support the water supply inventory and demand forecast, including:

- Knowledge of specific conservation opportunities by county commissioners, conservation districts and irrigation districts
- Land use and parcel information
- Information on projected demand needs

Additionally, Columbia River Basin county commissioners received draft copies of this report and comments are incorporated into this final report.

Watershed Planning

The Legislature has made a significant investment both in watershed planning and in the Columbia River Basin Water Management Program. Adopted watershed plans represent the management framework for water resource decision making within watersheds. At the same time, the Legislature directed Ecology to do long-term water supply and demand forecasting for the Columbia River Basin. Ecology has been directed to harmonize these efforts as part of implementing the Program. To that end, Ecology:

- Consults with local watershed planning units to identify potential conservation and storage projects and to address other elements of the Program (including proposed Voluntary Regional Agreements).
- Engages the initiating governments for watershed planning through the PAG and through monthly county commissioner meetings.
- Uses adopted watershed plans as a key source of information for this legislative report.
- Conducts a training program for its watershed leads to convey information regarding the Columbia River Program to the lead agencies and planning units.

During the public comment period for the 2006 Columbia River Legislative Report, Ecology received comments from watershed planning units that a greater level of coordination between the Columbia River Program and watershed planning units was needed. Ecology made the following new efforts in 2007 to integrate the Program with existing planning efforts and recognizes that this will be an on-going part of Program development.

First, Ecology held a joint Columbia River / Watershed Planning conference on May 17 in Moses Lake to foster a dialogue on ways to better coordinate the Program with watershed planning. With nearly 100 people in attendance, there were ample discussions on a range of issues. Some highlighted discussion areas and Ecology's responses follow.

- How does Columbia River planning overlap with watershed planning? Ecology looks to adopted watershed plans as the foundation of its broader Columbia River planning requirements. With over 20 active planning efforts going on in the Columbia River Basin, Ecology seeks to both respect individual, diverse planning goals, and integrate commonalities among the plans for development of the inventory and the long-term water supply and demand forecast.
- Is the Columbia River competing with watershed planning for projects? Ecology is looking for partnership opportunities on funding projects. Most watershed plans recognize a need to augment instream flows. One "win-win" opportunity would be using Program funds for a portion of a storage or conservation project, leaving that water in the tributary to meet watershed planning goals for instream flows, and then issuing new permits from the Columbia River for out-of-stream uses.
- Is potential for out-of-stream benefit in tributary basins lost when Columbia River funding is used? Ecology is looking for opportunities to address concerns about keeping water in-WRIA. In some cases, these are addressed statutorily (e.g. RCW 90.90.010(2)(a), and potentially through VRAs in RCW 90.90.030). Ecology also plans to work with local government on this issue through the long-term water supply and demand forecasting, through specific environmental review in SEPA and through consultation in the Columbia River Grant Program.

Second, Ecology began several efforts to improve coordination with watershed planning groups, including the following:

- In August 2007, Ecology used Program funding to hire a Columbia River Watershed Lead Coordinator position. This position will be an integral part of Ecology's internal Columbia River Implementation Team and will help coordinate outreach efforts among the watershed leads and planning units.
- In early 2007, Ecology used Program funding to assist counties in their efforts to keep pace and provide input into the Program. The Washington State Association of Counties (WSAC) hired staff to coordinate county issues among eastern Washington county commissioners and watershed planning units.
- On June 8, Ecology sent letters to all 20 Eastern Washington planning units as a follow-up to our May 17 conference. Ecology offered to meet one-on-one with planning units to address specific issues of coordination. The letters also invited planning units to submit projects for inclusion in this report (in addition to projects proposed in adopted watershed plans). In response, 16 planning units requested one-on-one meetings, which were held in summer 2007. Comments during these meetings generally focused on how the Columbia River funds could be used to meet watershed-planning objectives, concerns over exporting water from local watersheds to Columbia River water rights, and future planning coordination. Several planning units submitted additional projects that have been included in this report.
- As a follow-up to the May 17 meeting, Ecology agreed to work with planning units to hold follow-up conferences on an annual or semi-annual basis. The purpose is to keep the lines of communication open and to address emerging issues.

State Government

Cooperation and coordination with other state agencies is critical to the Program's success. Representatives from the Washington Conservation Commission and the Washington Department of Fish and Wildlife sit on the Program's implementation team (which meets weekly) and on the PAG. Additional communication also occurs with agencies like the Washington departments of Health, Natural Resources, and Agriculture.

Ecology engaged a variety of state agencies to provide both data and feedback for this report:

- Ecology worked with the Washington Conservation Commission on a contract with local conservation districts to supply information on conservation and storage opportunities in the Columbia River Basin. The contract, totaling approximately $10,000, generated approximately 500 new projects for this year's inventory. Ecology partnered with the Conservation Commission and conservation districts with a separate $10,000 contract to provide technical assistance to applicants for the first year of the competitive Columbia River grant program. The Conservation Commission is also the chair of Ecology's Technical Advisory Group (TAG), which will help score and rank grant applications.

- Ecology met weekly with the Washington Department of Fish and Wildlife (WDFW) to discuss the goals for this report, and to report on the status of the Columbia River water supply. WDFW is an integral partner in the Program as a member of both the PAG and TAG, taking part in the development of the grant program, conducting major project reviews, and assisting in policy development. Ecology is using Columbia River funds for two WDFW positions (one full-time and one half-time), plus about 168 staff-months of seasonal staff, to support implementation of the Program.

Federal Government

Ecology recognizes the key role that the federal government plays in the management of the Columbia River and the demands on the river for both instream and out-of-stream uses. The following agencies are key stakeholders:

- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers
- Bonneville Power Administration and Northwest Power and Conservation Council
- U.S. Fish and Wildlife Service
- National Oceanic and Atmospheric Administration (NOAA)
- U.S. Environmental Protection Agency
- U.S. Department of Agriculture
- U.S. Bureau of Land Management

These agencies will have the greatest role to play when Ecology develops the 2011 Columbia River Water Supply and Demand Forecast Update. To develop the inventory of storage and conservation projects for this report the U.S. Bureau of Reclamation has had the most influence. The Bureau of Reclamation is a funding partner and study lead on the Yakima River Basin Storage Feasibility Study, the Potholes Reservoir Supplemental Feed Route Project and the Odessa Special Study Project. They also provide technical expertise on the Columbia River Mainstem Off-Channel Storage Study and Lake Roosevelt Drawdown Study. These projects make up the central part of the water supply inventory. Ecology meets monthly with the Bureau of Reclamation to discuss and coordinate these projects.

Other State Governments and Canada

The Columbia River drainage basin includes seven states (including parts of Montana, Idaho, Washington, Oregon, Wyoming, Utah, and Nevada) and British Columbia, Canada. Introducing the Program into the existing multi-jurisdictional framework of state and provincial governments is a critical piece in improving the overall Columbia River system. Ecology has existing partnerships and relationships with its sister states and continues to explore opportunities to connect with Canadian partners, including agreements on how the river is managed. Continuing interest has been expressed by these parties on further collaboration.

Ecology, local government, and Canadian officials are currently discussing a proposal to build a storage facility/dam at Shanker's Bend on the Similkameen River in Okanogan County.

Oregon was helpful in providing information on the status of its water needs in this and past reports. Ecology plans to work closely with Oregon Water Resources Department to understand how that demand may change in the future.

Idaho and Montana will also be important to future legislative reports because the Snake River drainage is the biggest tributary to the Columbia River.

Tribal Governments

Implementing a Program for the Columbia River would not be possible without our tribal partners. The following seven tribal governments were consulted during the preparation of this report.

- Confederated Tribes and Bands of the Yakama Nation
- Confederated Tribes of the Colville Reservation
- Confederated Tribes of the Umatilla Indian Reservation
- Confederated Tribes of Warm Springs
- Kalispel Tribe of Indians
- Nez Perce Tribe
- Spokane Tribe of Indians

Four of the tribes are also members of the PAG (Yakamas, Colvilles, Spokanes, and Umatillas). Ecology will promote tribal involvement and partnerships as implementation of the Program continues.

Examples of Outreach to Governmental Organizations and Non-Governmental Stakeholders

The list of stakeholders that are interested in the Program is long. Ecology's challenge is to be inclusive, and yet also be productive. The PAG will serve as a useful forum to allow stakeholders to take part in developing the Program. Additionally, Ecology has and will continue to reach out to involve stakeholders individually and by organization. Following are some examples of efforts conducted this year:

Derek Sandison, Ecology Regional Director and Gerry O'Keefe, Ecology's Columbia River Coordinator, met with Eastern Washington county commissioners on January 24, 2007.
Derek Sandison and Dan Haller, Columbia River Unit Supervisor, gave presentations on the Columbia River Programmatic Environmental Impact Statement (EIS) to the PAG on January 25, 2007 and March 1, 2007.
Dan Haller discussed the timeline for creating this report with the PAG on March 1, 2007.
Dan Haller and Dave Burdick, Water Resource Grant Coordinator, discussed the implementation of the Columbia River Grant Funding Program, and Derek Sandison addressed the preferred alternatives in the PEIS with PAG on April 8, 2007.
Gerry O'Keefe met with Okanogan County Commissioners, representatives from the Okanogan County Public Utilities District, and Canadian and First Nations interests about the proposed water storage projects on the Similkameen River on April 10, 2007.
Derek Sandison and Gerry O'Keefe met with Eastern Washington county commissioners to discuss the Program on April 11, 2007.
Derek Sandison delivered a presentation of the Program at the Upper Crab Creek Planning Unit meeting on April 17, 2007.
Keith Stoffel, Water Resources Section Manager of Ecology's Eastern Regional Office, presented the Program to the Lake Roosevelt Water Management Workshop on April 26, 2007.
Gerry O'Keefe discussed water resource projects with the Confederated Tribes of the Colville Reservation on May 4, 2007.
Ken Schuster, Ecology metering specialist and Meghan O'Brien, permitting specialist, answered questions about the Program's metering project at a water users workshop sponsored by Ecology and the Franklin and Walla Walla conservation districts, held May 5, 2007.
Program staff participated in a workshop with watershed planning units and county commissioners on May, 17, 2007.
Program staff met with a representative of the Center for Environmental Law and Policy to discuss the Program on May 18, 2007.
Dan Haller gave a presentation at the 16th Annual Conference on Washington Water Law on June 5, 2007.
Dan Haller delivered presentations on the Columbia River Drought Insurance Program and the grant funding process to the PAG on June 6, 2007.
Derek Sandison, Keith Stoffel and Tom Tebb, Water Resources Section Manager of Ecology's Central Regional Office, met with16 individual watershed planning units between June 24, 2007 and September 13, 2007 to discuss their concerns, coordinate the Program's efforts with theirs, and to solicit data for this report.
Derek Sandison held public informational meetings on the Columbia River Mainstem Storage Appraisal Study in Othello and Davenport on July 31 and August 1, 2007.
Derek Sandison discussed the Program with the Joint Committee on River Governments in Boise, Idaho on August 21, 2007.
Program staffer, Al Josephy, held grant application training in Coulee Dam and Moses Lake on September 10, 2007.
Dan Haller gave a presentation to the Washington State Bar Association's Annual Conference on Washington Water Law on September 25, 2007.
The Program staffed an informational booth at The Columbia Basin Development League's Conference and Annual Meeting in Moses Lake on October 30, 2007
The Program staffed an informational booth at the Water in the Pacific Northwest Conference in Stevenson on November 7 through 9, 2007
Derek Sandison gave a presentation at the Lake Roosevelt Forum in Spokane on November 14, 2007.
The Program staffed an informational booth at the Lake Roosevelt Forum in Spokane on November 14 and 15, 2007.

Public Outreach – Products and Information

Ecology has been very active in engaging stakeholders at meetings, workshops, and conferences. We have also developed products and information this year to showcase the Program to the general public.

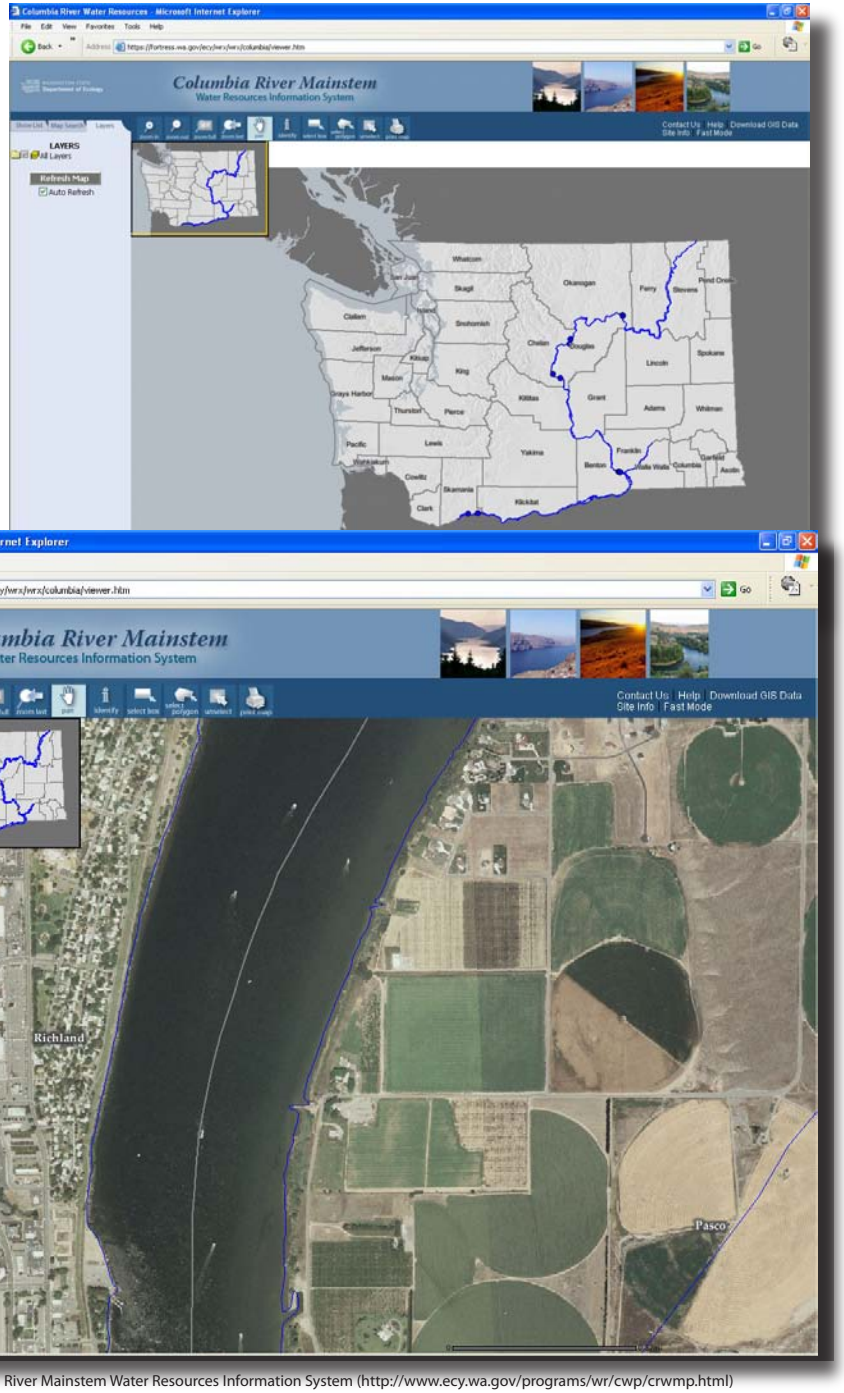
Under RCW 90.90.050, Ecology is required to "establish and maintain a Columbia River mainstem water resources information system that provides the information necessary for effective mainstem water resource planning and management." Because there are so many diverse stakeholders with an interest in the Columbia River, Ecology decided to implement this mandate in three phases: Phase 1 in 2007, Phase 2 in 2008, and Phase 3 in 2009.

In August 2007, Ecology completed the first phase of the Columbia River Mainstem Water Resources Information System and placed it on the Program's website. This database contains:

- The locations of water rights within one-mile of the Columbia River
- Detailed information on those water rights
- Images of the water right files
- Aerial photographs
- Stream flow data and more.

Later phases will include metering information, searchable reports on Columbia River trust water holdings, and information on new permits issued. Our goal is to provide the public with as much information as possible to help them better understand how Ecology does its work and how best to co-manage the river with a multitude of federal, state, and local partners.

This year we began a comprehensive overhaul of the Program's website and made changes to make it more user-friendly. These include "At-A-Glance" summaries of major projects, additional information on project history, informational videos and tutorials, and other multi-media ways for the public to learn about the Program.



Screenshots of Columbia River Mainstem Water Resources Information System (http://www.ecy.wa.gov/programs/wr/cwp/crwmp.html)

Ecology also greatly expanded its catalog of focus sheets about the Program. The Columbia River Program is so broad and far-reaching, that the public and stakeholders has repeatedly told Ecology that it is hard to keep track of it all. Each of the major projects (like Mainstem storage, Yakima storage, new incremental storage releases at Lake Roosevelt, Potholes Alternative Feed Route, and more) has generated a lot of interest. By creating updated, readily available information and timelines on project reviews, we are working hard to maintain our goal of access to the Program.

Columbia River Open Houses

On October 17 and 18, 2007, Ecology held the Columbia River Basin Water Resources Open Houses in Okanogan and Kennewick. The purpose for the open houses was two-fold. First, it provided Ecology with a venue for reporting Program progress, plans, and the challenges faced in developing new water for instream and out-of-stream uses. Second, it served as a forum to facilitate dialog between Ecology, other government agencies, stakeholder groups, and the public at large.

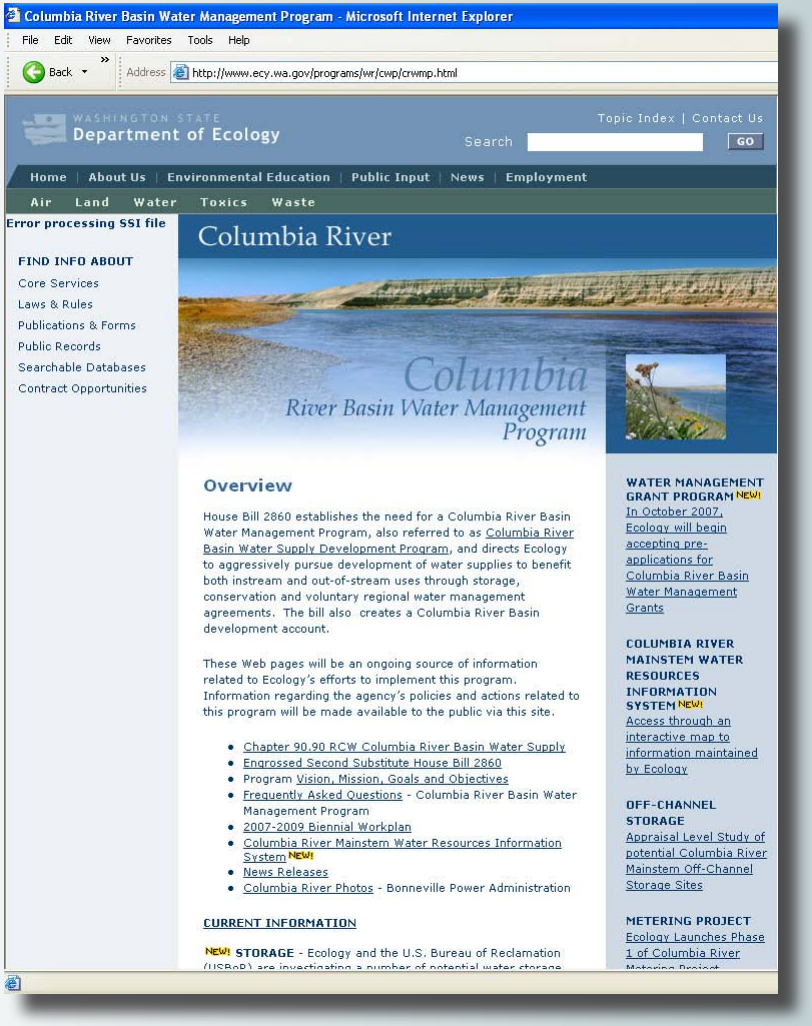
The 2007 Open Houses showcased several significant projects and planning efforts, including:

- Launching the first competitive Columbia River grant program.
- Reviewing a draft of this report with the public, and seeking their comment on the inventory and steps Ecology is taking to refine the water supply and demand forecast due in 2011.
- Describing Ecology's investment in evaluating climate change in the Columbia River Basin.
- Providing presentations by Ecology on major Program elements, such as Mainstem Storage, the Potholes Alternative Feed Route, metering, and water right permitting.

Public Outreach through the Media

Information about Program decisions and activities was provided to the public via the following press releases:

- **February 15, 2007** - Water Program Offers Balance to Meet Environmental, Economic Needs
- **March 13, 2007** - Ecology's Water Resources Program Releases Several Reports
- **April 23, 2007** - Metering Grants Available for Columbia River Water Users
- **June 8, 2007** - Study Suggests Grant County as Possible Site for New Water Storage
- **August 30, 2007** - Columbia River Water Measuring Program a Success
- **September 10, 2007** - Program Earmarks Funds for Columbia River Projects
- **September 28, 2007** - Open Houses Provide Updates on Columbia River Water Program
- **December 17, 2007** - Agreements Deliver Water for Farms, Cities and Salmon in Eastern Washington



Screenshot of Columbia River Basin Water Management Program's Website

Chapter 3: Funding of Projects

Table 3-1: Currently Funded Projects

COLUMBIA RIVER CAPITAL

Available Columbia River funding includes $200 million in bond authorizations under ESSHB 2860 and $16 million from the State Building Construction Account authorized under the previous Columbia River Initiative.

Budget			**$ **60,500,000**
	Signed Agreements	**Funds Obligated**	**Total**
Modification of Existing Storage	**$ 3,776,302**		**$ 3,776,302**
Lake Roosevelt Drawdown	$ *1,628,696	$ -	$ 1,628,696
Supplemental Potholes Feed Route	$ 2,147,606		$ 2,147,606
Odessa	**$ 4,181,205**		**$ 4,181,205**
Odessa Sub-area Special Study	$ 4,181,205		$ 4,181,205
New Storage	**$ 4,112,139**	**$ 1,400,000**	**$ 5,512,139**
Mainstem Storage Alternatives	$ 4,112,139		$ 4,112,139
Similkameen Storage Options		$ 150,000	$ 150,000
City of Kennewick ASR		$ 1,000,000	$ 1,000,000
ASR Feasibility		$ 250,000	$ 250,000
Pump Exchanges	**$ 1,750,000**		**$ 1,750,000**
Walla Walla Pump Exchange	$ 400,000		$ 400,000
Yakima Pump Exchange Alternatives	$ 1,350,000		$ 1,350,000
Acquistion and Conservation	**$ -**	**$ 1,030,000**	**$ 1,030,000**
Water Acquisition		$ 1,000,000	$ 1,000,000
Conservation in Columbia Basin Project		$ 30,000	$ 30,000
Columbia River Webmap	**$ 298,725**	**$ 701,275**	**$ 1,000,000**
Metering	$ 298,725	$ 701,275	$ 1,000,000
Other Feasibility Studies and Reports	**$ 1,039,733**	**$ 1,430,000**	**$ 1,039,733**
Programmatic EIS	$ 610,922		$ 610,922
Water Inventory Demand Forecast	$ 50,000		$ 50,000
Climate Change	$ 378,811		$ 378,811
Contract/Project Administration	**$ 137,425**	**$ 250,000**	**$ 387,425**
Conservation Commission Assistance	$ 105,425		$ 105,425
Contract Staff	$ 32,000	$ 250,000	$ 282,000
Total Agreements	**$ 15,295,529**	**$ 4,811,275**	**$ 18,676,804**
Budget Remaining			**$ 41,823,196**

* This number includes the assessment of impacts of the Lake Roosevelt Drawdown: $1,222,991 to the Confederated Tribes of the Colville Reservation to assess the tribal cultural, tribal fisheries, and tribal economic impacts; and $405,705 to Washington Department of Fish and Wildlife assess the impacts Lake Roosevelt Kokanee and White Sturgeon populations. These assessment are a necessary component of the Environmental Impact Statement for the Lake Roosevelt Drawdown and is the assessment used to determine the total agreed to in the Colville Agreement.

** The $60,500,000 Budget is the amount of the $216,000,000 available that has been appropriated by the legislature. $44,500,000 of Columbia River Basin Water Supply Development Account (Section 3024 of the Capital Budget Project 06-2-950) and, $16,000,000 of State Building Construction Account (Section 3025 of the Capital Budget Project 06-2-010).

To date, Ecology has not awarded Program funding for construction of conservation or storage projects, although many projects are being evaluated at different levels of study (e.g. pre-appraisal, appraisal, feasibility). Many of these projects pre-date the passage of the Columbia River Water Supply Act, including studies on Yakima Basin Storage, Columbia River Mainstem Storage, and feasibility of new incremental storage releases at Lake Roosevelt. Table 3-1 contains a summary of these projects and a description of their status. Other on-going investments are provided in the following sections.

Since the passage of the Columbia River Water Supply Act, most of Ecology's funding efforts have been focused on projects that pre-date the passage of the legislation. These include projects from the 2004 Memorandum of Understanding (MOU) among the State of Washington, the Bureau of Reclamation and the Columbia Basin Irrigation (the South Columbia Basin Irrigation District, the East Columbia Basin Irrigation District and the Quincy-Columbia Basin Irrigation District). The MOU describes roles and expectations of those parties in the then-anticipated Columbia River Initiative. Under provisions of the MOU, Ecology and the Bureau are cooperating on a number of studies, including the potential for:

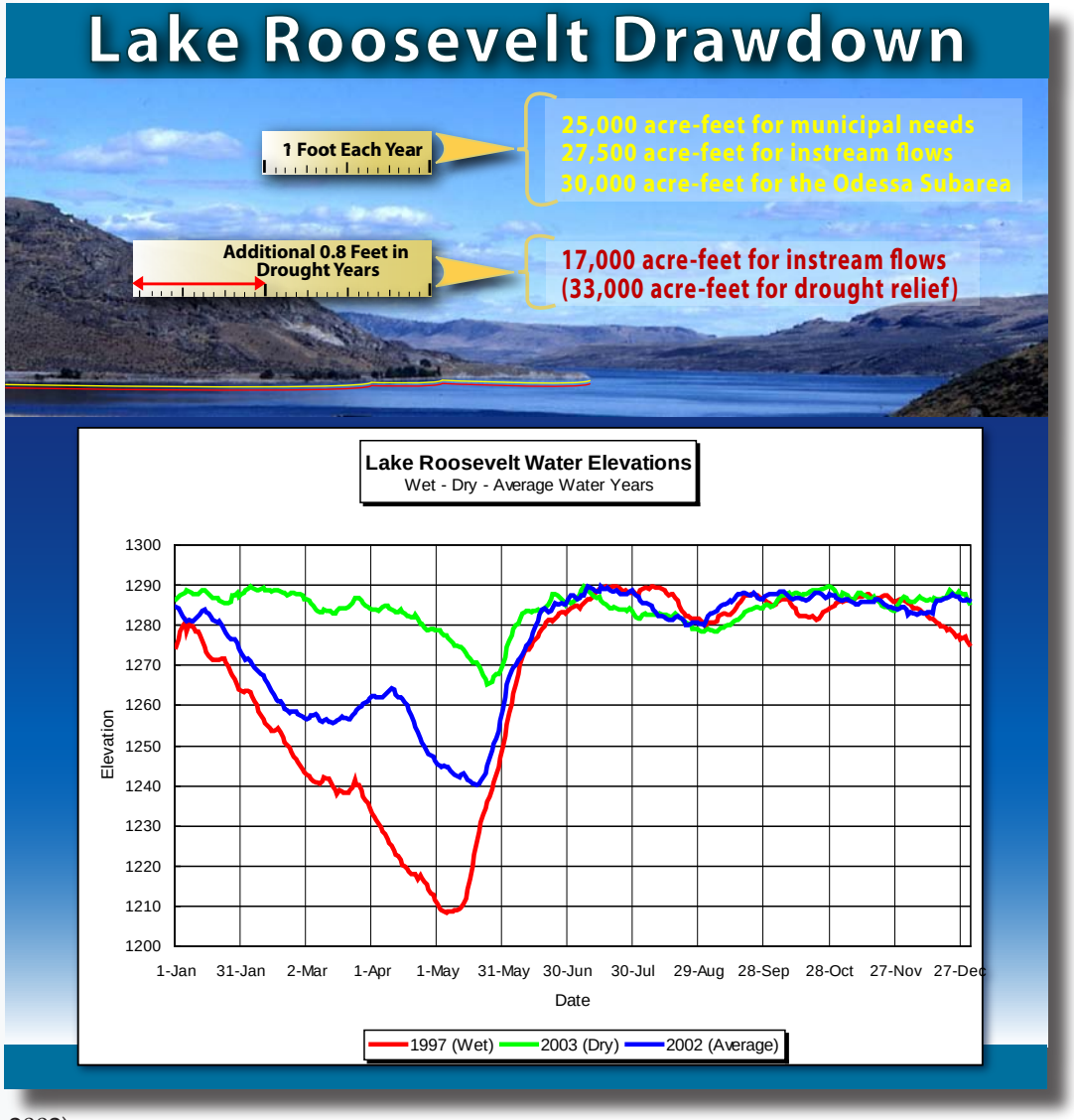
- New incremental release of water from Lake Roosevelt for out-of-stream uses by Odessa irrigators, pending municipal and industrial applicants, interruptible water users on the Columbia River and instream uses for fish.
- Opportunities for development of an alternative feed route to Potholes reservoir.
- Development of new large, off-channel storage sites in the Columbia River basin.

Also predating the legislation are studies begun in 2003 to examine the feasibility and acceptability of storage augmentation in the Yakima River Basin and consideration of pump exchange opportunities on the Walla Walla and Yakima Rivers. Some new projects have emerged since the legislation, including a pilot study with the City of Kennewick on aquifer storage and recovery, evaluation of surface storage on the Similkameen River, and how coordinated conservation by Columbia Basin Irrigation Districts can meet the goals of the Columbia River Program. A summary of on-going capital funding investments is provided in Table 3-1.

To date, Ecology has not awarded Program funding for construction of conservation or storage projects. Ecology expects that to change in 2008 when we will propose specific construction projects for funding to the Legislature originating from the Columbia River Grant Program. These projects will be vetted through a public process, including input from a technical advisory group, watershed planning units and the Policy Advisory Group (PAG). In late 2008 and into 2009, Ecology anticipates actual delivery of water instream and issuance of new permits for the first time on the Columbia River in nearly two decades. A summary of the projects currently being funded and projects being considered for funding next year through the Grant Program are discussed in this chapter.

New Incremental Storage Releases at Lake Roosevelt

The 2004 MOU specifically contemplates new incremental storage releases at Lake Roosevelt. In 2005, Ecology entered into a Government-to-Government Agreement in Principle (AIP) with the Confederated Tribes of the Colville Reservation to describe conditions that must be evaluated for their support of the proposed incremental storage releases. On December 17, 2007, Governor Chris Gregoire signed an agreement with Confederated Tribes of the Colville Indian Reservation to deliver water from Lake Roosevelt to the Columbia Basin for farmers, cities and endangered salmon.



Funding for this project has continued under the Columbia River Basin Water Management Program. New incremental storage releases at Lake Roosevelt was identified as an Early Action Item in the 2007 Programmatic EIS. Initial environmental review was conducted under that document, and is being supplemented in late 2007 and 2008. Ecology funded $271,079 to partner with Washington Department of Fish and Wildlife to study impacts of the proposed new incremental storage releases on Kokanee and white sturgeon. Ecology is currently in negotiations with the Colville Tribes to evaluate cultural and environmental impacts of the new incremental storage releases. This information is being merged into a supplemental EIS, which began scoping in September 2007.

Lake Roosevelt is impounded behind Grand Coulee Dam and has an active capacity of 6.4 million acre-feet during normal reservoir operations. New incremental storage releases at Lake Roosevelt will involve changing current reservoir operations to provide for additional incremental releases. Both annual withdrawals and additional drought-year withdrawals are proposed. A drought year is defined by Ecology in rule as any year when the March 1 National Weather Service forecast for April through September runoff at The Dalles Dam is less than 60 million acre-feet (WAC 173-563-056). For drought-year conditions to apply, Ecology must also make a formal request in accordance with the Reclamation States Drought Relief Act of 1991 (P.L. 102-250). By this definition, a drought year occurs on average once every 26 years (Slattery, 2002).

In a non-drought year, water would be released from the reservoir resulting in a drawdown of one foot by the end of the irrigation season. Under current operations, Lake Roosevelt is drawndown in early spring approximately 40 feet in an average year and as much as 80 feet in a high flow year to provide flood control storage. The reservoir fills to a normal operating level by July.

During non-drought years, the Bureau would divert or release an additional 82,500 acre-feet from Lake Roosevelt to provide the following:

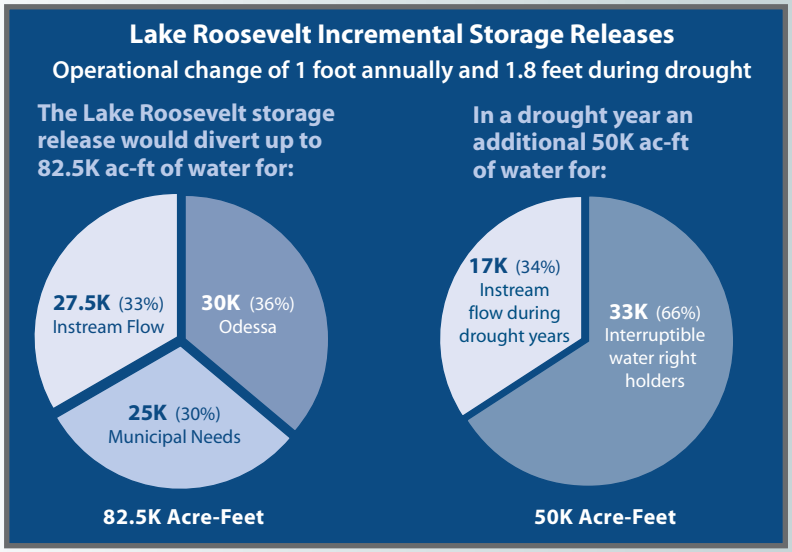
- 25,000 acre-feet of municipal/industrial supply
- 30,000 acre-feet of irrigation water for replacement of ground water supplies in the Odessa Subarea
- 27,500 acre-feet for stream flow enhancement downstream of Grand Coulee Dam

During drought years (driest 4% of water years) an additional 50,000 acre-feet would result in approximately 0.8 feet of new incremental releases (about 10 inches), distributed as follows:

- 33,000 acre-feet for Columbia River mainstem interruptible water right holders
- 17,000 acre-feet for streamflow enhancement downstream of Grand Coulee Dam

When implemented, the new incremental releases would result in a net increase to stream flows from McNary Dam during the summer (July-August) flow augmentation period of roughly 225 cfs average (corresponding to the 27,500 acre-feet listed above) in non-drought years. In drought years, flows would increase roughly 360 cfs average (44,500 acre-feet, which represents the sum of the 27,500 acre-feet and 17,000 acre-feet listed above). However, the instream component of the new incremental releases could also be used at any time from April through August. This would provide flexibility to ensure that water is released so as to meet the needs of ESA-listed species.

The environmental review for the new incremental storage releases at Lake Roosevelt is expected to be completed in February 2008. At that time, the Bureau plans to apply for secondary use permits for the quantities in the new incremental releases under its 1938 reserve of surface water for the Columbia Basin Project.



Supplemental Potholes Feed Route

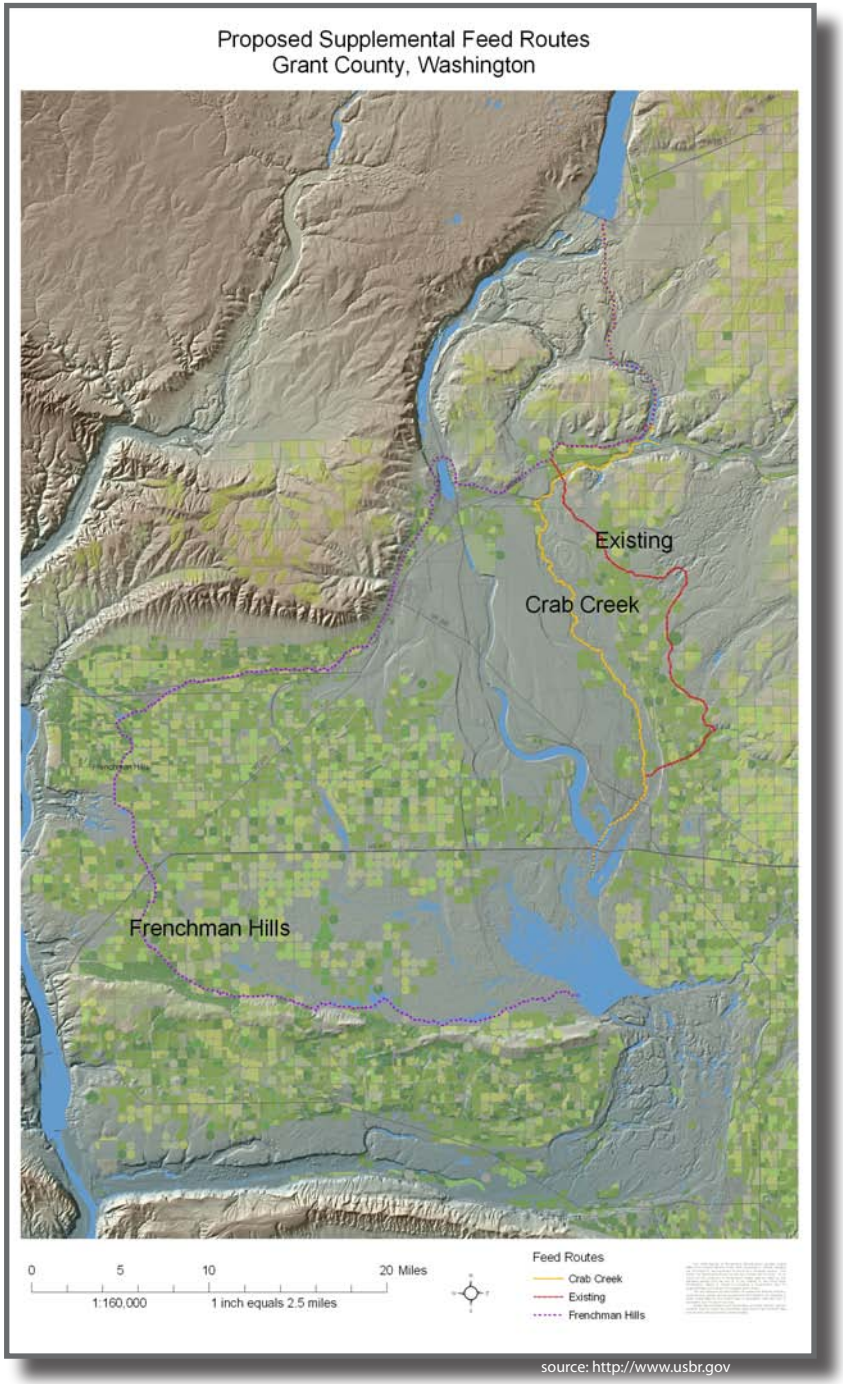
In the late 1970s, the Bureau determined that a feed route to Potholes Reservoir was necessary to ensure a reliable water supply for the South Columbia Basin Irrigation District. The Columbia Basin Project (CBP) was designed to capture return flows from irrigation on the northern half of the project for use in the southern half of the project. However, irrigation in the north half does not yet provide enough return flow to fully supply the south half.

To correct this problem, a feed route was developed to move water from Banks Lake to Potholes Reservoir. The feed route transports water through the Main Canal to the bifurcation (the point at which the West and East Low Canals split), then south through the East Low Canal (ELC) to Rocky Coulee Wasteway where the feed is discharged into Upper Crab Creek near the north end of Moses Lake. From this point, the water moves through Moses Lake and into Potholes Reservoir at the Moses Lake outlet structure. Feeding can be done early and late in the irrigation season when demand for irrigation water is low and the ELC is operating at less than full capacity. At these times, the "unused" capacity is used to carry feed water to Potholes Reservoir.

Aerial view of Potholes Reservoir

This feed route solved the immediate problem in 1980 and is still used today. However, the ability of this route to meet needs has lessened over time. Improvements in irrigation efficiency in the northern half of the project have led to even lower return flows and an increased need for feed to supply the southern half. Demand has also changed. Block 26 (a Columbia Basin Farm Unit) was added to the Potholes system in 1984 and the East Columbia Basin Irrigation District (ECBID) Supplement No. 1 to the Master Water Service Contract allowed for additional use out of the ELC. As a result, the demand on Potholes is greater, and the amount of "unused" capacity in the ELC has declined. These factors and a need for system reliability have led to the need for a supplemental feed route (USBR, 2007 E.A.).

Since 2005, Ecology has partnered with the Bureau and invested $2.1 million to study the need for a supplemental feed route. In August 2007, the Bureau issued a final Environmental Assessment (EA) and Finding of No Significant Impact for the Potholes Reservoir Supplemental Feed Route.



source: http://www.usbr.gov

Alternatives Considered

The draft EA evaluated four alternatives for conveying the waters: "No Action," Crab Creek Perennial (year-round use), Crab Creek Ephemeral (intermittent use), and Frenchmen Hills. During the comment period the WDFW requested that, for purposes of fish and wildlife management, a Crab Creek option be developed that, while primarily used year round, included the option of occasionally providing only spring flows. Operating the Crab Creek feed route intermittently would be done to limit the spread of invasive species.

To accommodate this request, Crab Creek alternatives were combined using the flow targets from the Crab Creek Perennial alternative: 500 cfs in the spring and 100 cfs for the remainder of the year in those years when flows are year round. Under this new alternative, less water can be fed down Crab Creek in the years when it would be operated only in the spring compared to the EA's Crab Creek Ephemeral alternative that had a spring flow target of 650 cfs.

To accommodate this shortfall in years when the Crab Creek route would be operated in the spring only, the Frenchmen Hills route was added to the combined Crab Creek alternative. With the Frenchmen Hills route included, the new alternative could feed almost 80,000 ac-ft in years when Crab Creek is used only seasonally. Therefore, two alternatives, the No Action alternative and the combined Crab Creek and Frenchman Hills Wasteway alternative, were considered and evaluated in the final EA.

Crab Creek

The Bureau identified Crab Creek and Frenchman Hills Wasteway as the preferred alternative. This alternative would release feed water from Billy Clapp Reservoir through the four-by-four-foot outlet into Brook Lake, a natural water body within the Crab Creek channel. Crab Creek would then convey the water into Moses Lake and Potholes Reservoir. Water would also be released from Billy Clapp Reservoir via the Main Canal and West Canal, into the Frenchman Hills Wasteway, and then into Potholes Reservoir (Bureau, 2007 EA). Implementation of this preferred alternative is expected to occur in 2008.

Odessa Subarea Special Study

Reclamation is investigating continued phased development of the Columbia Basin Project. The investigation, known as the Odessa Subarea Special Study, focuses on project development for the purpose of replacing groundwater currently used for irrigation in the Odessa Ground Water Management Subarea with surface water. The five year study began in 2006, and will conclude with a planning report and the appropriate National Environmental Policy Act (NEPA) documents. While this is not a storage study, alternatives include provisions for storage.

In the study, the Bureau identifies a number of water supply options being considered include the following five options:

- Black Rock Coulee Re-regulation Reservoir has a capacity of approximately 28,599 acre-feet.
- Dry Coulee has a capacity of approximately 481,000 acre-feet
- Lind Coulee has a capacity of approximately 75,907 acre-feet
- Rocky Coulee has a capacity of approximately 126,000 acre-feet
- Lower Crab Creek has a capacity of approximately 313,166 acre-feet

Since this study began, the Bureau has eliminated the Lind Coulee option. In addition, two reservoir scenarios are being considered in regard to the Lower Crab Creek option:

- Reservoir 1 has a capacity of approximately 200,000 acre-feet.
- Reservoir 2 has a capacity of approximately 472,000 acre-feet.

Reclamation is also considering reoperation of Banks Lake for ground water replacement in the Odessa Subarea (50,000 - 125,000 acre-feet).

Dry Falls Dam on Banks Lake (source: USBR website)

Reoperation of Banks Lake (Drawdown and Raise)

Since its construction in the early 1950s, Banks Lake has been operated and maintained for the storage and delivery of irrigation water drawn from the Columbia River to CBP lands. As constructed, the maximum active storage capacity of Banks Lake is 715,000 acre-feet. Although Banks Lake was originally designed to operate at great pool heights and drawdown levels, considerations for fish, wildlife, and recreation restrict reservoir operations. Currently, the Bureau operates the lake between 1537 feet and 1570 feet of elevation to meet contractual obligations, ensure public safety, and to protect property (Blanchard, 2007).

Changes in the operations at Banks Lake are among the options considered for supplying the Odessa Subarea in the Bureau's 2006 Odessa SubArea Special Study. This study is part of the Bureau's continuing investigation of phased development of the Columbia Basin Project (CBP or Project). This study focuses on development of surface water supplies as a replacement for ground water currently used for irrigation in the Odessa Ground Water Management Subarea. The Bureau projects that the study will take five years, beginning in 2006, and will conclude with a planning report and the appropriate NEPA documents.

The goal is to replace existing ground water uses with surface water from the Columbia River that can be diverted during times of the year that would not impair the Columbia River target flows established by the NOAA Fisheries for the protection of ESA-listed salmon and steelhead (USBR, 2006).

Drawdown of Banks Lake

The Banks Lake drawdown options attempt to use Banks Lake storage during the months that further diversions at Grand Coulee Dam are not available April through August, with refill in September and October.

Modeling of CBP operations estimates an April through August drawdown to elevation 1,563 feet can supply 39,000 acres of existing ground water irrigation in the Study area (Reclamation, 2006a). A drawdown to elevation 1,559 feet can supply an estimated 73,000 acres. It would take a drawdown to elevation 1553 feet to supply the entire 121,000 acres of Study area groundwater irrigation. These simulations include the five-foot drawdown that currently occurs in August. Full pool for Banks Lake is elevation 1,570 feet. In all scenarios, refill to 1,570 feet occurs during September and October, assuming normal pumping capacity is available at Grand Coulee Dam.

The Bureau's Banks Lake Drawdown Final Environmental Impact Statement (FEIS) (2004a) evaluated the effects of drawing Banks Lake down an additional five feet to elevation 1,560 (for a total of ten feet below full pool) in August to enhance the probability of meeting Columbia River target flows for ESA-listed salmonid stocks. Based on the analyses contained in the FEIS, a drawdown to elevation 1,563 feet may be achievable with minimal adverse impacts to the existing multiple benefits of Banks Lake, or have impacts that are reasonable to mitigate (USBR, 2006). The range of drawdowns being considered is 50-125K acre-feet.

Banks Lake

Raising Banks Lake

Filling Banks Lake to above elevation 1,570 feet (the current full pool) could provide added water supply while meeting Columbia River target flows, especially if done in conjunction with Banks Lake drawdown or other water supply options. Each additional foot of elevation equals about 25,000 acre-feet of added storage, enough to supply about 8,000 acres. The Bureau is currently considering up to a two-foot raise, or 50,000 acre-feet. Available technical information indicates that Dry Falls Dam and North Dam each have approximately ten feet of potentially useable freeboard above elevation 1,570 feet. Operating the reservoir within this potentially useable freeboard will require a dam safety review by the Bureau. Impacts to highways, parks, other shoreline features, other infrastructure, the riparian environment, and the communities of Coulee City and Electric City will also need detailed review. The Bureau's Technical Team assumed a raise of two feet to a new operational level of elevation 1,572 feet (USBR, 2006).

Ecology has pledged $1.5 million to continue to support the Bureau's efforts to develop additional water supplies for the Odessa Subarea. Further environmental and cultural reviews are planned on the effects of modifying operations at Banks Lake.

Black Rock Coulee Dam and Re-regulation Reservoir Site

The Black Rock Coulee site is located approximately 17 miles northeast of Moses Lake. The dam and reservoir would be located in Grant County. Water would be diverted from the Columbia River at Grand Coulee through the Main Canal to a proposed EHC to fill the reservoir. Water would then be released back to Black Rock Coulee into Upper Crab Creek through Moses Lake to Potholes Reservoir. Preliminary evaluation indicates Black Rock Coulee has insufficient volume to be practical as a storage reservoir but could be useful as a reregulation reservoir for infrastructure alternatives that include the EHC.

Lower Crab Creek Dam and Reservoir Site

The Crab Creek site is located east of the Columbia River, approximately four miles south of Wanapum Dam. The dam and reservoir would be located in southwest Grant County. Water would be diverted from the Columbia River at Grand Coulee through the Main Canal to the East Low to Rocky Coulee Wasteway to Potholes Reservoir and into Lower Crab Creek to fill this reservoir. Water would then be released back to the Columbia River to offset diversion from Grand Coulee used to serve new acreage in the Study area.

Dry Coulee Dams and Reservoir Site

The Dry Coulee site is located approximately ten miles south of Coulee City. Two dams and reservoir would be located in Grant County. Water would be diverted from the Columbia River at Grand Coulee through the Main Canal to fill this reservoir. Water would then be released back to the West Canal.

Rocky Coulee Dam and Reservoir Site

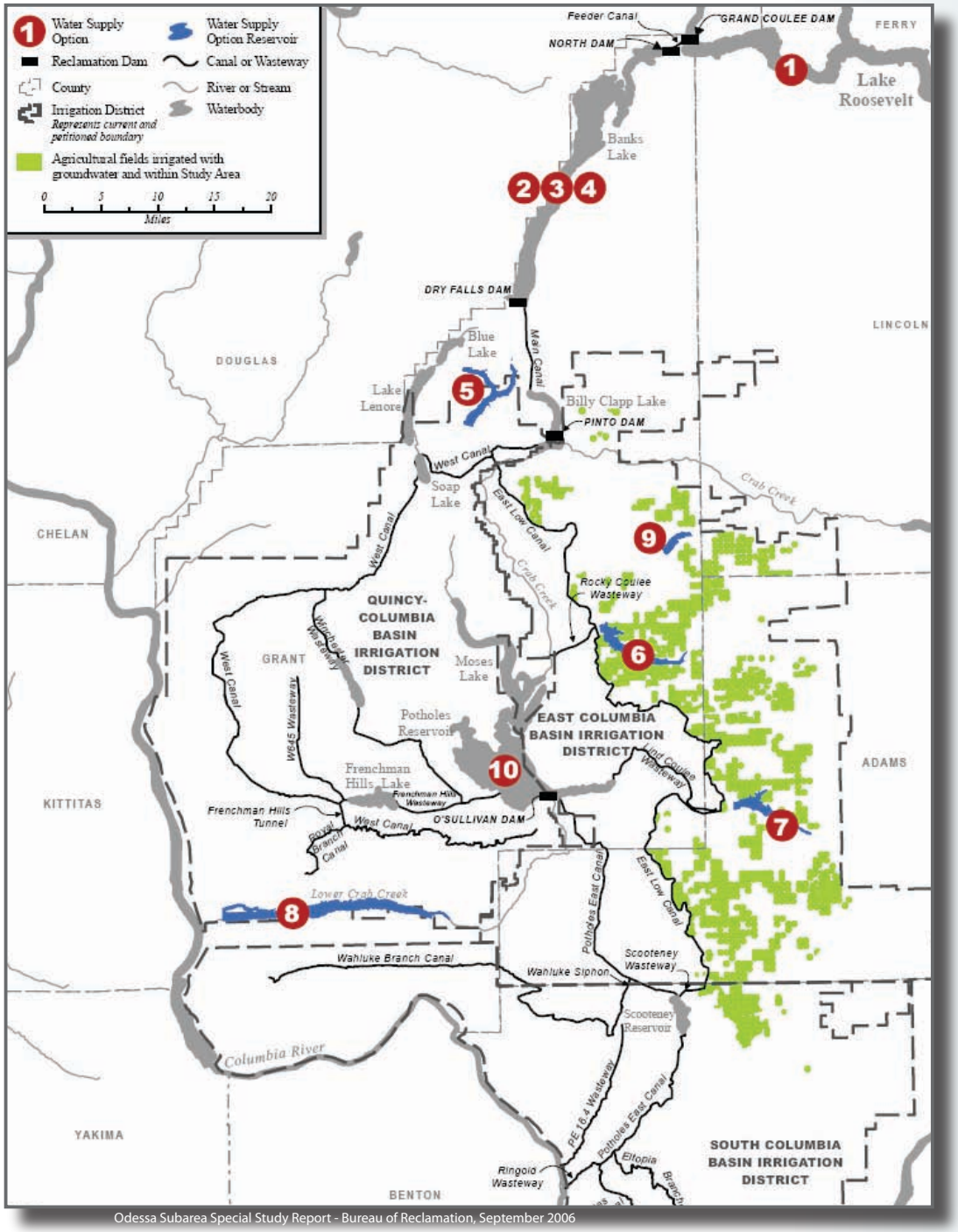
The Rocky Coulee site is located approximately eight miles northeast of Moses Lake. The dam and reservoir would be located in Grant County. Water would be diverted from the Columbia River at Grand Coulee through the Main Canal to ELC at Mile 23 to fill this reservoir. This is a gravity inflow. Water would then be released back to Rocky Coulee Wasteway into Potholes Reservoir.

Reoperation of Potholes Reservoir

Some of the Odessa Subarea alternatives may require increased use of the ELC to supply irrigation water to lands presently irrigated with groundwater in the Study area. The increased demand on the ELC may reduce the amount of feed available to Potholes Reservoir and may require a change to the reservoir operations. An additional feed route may be needed to ensure that adequate water supply for all lands served from the Potholes Reservoir will be met. At present, the Potholes Canal System serves approximately 227,000 acres, requiring up to 940,000 acre-feet annually from Potholes Reservoir.

During low runoff years, the spring feed capacity is not sufficient to fill Potholes Reservoir without a fall feed program the previous year. Fall feed is limited by the reservoir space in Potholes Reservoir needed for winter return flows and spring runoff to minimize spill into Lower Crab Creek. Historically, Potholes Reservoir has been left with as much storage space as is practical. Fall feed, which leaves Potholes Reservoir at high elevations, increases the risk of a spring spill.

By reoperating Potholes Reservoir, an estimated 50,000 acre-feet of water can be made available to replace groundwater use in the Odessa by shifting the volume of feed from spring to fall. This option would require an evacuation route from Potholes Reservoir.



Odessa Subarea Special Study Report - Bureau of Reclamation, September 2006

Option	Potential Water Supply Options
1	Lake Roosevelt reoperation - exercise 1936 water withdrawl
2	Banks Lake - drawdown to approx. elevation 1563'
3	Banks Lake - drawdown to below elevation 1563'
4	Banks Lake - raise operational level above elevation 1570'
5	Dry Coulee Reservoir
6	Rocky Coulee Reservoir
7	Lind Coulee Reservoir
8	Lower Crab Creek Reservoir
9	Black Rock Coulee Reregulation Reservoir
10	Reoperation of Potholes Reservoir

Columbia River Mainstem Off-Channel Storage

In December 2004, the State of Washington, the Bureau of Reclamation and the Columbia Basin Project (CBP) irrigation districts (the South Columbia Basin Irrigation District, the East Columbia Basin Irrigation District, and the Quincy-Columbia Basin Irrigation District) entered into a Memorandum of Understanding (MOU). The MOU describes roles and expectations of those parties in the then-anticipated Columbia River Initiative. Under provisions of the MOU, Ecology and the Bureau are cooperating on a study to evaluate the potential for development of new large, off-channel storage sites in the Columbia River Basin.

A pre-appraisal report assessed a preliminary list of 21 potential off-channel storage sites before passage of the Columbia River Program (Ecology and Reclamation, 2005). The pre-appraisal report focused on potential sites with the following criteria:

- Within ten miles of the Columbia River mainstem
- A capacity of at least 300,000 acre-feet
- With less than an 800-foot lift to pump water from the Columbia River to the reservoir

Potential Storage Sites

The list of 21 potential storage sites was narrowed by Bureau of Reclamation and the Department of Ecology using specific criteria:

- 10 miles or less from Columbia
- 300,000 or more ac-ft capacity
- no more than an 800 foot lift

Sites narrowed further by:

- size
- dam safety
- integration with Columbia River

- social/environmental considerations

- dam safety

Narrowed list to final 3 sites:

3. Hawk Creek
12. Sand Hollow
13. Crab Creek

1. Big Sheep Creek
2. Ninemile Flat
3. Hawk Creek
4. Banker Canyon
5. Goose Lake
6. Foster Creek
7. Twisp River
8. Eagle Creek
9. Mission Creek
10. Moses Coulee
11. Douglas Creek
12. Sand Hollow
13. Crab Creek
14. Black Rock
15. Alder Creek
16. Rock Creek East
17. Rattlesnake Creek
18. Little White Salmon
19. Panther Creek
20. Rock Creek West
21. Kalama River

The preliminary list of 21 sites was refined to 11 sites by evaluating size, dam safety issues, and compatibility with the Columbia Basin Project. In June 2007, Ecology and Reclamation refined the list of 11 sites down to four sites. Sites that were structurally infeasible, had excessive leakage, or other conflicts were eliminated. Also, the Confederated Tribes of the Colville Reservation requested that two of the 11 potential reservoir sites located on their reservation not be further evaluated at this time.

The Bureau evaluated the four remaining sites in an appraisal study (USBR and DOE, 2007, Appraisal Study) in preparation for a more comprehensive feasibility study and Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA). Those sites include:

Hawk Creek - A site in northern Lincoln County tributary to Lake Roosevelt with potential active reservoir capacity of 1,000,000 - 3,000,000 acre-feet

Foster Coulee - A site in northern Douglas County tributary to Lake Pateros with potential active reservoir capacity of 1,210,000 acre-feet

Sand Hollow - A site in western Grant County tributary to Lake Wanapum with potential active storage capacity of 1,000,000 acre-feet

Crab Creek - A site in western Grant County tributary to Priest Rapids Lake with potential active storage capacity of 1,000,000 - 3,000,000 acre-feet


Hawk Creek


Foster Coulee


Sand Hollow


Crab Creek

During the appraisal study, the four sites were screened to identify those sites that were suitable to move forward into a feasibility study and joint NEPA and State Environmental Policy Act (SEPA) EIS. The screening process involved evaluation of the sites for technical feasibility, preliminary costs and benefits, and potential impacts on the built and natural environment including impacts to cultural resources. Foster Coulee was eliminated early in the study due to concerns over geologic stability and failure risk.

The appraisal study determined that the Crab Creek site represents a potentially viable reservoir location. This site appears preferable to either the Sand Hollow or Hawk Creek sites based on both cost and technical feasibility. However, construction of a facility at the lower Crab Creek site would have potentially significant environmental, socioeconomic, and cultural impacts that would need to be thoroughly evaluated in an EIS.

Prior to conducting a feasibility study, the Bureau must receive specific Congressional authorization; thus, it would likely be 2008 or 2009 before such a study could be started. In addition, expenditures from the Columbia River Basin Water Supply Development Account (Account) needed for the state share of the feasibility study and EIS requires Legislative authorization. Ecology estimates that a feasibility study and EIS would require three years to complete (Ecology, 2006).

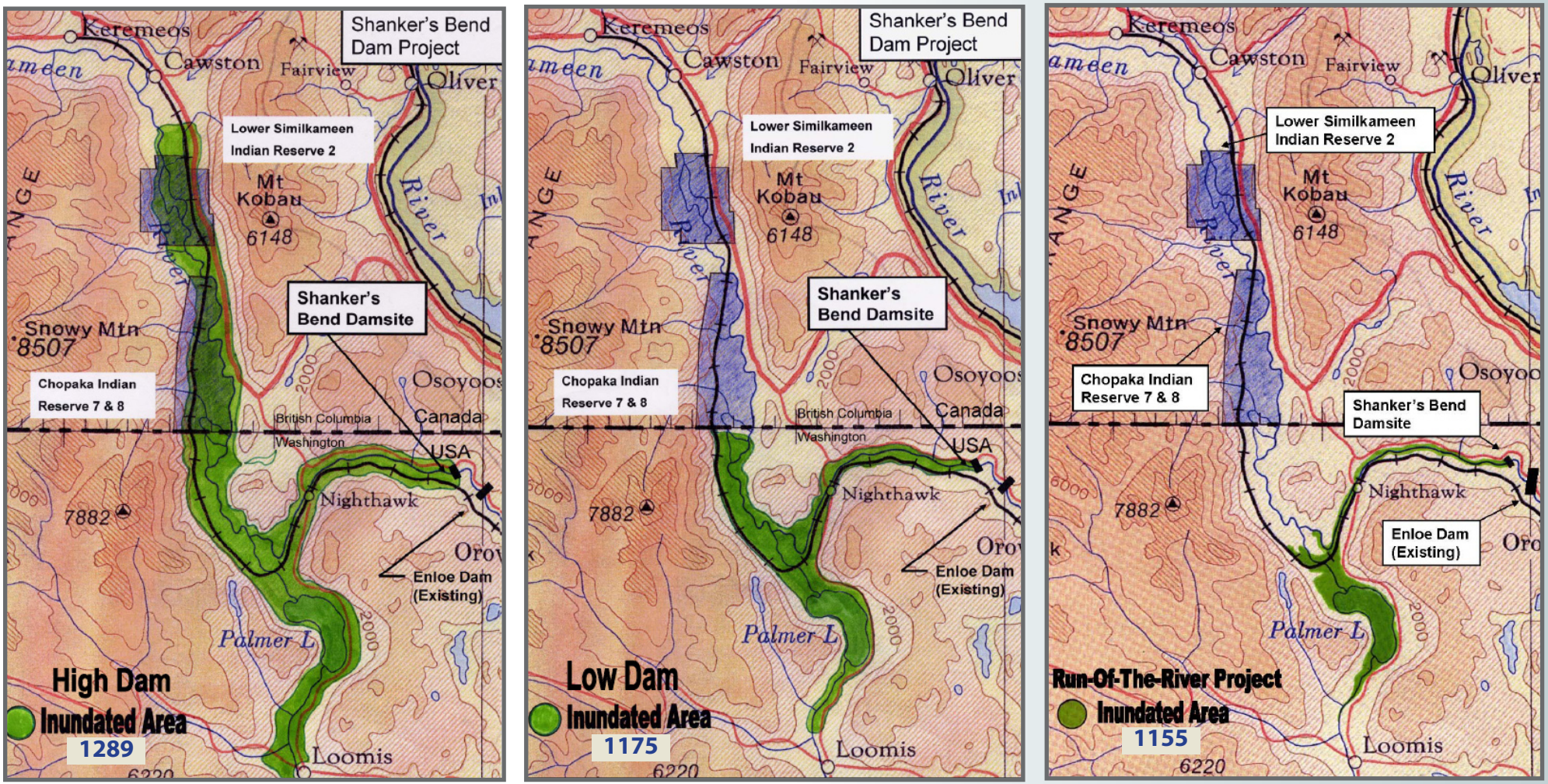
Similkameen Appraisal Study

The Okanogan Public Utility District (PUD) is studying the potential for a storage facility/dam at Shanker's Bend on the Similkameen River, a site that has been considered for construction of a dam since the 1940s. The proposed site is located a short distance upstream from the existing Enloe Dam. The Shanker's Bend project is viewed as having at least three possible configurations:

Project Config. (Elevation)	Dam Height	Reservoir Volume	Cost Est.	Cost Per Acre -Foot
1289.0 (High)	260 feet	1.7M Acre Feet	$260M	$153
1175.0 (Low)	160 feet	168K Acre Feet	$115M	$683
1155.0 (Run-of-River)	120 feet	50K Acre Feet (Temp.)	$50M	$1,000

These cost estimates were obtained from the original 1948 project documents and converted to 2007 costs using OFM inflation indexes. The 1948 original project estimates were the most detailed, including engineering, land acquisition, and typical other miscellaneous costs. However, the exact scope of costs included in the estimates is not known. Detailed estimates of abandonment of roads and infrastructure currently in place, as well as environmental mitigation costs are not likely to be included in all the pool options. The project appears to be attracting both interest and concern from across the Canadian border. The largest facility option (Elev. 1289) would inundate Canadian lands as well as lands adjacent to Palmer Lake in Washington. In 2007, Ecology provided $300,000 for the PUD to conduct an appraisal level review of the site, due in 2008. If the appraisal level review shows a basis for further investigation, then a more comprehensive study of environmental and cultural benefits and impacts will be considered. The PUD's previous FERC application material described this as "a final feasibility study that will incorporate refinements to engineering costs, environmental mitigation, and the exact benefits to Okanogan (PUD) from an operational standpoint". This would take place under the purview of a federal hydropower license preliminary permit issued by the Federal Energy Regulatory Commission (FERC).

Shanker's Bend / Similkameen River



Project Inundation Maps from Department of Ecology White Paper – Similkameen River Storage Project (Shanker's Bend) 5/17/07 David Cummings

Yakima River Basin Water Storage

In May 2003, the Bureau of Reclamation initiated the Yakima River Basin Water Storage Feasibility Study to examine the feasibility and acceptability of storage augmentation in the Yakima River basin. Added storage would benefit management operations to move the basin flow regime towards a normative condition for fish, a more reliable water supply for existing pro-ratable water users, and additional water supply for future municipal water demands (USBR, 2006).

In December 2004, the Bureau released its *Appraisal Assessment of the Black Rock Alternative*. This report summarized and added to numerous technical reports on the potential to build a new large storage facility called Black Rock Reservoir in eastern Yakima County. Black Rock could hold between 800,000 acre-feet to 1,300,000 acre-feet of water. As shown in Figure 3-2, this volume is greater than all five of the existing Yakima River Basin storage reservoirs combined. The proposed reservoir would be filled with water pumped from Priest Rapids Lake on the Columbia River when water is available in excess of current Columbia River flow targets. Participating Yakima basin irrigation districts would use water from the Black Rock Reservoir in exchange for water they currently divert from the Yakima River. The 2004 report estimated the cost of building Black Rock at approximately $4 billion.

In the 2006 appraisal study, the Bureau considered three Yakima River basin storage alternatives: a new Bumping Lake Dam and enlarged reservoir, Wymer dam and reservoir, and Keechelus-to-Kachess pipeline. In the 2006 appraisal, the Bureau concluded that while the Bumping Lake enlargement and Keechelus-to-Kachess pipelines did not meet study objectives, the Wymer reservoir should be investigated further. We describe each of these projects in more detail in the Small Storage and Modification of Existing Storage sections later in this report.

In December 2006, the Bureau published a Notice of Intent to prepare a combined planning report and EIS for the Yakima River Basin Water Storage Feasibility Study. At the same time, Ecology published a corresponding SEPA Determination of Significance (DS), requesting comments on the scope of the proposed EIS. The scope of the EIS and feasibility study includes (state & federally funded):

- **Black Rock Reservoir** with a capacity of 800,000 to 1.3 million acre-feet
- **Wymer Reservoir** with a capacity of 174,000 acre-feet
- **Wymer Plus Pump Exchange**[9] with a capacity of 574,000 acre-feet
- **No Action Alternative**

Dave Walsh, USBR: Aerial view of Black Rock damsite, looking west

Proposed Black Rock damsite (source: http://www.co.benton.wa.us/)yakima_basin.htm)

[9] The Wymer Pump Exchange and other Yakima Pump Exchange alternatives are described in the following section.

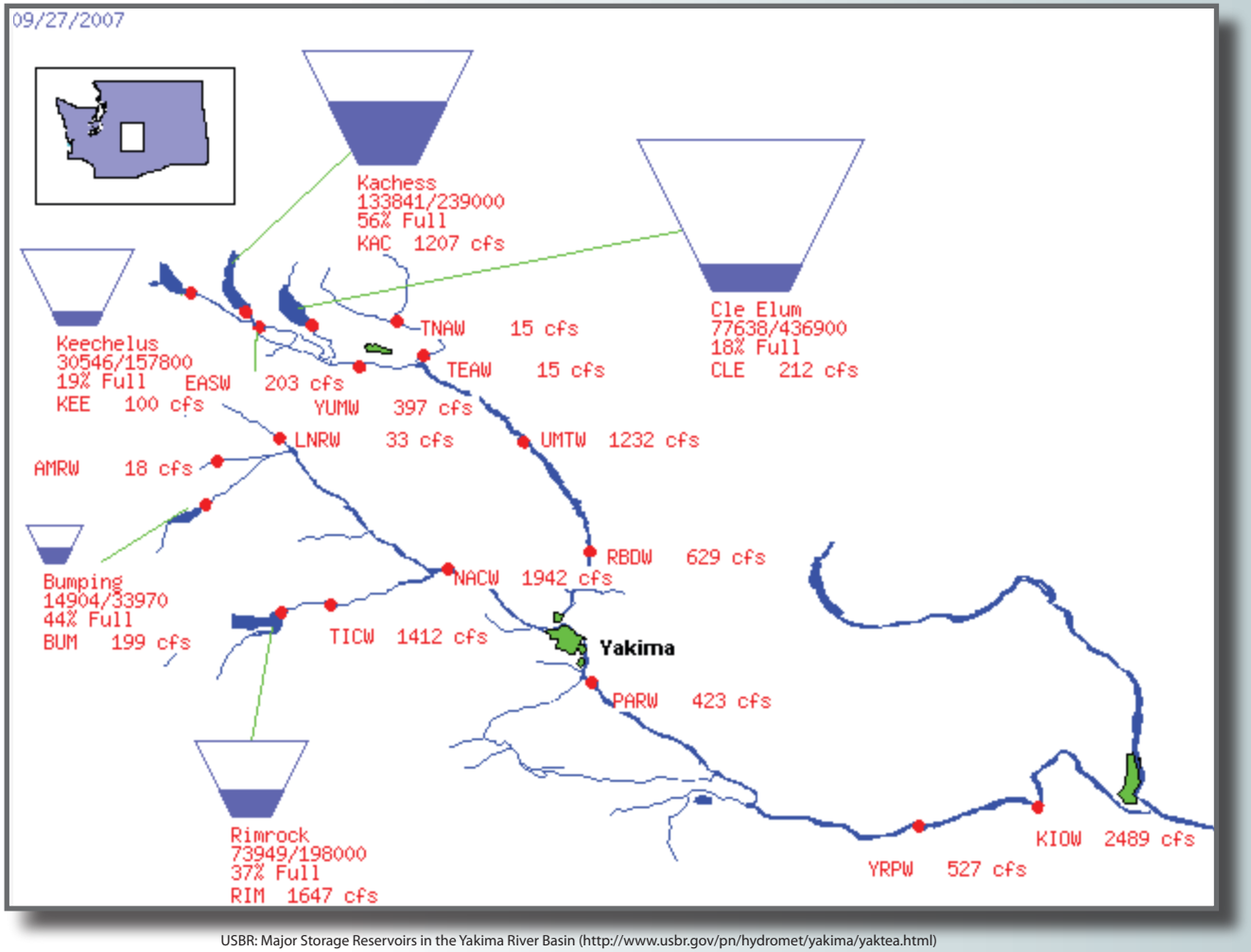
In addition, Ecology proposed three additional alternatives (state funded):

- **Water Marketing** to encourage the reallocation of water for both instream and out-of-stream uses by building an infrastructure to facilitate water marketing, banking, and transfers.

- **Enhanced Conservation** to provide incentives to encourage farmers to plant crops that require less water and institute other on-farm conservation measures, institute better dry year management practices, and line canals to decrease seepage.

- **Aquifer Storage and Recovery (ASR)** to store water in aquifers for subsequent instream and out-of-stream use. ASR methods include pump retrieval or passive recovery through infiltration back into the Yakima River.

A draft version of the study and EIS is expected to be ready for public comment in early 2008. They will include updated costs and an evaluation of the environmental and cultural benefits and impacts of these alternatives. Through June 30, 2007, Ecology has spent approximately $5.35 million in State cost share to study the feasibility of Yakima River Basin storage. Of that 1.35 million came from the Columbia River Account.



USBR: Major Storage Reservoirs in the Yakima River Basin (http://www.usbr.gov/pn/hydromet/yakima/yaktea.html)

USBR: Yakima River Basin Storage Alternatives Appriasal Assessment, 2006

Wymer Dam

Wymer Dam is one of the alternatives to Black Rock Reservoir that the Bureau and Ecology are considering for meeting Yakima River Basin water supply objectives. The Wymer Site is located between the Yakima River and Interstate 82 approximately ten miles south of Ellensburg.

The reservoir, with an active capacity of approximately 174,000 acre-feet, would be filled with water pumped from the Yakima River. This project would allow storage of excess winter flows for use later in the irrigation season and for drought situations. It also includes a Yakima River Pump Exchange, which would pump up to 1,200 cubic feet per second (cfs) from below the mouth of the Yakima River, up to portions of the Roza and Sunnyside irrigation districts. The water the districts currently divert would be left in the Yakima River to benefit fish and other instream resources (U.S.B.R., 2007).

In its 2006 Appraisal, the Bureau estimated the cost of the Wymer Reservoir (with pump exchange) at approximately $380 million. The Bureau and Ecology expect to issue a draft EIS for public comment in 2008 that assesses the environmental and cultural benefits and impacts of this proposal.

Yakima Pump Exchanges

Several different pump exchange options in the Yakima River basin are currently being evaluated by the Bureau, Ecology, and Yakima River basin irrigation districts. Each involves construction of a pumping plant on the Columbia River in the area where it meets the Yakima River. Water would then be piped to various locations in the Yakima River basin. Irrigators would then leave an equal quantity of water in the Yakima River for fish improvements.

- **Wymer** - The largest pump exchange we are considering (about 1200 cfs) relates to the Wymer Storage option. The Bureau is evaluating this option through a feasibility study and an Environmental Impact Statement, with completion expected in January 2008. The volume of water provided by this pump exchange depends on many factors including water availability in the Columbia and the Yakima rivers in a given year, and flow objectives in the Yakima River. However, 1,200 cfs over the irrigation season could provide as much as 400,000 acre-feet of benefit to the river. The total cost of the Wymer Reservoir and Yakima Pump Exchange is approximately $380 million, of which about $200 million is for the pump exchange.

- **Bureau of Reclamation** - The next largest pump exchange (about 700 cfs), the Bureau is assessing under the Yakima River Basin Water Enhancement Project (YRBWEP) funding program as part of its study of converting the Chandler pump station to electricity. The Chandler pump station is located near Prosser and supplies water to the Kennewick Irrigation District (KID). This would effectively meet all of KID's existing irrigation water right, or about 85,000 acre-feet. This pump exchange includes pump location but a different alignment for piping. The estimated construction cost (Isley 2007) of the option is about $64.4 million.

- **Kennewick Irrigation District** - The smallest pump exchange is being considered by KID. It has a different pump station location and alignment than the Wymer and Chandler pump exchange options. This version would exchange about 138 cfs of Columbia River water for Yakima River water withdrawals. In certain reaches, because of existing withdrawal points and return flow, the benefits would be 400 cfs. This version is associated with KID's pending application for an additional 82 cfs from the Columbia River, although under their current proposed alternative this could be reduced to 57 cfs.

Walla Walla Pump Exchange

Engrossed Second Substitute House Bill 2860 Section 7(2) stated that a portion of the $10 million could be used to support projects that enhance water supplies for the Walla Walla River Basin through exchanges and other methods. Therefore, Ecology has allocated $400,000 to the Confederated Tribes of the Umatilla Indian Reservation to enable them to continue working with the Corps of Engineers on a cooperative study in the Walla Walla River Basin. They expect to complete the four-year study in late 2007. It will determine the feasibility of restoring stream flows through several options:

- Delivery of Columbia River water for irrigation to the Walla Walla River Basin, in exchange for irrigators leaving an equal amount of water in the Walla Walla River to support fish
- Construct a new water storage facility on Pine Creek
- Purchase of out-of-stream water rights from willing sellers
- Increased irrigation efficiencie
- Use of shallow ground water recharge

Confluence of Walla Walla river and the Columbia

View of Walulla Gap: Confluence of Walla Walla river and Columbia to left

City of Kennewick

The City of Kennewick currently treats water from the Columbia River to supply its residents with drinking water. In response to increasing regulatory pressures under the Surface Water Treatment Rule and increasing summer water demands, Kennewick funded an Aquifer Storage and Recovery (ASR) feasibility report in October 2005. The goal of the study was to determine the feasibility of aquifer storage to provide source redundancy and reduce summer demands on the water treatment plant. The report identified that injection of water into a basalt aquifer at the south end of the city had the potential to hold approximately 318 acre-feet of water with less than ten percent leakage back to the river. The capacity of the ASR system is not known at this time, but could be in the range of 300-400 acre feet or more. How much of this stored water is retrievable is open to question, since many of the physical characteristics of the aquifer used to model system recoveries were assumed. A planned pilot test of the ASR system will answer most of these questions.


Overlooking Kennewick


Columbia River near Hanford

Kennewick would divert and treat water in winter months, when water is most available and the city's treatment plant has the greatest surplus capacity, then pump the water to two injection wells and store it for later use in the aquifer. The city would pump the water into the distribution system in the summer for municipal supply, while an equal amount of water would remain in the Columbia River.

In 2007, Ecology has reserved approximately $1 million to help fund a pilot for this project and is currently negotiating the scope of the study. In exchange for funding and following successful construction and operation of the facility, Ecology would manage the water stored (proportionate to funding under the Program) according to the statutory formula of two-thirds for out-of-stream uses and one-third for instream uses. Ecology continues to meet with the city of Kennewick to discuss the potential for additional funding of future project phases.

Columbia River Basin ASR Pre-Appraisal Study

As described above, many utilities in Eastern Washington are evaluating ASR. While some of these may have a future role in this Program, most of these utilities are making these initial investments to meet their own water needs. In the Columbia River Program, funding comes with the requirement that stored water will be managed by Ecology for instream and out-of-stream uses. Ecology will manage water in proportion to the funding supplied and not all water stored. In some cases, this requirement may outweigh the attraction of grant funding, because the project proponents (mainly municipalities) also need the water. Some are unwilling to dedicate one-third of the capacity of their ASR system for instream uses. And unless a proponent has a relatively senior pending water right application already on file with Ecology, it is unlikely that the two-thirds out-of-stream use would benefit them. Under the water code and WAC 173-152, Ecology must process applications in order they are received, except in narrow instances where priority processing is possible. The result is that water acquired through this funding program goes to the next most senior applicant who has requested the water (sometimes as much as 20 years ago), and often is not the person who helped develop the water supply.

Because Ecology believes ASR has great potential under the Program and in order to develop ASR supplies where this regulatory conflict is not as acute, Ecology is funding a basin-wide ASR pre-appraisal study that will mirror the initial surface storage assessments. The pre-appraisal study will include the following criteria:

- Both pumped recovery and passive recovery ASR methods will be considered
- Sites must be located within 10 miles from the river
- Would require pumping less than 800 vertical feet to lift water from the Columbia River to the reservoir
- Sites must contain an active storage of at least 10,000 acre-feet per year

The estimated cost of this appraisal study is being investigated. Ecology plans to recommend this project for funding in 2008 after technical review by the TAG.

Conservation in Columbia Basin Project

Within the Columbia River Basin, canal lining / piping projects also have the potential to offset groundwater pumping from the Odessa aquifer. From 1986 to 2004, Ecology partnered with Columbia River irrigation districts on 49 canal and lateral improvement projects. As a result, 16,276 acre-feet of water were saved, or 10, 536 acre-feet after return flow effects to Potholes Reservoir were considered. This project resulted in 2,361 acres of irrigated land in the Odessa sub-area being served by canal water instead of groundwater. A portion of the savings was also made available for municipal / industrial and wildlife purposes. Groundwater rights that previously served the 2,361 acres were converted to standby-reserve status. Under this project, no additional withdrawals from the Columbia River occurred because water saved through piping and lining was diverted to lands in the Odessa to reduce pumping from the Odessa aquifer.

As coordinated continuation of these efforts, this year Ecology is funding $30,000 of further study with the Columbia River basin irrigation districts to develop a water conservation strategy. The goal is to find other in-basin savings that can be directed to the Odessa sub-area. As in the previous work, water savings would be directed to existing Odessa farmland and offset drop-for-drop by conversion of Odessa groundwater rights to standby-reserve status.

Water Acquisition

RCW 90.90.010 identifies acquisition as one of the water supply development tools that Ecology can use to meet instream and out-of-stream demands. We provide a comprehensive description of Ecology's Columbia River acquisition inventory in Chapter 4. While we are exploring several acquisition strategies, Ecology's initial focus is acquiring water for interruptible water users. For this purpose, Ecology has set aside $1 million to run an auction to lease water rights for use during drought years.

Ecology is likely to run the drought-lease auction in late 2008 or early 2009. This auction, along with the new incremental storage releases at Lake Roosevelt project, would form the base of a Columbia River Drought Insurance Program. The goal of a Drought Insurance Program is to find new reliable sources of water for interruptible water users, as required in RCW 90.90.020. The drought-lease auction would establish a reserve price for water, by encouraging competition amongst bidders, so as to get the greatest value for the state investment. Depending on the outcome of the first round of bids, Ecology may adjust the reserve price in future bidding rounds. In evaluating bids, Ecology will consider where the water is located, how much is up for bid, the bid price, and in and out-of-stream benefits to the Columbia River.

The exact timing of the Columbia River auction depends on the outcome of a current study on how we may best manage this acquisition program. Ecology held a Yakima River Basin reverse auction in May 2007, which received only one bid. It is unclear why the auction did not generate more interest, given the level of sophistication of Yakima River Basin water right holders who have been participating in the Acquavella adjudication for the last 30 years. It could include the structure or timing of the auction, level of public awareness, Ecology's role as the auction manager or other factors.

The Columbia River Program has allocated $20,000 to fund a survey to provide recommendations on improving the program. For example:

- Should Ecology be the lead on the auction or use existing relationships between local water users and groups like conservation districts or non-profit river conservancies?
- Should Ecology pursue acquisition basin-wide or target specific watersheds? For example, some watershed planning groups are actively considering water marketing in their basins, which may provide partnership opportunities.
- Should Ecology run more sophisticated auctions (like multiple-round, reserve prices auctions) to ensure the best use of state funds, or does auction complexity act as a disincentive to participation?

By next year's legislative report, Ecology hopes to answer these questions and be able to report initial progress.

Programmatic Environmental Impact Statement

From May 2006 to February 2007, Ecology prepared a Programmatic EIS for the Columbia River Basin Water Management Program. As well as meeting requirements of the State Environmental Policy Act (SEPA), the EIS allowed the public to assess several policy alternatives and three early action alternatives. Ecology invested approximately $600,000 to complete this report. Section 2.1.1 provides a more detailed description of this effort, and a copy of the final report is available on Ecology's website (http://www.ecy.wa.gov/programs/wr/cwp/eis.html).

Water Inventory Demand Forecast

The 2006 Legislative Report provided a first look at growing water demands in Washington, and what conservation and storage projects could be used to meet that forecasted demand. Because of the short-time frame for issuing the first report (4.5 months), Ecology contracted with Golder Associates, Washington State University, the Conservation Commission, and various conservation districts to prepare the report. We used $50,000 of the capital budget and about $171,000 from operating funds to create an inventory of actual projects for potential funding in this years competitive grant program (see page 3-22) This report updates the 2006 inventory, which is available on Ecology's website.

Washington State Conservation Commission Assistance

Implementation of this program depends on building relationships with key stakeholders. As described in Chapter 2, Ecology has put a lot of effort into relationships, including development of the Policy Advisory Group, coordination with watershed planning units, coordination with tribal governments and coordination with local agencies.

Metering

Chapter 90.90 RCW directs Ecology to collect and publish water measurement data for Columbia River diversions on its web site by June 2009. Ecology expects to have data on 90 percent of surface and ground water withdrawn within one-mile of the Columbia River at that time. Ecology allocated $1 million to assist water users with paying to purchase and install metering systems.

Ecology began collecting data through a 3-Phase voluntary participation program, working with local conservation districts in the mid-Columbia / Lower Snake area. As of September 2007, over 90% of the largest water users in Phase 1 have agreed to measure and report their use to Ecology. These large water users account for about 80% of water diverted from the Columbia River within Washington State. In 2008, we will extend the program to water users from Priest Rapids to Wells Dam. By 2009, we will ask the balance of water users, from Bonneville to McNary, and Wells Dam to the Canadian border, to report their water use to meet the 90 percent reporting goal.

The Washington State Conservation Commission and local conservation districts are uniquely positioned to assist in program implementation. They have on-the-ground conservation experience and are trusted by local farmers. In order to leverage this experience to meet program goals, Ecology contracted with the Conservation Commission to hire a Technical Coordinator for the Columbia River Program. Ecology allocated approximately $105,425.00 to fund this position to assist with the following tasks:

- Facilitate and coordinate the Technical Advisory Group
- Partner with Ecology's metering coordinator to implement the Columbia River metering program
- Assist in developing the annual water supply inventory
- Assist in implementing Columbia River water acquisition efforts
- Work with participating Conservation Districts to formulate and implement a Best Management Practices for Voluntary Regional Agreement implementation.
- Other duties such as assist with annual report, trainer, facilitator, centralized technical assistance, consistency in program delivery, and meeting attendance

Climate Change

RCW 90.90.040 directs Ecology to prepare a long-term water supply and demand forecast and update it every five years. The purpose of the supply and demand forecast is to understand existing and future pressures and constraints on how the Columbia River is managed. Ecology's goal for the 2011 demand forecast is to include a comprehensive account of how climate change will affect Washington's future water needs. Chapter 5 of this report highlights Ecology's investment of nearly $400,000 of Columbia River funds to further this goal.

Columbia River Competitive Grant Program

While projects in Table 3-1 represent longer-term investments in water supplies, short term water supply development is expected through Ecology's first competitive grant program, implemented in October 2007. Ecology received 41 pre-applications for proposed projects, a summary of which is provided in Table 3-2. These projects will be investigated by Ecology and applications will be scored by the Technical Advisory Group. Ecology will include recommendations on funding for these projects in the 2008 Water Supply Inventory Report.

The grant application process has been created by Ecology in order to formally solicit applications for funding projects under the Columbia River Basin Water Management Program. The grant application is designed so that proposed projects can be analyzed in the context of the balanced goals of the statute (benefit to both instream and out-of-stream uses) and for cost and technical feasibility. Ecology developed the grant program by forming a team of Ecology, Department of Fish & Wildlife and Conservation Commission staff familiar with other funding programs in Washington. Some of the main goals the team used to build the program include:

Transparency: As a new funding program, it is important that funding criteria are clear.

Inclusiveness: A principal theme that was repeated by the PAG during review of funding criteria was the ability of all projects to compete for funding. Initially, the team considered using thresholds as a way of ensuring that funded projects would show both instream and out-of-stream benefits. However, the consensus by the majority of the stakeholders was that any conservation or storage idea should be considered initially.

Repeatability: The state has funding authority to issue bonds through 2016 up to 200 million dollars. If the Program is successful in developing new water supplies, it is likely that future funding for projects will be available. Building a sustainable and predictable grant program is therefore important so applicants understand the process each year.

Simplicity: By using "plain talk" and a minimum number of scoring criteria, Ecology intends this grant program to be easily understood by the public.

Location and Timing.

RCW 90.90.020 provides specific goals for Ecology in allocating new water supplies. Ecology's goal is to create a funding program that will deliver water where and when it is needed, including:

- Meeting both out-of-stream and instream needs
- Providing both permanent water (for new permits) and temporary water (for drought permits)
- Delivering water when it is needed (seasonal or year-round) and where it is needed (to pending applicants, to Odessa, to "interruptibles"[10] and so on)

[10] "Interruptibles" refer to those existing Columbia River water rights that must stop use when flows fall below the instream flow levels set in Chapter 173-563 WAC.

For example:

- Ecology is working with conservation districts, watershed planning units, and other stakeholder groups to provide technical assistance sources for funding applicants.
- Applications will be scored by a Technical Advisory Group (TAG) that includes technical experts from the Yakama Nation, Department of Fish & Wildlife, Conservation Commission, Conservation Districts, Salmon Recovery boards, and others.
- Ecology's recommendations for funding will be reviewed by the PAG for input on how best to use Program funding to achieve the goals of the legislation.

Pre-Application

The application process begins with submitting a simple pre-application worksheet intended to help Ecology pre-screen projects to determine if they qualify for Columbia River Program funding. This also provides a way for applicants to screen their proposals informally. Under the statute, conserved water must be placed in the trust. While funding for storage or feasibility projects do not have the trust water requirement, Ecology still must ensure that there is a valid water right to authorize construction of the project.

The required water right review can act as a disincentive for applicants who have good proposals, but have concerns regarding their water rights. This is an issue also being addressed in the Irrigation Efficiency Program, which Ecology implements through the Conservation Commission and local conservation districts. There is a similar pre-application step in that program where applicants can talk more informally about their proposals, their historical use of water, and how their conservation savings might fare under a formal application. This process has been successful in soliciting good conservation projects that have made significant improvements in tributary streams.

In the Columbia River grant program, the pre-application includes basic information about the related water right, including historical use, and a brief summary of the storage or conservation proposal. Ecology will typically conduct a site visit to learn more about the historical use and the applicant's proposal. If Ecology determines in the pre-application process that a project is initially eligible, we invite the applicant to complete the application process.

Application

Applicants invited to submit formal funding applications then provide a greater level of detail on their proposed project, including:

- Project Costs
- Net Water Savings
- Local Project Support
- Fish / Water Quality Benefits Derived from the Project
- Resources and Readiness to Proceed

The objective of the application process is to develop a list of fundable projects. Ecology will include information from both the pre-application stage and our initial site visit with the application for TAG review. TAG, chaired by the Conservation Commission, will score the applications for benefit to instream and out-of-stream uses after conducting further site visits.

Scoring and Weight

Information from the pre-application and application forms is intended to provide sufficient information for clear and unbiased scoring of potential projects by TAG. Each project can receive a maximum score of 50 points. Once projects are scored, weighting criteria developed by the funding team and reviewed by the PAG are applied. The goal of the weighting criteria is to ensure that those projects that best meet the objectives of the Program are ranked highest. For example, a project that has only fish benefit or only out-of-stream benefit should rank lower than a project that provides both instream and out-of-stream benefit.

Scoring Categories (50 points)

The application materials will be scored based on the following five categories:

1. **Project Costs (10 points)**
   - Project costs and level of funding sources available other than Ecology (matching)
   - Cost per acre foot of the water to be applied to trust (for all water, and for consumptive water)

2. **Net Water Savings (10 points)**
   - Total water savings that can be realized by implementing this project
   - Total amount of water that can be delivered through this project to the primary reach and to the mainstems of the Columbia or Snake rivers

3. **Project Support (10 points)**
   - Level of support by and within the local WRIA as well as other planning groups

4. **Fish and Water Quality Benefits (10 points)**
   - Potential water quality benefits that can be realized through this project
   - Value of contribution to meeting instream needs

5. **Current and Long Term Resources (10 points)**
   - Resources available to ensure long term performance of the project (operation and maintenance costs, measurement, and performance monitoring)
   - Proponents readiness to proceed (design and permits)

Project Weight (50 points, 100 points possible for total maximum score)

The funding team developed weighting for each of the scoring categories based on the goals of the legislation. Because weighting can be subjective and value-based, it may change through evolution of the Program. Ecology reviewed the initial weighting categories with PAG in June 2007 and received favorable comments. Ecology agreed to review the first year's funding results with PAG in 2008 to determine whether to retain or modify the weighting system for the next funding cycle. The weighting of each category provides a potential 100-point application score as follows:

- **Project Costs** (Weighting Factor = 2.0). Total awarded in this category is 20 points.
- **Net Water Savings** (Weighting Factor = 3.3). Total awarded in this category is 33 points.
- **Project Support** (Weighting Factor = 1.5). Total awarded in this category is 15 points.
- **Fish and Water Quality Benefits** (Weighting Factor = 2.2). Total awarded in this category is 22 points.
- **Current and Long Term Resources** (Weighting Factor = 1.0). Total awarded in this category is 10 points.

Grant Funding Recommendations

Once the TAG has scored the applications, Ecology will review projects and make funding recommendations. Ecology will base our funding recommendations on the following:

- **Funding score awarded by the TAG.** Those projects that score highest will be preferred in Ecology funding recommendations because they should represent opportunities for best use of state funds.
- **Location and seniority of applicants.** In the programmatic environmental impact statement (PEIS), Ecology decided to prioritize our water supply development efforts in areas where water right applicants have been waiting the longest. Even though a project may rank lower in TAG scoring, Ecology may recommend it for funding because it provides water in a location where senior applicants have requested it.
- **Timing.** In general, projects that supply permanent or perpetual savings should score higher than projects providing temporary savings. However, in some cases, a temporary supply of water may be a good fit for Ecology's goals (like providing interruptibles with drought protection). Even though a project may rank lower in TAG scoring, Ecology may recommend it for funding because it provides water when it is needed.
- **Studies vs. Construction.** Construction projects should rank higher than feasibility studies in TAG scoring. Even though a project may rank lower in TAG scoring, Ecology may recommend it for funding because it provides an investment in long-term water supply development.

Ecology will review our draft funding recommendations with the PAG each summer. The goal of this review is to engage stakeholders before the agency's budgeting process each fall. Ecology will consider PAG and other stakeholder recommendations before making final recommendations in our budget proposal to the Legislature. Ultimately, the Legislature must approve projects for funding each year by authorizing Ecology's budget request.

2007 Pre-Applications for Grant Funding

In September and October 2007, Ecology held pre-application workshops for potential applicants, other interested parties, and the conservation districts who will be providing technical assistance. From October 1 to November 30, 2007, Ecology began accepting pre-applications for Columbia River Basin Water Management Grants. Chosen projects will receive grant funding from the Account in the summer of 2009.

A variety of conservation and storage projects are eligible for grants, including:

- Conservation infrastructure ("pumps and pipes")
- Aquifer Storage
- Feasibility Studies
- Surface Storage
- Pump Exchange Projects
- Operations and Maintenance (funded annually)

Ecology received 42 pre-applications in 2007 which are detailed in Table-3-2. Eight of the pre-applications listed more than one project type. In total, the pre-applications produced 16 Conservation, 13 Storage, 19 Feasibility Studies, and one Beaver Study projects. Ecology is currently working to process the pre-applications.

Table 3-2: Grant Funding Pre-Applications Received

Applicant	WRIA	Project Type
Barker Ranch Ltd.	37	Horn Rapids Canal Piping
Beehive Irrigation District	40A	Beehive Reservoir Inflow Repair/ Improvement 12"
Boise Cascade	32	Cooling Tower
Boise Cascade	32	Aquifer Storage Recovery Project
City of Yakima	37	Municipal Pipe Replacement
City of Yakima	37	Aquifer Storage and Recovery Project
Confederated Tribes of the Colville Reservation	50/58	Goose Lake and Ninemile Flat Feasibility Study
AJ Ochoa Corp.	41	Irrigation Construction Conservation Project
Foster Creek Conservation District	44	Moses Coulee Aquifer Storage Feasibility Study
Foster Creek Conservation District	44/50	Surface Water Storage Feasibility Studies (Rock Island Creek & Foster Coulee)
Franklin/ Grant Conservation District	36	Irrigation Water Management
Franklin/ Grant Conservation District	36	Conversion of Irrigation Systems (Franklin, Grant and Adams Counties)
Franklin/ Grant Conservation District	36	Full Season Water Bank (Franklin, Grant and Adams Counties)
Franklin/ Grant Conservation District	36	Partial Season Water Bank (Franklin, Grant and Adams Counties)
Franklin/ Grant Conservation District	36	Orchard Sprinkler Conversions (Franklin, Grant and Adams Counties)
Franklin/ Grant Conservation District	36	Irrigation System Efficiency Audits (Franklin, Grant and Adams Counties)
Franklin/ Grant Conservation District	36	Conversion of Center Pivots from High to Low Pressure (Franklin, Grant and Adams Counties)
Franklin/ Grant Conservation District	36	Irrigation System Efficiency Audits (Franklin, Grant and Adams Counties)
Kittitas Conservation Trust LCU Inc.	39	Swauk Creek Surface Water Storage
Kittitas County Conservation District	39	Reed Ditch Pipeline
Kittitas County Conservation District	39	Menastash Ditch Pipeline
Klickitat County	30	Feasibility Study for Surface Storage, Dry Creek

Applicant	WRIA	Project Type
Klickitat County	30	Feasibility Study for Surface Storage and Conveyance, Horse Heaven Hills
Klickitat County	30	ASR Feasibility Study and Pilot Testing, City of White Salmon
Lake Cortez Water Users Association	40	Lake Cortez Water Quality/ Reliability Improvement Project
Lincoln County Conservation District	43	Lincoln County Passive Re-hydration Project
Lockwood and Canaday Irrigation Corp.	40A	Irrigation System Improvements
Many Waters Community Development	32	Little Walla Walla Rivers System Flow Feasibility Study
Naches-Selah Irrigation District (NSID)	39	NSID Equalization Reservoir & Tibbling Hill Spillway
Naches-Selah Irrigation District (NSID)	39	NSID Modernization and Improvement Plan
Palouse-Rock Lake Conservation District	34	Rock Lake Water Storage
Peshastin Irrigation District	45	Campbell Creek Reservoir Feasibility Study
Selah-Moxee Irrigation District	37	Irrigation System Improvements
Selah-Moxee Irrigation District	37	Little Moxee Canal Piping
Squilchuck Highline Ditch Association	40A	Squilchuck Highline Ditch Upgrade
Stemilt Project Inc. & Stemilt Irrigation District	40A	Stemilt Project Reservoir fill Ditch Rehab
Stevens Public Utility District	59	Mill Creek Water Storage Project
The Lands Council	57	Natural Water Storage and Urban Conservation
Walla Walla County Watershed Planning Dept	32	Walla Walla Rural Water Supply Program
Walla Walla County Watershed Planning Dept	32	Walla Walla Groundwater Replenishment and Instream Flow Enhancement Program
Washington Dept. Fish & Wildlife	43	Upper Lake Creek Wetland Restoration – Water Storage
Washington State University	55/57	Spokane Valley-Rathdrum Prairie ASR for CR Flow Augmentation

Chapter 4: Water Supply Inventory

This Chapter presents the results of the 2007 inventory of storage and conservation projects. Ecology compiled this inventory building on the 2006 inventory. We made use of additional planning documents and on-the-ground project reviews, as well as inviting contributions from watershed planning units, conservation districts, and tribal governments. Our intent was to include the full range of storage and conservation options in the Columbia River Basin. Table 4-1 summarizes the types of storage and conservation projects for which data was gathered.

In 2006, the Washington Conservation Commission (WCC) assisted in identifying approximately 5,400 conservation projects through contract for the 2006 Columbia River Water Supply Inventory. Ecology renewed its contract with WCC in 2007. The Commission added nearly 600 additional conservation and storage projects to the inventory.

The contract offered technical assistance funds to the conservation districts in Central and Eastern Washington whose boundaries included the Columbia River or one of its tributaries. Nine of the districts[11] inside the target area requested funds to help add to the inventory. Ecology allocated $19,630 to the nine districts to perform the 2007 inventory. Conservation districts added to the same database developed in the 2006 inventory, which includes project descriptions, estimated water savings, costs, and other factors. Appendix C provides a complete list of all projects in the inventory.

Table 4-1: Project Types Currently Under Consideration

Project Types
Storage
- Large Storage
- Small Storage
- Aquifer Storage & Recovery
- Modification to Existing Storage
Conservation
- Lining/Piping
- On-Farm Efficiency
- Tail Water Reuse
- Surface to Ground Water Conversion
- Reclaimed Water
- Municipal Conservation
- Irrigation Water Management
- Automation & System Control
Acquisition
- Crop Water Duty Reductions
- Crop Change
- Fallowed Corners/Land Retirement
- Partial Season Acquisitions/Leases

(Project types could be combined to provide both instream and out-of-stream benefits.)

Overview of the Inventory

The Columbia River Program focuses on generating new water supplies through conservation and storage, and then allocating those supplies to both instream and out-of-stream uses. This report (and annual updates) is intended to describe the range of opportunities available to meet these goals and to show Ecology's progress in meeting the goals. RCW 90.90.040 defines the required elements of the water supply inventory as:

- A list of conservation projects that have been implemented under this Chapter and the amount of water conservation achieved; and
- A list of potential water supply and storage projects in the Columbia River basin, including:
  - Cost per acre-foot
  - Benefit to fish and other instream uses
  - Benefit to out-of-steam uses
  - Environmental and cultural impacts [12]

[11] These included Benton, Cascadia, Franklin, Grant, Kittitas County, Lincoln County, North Yakima, Okanogan, and South Yakima Conservation Districts.

[12] Environmental and cultural impact data is not available for all projects in the inventory. Some of these impacts may not be known until a project has undergone environmental review through SEPA and/or NEPA. Ecology plans to complete a Programmatic Cultural Resources Environmental Review for the Columbia River Program in 2008. Annual updates to the inventory will include additional information on environmental and cultural impacts.

Organization of this Chapter

This chapter provides a description and summary of the inventory for each of the project types listed in Table 4-1. Detail on each type of project, estimated project cost, amount of water saved, and benefits to instream and out-of-stream uses are provided. A summary of inventory results and how those projects can be used to meet Columbia River program goals is provided at the end of the chapter.

Storage Overview

Well before the 2006 Columbia River Bill was passed, Ecology and Federal partners were considering opportunities for storage in the Columbia River Basin. Based on Congressional direction provided in 2003, Ecology and the Bureau have been jointly considering a range of proposals to increase water availability in the Yakima River Basin, including the feasibility of the proposed Black Rock Reservoir with a capacity of 1.3 million acre-feet. In 2004, Ecology signed agreements with the Colville Confederated Tribes, the Bureau, and Columbia River Basin irrigation districts to study new incremental storage releases at Lake Roosevelt and the feasibility of Columbia River mainstem water storage. The 2006 Columbia River legislation authorized further work on evaluating the feasibility of storage in the Columbia River Basin. Two-thirds of the $200 million authorized is intended to support the development of new storage facilities (RCW 90.90.010).

Like conservation, the Legislature defines storage as a new water supply. Conservation that reduces consumptive use is certainly "new water" because it takes water that was previously lost through evaporation, plant use, or within products or by-products and returns it to the river system for the benefit of both fish and new downstream users. Similarly, storage is a new water supply if water can be captured at times when it is surplus to water users and fish needs.

One measure of whether surplus water exists is by evaluating times when water is available in excess of NOAA Fisheries Columbia River flow objectives for fish listed under the Endangered Species Act (ESA)[13]. As part of the studies for the potential for new large Yakima Basin storage and Columbia River Mainstem Off-Channel Storage, and the study of water availability to meet source substitution goals in the Odessa, the Bureau has evaluated historical Columbia River availability. By evaluating historical river flow data through the use of BPA hydraulic models, the Bureau has concluded that water in excess of 1 million acre-feet is available above biological fish targets in the months of September, October, December and January, even in dry years. By retiming this water to periods of greater need (e.g. July and August), for both fish and people, there is the potential for the use of storage to accomplish the balanced objectives of the legislation. Water is not reliably available for diversion in February through June, and November. No water is available for diversion in July and August.

At this early stage in the Program, it is unclear what projects will serve the program objectives. Large storage offers economy of scale in terms of capital construction, operation, and management, but with the potential of greater environmental impact. Small storage has the potential for increased cost, but a lesser ecological "footprint." Aquifer storage and recovery costs are unknown, but has the greatest potential for environmental benefit by returning cooler and cleaner water. Ecology is funding a pre-appraisal study on ASR / SAR opportunities in the Columbia River Basin. This information will help provide accurate ASR cost information.

For consistency with the PEIS, storage categories described in this report are separated into the following categories:

- New large storage facilities (> 1 million acre-feet)
- New small storage facilities (< 1 million acre-feet)
- Modification of existing storage facilities
- Aquifer storage and recovery (ASR) (Ecology, 2006b)

As described more fully in this chapter, Ecology is studying all of these options in an effort to find the best solution or solutions for the Columbia River Basin.

[13] NOAA Fisheries Columbia River minimum flow objectives for ESA listed fish have been established since 1995.

Water Storage Inventory Results

New Large Storage Facilities

RCW 90.90.010 directs Ecology to spend two-thirds of the Columbia River funds "to support the development of new storage facilities." Ecology has been evaluating the potential for new large storage facilities with a capacity of 1 million acre-feet or more for several years. If a single storage facility is large enough, it could potentially resolve major in-stream and out-of-stream water supply problems in the Columbia River Basin (Ecology, 2006). Currently, Ecology is considering five new large storage facilities:

- Columbia River Mainstem Off-Channel storage (Crab Creek, Hawk Creek, Sand Hollow)
- Yakima River Water Basin water storage (Black Rock)[14]
- Similkameen River storage (Shanker's Bend)

In order for new large storage options to be successful, the benefits derived from storage must be "multi-purpose" in nature. RCW 90.90.010 provides guidance on how water supplies from Program-funded storage are to be used: two-thirds for out-of-stream uses and one-third for in-stream uses. Further, RCW 90.90.020 directs Ecology to meet multiple out-of-stream needs, including providing drought supplies for existing interruptible water rights, providing water for municipal and industrial needs, providing water for new applicants, and replacing ground water use in the Odessa.

New Large Storage	2006	2007
Number of Projects	**6**	**5**
Number of Projects w/ Estimated Water Savings	**6**	**5**
Number with Estimated Cost	**6**	**5**
Estimated Water Savings ac-ft/year	8,872,000	6,000,000
Estimated Cost	$13.1 billion	$10.4 billion
Estimated Cost Per Acre-ft	$1,484	$1,732

Additionally, Ecology must consider the Governor's climate change directive (Executive Order No. 07-02). Given the dependence of Eastern Washington on snow pack and the potential for climate change to reduce summer flows derived from snow, the need to evaluate the feasibility of storage in the Columbia Basin is clear.

New Small Storage Facilities

In addition to large storage evaluations, Ecology has been considering the potential for multiple small storage facilities to resolve major instream and out-of-stream water supply problems in the Columbia River Basin (Ecology, 2006). The Columbia River legislation does not define a preference for the size of storage reservoirs, only that two-thirds of program funds be used to support development of new storage.

New Small Storage	2006	2007
Number of Projects	**24**	**104**
Number of Projects w/ Estimated Water Savings	**20**	**89**
Number with Estimated Cost	**7**	**49**
Estimated Water Savings ac-ft/year	40,760	251,240
Estimated Cost	$32.2 million	$727 million
Estimated Cost Per Acre-ft	$790	$2,897

In 2006, Ecology evaluated adopted watershed plans, irrigation district plans, and other published documents for small storage opportunities. In 2007, Ecology augmented its research and outreach to watershed groups and conservation districts. Currently, Ecology is actively studying Wymer Dam as discussed in Chapter 3. Ecology will continue to update the inventory with potential small storage projects as they are presented.

[14] As discussed in Chapter 3, no monies from the Columbia RIver account have been allocated for the Yakima River Water Storage studies. The one-third, two-thirds standard in RCW 90.90 only applies when Columbia River Account funds are used.

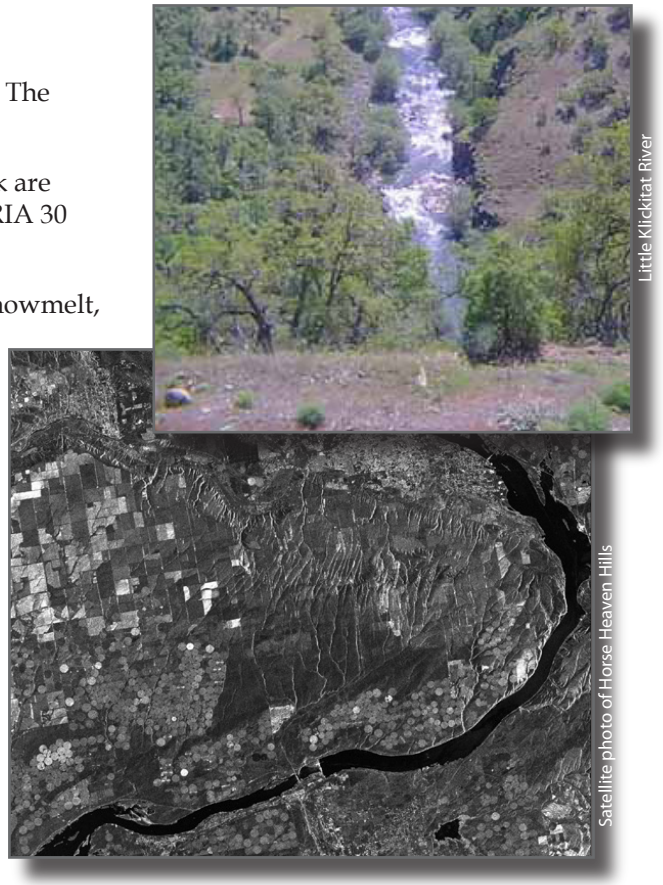
Watershed Planning Storage Assessments

A number of watershed planning units have completed preliminary storage assessments in their watersheds. The following sections summarize these opportunities which will be studied in greater detail in the future.

Little Klickitat Basin Surface Water Storage. Potential surface storage projects in Dry Creek and Idlewild Creek are described in section 4.3.3 of Appendix B Multipurpose Water Storage Screening Assessment Report of the WRIA 30 Watershed Plan. Dry Creek and Idlewild Creek are headwater tributaries of the Little Klickitat River.

Dry Creek has an extensive drainage area and appears to convey considerable winter/spring flows from snowmelt, with little groundwater base flow to sustain flows past June. The initial estimate of winter/spring discharge is 3,900 acre feet.

Idlewild Creek, in its lower reach, is incised into a relatively deep, narrow bedrock valley that would be amenable to construction of an in-channel storage reservoir. The valley is east-west oriented, with a steep southern wall that may help shade and maintain lower water temperatures. The estimated winter/spring discharge from the creek is approximately 1,600 acre feet.


Little Klickitat River

Satellite photo of Horse Heaven Hills

Horse Heaven Hills Water Storage. Concepts for large-scale (3,000 to 9,000 acre-foot) surface and ASR water storage projects with planning-level cost estimates are provided in the report/memorandum Preliminary Water Storage Assessment Glade-Fourmile Subbasin, WRIA 31, which was produced for the WRIA 31 Planning Unit. The projects would involve diverting water from the Columbia River with conveyance to ASR wells or surface impoundments located north of the River in areas currently supported by groundwater supply from the Wanapum Basalt Aquifers. Information presented in the Level I assessment indicates annual overdraft of the Wanapum Basalt Aquifer associated with the current level of pumping relative to recharge. Development of a storage project would assist in alleviating this worsening condition.

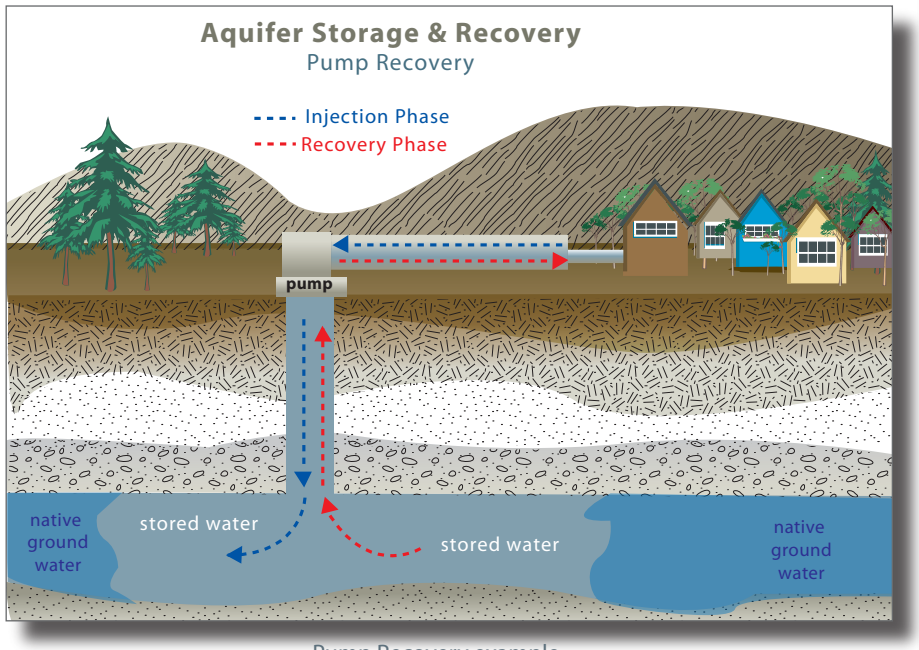
Aquifer Storage and Recovery / Shallow Aquifer Recharge

Aquifer storage and recovery (ASR) and Shallow Aquifer Recharge (SAR) is a water storage technique that uses underground aquifers as storage reservoirs. ASR is permitted by Ecology under RCW 90.03.370 and Chapters 173-157 (water rights), 173-160 (well construction), 173-200 (water quality), and 173-218 WAC (Underground Injection Control rules). Water may be introduced to the aquifer by infiltration from above ground or directly by using injection wells. Water may be stored for a period of weeks, months, or even longer, and then recovered for potable or other uses. There are two main ways of recovering artificially stored groundwater:

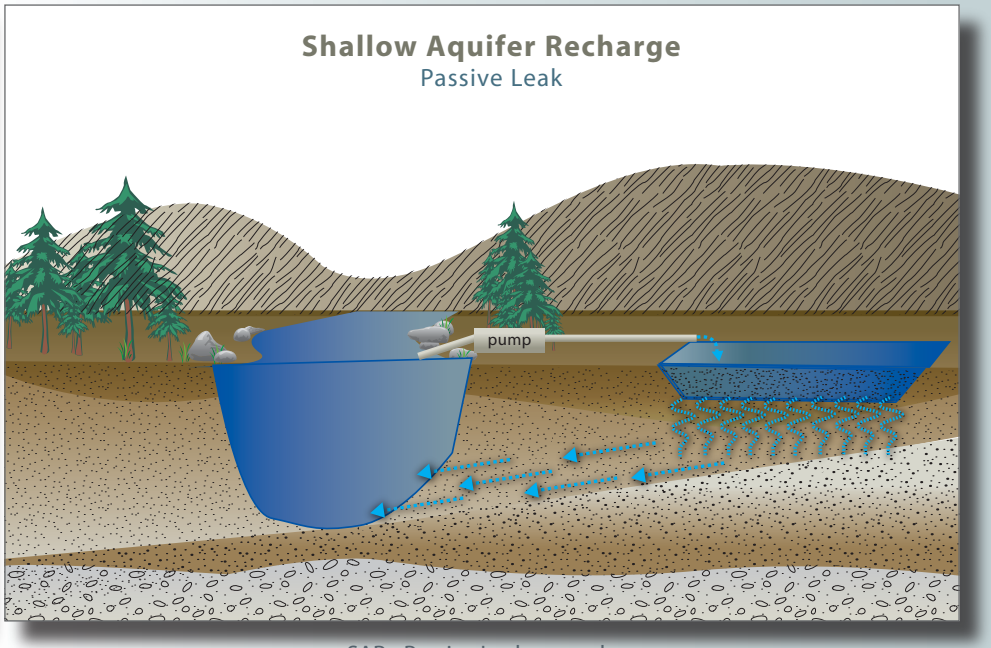
- **Pump recovery:** a system that uses wells and pumps to recover stored water for beneficial use. This type of ASR is assessed similarly to selecting surface storage. Ideally, the aquifer used to store water does not have excessive leakage or transport of ground water away from the injection or infiltration site. The water remains in storage until pumped back out for use. *(see ASR example on next page)*

Aquifer Storage & Recovery	2006	2007
Number of Projects	**1**	**31**
Number of Projects w/ Estimated Water Savings	**1**	**6**
Number with Estimated Cost	**0**	**10**
Estimated Water Savings ac-ft/year	unknown	343
Estimated Cost	unknown	$3,400,000
Estimated Cost Per Acre-ft	unknown	$9,913

- **Shallow Aquifer Recharge (SAR) - Passive Leak:** a system that relies on excessive aquifer leakage to transport the water back to the river. The purpose of this storage method is to retime the hydrograph from periods of low demand and high supply (such as in winter months when target flows are routinely met) to periods of high demand and low supply (such as summer months when irrigation demands and fish needs are greatest). The precision of a passive leak system in delivering water when and where it is needed tends to be lower than in pump recovery, but the cost is also lower. *(see SAR example below)*



Pump Recovery example



SAR - Passive Leak example

Some recognized benefits of ASR / SAR are:

- Substantial amounts of water can be stored deep underground. This may reduce the need to construct large and expensive surface reservoirs.
- ASR/SAR systems are considered more environmentally friendly than surface reservoirs because their ecological footprint tends to be far less than inundation of lands by surface storage.
- ASR/SAR can have greater water quality benefits than surface storage, particularly in regards to temperature.
- ASR/SAR may restore and expand the function of an aquifer that has experienced long-term declines in water levels due to heavy pumping necessary to meet growing urban and agricultural water needs.

ASR / SAR Opportunities in the Columbia River Basin

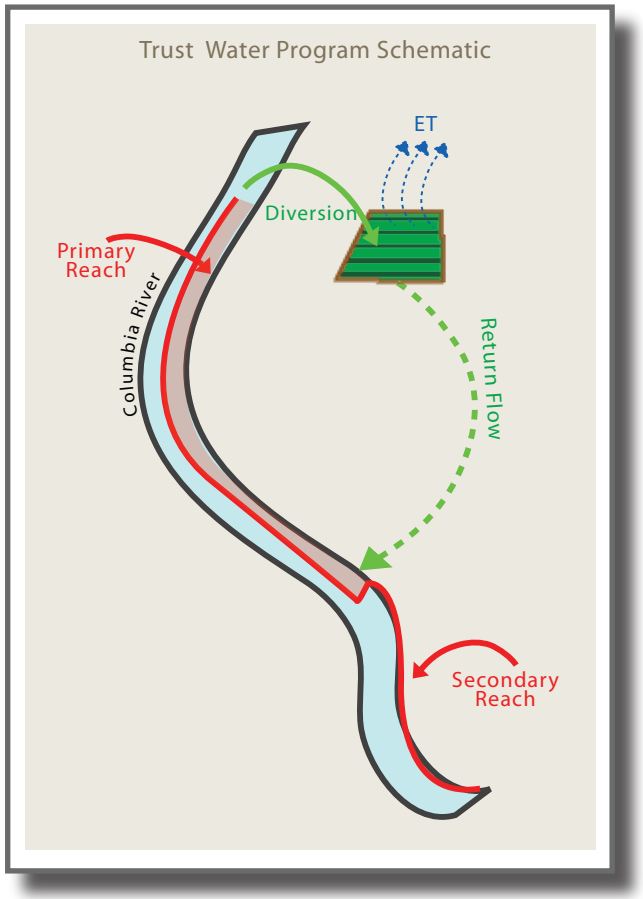
Several ASR projects are under consideration by utilities across Eastern Washington. Some are at the construction stage and many others are at conceptual or appraisal levels. The following is a summary of available information:

- The Foster Creek Conservation District has proposed an active pump recovery ASR project for the Upper Moses Coulee Groundwater Recharge Study. This project is in the conceptual feasibility stages with an estimated capacity of 3,200 acre-feet per two-year cycle.
- The City of Goldendale proposed an active pump recovery ASR project. The project is in the conceptual feasibility stage. Although capacity and cost information are currently unavailable, the city plans to move forward with a pilot test in the future.
- The City of Yakima has moved forward with an active pump recovery ASR project. The project is in the technical feasibility stage. A 2001 test pilot produced 275 acre-feet of recovered water. Estimated aquifer storage capacity is 1.7 billion gallons (5,200 acre-feet), but may be limited by infrastructure.
- Energy Northwest proposed a passive discharge SAR system. Battelle completed initial SAR modeling at a proposed site approximately 720 feet from the Columbia River. The total aquifer capacity modeled was 42,980 acre-feet. The Energy NW ASR study was primarily a modeling effort that took into account multiple scenarios. Most of the model results appear to indicate that the bulk of the water infiltrated would return to the river within 2 – 3 months. This may be somewhat over estimated based on previous tracer studies on the Hanford site which indicate a groundwater velocity of 15m/day. The project remains in the preliminary assessment stages.
- The City of Walla Walla has an active pump recovery ASR project. The project is currently semi-operational with two wells injecting an average of 441 million gallons (1350 ac-ft) each year. A study is being conducted to estimate the amount of water available from the aquifer, evaluate the recharge capacity, and identify recharge rates and operations to maximize aquifer storage capacity. The City of Walla Walla has applied to Ecology for storage permits for the facility.
- The City of Airway Heights is developing an ASR project for recharge and recovery of reclaimed water. This plant is currently under construction and should be fully operational in 2010. The project would bring an estimated 1.5 million gallons per day to water users.
- The City of Pullman is evaluating a Palouse Basin ASR using passive recharge and pumped recovery. This study is in the conceptual phase.

Modification of Existing Storage

The Columbia River is one of the most highly managed waterways in the United States. Ecology is partnering with the Bureau and other federal, state, local, and tribal governments to consider how existing storage facilities can be managed to add to water supplies for in stream and out-of-stream uses in the Columbia River Basin. Modifications could include raising the height of existing impoundments (on-channel or off-channel), raising operating pool heights, lowering drawdown depths, or otherwise altering operations at existing facilities. The advantages of modifying existing storage, over new construction, are that both the cost and the environmental and cultural impacts are likely much lower.

Modification to Existing Storage	2006	2007
Number of Projects	**1**	**5**
Number of Projects w/ Estimated Water Savings	**1**	**4**
Number with Estimated Cost	**0**	**0**
Estimated Water Savings ac-ft/year	unknown	unknown
Estimated Cost	unknown	unknown
Estimated Cost Per Acre-ft	unknown	unknown



Ecology is currently funding Banks Lake and new incremental storage releases at Lake Roosevelt studies (discussed in Chapter 3). As additional projects are presented, Ecology will update the inventory.

Water Conservation Overview

There are many water conservation strategies that can be applied in the Columbia River Basin. While conservation is a long-term approach to reducing the water demand over time, it can be achieved more quickly than construction of new storage. Successful implementation of conservation strategies can meet the dual objectives of the Program: water for fish and water for out-of-stream users.

Not all conservation projects will result in an immediate savings in the Columbia River. Not all conservation projects will benefit the entire Columbia River downstream of the historic point of discharge. Some conservation projects benefit only a particular "reach" of the Columbia River or a tributary. The savings that "accrue" to the river will depend on a number of factors, including:

- Whether the savings accrue due to conservation that reduces consumption (evaporation or transpiration) or reduces return flow (water that returns to the river at a point downstream of the diversion)
- Whether the diversionary water right is a surface water right or a ground water right
- The distance between the point of savings and the river; this can create both a time lag and spatial uncertainty about the location where the benefits occur
- The dynamics of natural recharge and artificial return flows to the river
- The ability to quantify and monitor water savings

Ecology recognizes the difficulty in issuing new permanent consumptive use permits based on water savings that are either temporary or non-consumptive in nature. It is Ecology's intent to match water supplies and demand in-land, in-time, and in-place.

In this report, Ecology attempts to go beyond the initial efforts in the 2006 report, which summarized the total conservation opportunities, but did not provide much detail on the RCW 90.90.040 requirements. In the following sections, as well as identifying potential costs and water savings, Ecology describes:

- Which conservation projects benefit fish
- Which benefit out-of-stream users (because new permits can be issued based on the savings)
- Which conservation projects do both

Conservation Project Inventory

Lining/Piping

Lining and piping (or water conveyance efficiency) is the conversion of open-ditch water conveyance delivery systems to a more efficient delivery pipe or the placement of an impermeable liner within a ditch. This is typically found in irrigation districts, companies, or associations that provide water to multiple end-users, but these projects can be located on individual farms as well (Ecology, 2006).

Lining/Piping	2006	2007
Number of Projects	**93**	**165**
Number of Projects w/ Estimated Water Savings	**79**	**109**
Number with Estimated Cost	**89**	**124**
Estimated Water Savings ac-ft/year	418,526	451,310
Estimated Cost	$456 million	$505 million
Estimated Cost Per Acre-ft	$1,091	$1,120

Canals without liners or with failing liners can lose 30 to 50 percent of their irrigation water through seepage. Canal-lining technologies can minimize seepage losses at reasonable costs (http://www.usbr.gov/pn/programs/wat/canal.html). Water conveyance efficiency projects possess a wide range of benefits including (from Deschutes Water Alliance, 2006):

Lining

- Piping reduces liability exposure from safety hazards inherent in open canals in urbanizing areas.
- Piping/lining reduces the diversion at the head gate and frees up water for instream flow and other district water needs.
- Piping can eliminate conflict between urban/suburban landowners.
- Piping will substantially reduce or eliminate operations and maintenance needs.
- Piping can provide gravity pressure, which conserves energy.
- Piping improves reliability and control of water delivery to more closely match demand fluctuation, which reduces need for surplus transport flows.
- Piping supports development of small hydropower facilities, which can increase revenue.

On-Farm Efficiency

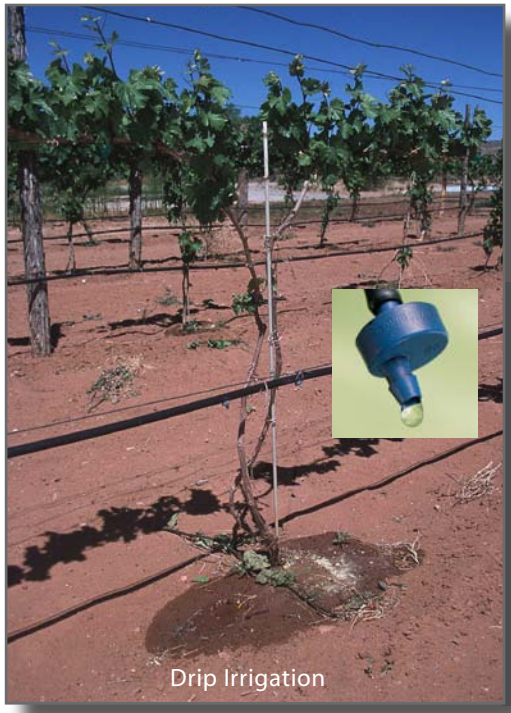
On-farm agricultural water conservation and irrigation efficiency measures are typically implemented by individual landowners, often with technical assistance from the local conservation district or the Natural Resources Conservation Service (NRCS) (Ecology, 2006). On-farm efficiency projects consist of installation of a more efficient irrigation application system. This can be accomplished in several ways.

Examples include replacing open laterals and trenches with closed pipe; replacing non-pressurized irrigation systems with pressurized or drip sprinkler systems; using soil moisture sensors to optimize water use; constructing on-farm ponds to capture and reuse tailwater, and by using automated water management (see page 4-16 for more information on IWM) systems with integrated soil moisture sensors (Ecology, 2006).

Ecology contracts with WCC's Irrigation Efficiencies Grants Program (IEGP) to help private landowners partner with local conservation districts to save water and aid salmon recovery. According to the 2003 Farm and Ranch Irrigation Survey (2003 Census), of the approximately 1.8 million acres of irrigated land in the state of Washington 80% are irrigated by sprinkler systems, 5% by drip irrigation, and 15% by gravity flow systems. The Census (2003) data suggests that the average water application is about 2.0 acre-feet for sprinkler irrigation, and 2.9 acre-feet for flood irrigation. Although these figures appear low, they do not include transmission losses and variation in crop duties. Typical crop duties for the Yakima River Basin are approximately 5 acre-feet.

Most on-farm efficiency projects only provide benefits to the primary reach unless the irrigation efficiency practice is in combination with fallowed corners. This type of conservation (return flow reduction) benefits the instream flow portion of the program, but is not well-suited to offset new permits without adversely impacting the Columbia River.

On-Farm Efficiency	2006	2007
Number of Projects	**5,220**	**5,587**
Number of Projects w/ Estimated Water Savings	**5,197**	**5,402**
Number with Estimated Cost	**5,199**	**5,410**
Estimated Water Savings ac-ft/year	216,886	259,952
Estimated Cost	$276 million	$338 million
Estimated Cost Per Acre-ft	$1,277	$1,302



Drip Irrigation

By using best management practices to increase the efficiency of on-farm water application and conveyance systems, the Irrigation Efficiencies Grant Program (IEGP) converts water savings into tributary flows where listed salmonid species will benefit from more consistent and persistent water flows. Best management practices can include:

- Irrigation canal improvements
- Irrigation regulating reservoirs
- Irrigation water conveyance projects
- Pumping plant for water control
- Structures for water control
- Water flow measuring devices
- Irrigation erosion control
- Irrigation system updates
- Irrigation water management
- Tail water recovery
- Water wells (surface to ground conversion)

Tail Water Reuse

Tail Water Reuse involves the capture and reuse of tail water (surface runoff) from a field or conveyance system rather than returning it back to the stream. Water from a rill/furrow irrigation system is captured in ponds, ditches, or recirculation facilities at the bottom of the field. Captured tail water is then recycled to the head ditch for reuse and withdrawals for irrigation are reduced in equal portion (Ecology, 2006).

Tail Water Reuse	2006	2007
Number of Projects	**2**	**4**
Number of Projects w/ Estimated Water Savings	**2**	**4**
Number with Estimated Cost	**2**	**4**
Estimated Water Savings ac-ft/year	2,900	5,800
Estimated Cost	$520,000	$1,040,000
Estimated Cost Per Acre-ft	$179	$179

Tail water recovery or recirculation facilities collect irrigation runoff and return it to the same or an adjacent field for irrigation use. Such systems can be classified according to the method of handling runoff or tailwater. If the water is returned to a field lying at a higher elevation, it is usually referred to as a return-flow system; if the water is applied to a lower lying field, this is termed sequence use. The components consist of tail water ditches to collect the runoff, drainage ways or waterways to convey water to a central collection area, a sump or reservoir for water storage, a pump, a power unit, and a pipeline or ditch to convey water for redistribution. Under certain conditions where gravity flow can be used, neither pump nor pipeline may be necessary (NRCS, National Engineering Handbook).


Tail Water Recovery System

source: http://awqa.org/farmers/capturingwater.html

Tail water reuse eliminates return flow that would return to the Columbia River. It provides instream benefit in the reach between the point of diversion and the point of return. It does not provide mitigation that can be used for out-of-stream permits.

Surface to Groundwater Conversion

Surface to Ground Water Conversion can reduce direct impacts on surface water supplies. This is particularly useful in times of drought when surface supplies are stressed. By moving surface diversions to groundwater, effects on surface water are diminished both in time (due to delayed effects of pumping) and in space (because effects of pumping are spread out over a longer river reach). For example, in 2005 and previous droughts, Ecology has permitted standby reserve wells in the Yakima River Basin when surface supplies were curtailed. The wells were located far enough away from the river to avoid impacts on the river due to pumping during the drought.

Surface to Groundwater Conversion	2006	2007
Number of Projects	**1**	**1**
Number of Projects w/ Estimated Water Savings	**1**	**1**
Number with Estimated Cost	**1**	**1**
Estimated Water Savings ac-ft/year	360	360
Estimated Cost	$200,000	$200,000
Estimated Cost Per Acre-ft	$556	$556

Surface to groundwater conversion does not create new water, but is merely a source substitution. Effects on the surface source still occur, just later and over a larger area. This type of project can benefit in-stream uses by removing a direct surface diversion, eliminating the need for fish screens, and creating water management flexibility during times of water shortage.

This type of conservation project is another tool that can be used to meet the statutory objective in the Columbia River Program to find reliable sources of supplies for interruptible water rights. In some areas of the Columbia, it may be possible to permit standby-reserve groundwater wells that can be used when Columbia River instream flows are not met. By moving demand to groundwater when surface supplies are stressed, instream benefits also occur. This type of project can therefore benefit both the instream and out-of-stream goals of the bill.

Reclaimed Water

In 1992 the Washington State Legislature passed the Reclaimed Water Act, Chapter 90.46 RCW, and directed the Department of Ecology and the Department of Health to develop standards for reclaimed water use and to jointly administer a reclaimed water program. The Reclaimed Water Act has the following goals:

- Encourage and facilitate reclaimed water use
- Protect public health and safety
- Gain public confidence and support for reclaimed water
- Provide new basic water supplies to meet future needs
- Protect and enhance our environment
- Find cost-effective solutions

King County uses beakers to demonstrate the exceptional quality of Class A reclaimed water. (King Co. photo)

Reclaimed water is a water supply obtained through the treatment of the waste water used for municipal or domestic purposes. Sometimes called water recycling or water reuse, reclaimed water may also include incidental contributions of industrial process water or storm water. The process of reclaiming water involves an engineered treatment system that speeds up nature's restoration of water quality. The process provides a high level of disinfection and reliability to assure that only water meeting stringent requirements leaves the treatment facility.

In addition to reclaimed water, which is derived from municipal wastewater, Chapter 90.46 RCW includes provisions for the beneficial use of greywater, agricultural industrial process water, and industrial reuse water.

- "Greywater" is wastewater having the consistency and strength of residential domestic wastewater. Greywater includes wastewater from sinks, showers and laundry fixtures but does not include toilet or urinal waters.
- "Agricultural industrial process water" refers to food processing wastewater that does not have a sewage component. This includes wastewater from the processing of potato, fruit, vegetables, or grain. The wastewater must be adequately and reliably treated so that it is suitable for other agricultural use.
- "Industrial reuse water" is industrial wastewater that does not contain sewage and has been adequately and reliably treated so that it is suitable for beneficial uses.

The owner of the wastewater treatment facility reclaiming the water with a permit issued under Chapter 90.46 RCW has the exclusive right to any reclaimed water generated by the facility. Use and distribution of the reclaimed water is exempted from the water right permit requirements of RCW 90.03.250 and 90.44.061. However, the exclusive right to use reclaimed water is only granted if existing water rights will not be impaired or adequate compensation or mitigation has been provided.

Ecology has developed guidance on evaluating reclaimed water impairment. In summary, if the historic wastewater discharge or disposal method has been to marine waters, via land treatment, or via another consumptive disposal method, then no impairment typically results. However, in areas where historic wastewater disposal has been to rivers or groundwater closed by rule or with instream flows, or in areas where downstream water users rely on that wastewater as part of the availability for their water rights, impairment of existing water right holders is more likely.

In 1997, four cities (Yelm, Sequim, Ephrata, and Royal City) received state funding support to design and construct demonstration projects modeling reclaimed water use within the state. By 2005, 17 facilities had been constructed or upgraded to operate under the state reclaimed water standards. The constructed facilities can produce between one thousand gallons and seven million gallons of water per day. Uses of reclaimed water from these facilities include crop and landscape irrigation, toilet flushing, dust control, construction water, industrial cooling, created wetlands, groundwater recharge, and stream-flow augmentation. There are also several facilities engaged in various stages of planning, design, or construction. The Tulalip Indian Tribe constructed a reclaimed water facility for use at the casino and other tribal properties. Other tribes are planning and constructing reclaimed water facilities (Ecology 2005).


Ephrata groundwater recharge basin

Since the passage of the 2006 Columbia River Bill, Ecology has received several inquiries as to how reclaimed water fits within the program. RCW 90.90 directs Ecology to aggressively pursue the development of new water supplies for instream and out-of-stream uses. Reclaimed water can be an important water supply source for alleviating water shortages and finding new ways to meet the growing water demands of the state. Reclaimed water intersects best with the Columbia River Program where the historic wastewater disposal method has been to consumptive land application, since there is little geographic opportunity for marine discharge. Examples of project costs include:

- The city of Ephrata funded reclaimed water facility construction through a $1.97 million Centennial Clean Water Fund grant appropriated by the Legislature and a $5.35 million Clean Water State Revolving Fund loan. The project's capital construction cost was $6.8 million. The Class A water reclamation plant has a design capacity of 1.22 million gallons per day (mgd). The average operating flows are approximately 0.55 mgd (615 ac-ft/yr).


Royal City's infiltratin basins.

- Royal City's primary reclaimed water use is aquifer recharge through surface percolation basins located at the water reclamation facility. The Class A water reclamation facility has a maximum design capacity of 0.25 million gallons per day (mgd), and presently averages 0.15 mgd (168 ac-ft/yr). Design and construction costs totaled $3.7 million.

- Quincy's Class A reclaimed water recharges the local aquifer through six infiltration basins located near the water reclamation facility. The Quincy facility treats 0.70 million gallons of water per day (mgd) and has a design capacity to treat up to 1.54 mgd (784 ac-ft/yr). Total capital cost for the reclamation facility project was $5.90 million.

Since the 2006 Legislative Report, Ecology has sought to augment information on reclaimed water opportunities. Ecology has permits on file for 90 wastewater treatment plants in the Columbia River Basin that dispose of wastewater through land application. No detailed cost or water savings information exists for improvements of these facilities to reclaimed water plants. Because this water was historically lost to evaporation (consumptive use), funding reclaimed water projects of this type can meet both the instream flow objectives and out-of-stream (new permits) objectives of the Program. However, as in all projects funded by the Columbia River Program, the reclaimed water savings would need to be managed by the State for new instream and out-of-stream uses. This would likely manifest itself through a contract between the reclaimed water generator and the State. In exchange for funding, the reclaimed water generator would agree to deliver reclaimed water to the proposed site where beneficial use would occur (if nearby and could be piped) or to waters of the State (e.g. a river for downstream use).


Quincy's treatment & control building with UV channel in front.

Municipal Conservation

Domestic water use includes water used for household purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, car washing, and watering lawns and gardens. Households include single and multi-family dwellings, such as apartments, condominiums, and small mobile home parks. Domestic use is separated into in-house uses (bathing, flushing toilets, laundry, cleaning, and cooking) and outside uses (lawn and garden watering, car washing, and pools). In-house uses tend to be consistent year round while outside uses tend to increase during specific seasons, usually summer, depending on the type of climate (U.S. Department of Housing and Urban Development, 1984a).

The largest domestic consumptive use is usually lawn watering, since most of this water is evaporated or transpired (Flack, 1981). In January 2007, Washington adopted a new rule requiring water utilities to conserve water now to avoid a water supply crisis in the future. Prepared by Washington State Department of Health, the rule requires utilities to maintain pipes and other infrastructure to reduce leakage to ten percent or less. Utilities must also: [15]

- Prepare plans for efficiently using water
- Set water-use goals in a public forum
- Install meters within ten years if not already installed
- Report yearly on water use, leakage, and progress toward meeting their goals

In 2006, Ecology reviewed published water system planning documents for conservation measures. Of the communities assessed, conservation goals included both supply and demand strategies achieving modest conservation savings of approximately five percent.

Municipal conservation is used as an effort to avoid a water shortage and it is the least expensive way for municipalities to secure water for the future. Many communities have mandated water conservation measures in place, which include both supply-side and demand-side measures. Supply-side measures attempt to reduce water use by better matching available supply to variable demand, including:

- Metering
- Source control
- Reservoir overflow and spill reduction
- Leak detection and repair

[15] http://www.5.doh.wa.gov/Publicat/2007_news/07-010.htm

Demand-side conservation measures attempt to reduce water use by changing behavior of water users and making physical improvements (typically in-house), including:	
• Implementing a conservation-based water rate and billing structure	
• Encouraging in-home water reduction, such as:	
- Low flow showers and toilets - Not leaving faucets running while brushing teeth - Only running the dishwasher when it is full	- Fixing leaky faucets and toilets - Keeping a cold water jug in refrigerator
• Outdoor demand reduction includes:	
- Adoption of an odd-even day watering schedule - Using efficient irrigation techniques - Using a broom when cleaning driveways rather than spray washing - Adjusting sprinklers so only vegetation is watered—not the driveway - Watering during the cool time of the day to minimize evaporation - Installing an automatic irrigation timer	- Selecting low-water-use plants - Putting mulch around plants to reduce evaporation - Using soap and water from a bucket for car washing - Using a hose with a shut-off nozzle - Not watering on windy days - Checking and maintaining sprinkler systems regularly - Adjusting watering schedules to changes in seasonal water demand

For this legislative report, Ecology contacted the Department of Health (DOH) for additional water system planning information. Since the last report, DOH has approved 16 additional water system plans in Eastern Washington. A survey of these plans revealed similar conservation goals and savings as for 2007. In the coming years, Ecology plans to work with the Washington State Department of Health to better understand municipal demand and opportunities for municipal conservation. This information will be included in next year's legislative report.

With the exception of reductions in consumptive use associated with lawn watering, the types of conservation employed by municipalities tend to result in return flow reduction / non-consumptive water savings. This benefits the instream flow portion of the program, but cannot be used to offset new permits without adversely impacting the Columbia River. RCW 90.90.010 (4) states that conserved water must be in placed in trust in exchange for Program funding. Municipalities are therefore better suited to conserve water under existing rights in order to gain water for growth, rather than seek funding under this program for conservation work.




Irrigation Water Management

Irrigation water management (IWM) means to control application of irrigation water in a way that satisfies crop needs without wasting water, soil, or plant nutrients; or degrading the soil resource. This involves applying water (from the WIG 1997):

- According to crop needs
- In amounts that can be held in the soil and be available to crops
- At rates consistent with the intake traits of the soil and the erosion hazard of the site
- So that water quality is maintained or improved

A primary objective of IWM is to give irrigators an understanding of conservation irrigation principles. This is done by showing them how they can judge the effectiveness of their own irrigation practices, make good water management decisions, recognize the need to make minor adjustments in existing systems, and recognize the need to make major improvements in existing systems or to install new systems. The net results of proper irrigation water management typically:

- Prevent excessive use of water for irrigation purposes
- Maintain or improve quality of ground water and downstream surface water
- Increase crop biomass yield and product quality
- Prevent excessive soil erosion
- Minimize pumping costs
- Reduce labor

Tools, aids, practices, and programs to assist irrigators in applying proper irrigation water management include:

- Using water budgets, water balances, or both, to identify potential water application improvements
- Using soil characteristics for water release, allowable irrigation application rates, available water capacity, and water table depths
- Using crop characteristics for water use rates, growth characteristics, yield and quality, rooting depths, and allowable plant moisture stress levels
- Knowing water delivery schedule effects
- Using water flow measurement for on field water management
- Knowing irrigation scheduling techniques
- Applying irrigation system evaluation techniques

IWM is funded by individual farmers and through local programs. There are 200,000 -300,000 acres currently estimated to be in IWM in the Columbia River Basin, resulting in average water savings of approximately 10% to 17% per acre per year. Annual costs for IWM average $8-$20 per acre. Additionally, Ecology and the conservation districts identified the following specific IWM opportunities as part of this year's inventory:

- The Columbia River Basin Ground Water Management Area or GWMA was formed by locally elected leaders and citizens of Adams, Franklin, and Grant counties in 1997. This was done in response to scientific data showing nitrate in concentrations above naturally-occurring levels for this area (10 milligrams per liter). GWMA runs a cost-share IWM program to encourage growers to implement irrigation water management planning by using moisture monitoring for efficient use of water resources and nutrient management. Their goal is to implement IWM practices on 400,000 of the 800,000 irrigated acres.

Irrigation Water Management	2006	2007
Number of Projects	**1**	**33**
Number of Projects w/ Estimated Water Savings	**1**	**1**
Number with Estimated Cost	**1**	**1**
Estimated Water Savings ac-ft/year	243,503	243,503
Estimated Cost	$9.1 million	$9.1 million
Estimated Cost Per Acre-ft	$38	$38

This category includes automation projects (e.g. telemetry and control structures) and IWM projects. Generally, IWM projects represent annual savings on the order of $30 to $50 per ac-ft.

- The Bureau of Reclamation provides opportunities through the Agri-Met program. The Agri-Met program consists of weather stations and automated data collection platforms that provide near-real-time information the Pacific Northwest water operations management. This program is dedicated to the development of crop water use modeling and other agricultural operations (http://www.usbr.gov/pn/agrimet/).

- The AgWeatherNet (AWN) is a service of Washington State University that provides access to the raw data from their Public Agricultural Weather System (PAWS) and AWN weather network. The AWN includes 98 weather stations located mostly in the irrigated regions of Eastern Washington providing a weather data update about once an hour. The AWN network is administered and managed by the AgWeatherNet Program located in Prosser, Washington, and has been available only by subscription until now. You must register to gain access to the AWN raw data. Once registered, you can log in at any time to view or download data (http://www.weather.wsu.edu/)

- There are various private consultants that provide IWM services to irrigation districts, private farms, federal and state agencies. They help develop comprehensive water conservation and irrigation management programs. These services often include soil moisture monitoring, aerial infrared sensing, irrigation scheduling software, and on-line resources for water users.

IWM primarily reduces return flows. As such, it creates instream flow benefits in the river between the withdrawal point and where irrigation water returns to the river. Depending on the location of the farm, the location and timing of that return flow will vary. This type of conservation is not well-suited for the issuance of new permits without creating a deficit in the river below the point where return flows historically returned.

Irrigation Automation & System Control

Automation of irrigation system water applications can reduce manager time and effort considerably while maintaining yields and allowing control of water use efficiency of cropping systems. The goal is to provide plants with the required amount of water when necessary. By preventing over irrigation, automated systems can reduce fertilizer and water losses to deep percolation and improve yields (http://www.ars.usda.gov/research/). Some benefits of Irrigation Automation include (http://www.arguscontrols.com/articles/Irrig_tech_auto.pdf):

- Increases irrigation system performance
- Reduces run-off, thereby reducing water and fertilizer costs while lessening environmental impact
- Improves irrigation uniformity through more accurate water application
- Improves control of your irrigation by ensuring it gets done exactly when it is needed
- Improves crop quality and yield while often reducing disease

Automation & System Control	2006	2007
Number of Projects	**34**	**46**
Number of Projects w/ Estimated Water Savings	**21**	**21**
Number with Estimated Cost	**34**	**40**
Estimated Water Savings ac-ft/year	26,307	26,307
Estimated Cost	$9.7 million	$9. 7 million
Estimated Cost Per Acre-ft	$371	$371

Acquisition Overview

Water acquisition is an important avenue to securing water supplies for drought relief, interruptible users and other Columbia River Program objectives. RCW 90.90.010 (2) (a) states that expenditures from the Columbia River Basin Water Supply Development Account (Account) may be used to "assess, plan, and develop new storage, improve or alter operations of existing storage facilities, implement conservation projects, or any other actions designed to provide access to new water supplies within the Columbia River Basin for both instream and out-of-stream uses. Except for the development of new storage projects, there shall be no expenditures from this account for water acquisition or transfers from one water resource inventory area (WRIA) to another without specific legislative authority."

While acquisition is a tool that we can use to meet Program objectives, there is a strong preference to keep water savings within a watershed or WRIA by matching up conservation savings and new permits issued based on that savings. Only though legislative approval can water acquired by the state with Program funds be used to meet permitting objectives in other watersheds.

Chapter 90.90 RCW did not define "acquisition or transfer." Ecology included several policy alternatives to interpret this statute in its Programmatic EIS. A narrow interpretation of these terms would make fewer projects subject to the cross-WRIA transfer prohibition, which would:

- Provide Ecology with greater flexibility in matching available sources of supply funded under the program with pending applicants throughout the Columbia River Basin.
- Tend to give more weight to the priority system (first in time, first in right) for applicants who have waited years or even decades for water rights.
- Create the potential for more transfers between watersheds.

Conversely, a broad interpretation would make most non-storage projects subject to this provision and would:

- Decrease Ecology's ability to match available supplies to those applicants longest in line.
- Provide a closer link between the sources of supply and those applicants benefiting from that supply within a watershed.

After considering comments received on the EIS, Ecology identified a preferred alternative that defined acquisition and transfer. It includes a specific, but inclusive list of projects types that we felt best matched legislative intent to preserve supplies within a WRIA where possible. "Acquisition" means funding projects from the Account to reduce consumptive water use by any of the following methods:

- Purchasing water rights to place in the Trust Program
- Reducing crop water duty (deficit irrigation without crop change)
- Changing crops (e.g., permanent change of orchard to vineyard)
- Fallowing or idling corner irrigation of center-pivot irrigation systems or Land Retirement
- Switching from irrigated to non-irrigated crops
- Acquiring partial season buy-backs (for example, foregoing irrigation after first cutting of hay)

The EIS preferred alternative defined "transfer" as the change of a water right from one place and person to another place and person, or the issuance of a new permit where the consumptive demand is mitigated by a water right "acquired" using Account funds and held in the Trust Program.

Since the Programmatic EIS, Ecology is also investigating additional aquisition opportunities , such as:

- Partnering with state and/or federal conservation programs (i.e. Irrigation Efficiencies Grant Program, Conservation Reserve Enhancement Program)
- Participating in future BPA power buy-back programs

Chapter 90.90 RCW directs Ecology to place water gained through conservation measures funded by the Account into trust in proportion to the state funding provided to implement a project (RCW 90.90 (4)). Water right acquisition involves the selling or leasing of all or a part of a water right to state or federal agencies, or to private conservation organizations. The landowner then reduces diversions equal to the portion of the water right acquired. The diversion reduction may result from fallowing a previously irrigated field or portion thereof, reducing on-farm water duty through efficiency increases, or by other means.

For water gained through acquisition, the state may acquire all or part of an existing water right through purchase, gift, or other appropriate means other than by condemnation. Once acquired, such rights are trust water rights. A water right acquired by the state that is expressly conditioned to limit its use to instream purposes shall be administered as a trust water right in compliance with that condition (RCW 90.42.080 (1)(a)).

Despite its possible use in the Program, there are several obstacles to administering a successful water acquisition program. A report published by the Policy Consensus Center has described Ecology's water acquisition programs as marginally successful because of trust issues. Many farmers throughout the state view both Ecology and its Trust Water Right Program negatively; there is distrust of both Ecology motives and the quality of its scientific data. Other factors identified as barriers include fear of relinquishment and concerns over the effect water acquisition will have on the local agricultural economy. Competition with other programs, such as Irrigation Efficiencies Grant Program and the Conservation Reserve Enhancement Program may also negatively influence the overall success of Ecology's water acquisition programs.

There are two tools that Ecology can use in order to acquire water rights. These tools are:

- Purchase of water rights to place in the Trust Program. Two pieces of legislation – Chapter 90.38 RCW, the 1989 Yakima River Basin Water Rights Act and Chapter 90.42 RCW, the 1991 Water Resources Management Act – created a tool to acquire and manage water rights on a voluntary basis. Under the measures, water rights can be transferred to meet presently unmet needs, including instream flows for fish. Water rights acquired through Account funding can be managed within the trust water right program. Under the trust water laws, Ecology can acquire water rights through purchase from any person or entity or combination of persons or entities. Once acquired, these rights become trust water rights. Purchase of water rights work with the Program to meet the objective of issuing new permanent water right permits and to gain permanent fish benefit.

- Temporary acquisitions. Under the trust water laws, Ecology can also acquire water rights through leases (fixed-term or dry-year), donations, and other temporary measures. Once acquired, these rights become trust water rights for the term of the acquisition. Acquisition of temporary water rights meets Program objectives by providing water for interruptible water users and providing short-term fish benefit. Ecology may also be able to use leased water in the Trust Program to issue fixed term permits. Unlike permanent water rights, fixed-term permits would be for a specific period and would need to be matched with temporary demands. For example, term permits would not be used to support growth of municipalities or long-term crop investments like orchards.

The Columbia River Program is not the only acquisition funding entity to face concerns. The Irrigation Efficiencies Grant Program typically has surplus funds every year above program demand. This surplus is not due to lack of need for on-farm efficiency but rather concerns over water rights. In some cases, this concern is aggravated by statutory requirements for trust water to return to the farmer after the term of the efficiencies investment (e.g. 20 years). Conservancy groups also deal at times with surplus monies and a difficulty in attracting participants in acquisition programs.

Ecology is currently negotiating a scope of work with Washington Water Trust and Washington Rivers Conservancy to partner on water acquisitions in the Columbia River Basin. The focus for 2008 is small acquisitions of water already made available from existing conservation programs (e.g. fallowed corners associated with irrigation efficiency).

Finally, one of the most significant and consistent concerns heard by Ecology by watershed planning groups, county governments, and other local constituencies is the concern that water acquired in tributary basins for new Columbia River permits is needed also for tributary uses. The law mandates that water acquired in a WRIA must stay in the WRIA through new Columbia River permits for local uses. Ecology is working with watershed planning groups and the PAG to find projects that meet both Columbia River and local WRIA objectives and this value is given weight in the funding guidelines.

Federal Conservation Programs

Land Conservation Program

Land Conservation Programs are generally riparian or upland conservation programs that remove irrigated land from production for some state or federal conservation program purposes. Conservation Reserve Enhancement Program (CREP) and Conservation Reserve Program (CRP) are examples where irrigated agriculture is put to use for some other conservation practice not requiring irrigation (Ecology, 2006).

For programs such as CREP agricultural landowners can enroll eligible riparian lands into 10 to 15-year contracts and receive annual conservation payments, cost-share payments, and incentive payments for the riparian restoration practices. CREP is a continuous sign-up program and participants are not ranked (http://www.fsa.usda.gov/).

This program includes reimbursement of 75 percent (50 percent of the cost-share comes from the federal government and 25 percent from the state) of the eligible costs of planting, fencing, and livestock watering facilities. One-time incentive payments are also offered.

The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners. Through CRP, a landowner can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. To be eligible for CRP enrollment, a producer must have owned or operated the land for at least 12 months unless acquired through some means that provide assurance to FSA that a new owner did not obtain the land solely to place it in CRP. Unlike CREP, offers for CRP contracts are ranked for environmental benefit. CRP participants receive annual rental payments, and may be eligible for certain incentive payments and cost-share assistance (http://www.fsa.usda.gov/).

Land retirement programs are best suited to cropland where environmental costs are high relative to the value of production. Such lands are often characterized by lower productivity in crop uses or exceptionally high ecological services in a natural state, particularly where environmental concerns are acute and ecosystem functions require time to re-establish.

Land Conservation Programs can include both irrigated and non-irrigated farmland. For lands that have been historically irrigated under a valid water right, these programs can generate water savings. The Legislature has created protection in the water code from relinquishment for participants in these programs (RCW 90.14.140).

Because enrollment in a land conservation program includes fallowing of land, at least on a temporary basis, it can provide significant consumptive use savings. Surface water rights and select groundwater rights can be acquired and managed in the Trust Water Right Program and become a source of supply for both instream and out-of-stream uses. Groundwater rights that cannot be managed in the Trust Water Program, may still be used as a source of supply under the Columbia River Program provided the lands are within the Columbia River Basin Project (See RCW 90.90.010 (5)).

General Water Conservation	2006	2007
Number of Projects	**37**	**88**
Number of Projects w/ Estimated Water Savings	**3**	**5**
Number with Estimated Cost	**6**	**9**
Estimated Water Savings ac-ft/year	11,914	12,914
Estimated Cost	$7,066,300	$7,196,300
Estimated Cost Per Acre-ft	$593	$557

If savings are only available for a specific term, there are three potential coordinated uses for this water under the Columbia River Program.

1. This water can be managed to provide instream benefits under the program (RCW 90.90.005 (2).
2. This water can be managed as a source of supply for interruptible water users during the term of the savings (RCW 90.90.020 (3) (c)).
3. This water can mitigate for temporary out-of-stream uses through term permits—the term of the permit made equal to the term of savings. If at the end of the term, Ecology has not obtained additional savings, then the permits would cancel.

It may be possible for Ecology to develop a continuous term permitting system to match this type of savings to those applicants that can tolerate some uncertainty in their permit. For example, there are undoubtedly applicants that would accept a seven-year term permit if otherwise their application would be denied. This is particularly true if Ecology could consistently acquire water savings that would allow the term permits to be renewed. However, it would be important for these term permit holders to develop appropriate crops based on the risk of the permit being cancelled in the future (planting row or hay crops, rather than long-term orchard investments).

Ecology does not have information on the magnitude or cost of water conservation programs associated with federal land conservation programs. In the coming year, Ecology plans further research on this potential source of water for the Columbia River.

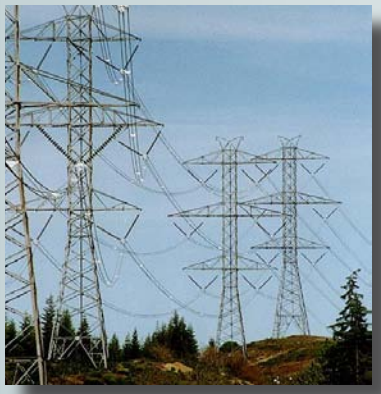
BPA's Dry Year Strategy

BPA makes decisions on what dry year tools to pursue to maintain power system stability and reliability in a drought year. BPA balances these goals for power system stability with its other statutory responsibilities, including:

- Balance both non-power and power uses during energy shortages.
- Maintain federal trust responsibilities.
- Protect fish and wildlife consistent with Endangered Species Act, the 1980 Northwest Power Act, and other laws.
- Act in a sound business manner.
- Provide an adequate, efficient, economical, and reliable power supply.
- Provide a cost-effective solution to energy shortages to maintain rates as low as possible and minimize the economic impact to the region and the Federal Columbia River Power System.

BPA relies on several tools during drought when power generation capacity and demands are most out of balance. (Guide to Tools and Principles for a Dry Year Strategy, BPA, 2006). One tool, load buy down involves paying farmers under contract to voluntarily fallow irrigated lands. Load buy down within the Columbia Basin Project is well aligned with the Columbia River Program. BPA's dry-year strategy includes the following:

"Columbia Basin Project Water Conservation. Enter into agreements with the U.S. Bureau of Reclamation and the irrigation districts to leave project land fallow, capped at some percent in order to limit disruption to the local agricultural economy. Approximately four acre feet of water per acre of land left fallow would remain in the mainstem Columbia River to improve flows and increase power generation. This would also save energy by reducing energy consumed pumping water into Banks Lake from Roosevelt Reservoir. This program has to be triggered early in January/February before investments and contracts are entered into by irrigators."



BPA also used power buy-back during the 2001 drought season (EIS Ecology, 2006). When buying power from the wholesale market became extremely expensive, BPA reduced its power purchases and instead paid its customers to reduce their demand for BPA power. These transactions are referred to as "buy-backs. "Costs associated with buy-backs were about $450 million in fiscal year 2002 and about $370 million in fiscal year 2003. The majority of the buy-back payments went to investor-owned utilities and direct service industries. Ecology in turn used $1 million from the drought preparedness account to lease 40,000 acre-feet of water from BPA to assist interruptible water users. This water allowed interruptible water users five additional weeks of irrigation during 2001, which resulted in significant economic benefits.

In future years, Ecology could use funds from the Account to participate in power buyback programs. Absent a new large storage facility, Ecology would likely need to invest in a suite of water supply options to provide water to supply the nearly 300,000 acre-feet of interruptible water use on the mainstem. Participating in buy-back programs during drought years is one option Ecology could use to gain water for both instream and out-of-stream uses.

Libby Dam, source: http://www.bpa.com

State Conservation Programs

Irrigation Efficiencies Grant Program

The Irrigation Efficiencies Grant Program provides technical assistance and cost share to promote on-farm water conservation activities. Landowners with a irrigation water right on a priority stream are eligible for the program. In order to receive assistance, farmers have to:

- Install a more efficient irrigation system
- Manage their irrigation system to maximize water conservation (use of best management practices - BMPs)
- Continuously measure and maintain records of their water use
- Install fish screens in diversions within twelve months
- Agree to compliance inspections when proper notice is given
- Lease a percentage of the saved water to the state for a minimum of ten years

The percentage of the saved water put into trust and the length of the trust period partially determines the percentage of cost share available. The landowner can receive up to 85 percent cost share through the Irrigation Efficiencies Grant Program. The state holds the leased water in trust until the lease period ends; at that time the water right reverts to the landowner in the same form as enrolled. (http://nycd.scc.wa.gov/irrigationefficiencies.html).

Columbia River Account funding could be used with irrigation efficiency funding to fully fund some projects. In most cases, irrigation efficiency projects reduce return flows and have good river-reach benefits that meet the instream objectives of the Columbia River Program. In some projects, consumptive use reduction also occurs, like converting flood irrigation to center-pivot application with fallowed corners. In those cases, using Columbia River Program funding for a portion of the project could mitigate new out-of-stream permits. Ecology plans to work in the coming year to review options for coordinating these funding programs.

Acquisition Inventory Results

Crop Water Duty Reductions

Crop Duty Reductions	2006	2007
Number of Projects	**0**	**15**
Number of Projects w/ Estimated Water Savings	**0**	**0**
Number with Estimated Cost	**0**	**0**
Estimated Water Savings ac-ft/year	unknown	unknown
Estimated Cost	unknown	unknown
Estimated Cost Per Acre-ft	unknown	unknown

By using improved water management strategies, it is possible to manage on-farm water use to maximize profits without maximizing plant growth. This can work for crops like tree fruit and vines where the quality of the fruit is often more important than the quantity produced. This strategy may not work for forage crops where the entire plant is harvested (hay, for example). Because reducing crop duty (deficit irrigation) reduces evaporation and transpiration, the consumptive use water savings can be used to meet other needs.

Some farmers have used crop duty reductions to "spread" water use to additional acreage under RCW 90.03.380. For example, a farmer that reduces crop water duty on 20 acres of wine grapes from 24 inches to 18 inches to stress the crop and improve fruit quality could plant approximately five more acres without exceeding the original consumptive use. Alternatively, the Columbia River Program could buy the water saved to benefit instream uses and to mitigate for new out-of-stream permits. Further, since land is not taken out of production, it addresses one of the concerns that local communities have had with Ecology-funded acquisition programs.

Crop Change

This type of conservation measure reduces the crop water needs on a field through a permanent change in crop. Changing from tree fruit (which can require four to five feet of water per acre) or alfalfa (which can require three to four feet of water per acre) to wine grapes (approximately 1.5 feet per acre) is an example of permanent crop change that produces water savings. Alternatively, conversion of land from irrigated crops to non-irrigated crops (such as dry-land wheat) can similarly produce water savings.

While many farmers change crops from year to year or every few years in rotation cycles to deal with nutrient, pest, and economic issues, investments in permanent crop change require long-term planning for water rights. Options for farmers contemplating long-term crop changes that reduce water requirements include:

- "Spreading" or adding additional acres of lower duty crop is an option under RCW 90.03.380, provided that the consumptive use from the new acres does not exceed the water savings from the crop change. Farmers can "spread" the additional acres to land they own, or can sell the water to another farmer and transfer the acres. "Spreading" requires permission from Ecology through the change application process and a number of statutory tests must be met, including no impairment of existing water rights from the change.

- Selling, leasing, or donating the water to the State's Trust Water Right Program. Water Right sales or leases can be a source of revenue for farmers who have surplus water and donations to the Trust Water Program may have income tax advantages. Because a permanent crop change yields consumptive water savings, this type of conservation measure can help Ecology meet both program goals: benefit for in-stream resources and potential mitigation for new out-of-stream permits.

- Farmers that voluntarily use less water than their water rights authorize for five years or more may relinquish the excess portion. There are exemptions to relinquishment, but one method is to donate the unused portion of the water right to the Trust Water Rights Program. The effect of relinquishment is that more water is in the river. However, relinquished water cannot be protected against downstream junior priority water users who may benefit from increased availability--especially during times of water shortage. Nor can relinquished water serve as mitigation for new permits. If farmers place this water in trust, either permanently or on a temporary basis, the water retains its priority and can be used to benefit the Program. Temporary placement through leases or donations also allows the farmer to regain use of the water right in the future.

  Many Washington farmers are switching to low duty crops such as wine grapes. According to the Washington Vineyard Acreage Report (2006), farmers reported that 31,000 acres of land were being used to grow grapes in 2006; up from 680 acres in 1993. The current emphasis on biofuels may also lead to increased crop change and attendant water savings. If these trends continue, there is potential for continued water savings through permanent crop change.

Fallowing Corners / Land Retirement

Fallowing corners typically results from the installation of a circular, center-pivot irrigation system on a square parcel that has been historically irrigated using less efficient means such as flood irrigation. For example, consider a one-quarter section (160 acres) that has been irrigated using surface (rill or flood) irrigation. An upgrade to a center-pivot system (approximately 100 acres) would leave four 15-acre parcels. During these upgrades, it can be costly or difficult to continue to irrigate the four remaining corners. In some cases, the landowner may choose to fallow the corners in lieu of irrigating them by some other method (Ecology, 2006).

The EIS defined fallowing of corners as one type of "acquisition" under RCW 90.90.010 (making this type of project subject to the same-WRIA permitting standard). Fallowing corners is a type of conservation project that offers multiple benefits to the Columbia River Program, including:

- Allowing Ecology to partner funding from the Account with other funding sources like the Irrigation Efficiencies Program, providing multiple incentives for farmers to upgrade their systems

- Providing consumptive water savings, which can be typically managed in Ecology's trust water program. This type of trust water results in instream flow benefits and can be used to mitigate for new out-of-stream permits issued under the program

Land can also be retired from irrigation for conservancy and habitat purposes that can result in water savings. For example, in 2003 Ecology cost-shared ($100,000) with the Bureau to acquire a Wenas Creek (Yakima River, Subbasin No. 15) water right. The property is now owned by the Bureau for habitat enhancement purposes and the water right is managed in the State Trust Water Program. Ecology has also explored other land retirement opportunities with federal, tribal, and river conservancy partners. The fallowed corner projects identified by the conservation programs to-date have been associated with conservation projects (like irrigation efficiency) completed within the lasts years. Higher savings may be possible through future project implementation.

Example of "Fallowing Corners"

Fallowed Corners / Land Retirement	2006	2007
Number of Projects	**0**	**45**
Number of Projects w/ Estimated Water Savings	**0**	**31**
Number with Estimated Cost	**0**	**31**
Estimated Water Savings ac-ft/year	unknown	392
Estimated Cost	unknown	$392,100
Estimated Cost Per Acre-ft	unknown	$1,000

Partial Season Acquisitions / Leases

As part of its program-wide acquisition goals, Ecology has obtained partial season leases, most notably during drought years when drought funds were available. Participating farmers forgo second and third hay cuttings during the months of July, August, and September when water demand is high. Partial season leases result in consumptive use reduction and therefore benefit fish while fulfilling permits on a temporary basis. While partial season leases will not result in a permanent water supply for new permits, they can be used to meet interruptible and short-term water needs. Ecology has not yet invested Columbia River Program dollars in acquiring partial-season leases, but is exploring this potential as part of the on-going study on acquisition described in Chapter 3.

Partial Season Acquisition/Lease	2006	2007
Number of Projects	**3**	**9**
Number of Projects w/ Estimated Water Savings	**3**	**5**
Number with Estimated Cost	**3**	**3**
Estimated Water Savings ac-ft/year	80,360	80,360
Estimated Cost	$6,700,000	$6,700,000
Estimated Cost Per Acre-ft	$83	$83

Table 4-2: Summary of Water Supply Inventory for 2006 and 2007

Type of Project	Number of Projects Listed		Projects with Water Savings (Projects with Cost Data)		Projects with Water Savings & Cost Data		Estimated Water Savings acre-feet/year		Estimated Cost		Estimated Cost per acre-foot	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
New Large Storage (> 1 million acre-ft)	6	5	6 (6)	5 (5)	6	5	8,872,000	6,000,000	$13,167,000,000	$10,392,000,000	$1,484	$1,732
New Small Storage (< 1 million acre-ft)	24	104	20 (7)	89 (49)	6	43	40,760	251,240	$32,220,700	$727,952,510	$790	$2,897
Aquifer Storage & Recovery	1	31	1 (0)	6 (10)	0	2	unknown	343	unknown	$3,400,000	unknown	$9,913
Modification to Existing Storage	1	5	1 (0)	4 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Lining/Piping	93	165	79 (89)	109 (124)	79	107	418,526	451,310	$456,740,404	$505,691,321	$1,091	$1,120
On-Farm Efficiency	5,220	5,587	5,197 (5,199)	5,402 (5,410)	5,197	5,399	216,886	259,952	$276,879,143	$338,459,565	$1,277	$1,302
Irrigation Water Management^	1	33	1 (1)	1 (1)	1	1	243,503	243,503	$9,167,184	$9,167,184	$38	$38
Automation & System Control	34	46	21 (34)	21 (40)	21	21	26,307	26,307	$9,757,000	$9,757,000	$371	$371
General Water Conservation *	37	88	3(6)	5 (9)	3	4	11,914	12,914	$7,066,300	$7,196,300	$593	$557
Tail Water Reuse	2	4	2 (2)	4 (4)	2	4	2,900	5,800	$520,000	$1,040,000	$179	$179
Surface to Groundwater Conversion	1	1	1 (1)	1 (1)	1	1	360	360	$200,000	$200,000	$556	$556
Reclaimed Water	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Municipal Conservation	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Partial Season Acquisitions/Leases^	3	9	3 (3)	5 (3)	3	3	80,360	80,360	$6,700,000	$6,700,000	$83	$83
Fallowed Corners/Land Retirement	0	45	0 (0)	31 (31)	0	31	unknown	392	unknown	$392,100	unknown	$1,000
Crop Water Duty Reduction	0	15	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Land Conservation Programs	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Crop Change	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Total (all)	5,423	6,138	5,335 (5,348)	5,683 (5,687)	5,319	5,621	9,913,516	7,332,481	$13,966,250,731	$12,001,955,980		
Total (conservation & acquisition only)	5,391	5,993	5,579 (5,623)	5,551 (5,591)	5,307	5,571	1,000,756	1,080,898	$767,030,031	$878,603,470		

2007 numbers reflect 2006 data with added data from 2007.

* General Water Conservation projects include public education, planning, researching and developing innovative irrigation implementation.

^ Annual cost per-acre feet

Table 4-3: Summary of Storage Inventory

Storage Project *	Volume (acre-feet)	Estimated Cost	Cost / Acre-Foot ($ /ac-ft)
Crab Creek	1,000,000 to 3,000,000	$932 Million to $2.4 Billion	$932 to $792
Sand Hollow	1,000,000	$1.6 Billion	$1,642
Hawk Creek	1,000,000 to 3,000,000	$6 Billion to $8 Billion	$5,979 to $2,720
Black Rock	800,000 to 1,300,000	$4 Billion	$5,000 to $3,076
Wymer	174,000	$180 Million	$2,184
Shanker's Bend / Similkameen	1,700,000	$260 Million	$153
Kennewick ASR **	318	$2.4 Million	$7,550
New Incremental Storage Releases at Lake Roosevelt	132,500	Unknown	Unknown

* These storage projects are in various stages of environmental review. Additional small storage sites are also included in the inventory in Appendix C.
** Actual capacity would be determined after pilot phase

Table 4-4: Summary of Pump Exchanges

Pump Exchanges	Volume (acre-feet)	Estimated Cost	Cost / Acre-Foot ($ /ac-ft)
Walla Walla	Unknown	$264.5 Million	Unknown
Yakima / Wymer	400,000	$200 Million	$500
Yakima / Kennewick Irrigation District	25,000	$50 Million	$2,000
Yakima / Bureau	85,000	$64.4 Million	$757

One of the most significant efforts Ecology undertook in this legislative report is to identify which conservation opportunities benefit in-stream uses and which could be used for out-of-stream uses (new permits). This distinction is required in RCW 90.90.040(1) so that Ecology can meet the balanced objectives in the statute. Tables 4-5 and 4-6 summarize which conservation projects can be used to meet each goal.

Table 4-5: Summary of Projects Benefiting Instream Uses

Type of Project	Number of Projects Listed		Projects with Water Savings (Projects with Cost Data)		Projects with Water Savings & Cost Data		Estimated Water Savings (acre-feet/year)		Estimated Cost		Estimated Cost per acre-foot	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Lining/Piping	93	165	79 (89)	109 (124)	79	107	418,526	451,310	$456,740,404	$505,691,321	$1,091	$1,120
On-Farm Efficiency	5,220	5,587	5,197 (5,199)	5,402 (5,410)	5,197	5,399	216,886	259,952	$276,879,143	$338,459,565	$1,277	$1,302
Irrigation Water Management ^	1	33	1 (1)	1 (1)	1	1	243,503	243,503	$9,167,184	$9,167,184	$38	$38
Automation & System Control	34	46	21 (34)	21 (40)	21	21	26,307	26,307	$9,757,000	$9,757,000	$371	$371
General Water Conservation *	37	88	3 (6)	5 (9)	3	4	11,914	12,914	$7,066,300	$7,196,300	$593	$557
Tail Water Reuse	2	4	2 (2)	4 (4)	2	4	2,900	5,800	$520,000	$1,040,000	$179	$179
Surface to Groundwater Conversion	1	1	1 (1)	1 (1)	1	1	360	360	$200,000	$200,000	$556	$556
Reclaimed Water	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Municipal Conservation	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Total	5,388	5,924	5,304 (5,332)	5,543 (5,589)	5,304	5,537	920,396	1,000,146	$760,330,031	$871,511,370		

2007 numbers reflect 2006 data with added data from 2007.

* General Water Conservation projects include public education, planning, researching and developing innovative irrigation implementation.

^ Annual cost per-acre feet

Table 4-6: Summary of Projects Benefiting Out-of-Stream Uses (and Instream Uses)

Type of Project	Number of Projects Listed		Projects with Water Savings (Projects with Cost Data)		Projects with Water Savings & Cost Data		Estimated Water Savings acre-feet/year		Estimated Cost		Estimated Cost per acre-foot	
	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Partial Season Acquisitions/Leases^	3	9	3 (3)	5 (3)	3	3	80,360	80,360	$6,700,000	$6,700,000	$83	$83
Fallowed Corners/Land Retirement	0	45	0 (0)	31 (31)	0	31	unknown	392	unknown	$392,100	unknown	$1,000
Crop Water Duty Reductions	0	15	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Land Conservation Programs	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Crop Change	0	0	0 (0)	0 (0)	0	0	unknown	unknown	unknown	unknown	unknown	unknown
Total	3	69	3 (3)	36 (34)	3	34	80,360	80,752	$6,700,000	$7,092,100		

2007 numbers reflect 2006 data with added data from 2007.

^ Annual cost per-acre feet

Summary

Through continued coordination and outreach with the conservation districts, watershed planning groups, and tribes, Ecology has added projects to the inventory and improved the data on conservation options. Table 4-2 summarizes the 2006 and 2007 data by project type. In general, Ecology was able to add approximately ten percent more conservation projects in 2007. Opportunities for large storage (over 1 million acre-feet) have been refined to five options (Hawk Creek, Crab Creek, Sand Hollow, Black Rock and Shanker's Bend). Opportunities for small storage (less than 1 million acre-feet) have increased in number, and are still emerging through watershed plan development and various appraisal studies (such as the Bureau Odessa Study and Ecology's ASR study). Table 4-3 summarizes available data on these projects. Table 4-4 summaries opportunities for pump exchanges currently being evaluated in the Columbia River Basin. Pump exchanges can provide significant instream flow benefits. If combined with storage, they can also provide water for out-of-stream uses.

As summarized in Table 4-5, 92 percent (1,000,146 / 1,080,898) of projects the conservation inventory would result in primarily non-consumptive (river reach) savings. These savings can have profound fish benefits by leaving water in the river (particularly tributaries) longer through diversion reductions. In addition to the flow benefits, it can improve habitat, reduce screening needs, and have water quality benefits. However, these projects (such as canal lining or flood to center-pivot conversions) generally reduce return flows to the Columbia River or other downstream water users. A small portion of the water savings from these projects (on the order of five to ten percent, or about 50,000 to 100,000 acre-feet) may include consumptive savings that could be managed in the Trust Water Program. For example, an on-farm efficiency project that replaces an overhead impact center-pivot system with a low-elevation drop-tube system could reduce spray evaporative loss and wind drift by approximately ten percent (Ecology, GUID 1210). Additionally, more water could be used for out-of-stream mitigation if, like storage, the savings are retimed from periods of low demand to high demand. However, because retiming of return flows tends to be project specific, it is difficult to estimate. However, we could consider the magnitude of this retiming potential to be on the order of one-third of the total savings (e.g. approximately 300,000 ac-ft) if water is retimed from four months in winter to four months in summer.

As summarized in Table 4-6, there appear to be very few conservation projects identified that result in direct consumptive use water savings that can provide mitigation for new permits. Projects that reduce consumptive use either reduce evaporation or transpiration by plants. This water is normally lost to the system and does not return to the river nor to other water users downstream. Therefore, issuing new permits based on these conservation projects does not reduce Columbia River flows, nor does it reduce water that has historically been available to downstream surface and groundwater users. These projects can also have significant instream benefits between the historic point of withdrawal to where the new permitted use is allowed (typically downstream).

There is still much left unknown about these types of conservation savings shown in Table 4-5. They don't tend to be identified in existing planning or other readily-available documents, as opposed to opportunities for on-farm efficiency or canal improvements. In addition to uncertainty about the amount of consumptive water savings, there is uncertainty about the cost of such projects. The data in the table above are based on an estimate of $1000/acre-foot for permanent acquisitions and $100/acre-foot for leases, which may or may not reflect the price that water conservation of this type will cost. In Ecology's recent experience, costs in the range of $1000 to $2000 are not atypical, so the costs in Table 4-3 reflect more of a floor than a ceiling. Additional auctions and direct negotiations with project proponents in the coming years will help better define the market for water.


http://outdoors.webshots.com/photo/2018053210046209414AexPoz?vhost=outdoors

To date, Ecology's acquisition program has met with mixed reviews by external stakeholders. Ecology's other acquisition funding programs and those run by other entities interested in acquiring water have current surpluses. For many existing water right holders, the "carrot" of funding is insufficient to overcome the fear of the "stick" (potential for relinquishment). Ecology plans in the next year to work on partnership opportunities with conservation districts, watershed planning groups, river conservancies, tribes, and others to better make use of existing relationships these groups have with water users. Through future auctions and direct outreach, we hope to better understand how much additional conservation water may be available for mitigation of new permits.

After reviewing the status of the current conservation inventory, it tends to reinforce Ecology's current investment in storage and the legislature's mandate to spend two-thirds of Columbia River funds on storage-related projects. Even within the conservation portion of the inventory, retiming of water supplies appears to have more promise than conservation based on reductions in consumptive use (ET). It is still unclear as to whether large storage, multiple small storage projects, ASR, or some combination will work best for Washington. All of the storage projects have the potential for retiming water from times of relative surplus to scarcity. The pump exchanges offer less retiming potential (unless paired with storage), but provide source substitution resulting in increased benefits (primarily to fish) in tributary streams where habitat is critical. Conservation projects can reduce non-consumptive water use and leave water in rivers longer, which benefits particular river reaches. Some conservation projects can also produce water for out-of-stream uses by reducing the amount of water actually consumed or retiming water. Ecology plans to redouble its efforts on this issue in the coming year to bring additional clarity to this issue. Additionally, by next year Ecology will have evaluated the first round of competitive grant funding, which may help us understand how successfully we can draw interested water right holders to the $200 million in funding.

Chapter 5: Preview of 2011 Supply and Demand Forecast

RCW 90.90.040 directs Ecology to prepare a long-term water supply and demand forecast and to update it every five years. The purpose of the supply and demand forecast is to work hand-in-hand with the supply inventory. By forecasting how supply will change and what new demands will come to Washington, we can project the need for new water supplies from storage and conservation. Ecology submitted our first Water Supply and Demand Forecast on November 15, 2006 that describes the existing physical, legal and managment framework for the Columbia River.

With less than five months to prepare, the 2006 supply and demand forecast does not provide a truly comprehensive picture of water supply issues in the Columbia River Basin. Nevertheless, it does provide an important foundation for understanding the complex river regulatory and management scheme and the broad range of demands on the river. An update to this report is due on November 15, 2011. However, rather than wait until that time to share its efforts on understanding future demand, Ecology plans to provide annual updates in its legislative reports on water supply inventories.
The following summarizes the results of the 2006 report and plans to improve our understanding of Columbia River supply and demand by 2011.

Water Supply Forecast

The 2006 report describes the Columbia River as a dynamic regional water course. Its management is complex and multi-jurisdictional, involving multiple Washington State, local, and tribal jurisdictions, as well as those in Canada, Idaho, and Oregon. Over time, changes in international or interstate agreements, or changes in climate or other factors, may affect the timing and quantity of water flowing in the Columbia River.

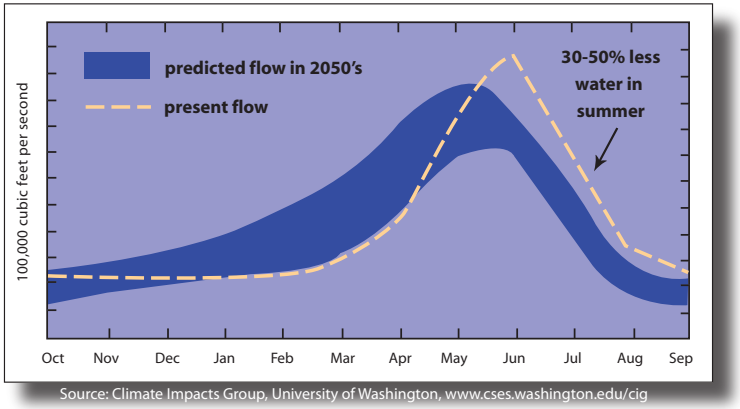
The 2006 report describes drainage areas and tributaries to the Columbia River and provides a water budget detailing average annual flows contributing to the river.

Second, the report describes the regulatory and management framework that overlays "Mother Nature." The construction and operation of dams on the Columbia River and its tributaries have profound impacts on the river--altering its flow regime on a daily basis.

Finally, the report begins to explore what happens when "Mother Nature" changes—specifically, the potential ramifications of climate change.

- The Columbia River Treaty (Treaty) was signed in 1961 by the United States and Canada, and approved by Canada in 1964. The Treaty has no termination date; however, it allows either Canada or the U.S. option to withdraw from the Treaty in 2024 with ten-year advance notice. Regional efforts are currently underway to begin discussion of the Columbia River Treaty prior to the 2014 notice date.
- Operation of Federal Columbia River dams is subject to target flows set by Biological Opinions (BiOp) to protect endangered and threatened species. Storage from Grand Coulee, Hungry Horse, Libby, Dworshak, and other storage projects are used to augment flows for migrating salmonids during the spring and summer. Litigation over the 2004 BiOp has been pending for a number of years on how dams should be operated to bring about the recovery of ESA-listed salmonids. By 2011, additional river operational changes may be in place. Ecology, through the Governor's Office, will continue to monitor and advocate for sound river management strategies.
- Resource planning in other states, by tribal governments, and in Canada can have significant impacts on Columbia River supplies in Washington. In particular, dams and water diversions in British Columbia and Idaho have a large influence on river operations. Ecology plans to continue coordination and outreach efforts with neighboring governments to better understand and coordinate river operation goals and look for water supply opportunities.

- Climate change is becoming an increasingly important component of water demand and supply forecasting. While the cause of climate change is subject to debate, a number of scientific assessments have concluded that the Earth's average temperature will increase during the twenty-first century (http://www.ipcc.ch/). Climate models used in these assessments predict that both temperature and precipitation will significantly increase in the Pacific Northwest over the next 50 years. The potential consequences to water resources in the Pacific Northwest associated with warmer temperatures, greater precipitation, and a shift in winter precipitation type from snow to rain include (Hamlet et al., 2001):
  - Reduced snow packs
  - Higher winter streamflows
  - Increased flood potential
  - Earlier snowmelt-generated peak flows
  - Lower summer flows.



Source: Climate Impacts Group, University of Washington, www.cses.washington.edu/cig

The following table details selected Snotel sites runoff and runoff data for 2007 versus the 30-year trend. It is evident that even where overall precipitation was higher than normal, the early runoff trend was still evident.

Site Name	Location	Elevation (feet)	# of Weeks That Runoff Occurred Earlier Than The 30-yr Mean
Sheep Canyon	Cowlitz/Skamania	4000	6
Stevens Pass	Stevens Pass	4070	3
Blewett Pass	W. of Wenatchee	4300	4
Bumping Ridge	NW of Yakima	4600	6
Quartz Peak	N. of Spokane	4700	3
Bunchgrass Meadows	Colville	5000	2
Paradise	Rainier	5100	5
Moses Mountain	Okanogan	5300	2
Harts Pass	Methow	6500	3

Water Demand Forecast

In 2006, Ecology took three steps to predict future water use in the Columbia River system: assessed current demand, conducted a first tier demand forecast and conducted a second tier demand forecast. Through this Ecology was able to estimate demands through 2026 (a 20 year planning horizon).

Current Demand Assessment. To estimate current demand, Ecology reviewed all of the water rights issued within the Management Zone, including those issued in Oregon. The USGS 2000 Water Use Inventory was also used to determine actual water use throughout this area. Ecology found:

- 7,087 water rights on file, representing over 8 million acre-feet
- 551 water rights and applications on file in Oregon, representing 936,190 acre-feet
- The USGS estimates actual water use at 4,603,266 acre-feet

First Tier Demand Forecast. The first tier demand forecast was based solely on the 454 water right applications located within one mile of the Columbia River (same definition as required for the 2009 Water Resources Information System). This method was selected because advance work had already been done on investigating these water rights. From these applications, Ecology predicted future demand for agriculture and domestic/municipal uses.

- 383,000 acre-feet of water applied for irrigation of 57,000 acres of land
- 87,000 acre-feet for domestic and municipal water for 450,000 people

Second Tier Demand Forecast. In the second tier demand forecast, historical water use data in the Columbia River Basin were used to predict future trends in population and irrigated agriculture. A study conducted by Washington State University and statistics from the Office of Fiscal Management were the basis of this second tier demand forecast:

- WSU predicted irrigated agriculture to remain stable, with a 750,000 acre margin of error (+ /- 3 million acre-feet) [16]
- Population was expected to grow by 20 percent throughout the Columbia River Basin, equating to approximately 350,000 more people (67,500 acre-feet) [17]

Comments received on the 2006 Water Supply Inventory and Long-Term Water Supply and Demand Forecast ranged from Program suggestions to simple text corrections. There was a consensus that, given the time frame, the report contained a good summary and compilation of the information that will be crucial to managing the state's water. Most commentors wanted to see forecasting improved upon because it forms the basis for decisions on water supply. For example, without accurate forecasting information, Ecology cannot accurately determine the role of conservation in providing water supply, how large a storage facility needs to be, and how much staff time and funding is necessary to complete Program mandates. Ecology plans to improve forecasting for its 2011 report and has started a number of efforts:

- Ecology is working to compile existing data on historical stream flows in order to address in-stream projection demands. At present, Ecology has obtained Columbia River flow information from BPA dating from 1929 to present. Ecology is analyzing the data to consider seasonal changes and drought occurrences as we work to understand how best to match available water supplies and projected demand. In the same manner, Ecology is also assessing tributary flow data. Ecology plans to include this information in its Water Resources Information System and make it available to the public through the internet in 2009. The first phase is already available on Ecology's website. The 2011 report will contain a summary of this information.

[16] Ecology used a unit irrigation water demand of four acre-feet per acre per year.

[17] Ecology used the unit domestic and municipal water demand calculated from the First Tier Forecast.

- While Washington State University (WSU) identified flat agricultural demands, due to time constraints they had to rely only on historical USDA agricultural statistics for their modeling. These data does not reflect changing global market conditions that could alter demand for U.S. crops. Additionally, there were several emerging crop markets for which historical statistics were not available. These include the face-paced wine industry in Washington State and renewable fuel crops. In addition, congressional action on the Farm Bill may affect Washington crops. Ecology plans to initiate a study out of its Columbia River operating funds in 2009 to evaluate these future demands. The timing of this study will coincide with the release of our efforts to better understand climate change, and both will be integrated into the 2011 legislative report.

- Ecology is participating with other state and federal agencies to fund a study by the Climate Impacts Group that will provide greater accuracy in predicting climate change in the Columbia River Basin - with a particular focus on the Yakima, Walla Walla, Wenatchee, and Okanogan watersheds. The completed study is expected in 2010 and Ecology will include the results in the 2011 report.

- In addition to changing supply, climate change has the potential to change existing crop demands. For example, in Eastern Washington (within the greater Columbia River Basin), US Geological Survey reports approximately 1.7 million acres of irrigated crops in the greater Columbia Basin. If 20 years from now climate change has resulted in a need for an added inch of water per acre, due to hotter weather and decreasing summer rain, then 140,000 acre-feet more water will be needed to maintain current crop production. There is also 5.3 million acres of non-irrigated agriculture in the basin (e.g. dry-land wheat). Increasing temperatures and shifting of water availability due to climate change may result in some of these lands moving to irrigation to maintain yield and profitability, or a decrease in yield for those that cannot obtain irrigation water. This issue will be included in the next Ecology agricultural demand study in 2009.

- Ecology is developing a Columbia River Drought Insurance Program. Currently, interruptible water rights total about 300,000 acre-feet. However, the degree to which these water uses are interrupted varies depending on the drought year and the effect of interruption. For example, in 2001 a portion of interruptible water users chose not to take part in an Ecology-sponsored drought program. Reasons varied, but it is clear that municipalities and farmers with high-value crops (such as 50 year-old cherry trees) have a greater need for a reliable water supply than a farmer with a hay crop. Ecology plans to evaluate options on allocation of new drought supplies to interruptible water users beginning in 2008 with a Supplemental EIS on the 33,000 acre-feet of water associated with the Lake Roosevelt Incremental Storage Release.

- ESA-listed salmonids in the Hanford reach suffer increased mortality from flow fluctuations caused by dam operations. As Ecology continues to evaluate storage supplies, we plan to consider how storage could be used with existing river operations to reduce these flow fluctuations. This instream demand could have significant benefits for the Hanford Reach. Ecology is making efforts to avoid OCPI determinations in future years by increasing the State's water portfolio.

- One-third of all new storage is dedicated for instream uses. The 2004 Study by the National Academy of Sciences characterizes July and August as the period where low mainstem flows provide the greatest fish risk. As with most things on the Columbia River, the fish situation is not that simple. In fact, desirable flows vary between different fish and at different life stages--making river management much more difficult. Ecology continues to work with our fish partners to better understand instream demands and how best to use water supplies as they are developed. Part of this understanding will come through the Supplemental EIS for Lake Roosevelt, as we consider options on how to release nearly 50,000 acre-feet of water from storage for fish benefit.

- Benefit to fish from implementation of the Columbia River Program goes beyond water instream. Many of the projects being considered in the Columbia River Grant Program can also have water quality benefits (e.g. temperature, turbidity), may remove fish barriers, or have other fish benefits. As Ecology funds conservation and storage improvements, Ecology will track and account for these other non-flow fish improvements on the Columbia River webmap and in future legislative reports.

- Ecology will incorporate feedback from Columbia River dam operators to better understand how new storage would affect supply for power generation and demand for additional power generation. Diverting water to a reservoir in the winter can result in lost power production in those months. However, the opportunity to produce power returns when that water is released from storage prior to its diversion out-of-stream. There may also a be an opportunity to develop integrated pump-storage in the Columbia River system to give dam operators greater ability to buffer changes in power demand that complement wind-based generation. In some cases, this may also provide a benefit by reducing entrained gases. All new storage developments will require extensive coordination with dam operators so that state water supply actions do not result in unanticipated consequences for hydropower generators.

- The Columbia River Program grant funding contains scoring guidelines that favor projects that provide fish benefit to Columbia River tributaries; in particular those tributaries that WDFW has listed as priority streams. Ecology plans to recommend specific projects for funding in 2008 and begin to measure and account for the specific fish benefits that accrue from construction of conservation and storage projects. This data will be made available on the Columbia River Webmap as it becomes available.

- WDFW last updated priority stream reaches in 2003. Since that time, many conservation, habitat and fish barrier improvements have been made through investments by local, state and federal funding partners. Stream reaches also need to be made consistent with federal recovery plans, watershed plans and subbasin plans that have been completed since 2003. Ecology is working with WDFW to provide a way to update this information for use in the Columbia River Grant Program, as well as other local, state and federal funding programs.

- Ecology plans to work with the Washington State Department of Health to better understand municipal demand and opportunities for municipal conservation. For example, in the 2006 legislative report, municipal demand was estimated based on data from OFM, USGS and DOH at 170 gpcd. However, in 2003, the legislature passed the Municipal Water Law which includes new conservation mandates for municipalities. In 2007, DOH adopted a new water use efficiency rule (WAC 246-290), whose implementation is expected to alter municipal water use goals in the future. For example, if the 170 gpcd average was reduced by a modest ten percent for the 350,000 additional people projected in the Columbia River Basin in the next 20 years, demand would drop from 67,500 acre-feet to approximately 60,000 acre-feet. Work is also needed to understand how much of the projected savings will offset new consumptive demand from the river (e.g. xeriscaping, lawn watering controls) vs. timing of returns to the river (e.g. fixing leaky pipes). This information will be included in next year's legislative report.

Ecology's goal, in these annual inventory reports, is to keep the public apprised of our efforts on water supply and demand forecasting. While reporting is only mandated every five years, an ongoing dialogue will ensure Ecology is moving in the right direction with full public review and input into this emerging Program.

Douglas County photo (http://www.douglascountywa.net/departments/tls/NaturalResources/areaphotos.asp)

Appendix A: References

Aspect Consulting. 2005. *Case Study: Aquifer Storage & Recovery Assessment.* http://www.aspectconsulting.com/water_resources.html

Aspect Consulting. 2003. *Multipurpose Water Storage Screening Assessment Report, WRIA 30.* Prepared for WRIA 30 Planning Unit. http://www.aspectconsulting.com/water_resources/wria_30_asr.html

Association of Cities. 1999. Draft Guide to Watershed Planning and Management. Washington State Department of Ecology Publication No. 99-106. Internet: http://www.ecy.wa.gov/pubs/99106.pdf

Bergeron, M.P., Spane, F.A. 2007. *Potential Hydrologic Impacts of a Proposed Infiltration Recharge Gallery on Hanford Site Groundwater-Flow Conditions: A Preliminary Assessment.* Prepared for Energy Northwest. Battelle Pacific Northwest Division: Seattle, WA.

Blanchard, Jim. 2007. Personal communication, United States Bureau of Reclamation, telephone conversation subject Banks Lake Drawdown/reservoir design for pool height and drawdown levels. July 20, 2007.

Bonneville Power Administration. 2007. *The Power of the Columbia.* http://www.bpa.gov/Power/pl/columbia/page4.htm

Bonneville Power Administration, U.S. Bureau of Reclamation, and U.S. Army Corps of Engineers. 2001. *The Columbia River System Inside Story. Federal Columbia River Power System. Second edition*. http://www.bpa.gov/power/pg/columbia_river_inside_story.pdf

Brundtland. 1987. UN Brundtland Commission Report. Our Common Future. Oxford University Press. http://www.are.admin.ch/are/en/nachhaltig/international_uno/unterseite02330/

Clifford, Peggy, Clay Laundry, and Andrea Larsen-Hayden. 2004. *Analysis of Water Banks in the Western States.* Washington State Department of Ecology Publication No. 04-11-011. http://www.ecy.wa.gov/pubs/0411011.pdf

Climate Impacts Group, University of Washington (CIG). 2007. http:// www.cses.washington.edu/cig

Columbia-Snake River Irrigators Association, *2006 Review of Water Conservation and Management Projects for Eastern Washington: With Recommendations for Project Selection Criteria and Development.* Prepared by: IRZ Consulting.

Deschutes Water Alliance. May 2006. *Irrigation District Water Efficiency Cost Analysis & Prioritization Executive Summary*, Prepared By: Newton Consultants, Inc. http://www.ci.bend.or.us/depts/public_works/dwa/docs/ExecSumm___IrrigationDistrictEfficiency.pdf

Fischer, Robert G. 2007. Personal Communication. Wildlife Biologist U.S. Army Corps of Engineers, Seattle District, Chief Joseph Dam.

Flack, J.E. 1981. *Residential Water Conservation.* American Society of Civil Engineers, Journal of the Water Resources Planning and Management Division, Proceedings Paper 16080, p. 85-95.

Foundation for Water and Energy Education. 2007. http://www.fwee.org/c-basin.html

Golder Associates. 2001. *Aquifer Storage and Recovery Pilot Test Report*. Prepared for City of Yakima

HDR. 2006. *Snake River Region Salmon Recovery and Walla Walla Watershed Detailed Implementation Plan.* Prepared for WRIA 32 Planning Unit. http://www.wallawallawatershed.org/_acrobat/WRIA32WatershedPlan/DIP/FINAL_DIP_FULL_JUNE_2006.pdf

Isley, Stan. 2007. Personal communication, United States Bureau of Reclamation, telephone communication regarding draft estimates of the construction const of the Chandler Option of the Yakima Pump Exchange. September 20, 2007.

Lang, Bill.2007. *Center for Columbia River History.* http://ccrh.org/river/history.php

National Research Council of the National Academies (National Research Council). 2004. *Managing the Columbia River: Instream Flows, Water Withdrawals, and Salmon Survival.* Washington, DC: The National Academies Press.

National Engineering Handbook, Washington Irrigation Guide (WIG).

NRCS, *National Engineering Handbook,* Section 15, Chapter 5, Furrow Irrigation (2nd Edition).

Office of Financial Management, Forecasting Division (OFM). 2006. File: gmacountychange.xls From: http:// www.ofm.wa.gov (accessed 9/06). Modified June 29, 2006.

Pacific Climate Impacts Consortium. 2007. http://www.pacificclimate.org

Pacific Groundwater Group. 2004. *WRIA 44/50 Storage Assessment and Feasibility Study.* Prepared for Foster Creek Conservation District. http://www.fostercreek.net/WRIA44-50_Final_Watershed_Plan.pdf

Slattery, Ken. 2002. Personal communication, Washington State Department of Ecology, email subject CSRIA Settlement/probability of regulation under existing rule. December 2, 2002.

U.S. Army Corps of Engineers (Corps). 2003. *Columbia River Water Management Report Water Year 2002.* Columbia River Water Management Group. October 2003. http://www.nwd-wc.usace.army.mil/crwmg/crwmg_reports.htm

United States Army Corps of Engineers. 2007. http://www.nws.usace.army.mil

United States Army Corps of Engineers. 2007a. Energy Information Administration. http://www.eia.doe.gov/cneaf/electricity/epa/epa_sum.html

United States Army Corps of Engineers. 2007b. http://www.nww.usace.army.mil/lsr/final_fseis/study_kit/studypage.htm

United States Bureau of Reclamation, http://www.usbr.gov/pn/agrimet/

United States Bureau of Reclamation. 2004. *Summary Report Appraisal Assessment of the Black Rock Alternative: A Component of Yakima River Basin Water Storage Feasibility Study,* Washington. Technical Series No. TS-YSS-7. http://www.usbr.gov/pn/programs/storage_study/pdf/summaryreport/web0BRSumRptentiredocument2-9-05forWEB.pdf

United States Bureau of Reclamation. 2004. *Appraisal Assessment of the Black Rock Alternative.* http://www.usbr.gov/pn/programs/storage_study/reports.html

United States Bureau of Reclamation and Washington State Department of Ecology. May 2007. *Appraisal Evaluation of Columbia River Mainstem Off-Channel Storage Options*. http://www.ecy.wa.gov/programs/wr/cwp/cr_storage.html

United States Bureau of Reclamation. 2006. *Reclamation: Managing Water in the West, Initial Alternative Development and Evaluation, Odessa Subarea Special Study, Columbia Basin Project, Washington*. http://www.usbr.gov/pn/programs/ucao_misc/odessa/report-alternatives.pdf

United States Bureau of Reclamation. 2006. *Yakima River Basin Storage Alternatives Appraisal Assessment: A component of Yakima River Basin Water Storage Feasibility Study*, Washington Technical Series No. TS-YSS-8, http://www.usbr.gov/pn/programs/storage_study/pdf/alternatives-appraisal/fullreport-yakima_alternatives_appraisal_assessment.pdf

United States Bureau of Reclamation. 2007. *Columbia Basin Project-Washington*. http://www.usbr.gov/dataweb/html/columbia.html

United States Bureau of Reclamation. 2007. *Potholes Reservoir Supplemental Feed Route Draft Environmental Assessment*. http://www.usbr.gov/pn/programs/ea/wash/potholes/potholes-draftea.pdf

United States Department of Agriculture Farm Service Agency Website. http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=landing

United States Department of Agriculture, Natural Resource Conservation Service. 1997.

United States Department of Agriculture, National Agricultural Statistics Service. 2003. Farm and Ranch Irrigation Survey Census of Agriculture. http://www.nass.usda.gov/census/census02/fris/fris03.htm

United States Department of Commerce: National Oceanic and Atmospheric Administration (NOAA). http://www.noaa.gov/

United States Department of Housing and Urban Development. 1984. *Residential water conservation projects--Summary report:* Office of Policy, Development, and Research, Building Technology Division.

United States Fish and Wildlife. 2007. *Conserving the Nature of America.* http://www.fws.gov

United States Geological Survey (USGS). 2002. Columbia River Basin Washington. U.S. Geological Survey Website. http://vulcan.wr.usgs.gov/Volcanoes/Washington/ColumbiaRiver/description_columbia_river.html

Washington Association of Wine Grape Growers. 2006. Washington Vineyard Acreage Report 2006. http://www.wawgg.org/files/documents/2006_Vineyard_Acreage.pdf

Washington State Department of Ecology Publication Number: 05-10-013. June 2005. *Creating New Water Supplies Across Washington State.* http://www.ecy.wa.gov/biblio/0510013.html

Washington State Department of Ecology. November 2006. *Water Supply Inventory and Long-Term Supply and Demand Forecast*. http://www.ecy.wa.gov/programs/wr/cwp/wsi_ltsdf.html

Washington State Department of Ecology. 2007a. POL-2010 Water Resources Program Policy Defining and Delineation of Water Sources http://www.ecy.wa.gov/PROGRAMS/wr/rules/images/pdf/pol_2010.pdf

Washington State Department of Ecology. 2007b. Columbia River Facts and Maps. http://www.ecy.wa.gov/programs/wr/cwp/cwpfactmap.html

Washington State Department of Ecology. February 2007c. *Final Programmatic Environmental Impact Statement for the Columbia River Water Management Program Under Chapter 90.90 RCW*. Publication # 07-11-009. http://www.ecy.wa.gov/biblio/0711009v1.html

Washington State Department of Ecology and Washington Department of Fish and Wildlife. 2004. *Draft Environmental Impact Statement: Columbia River Initiative*. December 2004. http://www.ecy.wa.gov/pubs/0411031.pdf

Washington State Department of Health and Washington State Department of Ecology. 1997. *Water Reclamation and Reuse Standards.* Publication #97-023 http://www.ecy.wa.gov/biblio/97023.html

Washington State Department of Health. January 22, 2007. News Release found on website: http://www5.doh.wa.gov/Publicat/2007_news/07-010.htm

Washington State University (**Wandschneider, Et Al.)**. 2006. Crop Production and Water Use Forecasts for the State of Washington Based on Econometric Estimation and Expert Opinion.

Washington State University AgWeather Net. http://weather.wsu.edu/

Wikipedia. 2007. Columbia River. http://en.wikipedia.org/wiki/Columbia_River

Appendix B: Glossary, Acronyms & Abbreviations

Term	Definition
1980 Instream Flow Rule	In June 1980, Ecology adopted an administrative rule for protecting instream flows on the mainstem Columbia River (WAC 173-563). Water rights on the Columbia River mainstem issued after 1980 are subject to the state instream flow rule.
Acquisition	The selling of a whole or partial water right to state or federal agencies or to private conservation organizations.
Acre-Foot	A unit of volume equal to one acre of area by one-foot depth (equal to 43,560 cubic feet or 325,851 gallons). This unit is generally used to measure the volumes of water used or stored in reservoirs. Also used are thousands of acre-feet (kaf) and millions of acre-feet (maf).
Active Storage	Water occupying the active storage capacity of a reservoir.
Active Storage Capacity	The portion of the live storage capacity in which water normally will be stored or withdrawn for beneficial uses, in compliance with operating agreements or restrictions.
Adjudication	"The process where all those claiming the right to use water from a water source are joined in a single legal action to determine the rights and priorities for the use of the water" (Clifford, et al., 2004:149).
Appraisal	Appraisal studies generally rely on existing data and information to develop plans for meeting current and projected needs and problems in a planning area. Appraisal studies involve a more detailed investigation into design issues and costs than a pre-appraisal study, and lead to feasibility studies. Federal appraisal studies are authorized under the Federal Reclamation Law (Act of June 17, 1902, Stat. 388 and acts amendatory thereof or supplementary thereto).
Appropriation	"The establishment of a water right by diversion, due diligence and beneficial use. Must be adjudicated to establish seniority of right" (Clifford, et al., 2004:149).
Appropriative Right	A water right granted by the State using the State water code and the prior-appropriation process
Aquifer Storage and Recovery	A water storage technique that uses underground aquifers as storage reservoirs. ASR is permitted by Ecology under WAC 173-157 and provides an opportunity for utilizing underground storage, provided certain technical conditions are met. Water may be stored for a period of weeks, months or longer, and then recovered for potable or other uses.
Average Streamflow	The average rate of flow at a given point during a specified period (Corps, 2003).
Basin	"The land area that drains into [a] waterbody" (Clifford, et al., 2004:156).

Term	Definition
Beneficial Use	Beneficial use shall include, but not be limited to, use for domestic water, irrigation, fish, shellfish, game and other aquatic life, municipal, recreation, industrial water, generation of electric power, and navigation (RCW 90.14.031(2) and WAC 173-500-050(4)).
Biological Opinion	A set of recommendations from NMFS defining what operations the Columbia River system operation should be in order to ensure that the endangered species are not placed into jeopardy (Corps, 2003).
Columbia Basin Project	A federal project authorized by Congress in 1935 and developed in parallel with the construction of Grand Coulee Dam. Primary irrigation facilities are the Feeder Canal, Banks Lake, the Main, West, East High, and East Low Canals, O'Sullivan Dam, Potholes Reservoir and Potholes Canal. There are over 300 miles of main canals, about 2,000 miles of laterals, and 3,500 miles of drains and wasteways on the project (Bureau of Reclamation, 2006a). The project irrigation facilities were planned to deliver a full water supply to 1,029,000 acres of land previously used only for dry farming or grazing. About 621,000 acres are currently authorized to be irrigated and further development is on hold.
Columbia River Initiative (CRI)	An initiative created to address the water management issues in the Columbia River. The CRI included a framework for issuing new water rights from the Columbia River while improving streamflows for fish. The CRI was composed of four elements—a legislative proposal for consideration in the 2005 legislative session, a proposed budget to secure water and conduct feasibility studies of new off-channel storage projects, draft rule language for implementation of the CRI, and cooperative agreements with federal and local partners.
Columbia River Water Management Program	A program established by House Bill 2860 in which Ecology aggressively pursues development of water supplies to benefit both instream and out-of-stream uses through storage, conservation and voluntary regional water management agreements.
Columbia-Snake River Irrigators Association (CSRIA)	An association that represents farming operations in Eastern Washington that irrigate about 250,000 acres of row crop, vineyard and orchard lands. Its members have farming operations along the Columbia-Snake River system north from the City of Brewster, reaching to the south along the John Day and McNary Pools of the Columbia River. Some of the members own farming operations in the Yakima Valley and within the CBP area. The membership also includes several municipal service irrigators, including Brewster, Kennewick, West Richland, and the Kennewick Irrigation and Hospital Districts (Ecology, 2006b).
Conceptual (level)	Conceptual level studies involve the most basic level of evaluations for a project. This level of study is typically required for initial funding, which includes a summary of the project, identification of preliminary issues to be investigated and order-of-magnitude costs.
Conservation	Conservation is the management of water resources so as to maximize efficiency of use and eliminate waste. In the context of the Columbia River Water Management Program, conservation generally refers to non-storage projects and can include water right acquisitions, infrastructure efficiency projects, and other projects designed to provide access to new water supplies for both instream and out-of-stream uses.

Term	Definition
Construction (level)	A construction level evaluation is the final design prior to preparing a project for bid, and includes final cost estimates.
Consumptive Use	Use of water whereby there is a diminishment of the water source (WAC173-500-050(5)). In the context of irrigation, consumptive use includes crop evapotranspiration, and water evaporated during irrigation applications (e.g. spray, canopy and wind losses).
Control Point	A stream gage that is used to measure the discharge of the stream to ensure that instream flow requirements are met.
Crop Irrigation Requirement (CIR)	Water supplied by irrigation to satisfy evapotranspiration that is not provided by water stored in the soil and precipitation. Where additional quantities of water are required for leaching, frost-protection, cooling and other miscellaneous crop requirements, these quantities are added to the CIR.
Crop Water Duty Reduction	Using improved water management strategies to manage on-farm water use to maximize profits without maximizing plant growth.
Cubic Feet Per Second (cfs)	Unit of measure expressing rates of discharge. Also expressed as thousand cubic feet per second (kcfs) (Corps, 2003). One cfs is equal to 449 gallons per minute and approximately two acre-feet per day.
Dam	A barrier built across a watercourse for impounding water.
Decision Support System	A model that attempts to capture many different parts of a complex system and couple them together in a variety of ways. The connections between parts can be quantitative (i.e. non-linear and linear mathematical relationships) and qualitative (i.e. preferences or rules). Groups of parts can be examined independently or in conjunction with others. DSS is useful for compiling and organizing information as well as for simulating processes and making decisions.
Discharge	The rate of flow of a river or stream measured in volume of water per unit of time. The standard units of measure are cubic feet per second (cfs) or thousand cubic feet per second (kcfs) (Corps, 2003).
Diversion	The amount of water withdrawn from surface or ground water sources (Corps, 2003).
Drafting	The process of releasing water from storage in a reservoir. Operators begin drafting reservoirs—through turbines or over the spillway of a dam —to lower the level for a number of reasons, including flood control or downstream flows for fish or power generation (FCRPS, 2001).
Drawdown	The distance that the water surface of a reservoir is lowered from a given elevation as the result of the withdrawal of water (Corps, 2003).

Term	Definition
Efficiency	Generally, efficiency is the ratio of output to input. Efficiency in the Columbia River Water Management Program will depend on the context of the project (e.g. agricultural, industrial, municipal). Increasing efficiency could be measured by increasing the output with the same amount of input, or by maintaining the same output with less input. For example, increasing irrigation efficiency means that the same or a greater crop production occurs with less water use. See also, Irrigation Efficiency.
Endangered Species	Any species which, as determined by the U.S. Fish and Wildlife Service, is in danger of extinction throughout all or a significant portion of its range other than a species of the class Insecta determined to constitute a pest whose protection would present an overwhelming and overriding risk to man (Corps, 2003).
Evapotranspiration	A loss of water from the soil both by evaporation and by transpiration from growing plants.
Existing Water Right Capacity	The difference between current water use and existing water rights.
Fallowing Corners	Occurs when a center pivot with a round irrigation pattern is installed on a square(ish) field and the landowner decides to leave the corners uncultivated in lieu of irrigating them by some other method.
Feasability Studies	Feasibility studies involve generation and collection of detailed, site specific data concerning a project and reasonable alternatives. Feasibility studies are usually integrated with National Environmental Policy Act (NEPA) compliance, potentially including development of a NEPA EIS.
Feed Route	A route (can be a combination of artificial and natural channels) used to transport irrigation water from one location to another.
First Tier Demand Forecast	A water demand forecast based solely on water right applications on file in Ecology's WRTS database. It includes a summary of water right applications and the water use associated with those applications.
Flood Control	Any activity designed to reduce the flow and impact of a flood. Flood control measures include levees and wall construction; improving discharge capacity of the stream channel; reservoir and dam construction; and diversion of excess water into bypasses or floodways.
Freeboard	This is the height from the waterline to top of boom flotation to prevent splashover at water storage facilities (dams).
Furrow / Rill Irrigation	Rill irrigation is accomplished by making narrow trenches in the land with a tractor and plow. Water is then flooded into these trenches.
Gage	An instrument that can measure water quantity and quality parameters.

Term	Definition
Group A Systems	Those domestic water systems that regularly serve either 15 or more service connections or 25 or more people per day for 60 or more days per year.
Group B Systems	Those domestic water systems that serve fewer than 15 service connections and fewer than 25 people per day, or 25 or more people per day for fewer than 60 days per year.
Hydropower	Mechanical energy derived from falling or flowing water, e.g., rivers, streams, and the overflow of dams. Water flowing from a higher level to a lower level (as from a dam or waterfall) is used to activate a turbine that drives an electric generator, a process called hydroelectric power generation. The amount of power furnished is proportional to the rate of flow of the water and the vertical distance through which it falls.
Impoundment	A facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold an accumulation of liquid.
Inchoate Water Right	An inchoate water right is an incomplete appropriative right in good standing that comes into being when the first step required by law for acquiring an appropriative right is taken (e.g. a permit is issued). The inchoate right remains in good standing for so long as the requirements of the law are fulfilled. An inchoate right to use water ripens into a vested water right only in the amount of water actually put to a beneficial use. In relation to the Columbia River, inchoate rights represent a portion of existing water rights that may be “in the river” now, but may not be in the future as the rights are developed.
Incomplete Appropriative Right in Good Standing	A water right granted by the State that has not been fully perfected to the permitted quantities and issued a final Certificate of Water Right.
Instream Flow	Used to identify a specific streamflow (typically measured in cubic feet per second, or cfs) at a specific location for a defined time, and typically following seasonal variations. Instream flows are usually defined as the streamflows needed to protect and preserve instream resources and values, such as fish, wildlife and recreation. (http://www.ecy.wa.gov/programs/wr/instream-flows/isfhm.html). A specific instream flow can be adopted by Ecology in rule, which becomes a water right with a priority date of the adoption of the rule; see 1980 Instream Flow Rule.
Instream Use	“A type of end application of water use that does not require withdrawal from the source. Examples of instream uses are recreational, navigational, and ecosystem preservation” (Clifford, et al., 2004:150).
Interruptible Water Right	Water rights junior to the 1980 instream flow rule that could be curtailed in low flow conditions in order to maintain adequate flows for fish. Interruptible rights can be curtailed when the March 1 forecast for April through September runoff at The Dalles Dam on the lower Columbia River is less than 60 million acre-feet.

Term	Definition
Inventory	The water supply inventory described in this report combines the information requirements under Sections 5 and 6 of ESSHB 2860. Section 5 of ESSHB 2860 defines the required elements of the water supply inventory as: • A list of conservation projects that have been implemented under this chapter and the amount of water conservation achieved • A list of potential water supply and storage projects in the Columbia Basin, including: - Cost per acre-foot - Benefit to fish and other instream uses; - Benefit to out-of-steam uses - Environmental and cultural impacts. Section 6 of ESSHB 2860 describes information requirements for a Columbia River mainstem water information system that includes: • Total aggregate quantity of water rights issued under state permits and certificates, and filed under state claims on the Columbia River mainstem and for ground water within one mile of the mainstem; and • Total volume of current water use under these rights as metered and reported by water users.
Irrigation	The controlled application of water to cropland, hay fields and/or pasture to supplement that supplied by nature.
Irrigation Efficiency	Irrigation efficiency represents the amount of water that needs to be applied in addition to the crop requirement for a particular type of irrigation system to meet the component system losses described below.
John Day/McNary Reserve	On August 8, 1978, the John Day/McNary Reserve (WAC 173-531) was created to set aside 1,320,000 acre-feet per year to provide a water supply for the 330,000 acres of irrigation projected to be developed in the Columbia Basin by the year 2020 and 26,000 acre-feet of water for municipal use. The reserve is directed toward lands under existing water right permits, pending applications, and land for which appropriation applications may not yet have been filed.
Junior Water Right	"Water rights that were established more recently than senior rights. The more recent a date on a water right, the more "junior" it is relative to water rights with older issuance dates. All water rights are defined in relation to other rights, and a water right holder only acquires the right to use a specific quantity of water under specified conditions. Therefore, when limited water is available, junior rights cannot be exercised until all senior rights have been satisfied" (Clifford, et al., 2004:152).
Land Conservation Program	A riparian or upland conservation program that removes irrigated land from production for some state or federal conservation program purposes. Conservation Reserve Enhancement Program (CREP) and Conservation Reserve Program (CRP) are potential examples where irrigated agriculture may have been fallowed or put to use for some other conservation practice that does not require irrigation.
Large Storage Opportunity	A storage facility with a capacity that is greater than 1 million acre-feet.
Lining/Piping	The conversion of open-ditch water conveyance delivery systems to a more efficient delivery pipe or the placement of an impermeable liner within a ditch.

Term	Definition
Management	The application of a system of managing water applications that creates water savings through scheduling changes or other management practices. Irrigation Water Management (IWM) is an example of a management tool that may create water savings. Canal automation is another example.
Management Zone	The one-mile corridor on either side of the Columbia River mainstem as defined in ESSHB 2860.
Mean Annual Flow	Volume (or rate) of river flow during a year (on average).
Municipal Use	There are three situations where water is considered to be for municipal use. The first is when water is used for residential purposes by fifteen or more residential service connections or for a nonresidential population that is, on average, at least 25 people for at least 60 days a year. The second is when water is used for governmental or governmental proprietary purposes by a city, town, public utility district, county, sewer district, or water district. The third includes indirect uses of water for residential, governmental or governmental proprietary purposes through the delivery of treated or raw water to a public water system for such use (RCW 90.03.015).
National Environmental Policy Act (NEPA)	A 1969 federal Act that requires federal agencies to integrate environmental values into their decision-making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions (http://www.epa.gov/compliance/nepa/).
Natural Streamflow	The rate of flow at a given point of an uncontrolled stream, or streamflow adjusted to eliminate the effects of all man-made development (Corps, 2003).
Non-Consumptive Use	A type of water use where either there is no diversion from a source body, or where there is no diminishment of the source (WAC 173-500-050(9)).
Non-Use	When all or a portion of the water associated with a water right has not been beneficially used.
OCPI Determinations	Perennial rivers and streams of the state shall be retained with base flows necessary to provide for preservation of wildlife, fish, scenic, aesthetic and other environmental values, and navigational values. Lakes and ponds shall be retained substantially in their natural condition. Withdrawals of water which would conflict therewith shall be authorized only in those situations where it is clear that overriding considerations of the public interest will be served.
Odessa Ground Water Management Subarea	An area of approximately 2,000 square miles under the eastern-most portion of the authorized Columbia Basin project, east of the East Low Canal, designated as a groundwater management subarea in 1988. The purpose of establishing the Odessa Ground Water Management Subarea (Odessa Subarea) was to "…provide a procedure for managing ground water within the Odessa ground water subarea to insure the maintenance of a safe sustaining yield from the ground water body within a reasonable and feasible pumping lift" (WAC 173-130A-040). Constraints on water use in the Odessa Subarea are based on controlling the rate of decline in the water level, establishing a maximum lowering of the water table level, regulating withdrawal of ground water to protect senior water right holders, limiting new water users and limiting the location where new wells may be drilled.

Term	Definition
On-Farm Efficiency	The installation of a more efficient irrigation application system. Examples would include a conversion from flood or rill/furrow irrigation to center pivot technology. Also, the replacement of hand-lines or less efficient sprinkler systems to drip irrigation.
On-Farm Water Duty	Water duty is the amount of water that, by careful management and use and without wastage, is reasonably required to be applied to a parcel of land for the period of time that is adequate to produce a maximum amount of such crops as ordinarily are grown on the land. Water duty varies according to conditions.
Out-of-Stream Water Use	A use that requires water to be taken out of the stream.
Partial Season Acquisitions/ Leases	Farmers forgo second and third hay cuttings during the months of July, August, and September when water demand is high. Partial season leases result in consumptive use reduction and therefore benefit fisheries while fulfilling permits on a temporary basis. While partial season leases will not result in a permanent water supply for new permits, they can be used to meet interruptible and short-term water needs.
Permanent Crop Change	A permanent change in a crop grown on a field to one with a smaller irrigation requirement. A change from tree fruit or alfalfa to grapes would be an example.
Permit-Exempt Well	A well that is exempt from the state's water right permitting system because it is used for an exempt use. According to the Attorney General's Office, the four types of ground water use that are exempt from the state's water right permitting system include: 1) Providing water for livestock (no gallon per day limit or acre restriction); 2) Watering a non-commercial lawn or garden one-half acre in size or less (no gallon per day limit); 3) Providing water for a single home or groups of homes (limited to 5,000 gallons per day); and 4) Providing water for industrial purposes, including irrigation (limited to 5,000 gallons per day but no acre limit).
Planning Unit	"A group that represents a wide range of water resource interests, tasked with conducting a watershed assessment and completing a watershed plan for one (or more) WRIAs. The initiating governments are responsible for development of an inclusive Planning Unit for the WRIA (RCW 90.82)" (Association of Cities, 1999:viii).
Pool Reach	The length of the mainstem Columbia River between two dams with the exception of the Hanford reach, which is a national monument and not impounded.
Power Buyback	Where formerly irrigated lands have been voluntarily fallowed in a contractual agreement with an electrical power provider. This occurred in the 2001 drought.
Pre-Appraisal	Preliminary studies based on limited analyses, available design data, and professional assumptions but of sufficient detail to provide satisfactory quantities and preliminary field cost estimates leading to an appraisal study.

Term	Definition
Priority Date	Water use of any sort is subject to the "first in time, first in right" clause, originally established in historical Western water law and now part of Washington State law. This means that a senior right cannot be impaired by a junior right. Seniority is established by priority date - the date an application was filed for a permitted or certificated water right - or the date that water was first put to beneficial use in the case of claims and exempt ground water withdrawals.
Reclaimed Water	Effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for a beneficial use or a controlled use that would not otherwise occur and is no longer considered wastewater (Ecology, 1998).
Relinquishment	Five or more successive years of non-use triggers forfeiture of a water right unless there is sufficient cause to explain the non-use. The burden to prove that the right is still in good standing and should not be considered relinquished, rests on the water right holder. There are several categories of reasons that may serve as "sufficient causes" to explain why water has not been used (RCW 90.14.140).
Re-Regulating/Storage Reservoirs	The installation of a reservoir to store fluctuations in canal flow for release at a later time, reducing the amount of water spilled at the end of a system. Also includes the installation of a reservoir to store water during high streamflow periods for use later in the season during low streamflow periods.
Reservoir	A natural or artificial pond or lake used for the storage and regulation of water.
Reservoir Storage Capacity	The volume of a reservoir available to store water (Corps, 2003).
Return Flow	Waters that, after having been diverted for a beneficial use, escape control of the water right holder and return to a public water body. Return flows may include, for example, waters lost through conveyance system inefficiency or waters used for a beneficial purpose that are not fully consumed by the purpose of use.
River Mile	River Mile (RM) measurements start at the mouth of the stream (RM 0.0) and are measured in statute miles (one statute mile = 5,280 feet) along the center line of a river.
Runoff	The water from rain, snowmelt or irrigation that flows over the land surface and is not absorbed into the ground, instead flowing into streams or other surface waters or land depressions.
Run-of-the-River Plant	A hydroelectric power plant using pondage or the flow of the stream as it occurs (Corps, 2003).
Seasonal Storage	Water held over from the annual high-water season to the following low-water season (Corps, 2003).
Second Tier Demand Forecast	The water demand forecast that is based on projections of estimated current water use. This projection focuses more on "wet" water.

Term	Definition
Seepage	The flow of a fluid through the soil pores, in downward or upward direction.
Senior Water Right	"Water rights that are older (more senior) than those of junior rights. All water rights are defined in relation to other rights, and a water right holder only acquires the right to use a specific quantity of water under specified conditions. Thus, when limited water is available, senior rights are satisfied first in the order of their Priority Date" (Clifford, et al., 2004:154).
Small Storage Opportunity	A storage facility with a capacity that is less than 1 million acre-feet.
Snowpack	An area of naturally formed, packed snow that usually melts during the warmer months.
Split-Season Acquisition	When a farmer voluntarily forgoes mid to late season irrigation. An example is when a hay farmer decides to harvest only the first cutting of hay and forgo the rest of the season through a lease or contractual agreement.
Standby-Reserve Status	A water right that can only be used when the primary water right goes unfilled or cannot satisfy an authorized use during times of drought or other low flow periods. A primary right must be used to the extent available before a standby / reserve right is used.
Streamflow	The rate at which water passes a given point in a stream usually expressed in cubic feet per second (Corps, 2003).
Source	A point of diversion or withdrawal authorized by a water right, not to be confused with a 'same body of groundwater' under RCW 90.44.100, 'same source of supply' under RCW 90.03.265 or other such references.
Source Substitution	A change from one withdrawl source to another. For example, surface to ground water conversion.
Surface to Ground Water Conversion	When a well is drilled to be used as a primary source for a water right that was previously served from a surface water source. Water savings may accrue from a reduction in canal seepage. This technique may be used in some areas to mitigate for low instream flows.
Sustainability	"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987).
Tail Water Reuse	The capturing and reuse of surface runoff water from a field or conveyance system rather than returning it back to the stream.
Tributary	A stream that contributes water to a larger stream.

Term	Definition
Trust Water	Trust water is a water right or a portion of a right acquired by the state for management in the Trust Water Right Program (Trust Program) (RCW 90.42.020(3)). The state may acquire all or portions of water rights by purchase, lease, or donation, and may acquire trust water rights on a permanent or a temporary basis. A water right exercised through the Trust Program for the beneficial use of instream flows is not relinquished for non-use while it is in the program.
Uninterruptible Water Right	Water rights that are not subject to curtailment in low flow conditions in order to maintain adequate flows for fish due to the June 1980 instream flow rule adopted by Ecology. These include existing pre-1980 rights, pre-1980 reserved water rights, and additional water withdrawn for the Columbia Basin Project.
Vector Autoregression	A method of forecasting crop yield and prices whereby "identification is achieved by estimating reduced-form relationships, in which every variable in the multi-variate system is allowed to affect every other variable in the system with lags" (Bessler, 1984).
Vested Water Right	A pre-water code use of water that was developed, put to beneficial use, and continuously beneficially used since prior to the water code.
Water Bank or Water Market	An institutional mechanism that facilitates the legal transfer and market exchange of surface water, ground water, or water storage. This mechanism may be administered by any type of entity, such as private, public, or non-profit.
Water Resource Inventory Areas (WRIA)	"One of 62 geographic areas comprising the State of Washington, defined on the basis of surface water resources and codified in Washington Administrative Code 173-500-040" (Association of Cities, 1999:ix).
Water Right Certificate	The legal record of a water right issued by Ecology once the department confirms that all the conditions of the permit have been met. It is recorded at a county auditor's office. Once Ecology issues a certificate, the water right is considered appurtenant (attached) to the land on which the water is used (http://www.ecy.wa.gov/pubs/961804swr.pdf).
Water Right Claim	A claim to a water right, for a water use that predates the state's water permitting system (for surface water, 1917/1932, for ground water, 1945). The validity of a claim can only be confirmed through judicial processes (http://www.ecy.wa.gov/pubs/961804swr.pdf).
Water Right Permit	Permission by the state to develop a water right; it is not a final water right. A permit allows you to proceed with construction of the water system and start putting the water to beneficial use, in accordance with the terms of your permit. (http://www.ecy.wa.gov/pubs/961804swr.pdf)

Term	Definition
Water Right Tracking System	The database Ecology uses to track water rights. The information captured in this database includes the type of water right (surface or ground), the name of the business or person applying for a right or a change to an existing right, the priority date or date of application, the instantaneous quantity (Q_i) or maximum withdrawal rate requested, the annual quantity (Q_a) or volume requested (reported in acre-feet per year), the purpose of use, the water source and the geographic location (township, range and section) for the point of diversion (place of withdrawal) and/or place(s) of use.
Water Year	The period from October 1 through September 30 of the following calendar year. It is the time base used in hydrology (Corps, 2003).
Watershed	"The land area that drains into the defined waterbody" (Clifford, et al., 2004:156).
Watershed Management Plan	A document presenting the findings and recommendations of the planning unit for a Watershed Management Program in the management area" (Association of Cities, 1999:ix).

Acronyms & Abbreviations	
ASR	Aquifer Storage and Recovery
BiOp	Biological Opinion
BPA	Bonneville Power Administration
CBP	Columbia Basin Project
CFS	cubic feet per second
CIG	University of Washington Climate Impacts Group
CIR	Crop Irrigation Requirement
Corps	U.S. Army Corps of Engineers
CREP	Conservation Reserve Enhancement Program
CRI	Columbia River Initiative
CRP	Conservation Reserve Program
CSRIA	Columbia-Snake River Irrigators Association
DEIS	Draft Environmental Impact Statement
DOH	Washington State Department of Health
DSS	Decision Support System
Ecology	Washington State Department of Ecology
EHC	East High Canal (Columbia Basin Project)
EIS	Environmental Impact Statement
ELC	East Low Canal (Columbia Basin Project)
ESA	Endangered Species Act
ESSHB	Engrossed Second Substitute House Bill
ET	Evapotranspiration
FCRPS	Federal Columbia River Power System
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
GPD	Gallons per day
GPM	Gallons per Minute
GW	Ground Water
IWM	Irrigation Water Management
kcfs	thousand cubic feet per second
Management Program	Columbia River Water Management Program
Management Zone	Columbia River Management Zone
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NRCS	National Resources Conservation Service
Odessa Subarea	Odessa Ground Water Management Subarea
OFM	Washington State Office of Financial Management
PAWS	Public Agricultural Weather System

Acronyms & Abbreviations	
PEIS	Programmatic Environmental Impact Statement
PUD	Public Utility District
Q_a	Annual Quantity
Q_i	Instantaneous Quantity
RCW	Revised Code of Washington
RM	River Mile
RW	Reservoir Water
SAR	Shallow Aquifer Recharge
SEPA	State Environmental Policy Act
Trust Program	Washington State Department of Ecology's Trust Water Rights Program
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VRA	Voluntary Regional Agreement
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WR	Water Right
WRIA	Water Resource Inventory Area
WRTS	Washington State Water Rights Tracking System
WSU	Washington State University
YRBWEP	Yakima River Basin Water Enhancement Project

Standard Water Unit Conversions	
1 cfs =	448.8 gpm
1 cfs =	646,272 gpd
1 cfs =	1.98 ac-ft per day
1 cfs =	0.6463 mgd
1 cubic ft. =	7.48 gallons
1 gpm =	1,440 gallons per 24 hour day
1 gpm =	1.61 ac-ft per year
1 ac-ft =	1 foot of water on 1 acre
1 ac-ft =	325,851 gallons

Appendix C: List of Projects

Due to its large format, Appedix C is contained in the enclosed CD.

	Entity	Comment	Response	Page #
1	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	In our view, Ecology should describe its water responsibilities in terms of responsibly managing and stewarding the state's water for the benefit of all the state's residents, including people who depend on healthy rivers, fish, and wildlife for their economic well-being and quality of life. While the Columbia Water Management Program (CRWMP) gives Ecology a responsibility to work to meet legitimate water needs with the most appropriate supply tools, the program should not be read as changing the agency's fundamental mission.	We agree that the Columbia River Program, and its mandate to develop new water supplies, adds to and takes nothing from Ecology's existing mission.	ES-9
2	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	With respect to supply, good progress has been made in assessing the potential of some types of conservation and efficiency, and it appears substantial (especially for instream benefits). On the other hand, the draft report shows that there is little knowledge of the water supply potential of municipal conservation, land conservation programs, crop water duty reduction, crop changes, or partial season acquisition/lease. There is also little knowledge about their cost relative to each other and other water supply tools.	Ecology will further evaluate opportunities for water supplies from these elements of the inventory in next year's report.	--
3	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	Little is known about the potential or cost of aquifer storage/ recharge projects. While five relatively small projects have been studied, a much more thorough assessment seems like it should be needed before Ecology makes conclusive sounding statements such as "aquifer storage is likely to cost the most" (p. 4-2). This seems unlikely given the construction, operation, and maintenance costs associated with new surface storage dams, but more information is needed to be certain and before embarking down a path that embraces one, both, or neither.	Ecology is funding a pre-appraisal study on opportunities for aquifer storage and recovery (ASR) and shallow aquifer recharge (SAR) in the Columbia River Basin. Also, specific ASR projects are being considered through the Columbia River Grant Program. Ecology will continue to evaluate opportunities for ASR / SAR in future legislative reports.	3-13, 4-2
4	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	On the demand side, the draft report appears to add nothing significant to the 2006 inventory report. It would be helpful in the final draft to have more explanation of next steps on demand estimates. Better defining economically and environmentally justified demand is essential to efficiently carrying out the CRWMP and forming its goals on how much water should be supplied through various tools.	An update to the supply and demand report is due on November 15, 2011. However, rather than wait until that time to share efforts to understand future demand, Ecology plans to provide annual progress updates in its legislative reports on water supply. These updates will provide information as to what steps Ecology is taking in order to move toward a comprehensive demand forecast. Ecology has added further detail on the scope and timing of our efforts to understand demand in this final report.	5-3 and ES-8

	Entity	Comment	Response	Page #
5	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. ES-6: Could packages of actions that primarily benefit instream uses (Table ES-4) and out-of-stream uses (Table ES-5) be put together to meet the requirements of the CRWMP?	Yes	ES-6, 4-1
6	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 1-2: Sentence on matching "water supply generated from the inventory to water demands identified in the bill" gives the impression that water demand is well understood. While general categories of demand may be understood, more work is necessary to determine the level of water demand that is economically beneficial and environmentally sustainable.	Ecology agrees. We have changed the text on page 1-2 to reflect the comment.	1-2
7	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	Rather than calling the proposed Shanker's Bend dam a "storage facility," we suggest calling it a dam. As the only surface storage proposal to date to call for damming a major river – and a scenic section of it – the public needs to know that this is not an environmentally benign form of storage.	Ecology agrees. We have changed the text on pages 2-6 and 3-3 to reflect the comment.	2-6, 3-3
8	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	This is not a substantive point, but leading off the chapter on project funding with a big, bold graphic on storage reinforces the misimpression that the CRWMP is primarily a surface storage program. We suggest re-ordering this section, or a least making the graphic on storage dams look more like the rest of the more low key graphics in the report. Also, the "storage" heading on the graphic should say "large surface storage" as this subsection focuses on surface storage behind large dams rather than on aquifer storage or small storage.	Revised chapter three to better showcase the diversity of water supply alternatives being considered.	CH-3
9	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 3-16: A clearer explanation of next steps on estimating future water demand would be helpful.	Further detail added to CH-3 and ES-8	CH-3 and ES-8
10	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-2: As noted above (in Section II), we find the assumption that ASR will "cost the most" puzzling. If there is a basis for assuming that this will be true across the board, explanation should be provided in the final report.	Ecology is funding a pre-appraisal study on opportunities for ASR / SAR in the Columbia River Basin. Also, specific ASR projects are being considered through the Columbia River Grant Program. Ecology will continue to evaluate opportunities for ASR / SAR in future legislative reports.	3-13, 4-2

	Entity	Comment	Response	Page #
11	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-3: We agree that evaluating all types of storage, along with other supply tools, is important in the face of climate change. However, until more information is available on how climate change will affect the Columbia Basin, where the need for water will be most acute will remain in question, which creates uncertainty about where to focus supply efforts.	Ecology is investing in climate change research for the Columbia River Basin, which will be completed in 2009. These results will be included in the 2011 Supply and Demand Forecast Report. In the interim, Ecology will continue to study multiple water supply strategies. Through its Columbia River Grant Program, Ecology will fund projects that we believe will make incremental progress on meeting the demands identified in RCW 90.90.020.	--
12	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-6: We agree that modifications of existing storage dams will likely prove a cost effective and less environmentally destructive way to provide significant new water supplies. More detail of potential modifications would be helpful in the final 2007 report.	Ecology is continuing to evaluate modification of existing storage and will add detail as it becomes available.	--
13	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-15: Ecology should consider using CRWMP funds to encourage municipal conservation to free up water supplies.	Municipal conservation is eligible for funding under the Program. However, under RCW 90.90.010 (4), net water savings from conservation must be placed in trust. This can be a funding disincentive as most municipalities want to use the conserved water for growth, in addition to funding assistance for the conservation project.	4-16
14	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-20: Water acquisition as an avenue for securing water supplies should remain as a tool but not be seen as the means to get large quantities of water. Ecology should continue to ensure that projects funded as mitigation for “wet” water actually provide water that is consumptive in nature. A recent evaluation prepared by Hardner and Gullison on the Columbia Basin Water Transactions Program shows strong support for using river conservancy type organizations to do water acquisition projects in Washington and other western states to overcome many of the obstacles described in this report. The unwillingness to engage in a water transfer project for fear of relinquishment is a valid concern. Ecology should support and partner with outside entities like river conservancy organizations and conservation districts that work with landowners to remove the immediate specter of relinquishment.	Ecology is currently negotiating with Washington Water Trust and Washington Rivers Conservancy to partner on water acquisitions in the Columbia River Basin. The focus for 2008 is small acquisitions of water in conjunction with projects funded by existing conservation programs (such as fallowed corners associated with the irrigation efficiency grant program (IEGP)).	4-20
15	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-21: The low cost of water savings from land conservation programs and partial season acquisition leases suggests that these tools should be explored further by Ecology.	Agreed	--

	Entity	Comment	Response	Page #
16	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-24: More explanation would be helpful about why 45 fallowed corner projects apparently yield such modest water savings.	The fallowed corner projects identified by the conservation programs to-date have been associated with conservation projects (like IEGP) completed within the last years. Higher savings may be possible through future project implementation.	4-26
17	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	p. 4-30, 4-31: The last paragraph on p. 4-30 and the first few on p. 4-31 do a good job of framing the purpose of this report and acknowledging that "[i]t is still unclear as to whether large storage, multiple small storage projects, ASR, or some combination will work best for Washington" to complement investments in conservation. We agree, although existing information suggests that large storage may simply not be a cost-effective means to meet foreseeable demand.	Comment noted.	--
18	American Rivers, Washington Environmental Council, Washington Rivers Conservancy	5-3: Projections for municipal growth assume that an additional 450,000 people in eastern Washington will use an average of 170 gallons per day per person [see p. 5-4 of the 2006 report]. This is more than double the amount for the average user in the Seattle area, and seems unreasonably generous in a region with very limited water supplies. Seattle Public Utilities has made great strides in reducing user demand and reducing waste in the system, and municipalities throughout the state will have to do the same as supplies further tighten and Department of Health efficiency regulations take effect. The 170 gallon per day assumption should be adjusted downward, which will reduce the 86 KAF forecast for municipal needs.	In the coming years, Ecology plans to work with the Washington State Department of Health to better understand municipal demand and opportunities for municipal conservation. This information will be included in next year's legislative report.	ES-8, 4-16, 5-4
19	Center For Water Advocacy	First, we urge that you always consider that protecting instream flows is one of the main purposes behind Washington water laws. Instream flows are critical for migrating salmon and steelhead populations and vital for long-term watershed health. Moreover, the existing instream flow targets set out to protect salmon and steelhead are often not met under the current system, yet the demand will only increase in the future under the CRWMP.	Agreed.	--

	Entity	Comment	Response	Page #
20	Center For Water Advocacy	Unfortunately, the basic premise behind the CRWMP and recent inventory report seems to serve irrigation districts and does little to address impacts to instream flows and habitat in the Columbia Basin, a main purpose behind the Columbia Basin Bill. However, it appears that only after the needs of these irrigation districts have been filled, then mitigation will be implemented.	We disagree. First, one of our main conclusions of this year's report is that most of the conservation water savings identified in the water supply inventory has a greater potential to benefit instream flows, than to serve as mitigation for new permits. Second, the report and Ecology's administration of the Program to–date demonstrates that Ecology intends to first develop water savings, then issue new permits based on that mitigation. Third, while irrigation districts, including those serving the Odessa, figure significantly in our efforts to develop water supplies, we also address the demands from municipal, fish, power, and non-district agricultural supplies.	4-9, 4-10, 4-11, 4-12, 4-14, 4-16, 4-18, 4-21, 4-23, 4-26, 4-27, 4-30
21	Center For Water Advocacy	While the Report addresses the need for water conservation projects, it recognizes that most of the water savings is only available on a temporary basis and will be used to hydrate interruptible water rights in times of drought and not for instream needs. In addition, most of these conservation projects (and funding for those projects) are focused on storage and not reductions in consumptive use. We urge you to explore more options for reducing consumptive use and how to prevent instream flow fluctuations and how to encourage behavioral changes that lead to water savings. Moreover, we ask that you do not use potential conservation opportunities, many of which are highly uncertain, as a means of justifying increases in issuing new water rights. Otherwise, Ecology will turn the concept of water conservation on its head by actually increasing rather than reducing the use of water.	We recognize the difficulty in issuing new permanent consumptive-use permits based on water savings that is either temporary or non-consumptive in nature. We have clarified that our general intent is to match water supplies and demand in-land, in-time, and in-place. An exception, we discuss in the report, is the potential for supply shift in conservation and storage from winter to summer. This would benefit instream flows and out-of-stream needs. Future reports will explore in greater detail those types of projects that meet these criteria, including land conservation programs and crop change.	4-8
22	Center For Water Advocacy	In addition, we ask that you further accommodate for the inherent uncertainty of the water cycle and overall cumulative effects to the entire watershed, including tributaries throughout the implementation process. Because the implementation of the CRWMP will result in tremendous amount of new water withdrawals, thorough consideration of how the uncertainty of the water cycle, changes in climate and increased demand will impact instream flows is necessary *prior* to issuing new permits. Withdrawals of this scope will undoubtedly have devastating impacts for Endangered Species Act (ESA) listed species that rely on instream flow for survival, subsistence practices of many individuals and the overall watershed health of the Columbia River Basin.	Ecology is investing in a better understanding of climate change and demand. We will include any new information in the 2011 Legislative Report. In the meantime, Ecology has structured its Columbia River Grant Program to score highest those projects that would both benefit instream flows and serve as mitigation for new permits. Ecology's best opportunities for meaningfully benefiting instream flows are projects that improve water supply in the tributaries, and those that shift supply for winter to summer. Ecology plans to fund projects that make incremental progress towards meeting these goals while studying long-term water supply and demand issues.	--

	Entity	Comment	Response	Page #
23	Columbia River Inter-Tribal Fish Commission	Ecology and the Legislature continue to place emphasis on new storage that by state law will return to the river for fish uses merely one third of the water removed. Instead, other options should be strongly considered, such as conservation and using the over 30 million acre feet of {Make sure this wasn't "of" in the original} existing storage in the Columbia Basin. In our comments on the 2006 CRWMP DEIS, we explained that the target flows established by the NOAA Biological opinion for the Federal Hydropower system were not adequate for anadromous fish, and we illustrated that these target flows were not met much of the time. Yet, Ecology and the State of Washington are proceeding with actions that will further reduce instream flows as well as reduce the probability that these targets will be met. Ecology is not hearing the tribal message on these issues.	Ecology is pursuing, with equal vigor, opportunities for conservation, modification to existing storage, and the long term potential for new storage. Storage, by statute, is a significant part of the Columbia River Program. Therefore, Ecology is considering ways to maximize existing storage and strategically implement new storage if it is needed. While it is true that by statute, only 1/3 of storage will be returned to the river, it will be returned at a time that is of greater benefit to fish that when it is stored. Additionally, the 2/3 reserved by statute for out-of-stream uses, can provide other reach benefits associated with release. We value all tribal perspectives on administration of this Program.	--
24	Columbia River Inter-Tribal Fish Commission	In considering water availability at any time of the year – winter or summer – Ecology must make a comprehensive analysis of the many different demands on the river, from consumptive use withdrawals to flow/power agreements such as the Mid-Columbia Hourly Coordination Agreement. Therefore, Ecology's position that Columbia River water is available outside the general fish migration seasons to fill new storage is too simplistic. In addition to the Hourly Coordination Agreement, there are two primary – and significant – considerations that will affect water availability in the winter: (1) minimum flows required for supporting lower river chum salmon between the months of November and March and; (2) refill probabilities for flood control operations on the federal hydropower system. Our hydrological modeling with the NWPCC GENESYS model indicates that withdrawing additional water in the winter for storage projects, such as Washington proposes, could reduce flows for chum and may also affect refill probability on the hydropower system. At this time, the Endangered Species Act (ESA) requires the hydropower system to have reservoirs at upper flood control rule curves on April 10 as necessary to meet spring and summer salmon flow targets, a result which our modeling shows will be increasingly difficult to meet should Ecology continue with its current plans for new storage. We recommend technical discussions between Ecology, CRITFC and its member tribes and the Bureau of Reclamation regarding Columbia River mainstem hydrological modeling, target flows and other fisheries needs.	Ecology agrees that this analysis is necessary and environmental reviews (such as the environmental impact statement (EIS)) for any new storage facility will require such an evaluation. We also agree that the meeting you propose would have benefits.	--

	Entity	Comment	Response	Page #
25	Columbia River Inter-Tribal Fish Commission	Ecology should revisit the Columbia River Water Supply Inventory's provision allowing two thirds of new stored water for consumptive use out-of-stream. Reserving only one-third of new storage water to the streams and rivers from whence it came is inadequate from both ecological and economical standpoints. Why is the division not an equal split, fifty-fifty?	Statute defines the 2/3 to 1/3 split. Although the 2/3 of new storage is allocated for new out-of-stream uses, not all of these uses are consumptive. Storage releases for out-of-stream uses may also result in reach instream benefits downstream.	--
26	Columbia River Inter-Tribal Fish Commission	The storage projects under consideration will be largely funded by public dollars. Collaborative conservation with tribes and other entities is recommended and could result in cost-savings in the long run.	Agreed.	--
27	David E. Ortman Attorney-at-Law	Black Rock reservoir would cost over $6 billion dollars. Groundwater seepage from this project would threaten the already long overdue cleanup of the Hanford Nuclear Reservation.	The estimated cost Black Rock reservoir is $4 billion as stated in the report on pages ES-3, 3-4, and 4-28. Ecology and the Bureau of Reclamation are evaluating this issue in the Yakima Basin Storage Study EIS. The first draft is due January 2008.	ES-3, 3-4, 4-28
28	David E. Ortman Attorney-at-Law	Other projects such as the Wymer site in the Yakima basin would likely cost over a half billion dollars if it were ever built. This project, and other sites in the Yakima Basin, has been studied and found to be perennial losers over the last thirty years at a time in which Yakima irrigation districts have yet to take water conservation seriously or pay off the existing Bureau of Reclamation's Yakima Basin Project.	Significant conservation has been achieved through the Yakima River Basin Water Enhancement Project (YRBWEP) through conveyance efficiency improvements, SCADA, and re-regulation reservoirs. We agree that there remains further potential for conservation in the Yakima River Basin. This is one of the alternatives to storage Ecology is evaluating in the Yakima Basin Storage Study EIS.	--
29	David E. Ortman Attorney-at-Law	The Similkameen River project proposed by the Okanagan Public District would inundate Canada and continue to bar opening fish passage above the existing Enloe Dam. Three Columbia River off-channel dam sites, Sand Hollow, Hawk Creek and Crab Creek (which would flood the Columbia National Wildlife Refuge) are among additional harmful dam proposals.	At present, Ecology is looking at large storage options in addition to a suite of other water supply options. The Similkameen River project includes three alternatives, including Washington-only and Washington / Canada proposals. Further, in recent hydro licensing proceedings, NOAA Fisheries staff made no recommendation requiring fish passage at the Enloe Dam project immediately downstream. Reading this to mean that passage would not be required, interest in the Shanker's Bend project revived. Finally, evaluation of the off-channel dam sites is still preliminary. Congress would need to approve a Feasibility Study / EIS before any further evaluation of these sites can proceed.	3-3

	Entity	Comment	Response	Page #
30	David E. Ortman Attorney-at-Law	While RCW 90.90.010 purports to require an evaluation of alternatives, the same legislation allows Ecology to rely on biased and slanted studies and information issued by the Bureau of Reclamation. Since the 1979 passage by Congress of the Yakima River Basin Enhancement Project, the Bureau of Reclamation has failed for nearly forty years to address issues of water-spreading, water-pricing, project repayment, surplus crops, and water conservation in senior irrigation districts in the Yakima Basin.	Comment noted.	--
31	David E. Ortman Attorney-at-Law	Your "inventory" fails to provide either Washington taxpayers or the Washington Legislature with adequate information on the following: - What are the irrigation districts growing? Surplus crops? Is the Kittitas ID still growing hay for the Japanese race horse industry? - What have the irrigation districts actually done on the ground since 1980 on water conservation? - What is the current costs to the irrigators of water (per acre feet) and electricity (are they still subsidized by BPA??) - Where are the irrigators at in terms of repayment. Have they paid off the costs of the Yakima River Basin Project? What would be the true costs of irrigated crops if they had to pay market rates for water and power?? - How big a factor is the wine industry? Are there any eastern Washington vineyards that do not rely on irrigation?	The purpose of the 2007 Columbia River Basin Water Supply Inventory Report is to provide a current list of potential water supply projects. The Columbia River Basin Water Supply and Demand Forecast (due 2011) will provide additional information on cropping patterns and power demand. The Yakima River Basin Water Storage Feasibility Study (draft due January 2008) will provide more information on water marketing opportunities in the Yakima River Basin.	--
32	David E. Ortman Attorney-at-Law	E2SHB 2860 is nothing more than an attempt to buy off eastern Washington votes in exchange for environmentally damaging and wasteful mega water projects. It is time for Ecology to pull the plug on more damaging mega-dam projects.	Comment noted.	--

	Entity	Comment	Response	Page #
33	Klickitat County	Page ES-1, paragraph 1 and elsewhere in the report: Please revise the report to be consistent with the statute, including the program title assigned by the Legislature. The Legislature enacted a bill titled "Columbia River Basin Water Supply" in which it found that a key priority of water resource management in the Columbia River Basin is the development of new water supplies and, therefore, declared that a Columbia River Basin water supply development program is needed. The Legislature did not enact the Columbia River Basin Water Management Program, nor did it declare that a Columbia River Basin water management program is needed.	In view of the broad range of implementation activities required under the bill and considering the opening sentence of ESSHB 2860 ("An act relating to water resource management in the Columbia River Basin . . . "), Ecology considers the Columbia River Basin Water Management Program to be an appropriate title for the program. However, other parties may choose to use the title "Columbia River Basin Water Supply Development Program." Regardless of which title is used, ESSHB 2860, codified as Chapter 90.90 RCW, clearly states the principal objective of the program is to aggressively pursue development of water supplies to benefit both instream and out-of-stream uses. Ecology is closely adhering to this objective, was we develop and implement the program.	--
35	Klickitat County	Chapter 90.90 RCW does not enable water resource management planning or the establishment of a water resource management program. It is clear in RCW 90.90.005 that the legislative intent was to address a key priority of the water resource management in the Columbia Rive Basin, which is the development of new water supplies. Moreover, the legislators on the Columbia River Task Force that drafted ESSHB 2860 made clear statements during Task Force meetings that the Legislature enacted the Watershed Planning Act (chapter 90.82 RCW) to provide for water resource management planning and implementation and that they were not going to reinvent the wheel.	Ecology agrees that adopted watershed management plans are the management framework for water resources within a water resource inventory area (WRIA). The Columbia River Program, codified in Chapter 90.90 RCW, spans dozens of WRIAs. It also has many program elements that can cross jurisdictions, including water supply development, water supply and demand forecasting, voluntary regional agreements, inventory development, developing a web-based water resource information system, and more. Ecology will work with watershed planning units to harmonize the Columbia River Program and watershed planning goals.	--

	Entity	Comment	Response	Page #
36	Klickitat County	Page ES-5, paragraph 1: It is in RCW 90.90.020(3), not RCW 90.90.040, it states: "The department of ecology shall focus its efforts to develop water supplies for the Columbia River basin on the following needs: a) Alternatives to groundwater for agricultural users in the Odessa subarea aquifer; b) Sources of water supply for pending water right applications; c) A new uninterruptible supply of water for the holders of interruptible water rights on the Columbia River mainstem that are subject to instream flows or other mitigation conditions to protect stream flows; and d) New municipal, domestic, industrial, and irrigation water needs within the Columbia river basin." My understanding of the statute is that Ecology is directed to develop water supplies to benefit both instream and out-of-stream uses, but shall focus its efforts on the four out-of-stream needs identified in RCW 90.90.020(3)(i)(ii)(iii) and (iii).	Ecology agrees. We have changed the text on page 1-2 to reflect the comment.	ES-5
37	Klickitat County	Page ES-5, paragraph 3 and elsewhere in report: It is helpful that the report indicates which types of projects will result in new water supplies that will be available for out-of-stream uses and which likely will not (at least not with the Department's current policies), because it helps everyone see which types of projects Ecology needs to focus its efforts on in order to comply with the mandate provided in RCW 90.90.020(3). However, the assertion that the distinction is required in RCW 90.90.040(1) is incorrect. RCW 90.90.040(1) states: "To support the development of new water supplies in the Columbia river and to protect instream flow, the department of ecology shall work with…to develop a Columbia river water supply inventory and long term water supply and demand forecast. The inventory must include:	Ecology reads RCW 90.90.040(1)(b) to require the inventory to estimate the benefits to instream needs and the benefits to out-of-stream needs for each project. This information is important as Ecology implements RCW 90.90.005 (aggressively pursue the development of water supplies to benefit both instream and out-of-stream uses) and RCW 90.90.020(3) (water for Odessa, pending applications, interruptibles, and new municipal, domestic, industrial and irrigation needs).	4-1

	Entity	Comment	Response	Page #
37	Klickitat County (cont'd)	a) A list of conservation projects that have been implemented under this chapter and the amount of water conservation they have achieved; and b) A list of potential water supply and storage projects in the Columbia river basin, including estimates of: i) Cost per acre-foot; ii) Benefits to fish and instream needs; iii) Benefits to out-of-stream needs; and iv) Environmental and cultural impacts. My understanding of the statute is that the report should list potential water supply and storage projects in the Columbia River Basin and their costs, benefits and estimated impacts as provided in RCW 90.90.040(1), not categorize projects as being either for instream or out-of-stream benefit. I found where environmental impacts associated with some of the identified storage projects are discussed in the report, but not cultural impacts. Also, have not found where environmental or cultural impacts are estimated for other types of water supply development projects.	The full information required by RCW 90.90.040(1)(b) is not available for all projects in the inventory. Some information may not be known until a project has undergone environmental review through the State Environmental Policy Act (SEPA) and/or the national Environmental Policy Act (NEPA). Ecology plans to complete a Programmatic Cultural Resources Environmental Review for the Columbia River Program in 2008. Annual updates to the inventory will include more information on environmental and cultural impacts, as well as further cost/benefit data.	
38	Klickitat County	Page ES-8: Working with the Commissioners Policy Advisory Group and its watershed planning forum and with individual watershed planning units should be included in the list of things Ecology will do to better understand water supply and demand in the Columbia River Basin.	Ecology agrees. We have changed the text on page ES-8 to reflect the comment.	ES-8
39	Klickitat County	Page ES-9, paragraph 1: Ecology is now tasked with developing water supplies for the Columbia River Basin and is not just "a water supply development agency on the Columbia River."	Ecology agrees. We have changed the text on page ES-9 to reflect the comment.	ES-9
40	Klickitat County	Page ES-9, paragraph 2, bullet 1 and elsewhere in report: As written, bullet two trivializes the issues. Additionally, the following statement is somewhat patronizing and portrays watershed planners' and other stakeholders' concerns as being envy-based: "There is a lot of energy and excitement around the Columbia River Program, and it is natural to want the same level of energy (staffing resources, capital expenditures, and permitting capacity) in other areas."	Ecology agrees. We have changed the text on page ES-9 to reflect the comment.	ES-9

	Entity	Comment	Response	Page #
41	Klickitat county	The report should note that there are several issues with Ecology's policy that water supplies developed under chapter 90.90 RCW would be available for out-of-stream uses only after they reach the Columbia River mainstem. Among the issues is that over time currently available water supplies and the potential out-of-stream benefit of opportunities to develop new water supplies in tributary basins will be transferred to the Columbia River mainstem and lost to the tributary basins.	Ecology agrees. We have changed the text on page 2-4 to reflect the comment.	2-4
42	Klickitat County	The scope of the program needs to be basin-wide, as the statute provides. If the water supply development program is not basin-wide some areas might benefit at considerable cost to other areas.	Comment noted.	--
43	Klickitat County	Page 1-1, paragraph 3: I cannot find where in chapter 90.90 RCW the Legislature specifically charged Ecology with considering acquisition. However, RCW 90.90.010(2)(a) does state that there shall be no expenditures from the Columbia River Basin water supply development account for water acquisition without specific legislative authority.	Ecology does not read RCW 90.90.010(2)(a) to require specific legislative authority to expend Account funds on acquisition. Ecology reads this mandate as broad (in effect, any actions designed to provide access to new water supplies). Further, it is only when water developed through acquisition is to be moved out-of-WRIA that legislative approval is required. Given that there is substantial demand in each WRIA, Ecology's goal is to satisfy in-WRIA demand first before considering a legislative request to move water out-of-WRIA.	--
44	Klickitat County	Page 1-2, section 1.1: There are two policy advisory groups. The report should also note that the Commissioners Policy Advisory Group (Commissioners PAG) and its watershed planning forum were formed.	We have revised the text to reflect the correct information on 1-2 and 2-3.	--
45	Klickitat County	Page 2-3, section 2.0.4, bullet 1: Ecology should meet with watershed planning units and discuss whether they are interested in working with the Department on the inventory/ forecast and what should be the nature of the working relationship.	Ecology sent letters to each WRIA requesting such a meeting on June 8, and met with all WRIAs that indicated an interest in a meeting. Ecology will continue to strengthen this relationship next year.	--
46	Klickitat County	Page 2-4; subsection entitled "First", bullet 1: What Columbia River planning, and what broader Columbia River planning requirements? Chapter 90.90 RCW does not include provisions for planning or any planning requirements.	RCW 90.90.050 requires Ecology to develop a long-range water supply and demand forecast for the entire Columbia River Basin (RCW 90.90.040) and develop a web-based information system for "effective mainstem water resource planning and management."	-

	Entity	Comment	Response	Page #
47	Klickitat County	A Columbia River planning effort that includes any area where watershed planning is underway under chapter 90.82 RCW would be counter to chapter 90.82 RCW. As provided in RCW 90.82.130(4): "After a plan is adopted in accordance with subsection (3), and if the department [Ecology] participated in the planning process, the plan shall be deemed to satisfy the watershed planning authority of the department with respect to the components included under the provisions of RCW 90.82.070 through 90.82.100 for the watersheds or watersheds included in the plan. The department shall use the plan as the framework for making future water resources decisions for the planned watershed or watersheds. Additionally, the department shall rely upon the plan as a primary consideration in determining the public interest related to such decisions." The addressing the development of waters supplies for instream and out-of-stream uses is addressed under RCW 90.82.070.	There are 20 WRIAs in the Columbia River Basin. We agree that an adopted watershed plan is the management framework for that WRIA.	--
48	Klickitat County	In the Finding – 2003 1st sp.s. c4: "The legislature declares and reaffirms that a core principle embodied in chapter 90.82 RCW is that state agencies must work cooperatively with local citizens and the governments closest to them in a process of planning for future uses of water by giving local citizens and the governments closest to them the ability to determine the management of the WRIA or WRIAs being planned." "The legislature further finds that this process of local planning must have all the tools necessary to accomplish this task and that is essential for the legislature to provide a clear process for implementation so that the locally developed plan will be the adopted and implemented plan to the greatest extent possible."	Comment noted.	--
49	Klickitat County	Where watershed planning is underway Ecology must depend on the watershed plan as the framework for water resource decisions and a primary consolidation in determining the public interest related to such decisions. This includes water supply development decisions related to implementing chapter 90.90 RCW. Additionally, Ecology must work cooperatively with local citizens and the governments closest to them in the watershed planning process which the Legislature provided as the means for them to determine the management of the WRIA or WRIAs being planned.	There are 20 WRIAs in the Columbia River Basin. We agree that an adopted watershed plan is the management framework for that WRIA. Ecology will continue to coordinate with watershed planning units to harmonize the Columbia River Program with local planning efforts.	--

	Entity	Comment	Response	Page #
50	Klickitat County	Page 3-19, section 3.3" It would be helpful for future reports to the Legislature if the project funding applications asked for the information required in RCW 90.90.040(1)(a).	Comment noted.	--
51	Klickitat County	Page 3-19 and 3-20, section 3.4: Project scoring criteria and weighting heavily favor projects that provide instream benefits making the project selection process inconsistent with the direction that Ecology focus its efforts to develop water supplies on the needs specified in RCW 90.90.020(3).	Net Water Savings, which is the primary metric for out-of-stream benefit, is weighted the highest. However, this year's evaluation and scoring will teach us much about how to structure the scoring guidelines in the future.	--
52	Merrill Ott, Chair, County Commissioners Policy Advisory Group, and Stevens County Commissioner	Page E S-9 ''Water for the Columbia River or Water for Tributaries? Watershed planning units and other stakeholders have expressed concerns about the State developing water supplies for the Columbia but not in the tributaries. There is a lot of energy and excitement around the Columbia River Program, and it is natural to want that same level of energy (staffing resources, capital expenditures and permitting capacity) in other areas. Ecology is working with local groups to try and find common ground on these issues and in particular to fund projects that benefit both tributaries and the Columbia River." Ecology representative have attended meetings of eastern Washington County Commissioners and watershed planners and discussed this point. At these meetings, Ecology's view has been explained as initially only looking at the mainstem due to legislative direction, but having shifted ove time to now also take into account projects in the tributaries. This description above makes it sound as if it continues to be up in the air whether the tributaries can be a focus of the program. I recommend this language be changed to more accurately represent Ecology's present position that the tributaries are an important focus as well as the mainstem.	Ecology agrees. We have revised the text on page ES-9 to reflect the comment.	ES-9

	Entity	Comment	Response	Page #
53	Merrill Ott, Chair, County Commissioners Policy Advisory Group, and Stevens County Commissioner	Page ES-5 "The statute directs Ecology to develop water supply options that meet instream flow needs. It also directs Ecology to develop supply options for specific out-of-stream needs (RCW90.90.040): • Replace ground water use from the Odessa Subarea aquifer; • Approve pending water right applications; • Convert existing interruptible water rights to uninterruptible water rights; and • Issue new municipal, domestic, industrial, and irrigation water rights." This description lists instream flow needs as the first need, followed by out of stream needs. This is reverse of the order actually in the statute, and seems to place a higher priority on instream flow needs. I recommend this be reworded to clarify that out of stream uses are a top priority, as indicated b y this language in RCW 90.90.010: " (I) The legislature finds that a key priority of water resource management in the Columbia River basin is the development of new water supplies that includes storage and conservation in order to meet the economic and community development needs of people and the instream flow needs of fish."	Ecology reads the statutory mandate to require improvement in both instream and out-of-stream needs. We do not read the section you cite to place a higher emphasis on out-of-stream needs because people are listed before fish, just as we don't read instream needs to be more important in the following sentence just because it is listed first: "aggressively pursue the development of water supplies to benefit both instream and out-of-stream uses". The bill passed due to compromise on a program that prioritizes improvement on both fronts, which is the spirit Ecology is following when administering the program. We have revised the language you referenced to better reflect this.	ES-5
54	Merrill Ott, Chair, County Commissioners Policy Advisory Group, and Stevens County Commissioner	Page ES-5: The citation of RCW 90.90.040 as listing those needs is incorrect. The correct citation is RCW 90.90.020.	Ecology agrees. We have revised the text on page ES-5 to reflect the comment.	--
55	Merrill Ott, Chair, County Commissioners Policy Advisory Group, and Stevens County Commissioner	Section 2 .0.4 on page2-4 references the Washington State Association of Counties hiring staff "...coordinate county Issues among watershed planning units." This staff person actually: "... coordinates county issues among eastern Washington county commissioners and watershed planning units." You might also consider moving that reference to section2 .0.3, which discusses local government, rather than 2.0.4 which is about watershed planning.	Ecology agrees. We have changed the text on page 2-4 to reflect the comment.	2-4

	Entity	Comment	Response	Page #
56	Merrill Ott, Chair, County Commissioners Policy Advisory Group, and Stevens County Commissioner	Section2 .0.3 references the county commissioners group as "the Forum". This was an early name for the county commissioner group, but the charter for this group now uses the name" County Commissioners Policy Advisory Group".	Ecology agrees. We have changed the text on page 2-3 to reflect the comment.	2-3
57	Walla Walla County Watershed Planning (WRIA 32)	Walla Walla County Watershed Planning supports additional reach-based and watershed level studies, which will provide better monitoring and evaluation data; these efforts are a high priority in Water Resource Inventory Area (WRIA) 32, the Walla Walla watershed.	Comment noted.	--
58	Walla Walla County Watershed Planning (WRIA 32)	For implementation of any future conservation projects in or affecting WRIA 32 such as water transfers, water trust transactions, etc., Walla Walla County asks that Ecology consider the recommendations embodied in our locally developed plans and would also request for consultation with the WRIA 32 Walla Walla Watershed Planning Unit to ensure that any such projects will be evaluated against local our plans including the WRIA 32 Watershed Plan and the Snake River Salmon Recovery Plan.	Ecology will consult with the WRIA 32 Planning Unit before funding projects in that WRIA to ensure consistency with the watershed plan.	--
59	Yakama Nation	The heavy emphasis on new storage to solve water management problems in the Columbia has, if anything grown heavier in this year's version of the Inventory. Storage is only one management tool, and should not be pursued until other less destructive options have been exhausted.	Ecology's progress on evaluation of new storage is partly an artifact of events predating the Columbia River legislation (e.g. congressional authority to study storage in the Yakima Basin, 2004 MOA to study Mainstem Off-Channel Storage). Ecology agrees that it needs to evaluate a suite of water supply options. Funding of conservation projects this year and further studies (e.g. Coordinate Conservation Planning by Columbia Basin Irrigation Districts, ASR Pre-Appraisal Study) will help clarify our options.	4-4 thru 4-6
60	Yakama Nation	The Inventory continues to treat all pending applications as a demand that must be met. We do not believe that the Columbia River Bill calls for this or that the Bill freed Ecology from its obligation to investigate each pending water right application and determine whether the proposed new use can be considered beneficial and in the public interest.	We agree that as submitted application does not guarantee that Ecology will issue a permit. A list of pending applications is only one indicator of potential demand. As Ecology looks to improve our demand forecasting efforts in 2011, we will use other forecasting tools to help evaluate how much demand to plan for.	--

	Entity	Comment	Response	Page #
61	Yakama Nation	The Inventory gives short shrift to what is probably the most economical and least destructive means to meet new demands, which is acquisition of existing water rights. With vast amounts of water in the basin being used for low-value or amenity uses, a responsible approach would be to test the ability of the market to satisfy demand before proposing costly, destructive, government subsidized new storage projects.	Ecology agrees that much work remains to be done to understand how acquisition and water marketing can be used as part of a portfolio of water supply options. Ecology is funding evaluation of water marketing in the Yakima River Basin, is looking at scale-up opportunities for the entire Columbia River Basin, plans to partner with River Conservancies in 2008 on acquisition, and plans to study in greater detail how land conservation programs and crop duty reduction can fit in this program.	3-15, 3-17, 4-1, 4-18, 4-19, 4-20, 4-24, 4-25, 4-26
62	Yakama Nation	The over-emphasis on storage perpetuates the myth born in the Columbia River bill that new storage, changing of existing storage operations, or new appropriations of water will not have a harmful effect on the Columbia River so long as there is no net reduction of flow in July and August. This is a greatly oversimplified and inappropriate reading of the National Research Council report on the Columbia, which is, in turn a less than comprehensive look at water budget issues on the Columbia due to the narrow charge to the NRC. The NRC was only asked to address the effects of new diversions from the river, and they advised against new diversions in July and August. Water that is diverted from storage during the summer creates a deficit that must be repaid from streamflow during the refill season. New diversions, whether from new storage or existing storage (e.g. the proposed new diversion to the Columbia Basin Project) would exacerbate existing problems. Any consideration of new storage must clearly demonstrate that water is available to divert from streamflow without adverse consequences. That has not been done in the CRWMP. The Columbia River Bill and the Inventory ignore these existing problems on the river and instead seem to assume that the river is an infinite source of water ten months of the year. We reject this interpretation.	Each storage project will have a fill regime based on water availability, supported by a comprehensive environmental review and an open and transparent public review. Our current program planning is based on Bureau of Reclamation and BPA river flow projections that estimate water to be available in excess of biological flow targets in certain months of the year, most notably September, October, December, and January.	--
63	Yakama Nation	For the past few years, the discussion of new storage has consistently referred to “off channel” storage, implying that new dams would not block or eliminate existing fish passage. If our current understanding is correct, at least two of the potential reservoir sites in the Inventory would be located on fish-bearing streams and would block passage into currently used salmon habitat.	The Off-Channel Mainstem Storage Study began in 2004 as part of the MOU with Columbia Basin Irrigation Districts and the Bureau of Reclamation. Since then, other on-channel projects have been added to on-going studies. We have tried to use appropriate terms in the report.	--

	Entity	Comment	Response	Page #
64	Yakama Nation	Page ES- 5 The discussion of "new water" is a helpful clarification of previous versions. We disagree with the implication that "times of surplus availability" have been adequately defined. The definitions of consumptive and non-consumptive use need to be reworked to be more clear and accurate. For example, only a fraction of the water discharged through treatment plants is diverted for irrigation. Most is used for instream flow and hydropower. The final sentence, "However, this water eventually returns to the Columbia River Basin too, in the form of rain or snow" is misleading and should be stricken.	We agree that times of surplus availability will need to continue to be evaluated as water supply options move forward. Language has been updated.	ES-5
65	Yakama Nation	Page ES- 7 The clarification about the reach specific effects of conservation is a useful addition. We do not agree with the language in the last paragraph reinforcing the need for storage, particularly given the lack of emphasis placed on acquisition and transfer as tools for meeting changing needs.	Ecology agrees. We have revised the text on page ES-7 to reflect the comment.	ES-7
66	Yakama Nation	Page ES- 8 First sentence: "complimentary" should be "complementary".	Ecology agrees. We have changed the text on page ES-8 to reflect the comment.	ES-8
67	Yakama Nation	Page ES- 8 Paragraph beginning with "In addition to changing supply": The discussion of increasing crop water requirement ignores the fact that much agriculture has been shifting to lower water-demand crops. Thus the assumption of needing an additional 140,000 acre feet to maintain the existing irrigated land base is probably not accurate.	The one inch of additional water estimate provided in the report is one possibility that could occur. Actual future irrigation demand could be greater or less than this amount. The 2011 Columbia Water Supply Inventory and Long-Term Water Supply and Demand Forecast will address this issue in greater detail.	--
68	Yakama Nation	Page 3-13 The discussion of the proposed "Lake Roosevelt Drawdown" is misleading. The proposal is not to drawdown the reservoir i.e, lowering the reservoir by releasing water from it. The proposed action here is large new diversions. The drawdown is the consequence of the proposed action; it is misleading to talk about a net increase to streamflows resulting from this project. There would, of course be a substantial net reduction in streamflows annually. That loss would create a demand to be refilled. This document neglects to mention the consequences to streamflow of the increased refill demand.	We have updated language in the report characterizing the "Lake Roosevelt Drawdown" as incremental storage releases. Ecology will complete a Supplemental EIS on this project in 2008 that will describe this project in greater detail.	ES-2, ES-3, 2-1, 2-5, 2-9, 3-1, 3-13, 3-14, 3-15, 4-2, 4-6, 4-28

	Entity	Comment	Response	Page #
69	Yakama Nation	Page 3-16 Considering the multi-million dollar expenditures for studying storage and out of stream diversion options, $20,000 allocation to water acquisition seems woefully inadequate, Unlike some other alternatives, acquisition offers the potential to improve conditions in tributaries while freeing up water for the mainstem. Ecology should aggressively pursue this option.	Ecology has entered into a partnership with Washington Water Trust and Washington Rivers Conservancy to negotiate water right acquisitions with willing sellers, focusing on permanent transactions as first priority. We will also consider long-term leases and drought leases for the Trust Water Program. Water acquisitions from this partnership may result from fallowed corners and land retirement, and crop change projects. Additional water acquisitions could result from partial season acquisition/lease and from working in conjunction with land conservation programs.	--
70	Yakama Nation	At this time it still appears the balance is tipped heavily toward new out of stream users, with potential new adverse impacts to the instream economy.	In 2008, Ecology plans to recommend specific construction projects for funding that will benefit both instream uses and meet new out-of-stream demands. Chapter 3 provides a list of pre-applications we are currently considering.	3-21

Comments from:
American Rivers, Washington Environmental Council & Washington Rivers Conservancy

November 14, 2007

LeAnn Purtzer
Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902-3452

Via email: lesc461@ecy.wa.gov

Re: Comments on Draft 2007 Columbia River Basin Water Supply Inventory Report

Dear Ms. Purtzer:

American Rivers, Washington Environmental Council, and Washington Rivers Conservancy thank you for the opportunity to comment on the Department of Ecology's draft 2007 Columbia Basin Water Supply Inventory Report. The information presented in the draft report is helpful in understanding how the program is developing and identifying both opportunities and information gaps that need to be filled before Ecology commits significant resources toward a particular strategy or combination of strategies to satisfy demonstrated water demand in Washington's portion of the Columbia Basin.

Our comments on the draft report are divided into general, overarching reactions and more specific reactions to particular items in the text.

I. Ecology's mission

As we recently mentioned in a meeting with Jay Manning and Gerry O'Keefe, one concern we have about the draft report is that it claims that Ecology's fundamental mission has changed since it was tasked with implementing the Columbia Water Management Program:

> During our history, we've moved from a water allocation agency (for the first 50 years, 1917 to 1967), to one with a more balanced regulatory role (the next 40 years, from 1967 to 2006), and now to a water supply development agency on the Columbia River. [Draft report, p. ES-9]

In our view, Ecology should describe its water responsibilities in terms of responsibly managing and stewarding the state's water for the benefit of all the state's residents, including people who depend on healthy rivers, fish, and wildlife for their economic well-being and quality of life. While the Columbia Water Management Program (CRWMP) gives Ecology a responsibility to work to meet legitimate water needs with the most appropriate supply tools, the program should not be read as changing the agency's fundamental mission. For instance, the program does not supersede existing legal and regulatory responsibilities, such as applying the four-part test for issuing a water right. We believe that the commitment of substantial public money to developing water supplies should actually increase the importance of the public interest component of the four part test., as the state's taxpayers have a substantial interest in knowing that the resources devoted to developing new water supplies benefit the state as a whole and not just particular water users. In other words, the responsibility of the agency to serve as a steward of Washington's water resources for the benefit of the whole state is, if anything, enhanced by the creation and existence of the CRWMP. Ecology's water supply responsibilities exist within in that larger mission. In addition, Ecology will function better as an agency if it focuses on its core mission and views its programs through that lens rather than attempting to serve different roles in different contexts.

II. General comments on supply and demand

The draft report makes it clear that there are significant information gaps on both the supply and demand sides that must be filled before well-informed large scale decisions can be made with respect to Washington's management of Columbia River water. The report is helpful in identifying those gaps on the supply side, but adds nothing significant to the 2006 inventory report when it comes to better defining that report's inconclusive demand estimate.

With respect to supply, good progress has been made in assessing the potential of some types of conservation and efficiency, and it appears substantial (especially for instream benefits). On the other hand, the draft report shows that there is little knowledge of the water supply potential of municipal conservation, land conservation programs, crop water duty reduction, crop changes, or partial season acquisition/lease. There is also little knowledge about their cost relative to each other and other water supply tools. In addition, little is known about the potential or cost of aquifer storage/recharge projects. While five relatively small projects have been studied, a much more thorough assessment seems like it should be needed before Ecology makes conclusive sounding statements such as "aquifer storage is likely to cost the most" (p. 4-2). This seems unlikely given the construction, operation, and maintenance costs associated with new surface storage dams, but more information is needed to be certain and before embarking down a path that embraces one, both, or neither.

On the demand side, the draft report appears to add nothing significant to the 2006 inventory report. It would be helpful in the final draft to have more explanation of next steps on demand estimates. Better defining economically and environmentally justified demand is essential to efficiently carrying out the CRWMP and forming its goals on how much water should be supplied through various tools.

III. Some page-by-page reactions

Executive Summary:

p. ES-6: Could packages of actions that primarily benefit instream uses (Table ES-4) and out-of-stream uses (Table ES-5) be put together to meet the requirements of the CRWMP? This seems like a potentially practical way to benefit both agriculture and river/fisheries health. Conservation, including efficiency and lining/piping, clearly has significant, relatively low-cost potential to help instream flows. Moreover, Ecology has indicated in the past that it recognizes that projects to increase on-farm efficiencies that result in instream benefits directly benefit agricultural users through improved operations and new equipment.

These efficiencies could also allow more water move down the tributaries all the way to the Columbia, where it might create more out-of-stream benefits than the report indicates. More discussion of why this may or may not be the case would be helpful.

Chapter 1:

p. 1-2: Sentence on matching "water supply generated from the inventory to water demands identified in the bill" gives the impression that water demand is well understood. While general categories of demand may be understood, more work is necessary to determine the level of water demand that is economically beneficial and environmentally sustainable.

Chapter 2:

p. 2-1: In general, Ecology's communication and outreach has been very good – this will help ensure that the program is successful.

p. 2-4: We support looking for the "win-win" scenarios highlighted in the second bullet of the first shaded box on this page.

p. 2-6: Rather than calling the proposed Shanker's Bend dam a "storage facility," we suggest calling it a dam. As the only surface storage proposal to date to call for damming a major river – and a scenic section of it – the public needs to know that this is not an environmentally benign form of storage.

p. 2-8: The information on water rights and other information that Ecology has developed and displayed on its website will be very helpful for future decision-making. This is a good use of CRWMP resources.

Chapter 3:

p. 3-2: This is not a substantive point, but leading off the chapter on project funding with a big, bold graphic on storage reinforces the misimpression that the CRWMP is primarily a surface storage program. We suggest re-ordering this section, or a least making the graphic on storage dams look more like the rest of the more low key graphics in the report. Also, the "storage" heading on the graphic should say "large surface storage" as this subsection focuses on surface storage behind large dams rather than on aquifer storage or small storage.

p. 3-13: We look forward to the ASR study referenced on this page. Knowledge on ASR (and other supply options) must catch up with knowledge on surface storage.

p. 3-16: We are supportive of Ecology's attempt to use market-based strategies like auctions to find water for in and out-of-stream uses but believe there is additional work that needs to be done before the concept will be successful in Washington, especially using a Columbia Basin-wide approach. The number of water claims in Washington, un-adjudicated basins, and the Sinking Creek decision are strong deterrents for success. We support the use of river conservancies and others to work with landowners on an individual basis and believe that strategy will lead to water availability. We also fully support Ecology partnering with our groups and others to look at what options are available for a streamlined adjudication of water rights in Washington State.

p. 3-16: A clearer explanation of next steps on estimating future water demand would be helpful.

p. 3-17: We strongly support Ecology's investment in getting better information on how global warming will affect Columbia Basin river flows and runoff patterns.

p. 3-17: The discussion of the project funding process beginning here is clear and concise.

Chapter 4:

p. 4-2: We appreciate the statement that conservation can create "new" water supplies instream and out-of-stream.

p. 4-2: As noted above (in Section II), we find the assumption that ASR will "cost the most" puzzling. If there is a basis for assuming that this will be true across the board, explanation should be provided in the final report.

p. 4-3: We agree that evaluating all types of storage, along with other supply tools, is important in the face of climate change. However, until more information is available on how climate change will affect the Columbia Basin, where the need for water will be most acute will remain in question, which creates uncertainty about where to focus supply efforts.

p. 4-6: We agree that modifications of existing storage dams will likely prove a cost effective and less environmentally destructive way to provide significant new water supplies. More detail of potential modifications would be helpful in the final 2007 report.

p. 4-15: Ecology should consider using CRWMP funds to encourage municipal conservation to free up water supplies.

p. 4-20: Water acquisition as an avenue for securing water supplies should remain as a tool but not be seen as the means to get large quantities of water. Ecology should continue to ensure that projects funded as mitigation for "wet" water actually provide water that is consumptive in nature. A recent evaluation prepared by Hardner and Gullison on the Columbia Basin Water Transactions Program shows strong support for using river conservancy type organizations to do water acquisition projects in Washington and other western states to overcome many of the obstacles described in this report. The unwillingness to engage in a water transfer project for fear of relinquishment is a valid concern. Ecology should support and partner with outside entities like river conservancy organizations and conservation districts that work with landowners to remove the immediate specter of relinquishment.

p. 4-21: The low cost of water savings from land conservation programs and partial season acquisition leases suggests that these tools should be explored further by Ecology.

p. 4-24: See comments in Section II on need for more information on land conservation programs, crop water duty reduction, and crop changes.

p. 4-24: More explanation would be helpful about why 45 fallowed corner projects apparently yield such modest water savings.

p. 4-30, 4-31: The last paragraph on p. 4-30 and the first few on p. 4-31 do a good job of framing the purpose of this report and acknowledging that "[i]t is still unclear as to whether large storage, multiple small storage projects, ASR, or some combination will work best for Washington" to complement investments in conservation. We agree, although existing information suggests that large storage may simply not be a cost-effective means to meet foreseeable demand.

Chapter 5:

5-3: Projections for municipal growth assume that an additional 450,000 people in eastern Washington will use an average of 170 gallons per day per person [see p. 5-4 of the 2006 report]. This is more than double the amount for the average user in the Seattle area, and seems unreasonably generous in a region with very limited water supplies. Seattle Public Utilities has made great strides in reducing user demand and reducing waste in the system, and municipalities throughout the state will have to do the same as supplies further tighten and Department of Health efficiency regulations take effect. The 170 gallon per day assumption should be adjusted downward, which will reduce the 86 KAF forecast for municipal needs.

Thank your for your consideration of our comments.

Sincerely,

Michael Garrity
Associate Director, Columbia Basin Programs
American Rivers

Michael Mayer
Legal Director
Washington Environmental Council

Lisa Pelly
Executive Director
Washington Rivers Conservancy

Comments from:
Center for Water Advocacy

Center for Water Advocacy

90 West Center Street • Moab, UT 84532 • 541-377-0960
www.wateradvocacy.org / waterlaw@uci.net

The Center for Water Advocacy (CWA) is a non-profit public interest entity dedicated to protecting water resources that affect the interests of the public and the Center's members in the west. CWA conducts legal and scientific research, policy analysis and litigation in its efforts to protect and restore water quantity, water quality and water rights for the health of watershed ecosystems, preservation of cultural identity and the benefit of the public.

I am writing today to express concerns over the Columbia River Water Management Program (CRWBP) Legislative Report on Water Supply Inventory (Report) and urge you to consider implementation issues relating to the impacts on aquatic resources, native fish habitat and the overall health of the Columbia River. We would also like to remind Ecology to balance decisions to permit water withdrawals with its obligation to protect and enhance the quality of the natural environment.

First, we urge that you always consider that protecting instream flows is one of the main purposes behind Washington water laws . Instream flows are critical for migrating salmon and steelhead populations and vital for long-term watershed health. Moreover, the existing instream flow targets set out to protect salmon and steelhead are often not met under the current system, yet the demand will only increase in the future under the CRWMP.

A critical balancing is required to assure that any action benefits both out-of-stream and instream uses. Unfortunately, the basic premise behind the CRWMP and recent inventory report seems to serve irrigation districts and does little to address impacts to instream flows and habitat in the Columbia Basin, a main purpose behind the Columbia Basin Bill. However, it appears that only after the needs of these irrigation districts have been filled, then mitigation will be implemented.

We appreciate that river management is complex and applaud Ecology's plans for working with WDFW and the Tribes to better understand instream demand and how to best use water supplies. We ask Ecology to thoroughly investigate this complex issue before you commit to issuing numerous new water permits for irrigation and other out of stream uses. Without the necessary information on the impacts, the report provides insufficient analysis of the amount of water that will be appropriated from the basin and the actual impacts to instream flows.

While the Report addresses the need for water conservation projects, it recognizes that most of the water savings is only available on a temporary basis and will be used to hydrate interruptible water rights in times of drought and not for instream needs. In

addition, most of these conservation projects (and funding for those projects) are focused on storage and not reductions in consumptive use. We urge you to explore more options for reducing consumptive use and how to prevent instream flow fluctuations and how to encourage behavioral changes that lead to water savings. Moreover, we ask that you do not use potential conservation opportunities, many of which are highly uncertain, as a means of justifying increases in issuing new water rights. Otherwise, Ecology will turn the concept of water conservation on its head by actually increasing rather than reducing the use of water.

In addition, we ask that you further accommodate for the inherent uncertainty of the water cycle and overall cumulative effects to the entire watershed, including tributaries throughout the implementation process. Because the implementation of the CRWMP will result in tremendous amount of new water withdrawals, thorough consideration of how the uncertainty of the water cycle, changes in climate and increased demand will impact instream flows is necessary *prior* to issuing new permits. Withdrawals of this scope will undoubtedly have devastating impacts for Endangered Species Act (ESA) listed species that rely on instream flow for survival, subsistence practices of many individuals and the overall watershed health of the Columbia River Basin.

Thank you for this opportunity to comment on the legislative report for the CRWMP process and for your consideration.

Kelly O'Brien, Water Policy Coordinator
Center for Water Advocacy

Comments from:
Columbia River Inter-Tribal Fish Commission

COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION
729 NE Oregon, Suite 200, Portland, Oregon 97232
Telephone 503 238 0667
Fax 503 235 4228

November 15, 2007

LeAnn Purtzer
Department of Ecology
15 West Yakima Ave -- Suite 200
Yakima, WA 98902-3452
lesc461@ecy.wa.gov

RE: Comments on Draft 2007 Columbia River Legislative Report - Columbia River Water Supply Inventory

Dear Ms. Purtzer:

The Columbia River Inter-Tribal Fish Commission (CRITFC)[1] appreciates the opportunity to provide comments to Ecology on the Draft 2007 Columbia River Legislative Report - Columbia River Water Supply Inventory (herein "Draft 2007 Legislative Report"). Below we are providing some brief general comments as well as some addition specific comments to the draft document.

CRITFC's member tribes have a direct interest in the waters of the Columbia River Basin that is related to existing treaties between the tribes and the United States. All of the CRITFC member tribes have ceded territories that encompass entire large watersheds within the Columbia River Basin, e.g. the Yakima Basin.[2] Each Tribe exercises treaty rights to take fish from the Columbia River and its tributaries. As supported by a significant body of case law, these treaty rights include off-reservation instream water rights with priority dates that are senior to all other users and that are the necessary to protect the biological functions of fish and their habitat.[3]

Adequate instream flow with water of high quality is essential to sustaining healthy and viable salmonid populations, and preserving tribal culture, religion and economies. The burden of reduced instream water resources must not continue to fall upon the salmon and other aquatic species, such as sturgeon and Pacific lamprey. In fact, pacific lamprey are in serious decline in the State of Washington with only 84 adults passing Lower Granite Dam this year.

---

[1] In 1977, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Nez Perce Tribe, and the Yakama Nation created the Columbia River Inter-Tribal Fish Commission (CRITFC or "Commission"). These four tribes have 1855 treaty rights to take fish that pass their usual and accustomed fishing places. Consequently, it is of critical importance to the tribes to protect and conserve the habitat and life cycle of the fisheries. The Commission functions to protect, promote, and enhance the Columbia River Basin's anadromous fish resources consistent with the treaty-secured interests of its member tribes by formulating a broad, general fisheries program, and providing technical and legal support.

[2] We incorporate by reference our November 5, 2006 comments on the Draft Programmatic EIS (DEIS) for the Columbia River Water Management Program

[3] *See, e.g., United States v. Winans, 198 U.S. 371 (1905); Colville Confederated Tribes v. Walton, 647 F.2d 42 (9th Cir. 1981); United States v. Adair, 723 F.2d 1394 (9th Cir. 1984); Ecology v. Yakima Reservation Irr. Dist., 850 P.2d 1306 (Wash. 1993).*

Ecology and the Legislature continue to place emphasis on new storage that by state law will return to the river for fish uses merely one third of the water removed. Instead, other options should be strongly considered, such as conservation and using the over 30 million acre feet of existing storage in the Columbia Basin. In our comments on the 2006 CRWMP DEIS, we explained that the target flows established in the NOAA Biological Opinions for the Federal hydropower system were not adequate for anadromous fish, and we illustrated that the these target flows were not met much of time. Yet, Ecology and the State of Washington are proceeding with actions that will further reduce in stream flows as well as reduce the probability that these targets will be met. Ecology is not hearing the tribal message on these issues.

In considering water availability at any time of the year – winter or summer – Ecology must make a comprehensive analysis of the many different demands on the river, from consumptive use withdrawals to flow/power agreements such as the Mid-Columbia Hourly Coordination Agreement. Therefore, Ecology's position that Columbia River water is available outside the general fish migration seasons to fill new storage is too simplistic. In addition to the Hourly Coordination Agreement, there are two primary – and significant – considerations that will affect water availability in the winter: (1) minimum flows required for supporting lower river chum salmon between the months of November and March and; (2) refill probabilities for flood control operations on the federal hydropower system. Our hydrological modeling with the NWPCC GENESYS model indicates that withdrawing additional water in the winter for storage projects, such as Washington proposes, could reduce flows for chum and may also affect refill probability on the hydropower system. At this time, the Endangered Species Act (ESA) requires the hydropower system to have reservoirs at upper flood control rule curves on April 10 as necessary to meet spring and summer salmon flow targets, a result which our modeling shows will be increasingly difficult to meet should Ecology continue with its current plans for new storage. We recommend technical discussions between Ecology, CRITFC and its member tribes and the Bureau of Reclamation regarding Columbia River mainstem hydrological modeling, target flows and other fisheries needs.

Ecology should revisit the Columbia River Water Supply Inventory's provision allowing two-thirds of new stored water for consumptive use out-of-stream. Reserving only one-third of new storage water to the streams and rivers from whence it came is inadequate from both ecological and economical standpoints. Why is the division not an equal split, fifty-fifty? As pointed out above, disagreements exist concerning whether or not water is available for storage above and beyond ESA requirements. Further, the storage projects under consideration will be largely funded by public dollars. Collaborative conservation with tribes and other entities is recommended and could result in cost-savings in the long run.

Thank you for the opportunity to submit these comments. We believe that through continued, candid communication and consultation, Ecology and the tribes will be able to work out a compromise that is more acceptable than what is currently on the table. Please feel free to contact Robert Heinith or Julie Carter at 503-238-0667.

Sincerely,

Olney Patt, Jr.
Executive Director

Specific Comments
Draft 2007 Columbia River Legislative Report - Columbia River Water Supply Inventory

Chapter 2. Stakeholder outreach.

It is of the highest priority that Ecology details the current use of water and water rights in the State of Washington before other water use options are considered. This includes verification of water use via metering and reports on Columbia River water trust holdings. The amount and timing of water use, including return flows, water lost to evapo-transpiration, changes in consumptive use, unaccounted water, conservation and water banking need to be carefully quantified before Ecology considers additional river withdrawals.

Technical meetings are needed between the tribes, Ecology, WDFW and the Bureau of Reclamation (BOR) to better define instream water needs for fish. A recently released WDFW report [4] details the importance of instream water rights for fish and should be incorporated into the final 2007 CRWMP Report to the Legislature.

Chapter 3. Funding of Projects.

Any proposed storage project would be very expensive to implement and needs a comprehensive, NEPA/SEPA review process. All storage projects result in lost water resources from consumptive use (evapotransporation and plant respiration). The proposed site at Crab Creek would be detrimental to a listed ESA subpopulation of Upper Columbia steelhead. CRITFC is supporting a fish passage alternative in the Enloe Dam FERC licensing proceeding. The proposed storage site at Shankers' Bend in the Similkameen River would eliminate consideration of anadromous fish passage into this area of the river and likely have detrimental water quantity and quality impacts on a very important summer Chinook stock in the lower Similkameen River.

CRITFC has consistently recommended a 10 foot drawdown of Banks Lake to elevation 1560 to augment fish flows and increase the probability meeting summer target flows. The Bureau of Reclamation has cited protection of cultural resources and recreational uses as reasons not to achieve the 10 foot drawdown. Ecology and Bureau of Reclamation should work together to define what it would cost to provide protection of cultural resources at elevation 1560 and report back to the tribes, Ecology and Legislature. Utilizing the existing storage capacity in Banks Lake would be far cheaper than building new storage sites.

CRITFC has not supported the CRWMP Lake Roosevelt drawdown action due to three primary reasons:

1) Only one third of the storage water is allocated for instream- fishery uses.
2) Refill of the drawdown space must occur in September which exacerbates already low flow conditions. This has negative effects on the remaining juvenile salmon and the bulk of the annual adult salmon run that occurs in September.
3) CRITFC's member tribes' treaty fishery will be negatively impacted by September refill. Low flows reduce fishing access and proper operation of fishing equipment. Tribes are only provided a few weeks to engage in the fishery and this generally occurs during the first three weeks in September.

[4] Vadas, R.L. Jr., and H.A. Beecher. 2007. Mainstem flows - an important factor in fish production and protection in the Columbia/Snake River basin. Washington Department of Fish and Wildlife, Habitat Program. Olympia, WA. 43 pp.

It is not mentioned in this section, but FCRPS reservoirs are operated to maintain ESA listed lower Columbia River chum flows of about an 11.5 foot tailwater at Bonneville Dam (about 125 kcfs depending on ambient flows, bank storage and tides). FCRPS reservoirs are also operated to maintain Hanford Reach fall Chinook spawning and redd coverage from November through early May. Thus, fall and winter fish flows are also important and will be impacted if flows are removed from the river for storage projects.

Likewise, Ecology must evaluate the effect of the Mid-Columbia Hourly Coordination Agreement that plays a large part in managing flows on the mid section of the river from Grand Coluee Dam to McNary Dam. Flow regimes under the Agreement are affected by water discharged from Coulee and are based on power needs and refill capacity of the Mid Columbia PUD hydroprojects. The Hourly Coordination Agreement is not always honored by all of its parties. Deviations from the Agreement by any party can, in particular negatively affects river flow for fish and their critical habitat and in the case of the Hanford Reach, can impact salmonids in various lifestages.

Chapter 4. Water Supply Inventory.

CRITFC has filed consistent comments in the CRWMP process that existing storage space in FCRPS reservoirs is considerable and available for instream and potentially out-of-stream use if existing flood control rule curves and fall/winter power rule curves are modified. New and advanced forecasting tools provide the foundation to modify these curves to allow additional storage and avoid premature reservoir drafting. Climate change projections indicate that reduced snowpack and earlier runoffs will only make it more imperative to seek flexibility in reservoir storage curves.

While we applaud Ecology's actions on water conservation, we believe they are much too limited. Ecology is only providing $30,000 of the many millions of dollars in the CRWMP to this effort. Ecology should provide a much greater proportion (at least 25%-30% of CRWMP funds) toward investigating and securing additional water conservation and acquisition. Further, Ecology should more fully develop the water bank concept into the CRWMP. This concept is being used successfully in the upper Snake River between willing buyer and willing seller under the Snake River Basin Adjudication to provide instream fish flows.

We also applaud Ecology's actions to establish a 90% compliance rate for water metering by 2009. We recommend that Ecology consider raising the compliance rate to 95% or even greater by 2010. Again, it is critical to understand the current water use patterns before additional out of stream water withdrawals are considered.

Water Inventory Demand Forecast. The State of Washington needs to assess comprehensive growth management planning based upon existing water supplies and storage facilities as a key action in the CRWMP. Columbia River water resources are finite and must be shared equitably between tribal and non-tribal people in Canada, Washington State, Idaho and Oregon. If Ecology and the Legislature continue to proceed without this paradigm it will only cause increased conflict with other basin water users and establish misconceptions with potential Washington State water users that cannot be realized due to demands and authorities in other parts of the basin. This was a key recommendation by the National Research Council's 2004 Report to Ecology on the future of Columbia River mainstem water withdrawals.

Chapter 5. Preview of 2011 Supply and Demand Forecast.

In November, 2006, CRITFC filed comments on Ecology's 2006 Water Supply and Demand Inventory Report. We incorporate those comments into these comments. We are pleased that Ecology adopted some of our recommendations such as providing annual summaries of supply and inventories toward meeting long term goals, incorporating climate change and forecasting into the CRWMP process and including impacts on anadromous fish in the Hanford Reach from dam operations and flow management.

Among CRITFC's recommendations that were not adopted by Ecology in this draft 2007 Report were consideration of flood control modifications in existing storage and the import of target flows for fish. As we have stated above, we believe that Ecology should be conducting technical consultations with CRITFC and its member tribes to discuss and attempt to resolve these issues. This section mentions the importance of target flows, climate change, and crop changes. Due to new analytical methods and fish tagging data, there is important new science evidence regarding the relationship of flows and fish travel time and ocean conditions on anadromous fish survival and adult returns that we encourage Ecology to review and incorporate into the final 2007 Legislative Report (Schaller and Petrosky 2007; Berggren et al. 2007).

In addition, there are several key issues in the National Research Council's 2004 Report to Ecology on the subject of future water withdrawals from the Columbia mainstem that are critical and have yet to be addressed in the CRWMP process. We strongly recommend that Ecology at least identify and review these issues for the final 2007 Legislative Report, and address them in the 2008 CRWMP Legislative Report. These include:

The State of Washington and other Columbia River basin entities should continue to explore prospects for water transfers and other market-based programs as alternatives to additional withdrawals (Chapter 6).

- *• The conversion of water rights to uninterruptible status will decrease flexibility of the system during critical periods of low flows and comparatively high water temperatures. Conversions to uninterruptible rights during these critical periods are not recommended (Chapter 7).*
- *• Sound, comprehensive management Columbia River salmon management strategies will depend not only on science, but also on a willingness of elected and duly appointed leaders and managers to take actions in the face of uncertainties (Chapter 7).*
- *• Decisions regarding the issue of additional water withdrawal permits are matters of public policy, but if additional permits are issued, they should include specific conditions that allow withdrawals to be discontinued during critical periods. Allowing for additional withdrawals during the critical periods of high demand, low flows, and comparatively high water temperatures identified in this report would increase risks of survivability to listed salmon stocks and would reduce management flexibility during these periods (Chapter 7).*
- *• The State of Washington and other basin jurisdictions should convene a joint forum for documenting and discussing the environmental and other consequences of proposed diversions that exceed a specified threshold (Chapter 7).]*

Literature Cited

Schaller, H. and thirteen co-authors. 2007. Comparative Survival Study (CSS) of PIT-Tagged spring/summer Chinook and steelhead in the Columbia River Basin. Ten year retrospective summary report. Projects #1996-020-00 and #1994-033-00. Prepared for Bonneville Power Administration by the Comparative Survival Study Oversight Committee and Fish Passage Center. Fish Passage Center, Portland, Oregon.

Schaller, H.A. and C.E. Petrosky. 2007. Assessing hydrosystem influence on delayed mortality of Snake River Stream-type Chinook salmon. North American Journal of Fisheries Management 27:810-824.

Comments from:
David Ortman

November 5, 2007

Department of Ecology
Olympia, WA

Please include these comments on the as part of your 2007 Columbia River Basin Water Supply Inventory Report.

I join with others who are strongly opposed to Governor Gregoire's efforts to construct massive new water storage dams for irrigators in eastern Washington. One project alone, the Black Rock reservoir, would cost over $6 billion dollars. Groundwater seepage from this project would threaten the already long overdue cleanup of the Hanford Nuclear Reservation.

Other projects such as the Wymer site in the Yakima basin would likely cost over a half billion dollars if it were ever built. This project, and other sites in the Yakima Basin, has been studied and found to be perennial losers over the last thirty years at a time in which Yakima irrigation districts have yet to take water conservation seriously or pay off the existing Bureau of Reclamation's Yakima Basin Project.

The Similkameen River project proposed by the Okanagan Public District would inundate Canada and continue to bar opening fish passage above the existing Enloe Dam. Three Columbia River off-channel dam sites, Sand Hollow, Hawk Creek and Crab Creek (which would flood the Columbia National Wildlife Refuge) are among additional harmful dam proposals.

While RCW 90.90.010 purports to require an evaluation of alternatives, the same legislation allows Ecology to rely on biased and slanted studies and information issued by the Bureau of Reclamation. Since the 1979 passage by Congress of the Yakima River Basin Enhancement Project, the Bureau of Reclamation has failed for nearly forty years to address issues of water-spreading, water-pricing, project repayment, surplus crops, and water conservation in senior irrigation districts in the Yakima Basin.

Your "inventory" fails to provide either Washington taxpayers or the Washington Legislature with adequate information on the following:

- What are the irrigation districts growing? Surplus crops? Is the Kittitas ID still growing hay for the Japanese race horse industry?

- What have the irrigation districts actually done on the ground since 1980 on water conservation?

- What is the current costs to the irrigators of water (per acre feet) and electricity (are they still subsidized by BPA??)

- Where are the irrigators at in terms of repayment. Have they paid off the costs of the Yakima

River Bain Project? What would be the true costs of irrigated crops if they had to pay market rates for water and power??

- How big a factor is the wine industry? Are there any eastern Washington vineyards that do not rely on irrigation?

In summary, E2SHB 2860 is nothing more than an attempt to buy off eastern Washington votes in exchange for environmentally damaging and wasteful mega water projects. It is time for Ecology to pull the plug on more damaging mega-dam projects.

David E. Ortman
7043 22nd Ave N.W.
Seattle, WA 98117
Attorney-at-Law

Comments from:
Klickitat County

From: Dave McClure [DaveM@co.klickitat.wa.us]
Sent: Thursday, November 15, 2007 5:11 PM
To: Purtzer, LeAnn (ECY)
Subject: Klickitat County Comments

Ms. Purtzer,

I tried to submit comments via the on-line submittal process, but it was unclear if they made it.

In case the comments didn't get through, I am resubmitting them in this email. Thanks.

Dave McClure

Thank you for the opportunity to submit comments on the on 2007 Columbia River Basin Water Supply Inventory Report.

Page ES-1, paragraph 1 and elsewhere in the report: Please revise the report to be consistent with the statute, including the program title assigned by the Legislature. The Legislature enacted a bill titled "Columbia River Basin Water Supply" in which it found that a key priority of water resource management in the Columbia River Basin is the development of new water supplies and, therefore, declared that a Columbia River Basin water supply development program is needed. The Legislature did not enact the Columbia River Basin Water Management Program, nor did it declare that a Columbia River Basin water management program is needed.

Chapter 90.90 RCW does not enable water resource management planning or the establishment of a water resource management program. It is clear in RCW 90.90.005 that the legislative intent was to address a key priority of the water resource management in the Columbia Rive Basin, which is the development of new water supplies. Moreover, the legislators on the Columbia River Task Force that drafted ESSHB 2860 made clear statements during Task Force meetings that the Legislature enacted the Watershed Planning Act (chapter 90.82 RCW) to provide for water resource management planning and implementation and that they were not going to reinvent the wheel.

Page ES-5, paragraph 1: It is in RCW 90.90.020(3), not RCW 90.90.040, it states: "The department of ecology shall focus its efforts to develop water supplies for the Columbia River basin on the following needs:

a) Alternatives to groundwater for agricultural users in the Odessa subarea aquifer;
b) Sources of water supply for pending water right applications;
c) A new uninterruptible supply of water for the holders of interruptible water rights on the Columbia River mainstem that are subject to instream flows or other mitigation conditions to protect stream flows; and
d) New municipal, domestic, industrial, and irrigation water needs within the Columbia river basin."

My understanding of the statute is that Ecology is directed to develop water supplies to benefit both instream and out-of-stream uses, but shall focus its efforts on the four out-of-stream needs identified in RCW 90.90.020(3)(i)(ii)(iii) and (iii).

Page ES-5, paragraph 3: It is helpful that the report indicates which types of projects will result in new water supplies that will be available for out-of-stream uses and which likely will not (at least not with the Department's current policies), because it helps everyone see which types of projects Ecology needs to focus its efforts on in order to comply with the mandate provided in RCW 90.90.020(3). However, the assertion that the distinction is required in RCW 90.90.040(1) is incorrect. RCW 90.90.040(1) states: "To support the development of new water supplies in the Columbia river and to protect instream flow, the department of ecology shall work with…to develop a Columbia river water supply inventory and long term water supply and demand forecast. The inventory must include:

a) A list of conservation projects that have been implemented under this chapter and the amount of water conservation they have achieved; and
b) A list of potential water supply and storage projects in the Columbia river basin, including estimates of:
    i) Cost per acre-foot;
    ii) Benefits to fish and instream needs;
    iii) Benefits to out-of-stream needs; and
    iv) Environmental and cultural impacts.

My understanding of the statute is that the report should list potential water supply and storage projects in the Columbia River Basin and their costs, benefits and estimated impacts as provided in RCW 90.90.040(1), not categorize projects as being either for instream or out-of-stream benefit. I found where environmental impacts associated with some of the identified storage projects are discussed in the report, but not cultural impacts. Also, have not found where environmental or cultural impacts are estimated for other types of water supply development projects.

Page ES-8: Working with the Commissioners Policy Advisory Group and its watershed planning forum and with individual watershed planning units should be included in the list of things Ecology will do to better understand water supply and demand in the Columbia River Basin.

Page ES-9, paragraph 1: Ecology is now tasked with developing water supplies for the Columbia River Basin and is not just "a water supply development agency on the Columbia River."

Page ES-9, paragraph 2, bullet 1: As written, bullet two trivializes the issues. Additionally, the following statement is somewhat patronizing and portrays watershed planners' and other stakeholders' concerns as being envy-based: "There is a lot of energy and excitement around the Columbia River Program, and it is natural to want the same level of energy (staffing resources, capital expenditures, and permitting capacity) in other areas."

The report should note that there are several issues with Ecology's policy that water supplies developed under chapter 90.90 RCW would be available for out-of-stream uses only after they reach the Columbia River mainstem. Among the issues is that over time currently available water supplies and the potential out-of-stream benefit of opportunities to develop new water supplies in tributary basins will be transferred to the Columbia River mainstem and lost to the tributary basins.

Many watershed planning units and other stakeholders understand the legislation as it is titled: Columbia River Basin Water Supply. We see that the Act directs Ecology to focus its efforts to develop new water supplies on four out-of-stream needs, two of which are limited in scope (i.e., alternatives to groundwater for agricultural users in the Odessa subarea aquifer and a new uninterruptible supply of water for the holders of interruptible water rights on the Columbia River mainstem) and two of which encompass the entire Columbia River Basin within Washington State (i.e., sources of water supply for pending water right applications and new municipal, domestic, industrial, and irrigation water needs within the Columbia River Basin).

The scope of the program needs to be basin-wide, as the statute provides. Obtaining a new water right is difficult to impossible everywhere in the Columbia River Basin within Washington. Some tributary basins are looking to the Columbia River for future supply, as evidenced by the proposed pump exchange projects for the Yakima and Walla Walla basins and the proposed Black Rock storage project. Some watershed planning units are working to develop water management programs (e.g., water banking/exchange programs) to meet some of the existing and future demand with their existing inventory of water rights, or may be proposing water storage projects. If the water supply development program is not basin-wide some areas might benefit at considerable cost to other areas.

Page 1-1, paragraph 3: I cannot find where in chapter 90.90 RCW the Legislature specifically charged Ecology with considering acquisition. However, RCW 90.90.010(2)(a) does state that there shall be no expenditures from the Columbia River Basin water supply development account for water acquisition without specific legislative authority.

Page 1-1, footnote 1: Please see comment above for "Page ES-1, paragraph 1 and elsewhere in the report".

Page 1-2, section 1.1: There are two policy advisory groups. The report should also note that the Commissioners Policy Advisory Group (Commissioners PAG) and its watershed planning forum were formed.

Page 1-2, section 1.2: Please see comment above for "Page ES-5, paragraph 3." The report should include the data/information on potential projects as required in RCW 90.90.040(1)(b).

Page 2-3, section 2.0.3: The name on its charter is the Columbia River Basin County Commissioners Policy Advisory Group," not the "Columbia River County Commissioners Forum."

Page 2-3, section 2.0.4: Please see comment above for "Page ES-1, paragraph 1 and elsewhere in the report".

Page 2-3, section 2.0.4, bullet 1: Ecology should meet with watershed planning units and discuss whether they are interested in working with the Department on the inventory/forecast and what should be the nature of the working relationship.

Page 2-4, subsection entitled "First", bullet 1: What Columbia River planning, and what broader Columbia River planning requirements? Chapter 90.90 RCW does not include provisions for planning or any planning requirements. Please see comment above for "Page ES-1, paragraph 1 and elsewhere in the report".

A Columbia River planning effort that includes any area where watershed planning is underway under chapter 90.82 RCW would be counter to chapter 90.82 RCW. As provided in RCW 90.82.130(4): "After a plan is adopted in accordance with subsection (3), and if the department [Ecology] participated in the planning process, the plan shall be deemed to satisfy the watershed planning authority of the department with respect to the components included under the provisions of RCW 90.82.070 through 90.82.100 for the watersheds or watersheds included in the plan. The department shall use the plan as the framework for making future water resources decisions for the planned watershed or watersheds. Additionally, the department shall rely upon the plan as a primary consideration in determining the public interest related to such decisions." The addressing the development of waters supplies for instream and out-of-stream uses is addressed under RCW 90.82.070.

In the Finding – 2003 1st sp.s. c4: "The legislature declares and reaffirms that a core principle embodied in chapter 90.82 RCW is that state agencies must work cooperatively with local citizens and the governments closest to them in a process of planning for future uses of water by giving local citizens and the governments closest to them the ability to determine the management of the WRIA or WRIAs being planned." "The legislature further finds that this process of local planning must have all the tools necessary to accomplish this task and that is essential for the legislature to provide a clear process for implementation so that the locally developed plan will be the adopted and implemented plan to the greatest extent possible."

Where watershed planning is underway Ecology must depend on the watershed plan as the framework for water resource decisions and a primary consolidation in determining the public interest related to such decisions. This includes water supply development decisions related to implementing chapter 90.90 RCW. Additionally, Ecology must work cooperatively with local citizens and the governments closest to them in the watershed planning process which the Legislature provided as the means for them to determine the management of the WRIA or WRIAs being planned.

Page 2-4, subsection entitled "First", bullet 2: See comment above for "Page ES-9, paragraph 2, bullet 1." It is good that Ecology is giving consideration to watershed plans during project selection. However, water supplies developed with funding from the Columbia River Basin water supply development account should be available to support issuing new permits from the tributaries in which the projects create new water supplies, as well as from Columbia River.

Page 3-19, section 3.3" It would be helpful for future reports to the Legislature if the project funding applications asked for the information required in RCW 90.90.040(1)(a).

Page 3-19 and 3-20, section 3.4: Project scoring criteria and weighting heavily favor projects that provide instream benefits making the project selection process inconsistent with the direction that Ecology focus its efforts to develop water supplies on the needs specified in RCW 90.90.020(3).

Comments from:
Merrill Ott, Stevens County Commissioner

November 15, 2007

LeAnn Purtzer
Department of Ecology
15 West Yakima Ave -- Suite 200
Yakima, WA 98902-3452

Dear Ms. Purtzer:

Thank you for the opportunity to comment on the draft Columbia River Basin Water Supply Inventory Report. This is a good effort to report back to the Legislature, however, I have concerns with how some of the information is being presented.

1. Page ES-9 of the executive summary describes two primary "implementation issues". The first implementation issue is described as water for the mainstem or for tributaries. The draft language reads:

   "Water for the Columbia River or Water for Tributaries? Watershed planning units and other stakeholders have expressed concerns about the State developing water supplies for the Columbia, but not in the tributaries. There is a lot of energy and excitement around the Columbia River Program, and it is natural to want that same level of energy (staffing resources, capital expenditures and permitting capacity) in other areas. Ecology is working with local groups to try and find common ground on these issues and in particular to fund projects that benefit both tributaries and the Columbia River."

   Ecology representatives have attended meetings of eastern Washington County Commissioners and watershed planners and discussed this point. At these meetings, Ecology's view has been explained as initially only looking at the mainstem due to legislative direction, but having shifted over time to now also take into account projects in the tributaries. This description above makes it sound as if it continues to be up in the air whether the tributaries can be a focus of the program. I recommend this language be changed to more accurately represent Ecology's present position that the tributaries are an important focus as well as the mainstem.

2. Page ES-5 of the executive summary describes the statute as follows: "The statute directs Ecology to develop water supply options that meet instream flow needs. It also directs Ecology to develop supply options for specific out-of-stream needs (RCW 90.90.040):
   - Replace ground water use from the Odessa Subarea aquifer;
   - Approve pending water right applications;
   - Convert existing interruptible water rights to uninterruptible water rights; and
   - Issue new municipal, domestic, industrial and irrigation water rights."

   This description lists instream flow needs as the first need, followed by out of stream needs. This is reverse of the order actually in the statute, and seems to place a higher priority on instream flow needs. I recommend this be reworded to clarify that out of stream uses are a top priority, as indicated by this language in RCW 90.90.010: "(1) The legislature finds that a key priority of water resource management in the Columbia river basin is the development of new water supplies that includes storage and conservation in order to meet the economic and community development needs of people and the instream flow needs of fish."

   In addition, the citation of RCW 90.90.040 as listing those needs is incorrect. The correct citation is RCW 90.90.020.

3. Section 2.0.4 on page 2-4 references the Washington State Association of Counties hiring staff to "…coordinate county issues among watershed planning units." This staff person actually: "…coordinates county issues among eastern Washington county commissioners and watershed planning units." You might also consider moving that reference to section 2.0.3, which discusses local government, rather than 2.0.4 which is about watershed planning.

4. Section 2.0.3 references the county commissioners' group as "the Forum". This was an early name for the county commissioner group, but the charter for this group now uses the name "County Commissioners' Policy Advisory Group".

I appreciate the opportunity to provide these comments.

Sincerely,

Neil Aarland

for Merrill Ott, Chair, County Commissioners' Policy Advisory Group, and Stevens County Commissioner

Comments from:
Washington State Dept. of Fish & Wildlife

Draft Columbia River Basin Water Supply Inventory Report – 2007
Peggy Miller - WDFW

Comments:

Page ES-1
Text box "$589,00 acre-feet of potential water savings" Please clarify if it is a water volume unit or dollar unit.

Page ES-3
Table ES-1: Summary of Storage Inventory. Please include note that cost estimates do not include mitigation.

Page ES-4
Table ES-2: Summary of Water Supply Inventory for 2006 and 2007. Please include note where necessary that cost estimates do not include mitigation. Please add to other costs tables in the report where necessary (Table 4-3, 4-4.

Page ES-5
"…the inventory are not generally not "new" water in the physical sense. Please remove a not or remove the double negative for "not generally not".

Page ES-8
"…this work will focus on emerging markets such as the face-paced wine industry…" Please change "face-paced" to fast-paced.

Page 1-2
1.1 2006 Legislative Report "…Ecology submitted its first reports…" Please consider "first set of reports" or "first report".

Page 1-2
1.1.1 Supply Inventory
Why is this text box different from the test box on page ES-1? Both are highlighting 2006 agricultural conservation projects, large storage and small storage but there are different statistics for agricultural conservation projects, and the first line of large storage.

Page 2-4
"…and recognizes that this will e an on-going part of Program development." Please change "e" to be.

Page 2-7
Text box – "Derek Sandison and Gerry O'Keefe,…" Has Derek's title been defined yet. If not add his title.

Page 2-7
Text box - "…Lake Roosevelt forum in Spokane on October…". Please change "October" to November on the 20th and 21st stripe.

Page 2-9
2.0.11 Columbia River Open Houses – "The purpose for the open houses is two-fold." Please change to past tense in this sentence and the rest of the paragraph.

Page 3-6
"..approximately 174 000 acre-feet…" Please change space to comma in water volume.

Page 3-6
"…this could be as little as 57 cfs" Please place a period after cfs.

Page 3-12
"The report identified that injection of water into a basalt aquifer at the south end of the city had the potential to hold approximately318 acre-feet of water with less than 10% leakage back to the river. The report identified an area south of the City where water could be injected into a basalt aquifer." Please delete the appropriate sentence.

Page 3-12
"…water stored (proportinate to funding…" Please correct spelling of "proportinate" to proportionate.

Page 3-13
"In the Columbia River Program, funding comes with the requirement that stored water will be managed by Ecology for instream and out-of-stream uses." Please clarify as you have on page 3-12, that Ecology will manage water in proportion to the funding supplied and not all of the stored water.

Page 3-13
"Ecology plans to recommend this project for funding in 2008 followed by technical review by the TAG." Please clarify this statement. Earlier in the paragraph it was indicated that ASR Appraisal Study would be submitted during the 2007 grant funding cycle. Now it reads as submitting it in 2008. The following is a suggested change. Ecology plans to recommend this project for funding in 2008 after technical review by the TAG.

Page 3-13
"This information is merged into a supplemental EIS,…" Is being merged may be more appropriate.

Page 3-14
"Under current operations, Lake Roosevelt is drawndown in early spring is approximately 40 feet in an average year and as much as 80 feet in a high flow year to provide flood control storage." Please change sentence. Suggested sentence follows. Under current operations, Lake Roosevelt is drawn down in early spring approximately 40 feet in an average year and as much as 80 feet in a high flow year to provide flood control storage, or Under current operations, the Lake Roosevelt drawdown in early spring is approximately 40 feet in an average year and as much as 80 feet in a high flow year to provide flood control storage

Page 3-14
"Under this project, no additional withdrawals from the Columbia River occurred because water saved through piping and lining that was then diverted to lands in the Odessa to reduce pumping form the Odessa aquifer." Please consider revising this sentence to Under this project, no additional withdrawals from the Columbia River occurred because water saved through piping and lining was diverted to lands in the Odessa to reduce pumping form the Odessa aquifer.

Page 3-18
"This also provides a way for applicants to screen their proposals imformally." Please change "imformally" to informally.

Page 3-21
"…November 30,2007…" A space is needed between 30 and 2007.

Page 4-4
"…or directly by injection using wells." Please change to using injection wells.

Page 4-6
"…add to water supplies for in-stream and out-of-stream uses…" For consistency please change "in-stream" to instream.

Page 4-7
"Table 4-2 provides a …." Is that a note that will be changed before the finial version is produced? Other placeholders were in red.

Page 4-8
"…reinforced or unreinforced concrete…" Is "unreinforced" a real word? Please consider concrete with or without reinforcement.

Page 4-10
"…butis not well-suited…" Please add space between but and is.

Page 4-18
"…issuance of new poermits without creating a deficit…" Please change poermits to permits.

Page 4-21
"…lower productivity in cropped uses…" Please consider crop uses.

Page 4-21
"…for both in-stream and out-of-stream…" For consistency please change "in-stream" to instream.

Page 4-22
"This water can mitigate for temporary out-of-stream uses thorough term permits…" Please change thorough to through.

Page 4-23
"participate in power buyback programs." For consistency consider buy-back.

Page 4-23
"…for both in-stream and out-of-stream…" For consistency please change "in-stream" to instream.

Page 4-23
"…through the Irrigation efficiencies Grant Program." Please capitalize Efficiencies.

Page 4-24
"…benefit in-stream uses…" For consistency please change "in-stream" to instream. Please scan for in-stream. There are too many to continue listing them. Others may be found on pages 4-25, 4-28, 5-3

Page 5-1
"…either Canada or the U.S. the option withdraw for the Treaty…" Please consider "option to withdraw".

Page 5-1
"Storage from Grande Coulee…" Please be consistent. Is it Grand Coulee or Grande Coulee?

Page 5-4
"…dam operators to that state water…" Please change "to" to so.

Comments from:
Walla Walla County Watershed Planning

WALLA WALLA COUNTY WATERSHED PLANNING

500 Tausick Way · Walla Walla, WA 99362 · (509) 524-5216

DEPT OF ECOLOGY Received NOV 14 2007 CENTRAL REGION OFFICE

November 13, 2007

LeAnn Purtzer
Department of Ecology
15 West Yakima Ave -- Suite 200
Yakima, WA 98902-3452

Subject: Comments on the Draft 2007 Columbia River Legislative Report - Columbia River Water Supply Inventory for the Columbia River Water Management Program

Dear Ms. Purtzer:

Please consider the following comments on the Draft 2007 Columbia River Legislative Report - Columbia River Water Supply Inventory for the Columbia River Water Management Program.

1. Review and comment on the accuracy of data included in the report have been foregone as the report discloses the "illustrative" nature of the data, and that the data is only supposed to provide "glimpses" of what better data or forecasting could provide. **Walla Walla County Watershed Planning supports additional reach-based and watershed level studies, which will provide better monitoring and evaluation data; these efforts are a high priority in Water Resource Inventory Area (WRIA) 32, the Walla Walla watershed.** An example of this additional work noted in your report is the effort by the Washington State Department of Ecology to fund a study by the Climate Impacts Group to provide greater accuracy in predicting climate change effects in the Columbia River Basin, with the Walla Walla watershed identified as one of the focus areas.

2. Walla Walla County administers the WRIA 32 Walla Watershed Planning Unit. A tremendous amount of time and energy has been spent by citizens, agencies, Tribes and interest groups over the last six years developing a water management plan for WRIA 32, including portions of Walla Walla County and Columbia County. This plan, WRIA 32 (Walla Walla) Watershed Management Plan was adopted in June, 2005 and sets forth the priority areas and actions for improvements to watershed health for current and future generations. The plan addresses instream flow, water quantity, water quality and habitat, and benefits greatly from commitments and support from those in our watershed. In addition, the Detailed Implementation Plan for WRIA 32 identifies the highest priority project in our basin to be the Flow Enhancement Feasibility Study with Pump Exchange sponsored by the Confederated Tribes of the Umatilla Indian Reservation and U.S. Army Corps of Engineers.

   Our WRIA 32 Watershed Plan sets the direction and priorities for our watershed, and we will continue to engage in the Columbia River Water Management Program decision-making process with representatives attending meetings of the Ecology / Eastern Washington County Commissioners forum and the Ecology Policy Advisory Group to follow the progress of this effort. **For implementation of any future conservation projects in or affecting WRIA 32 such as water transfers, water trust transactions, etc., Walla Walla County asks that Ecology consider the recommendations embodied in our locally developed plans and would also request for consultation with the WRIA 32 Walla Walla Watershed Planning Unit to ensure that any such projects will be evaluated against our local plans including the WRIA 32 Watershed Plan and the Snake River Salmon Recovery Plan.**

If you have further questions regarding these comments please contact me at cathy.schaeffer@wwcc.edu or (509) 524-5216. Thank you for this opportunity to comment.

Sincerely,

Cathy Schaeffer

Cathy Schaeffer, Director
Walla Walla County Watershed Planning

Comments from:
Confederated Tribes and Bands of the Yakama Nation

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

DEPT OF ECOLOGY Received NOV 15 2007 CENTRAL REGION OFFICE

November 15, 2007

LeAnn Purtzer
Department of Ecology
15 West Yakima Ave -- Suite 200
Yakima, WA 98902-3452

FAX (509) 454-4121
Email lesc461@ecy.gov

Re: Columbia River Basin Water Supply Inventory Report (11-15-07)

Dear Ms. Purtzer,

I am writing to offer these staff level comments on the Columbia River Basin Water Supply Inventory Report dated 11-15-07 (Inventory).

It is important that our participation in the Columbia River Policy Advisory Group not be misinterpreted as support or acquiescence in any or all of the myriad moving parts of the CRWMP. Other than authorizing staff participation in the CRPAG, the Yakama Tribal Council has not endorsed any of the measures being contemplated in the CRWMP. The Yakama Nation holds Treaty Rights to instream and out of stream uses in the Columbia River basin. These rights are the senior water rights in the basin. Our participation is intended to preserve and enhance those rights, while working with the State to address its water issues. We will not comment in detail on all aspects of the Inventory, but will touch on a few key points. These comments are from the staff level and do not represent a policy or legal position of the Yakama Nation.

Certain aspects of the CRWMP as expressed in the Inventory remain problematic to us. The heavy emphasis on new storage to solve water management problems in the Columbia has, if anything grown heavier in this year's version of the Inventory. Storage is only one management tool, and should not be pursued until other less destructive options have been exhausted. The Inventory continues to treat all pending applications as a demand that must be met. We do not believe that the Columbia River Bill calls for this or that the Bill freed Ecology from its obligation to investigate each pending water right application and determine whether the proposed new use can be considered beneficial

Post Office Box 151, Fort Road, Toppenish, WA 98948 (509) 865-5121

and in the public interest. The Inventory gives short shrift to what is probably the most economical and least destructive means to meet new demands, which is acquisition of existing water rights. With vast amounts of water in the basin being used for low-value or amenity uses, a responsible approach would be to test the ability of the market to satisfy demand before proposing costly, destructive, government subsidized new storage projects.

The over-emphasis on storage also perpetuates the myth born in the Columbia River bill that new storage, changing of existing storage operations, or new appropriations of water will not have a harmful effect on the Columbia River so long as there is no net reduction of flow in July and August. This is a greatly oversimplified and inappropriate reading of the National Research Council report on the Columbia, which is, in turn a less than comprehensive look at water budget issues on the Columbia due to the narrow charge to the NRC. The NRC was only asked to address the effects of new diversions from the river, and they advised against new diversions in July and August. Water that is diverted from storage during the summer creates a deficit that must be repaid from streamflow during the refill season. Refill of existing diversions and releases already causes adverse effects on the river. New diversions, whether from new storage or existing storage (e.g. the proposed new diversion to the Columbia Basin Project) would exacerbate existing problems. Any consideration of new storage must clearly demonstrate that water is available to divert from streamflow without adverse consequences. That has not been done in the CRWMP. The Columbia River Bill and the Inventory seem to ignore these existing problems on the river and instead seem to assume that the river is an infinite source of water ten months of the year. We reject this interpretation.

For the past few years, the discussion of new storage has consistently referred to "off-channel" storage, implying that new dams would not block or eliminate existing fish passage. If our current understanding is correct, at least two of the potential reservoir sites in the Inventory would be located on fish-bearing streams and would block passage into currently used salmon habitat. We wish to make it clear that the Yakama Nation has not agreed to any project that would damage or eliminate existing habitat. We do not believe it would be wise at this point in history to eliminate any existing salmon habitat. There is simply too little habitat left and too many runs on the brink.

A few specific comments and edits follow.

Page ES- 5 The discussion of "new water" is a helpful clarification of previous versions. We disagree with the implication that "times of surplus availability" have been adequately defined.

The definitions of consumptive and non-consumptive use need to be reworked to be more clear and accurate. For example, only a fraction of the water discharged through treatment plants is diverted for irrigation. Most is used for instream flow and hydropower. The final sentence, "However, this water eventually returns to the Columbia River Basin too, in the form of rain or snow" is misleading and should be stricken.

Page ES- 7 The clarification about the reach specific effects of conservation is a useful addition. We do not agree with the language in the last paragraph reinforcing the need for storage, particularly given the lack of emphasis placed on acquisition and transfer as tools for meeting changing needs.

Page ES- 8 First sentence: "complimentary" should be "complementary".

Paragraph beginning with "In addition to changing supply": The discussion of increasing crop water requirement ignores the fact that much agriculture has been shifting to lower water-demand crops. Thus the assumption of needing an additional 140,000 acre feet to maintain the existing irrigated land base is probably not accurate.

Page 3-13 The discussion of the proposed "Lake Roosevelt Drawdown" is misleading. The proposal is not to drawdown the reservoir i.e. lowering the reservoir by releasing water from it. The proposed action here is large new diversions. The drawdown is the consequence of the proposed action. It is misleading to talk about a net increase to streamflows resulting from this project. There would, of course be a substantial net reduction in streamflows annually. That loss would create a demand to be refilled. This document neglects to mention the consequences to streamflow of the increased refill demand.

Page 3-16 Considering the multi-million dollar expenditures for studying storage and out of stream diversion options, $20,000 allocation to water acquisition seems woefully inadequate. Unlike some other alternatives, acquisition offers the potential to improve conditions in tributaries while freeing up water for the mainstem. Ecology should aggressively pursue this option.

We appreciate the opportunity to comment. At this time it still appears the balance is tipped heavily toward new out of stream users, with potential new adverse impacts to the instream economy. We hope the Department of Ecology will redouble its efforts to achieve solutions that truly benefit both the peoples who have relied on the bounty of the Columbia River for hundreds of generations as well as more recent out of stream users.

Sincerely,

Philip Rigdon, Deputy Director
Department of Natural Resources

Wanapum Lake