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When most people think of Washington State, they visualize an area with a wet climate. While that perception is at least partially accurate, the rain forests on our Olympic Peninsula receive on average about 140 inches of rainfall a year, much of the east half of the state, which lies in the rain shadow of the Cascade Mountains, has a semi-arid climate. The total annual number of inches of precipitation in some portions of eastern Washington is measured in single digits. For example, in the lower Yakima River Valley of Washington, the annual precipitation is less than 9 inches. It is eastern Washington, the dry side of the state including most of the Washington portion of the Columbia and Snake River basins, for which my organization is responsible for management and development of water supplies.

Management of water in the Columbia River and Snake River basins during the 1980s and 1990s was highly contentious and marked by protracted legal battles. Many of the tributary basins were and still are closed to further appropriation and dry year stream flows in many portions of eastern Washington have been seriously diminished, contributing to substantial reductions, and in some cases extirpation, in salmon and steelhead runs. In 2006, the state of Washington determined that it was time to take another tack.

In that year, with strong bipartisan support, the Washington State Legislature passed and former Governor Gregoire signed into law landmark legislation known as the Columbia River Water Supply Management Act (Chapter 90.90 RCW). The act directs the Washington State Department of Ecology to “aggressively pursue” development of new water supply for both instream and out-of-stream uses and created a \$200 million water supply development account (bond fund) to support our water supply development activities. Expenditures from the account may be used to assess, plan, and develop new storage; improve or alter operations of existing storage facilities; implement conservation projects, develop pump exchanges; lease or acquire water; or undertake any other actions designed to provide access to new water supplies within the Columbia River basin of Washington for both instream and out-of-stream purposes. The legislature made it clear that in meeting the water needs of the basin, we were expected to use all options at our disposal, or use what we term, a big tool box.

The legislation required that two-thirds of water supplies developed through new storage and funded by the water supply development account be committed to out-of-stream uses. The remaining one-third would be allocated for instream uses.

In implementing the legislation, our department was directed to focus on the following needs:

- Finding replacement water for irrigators in the central portion of the Columbia Basin, known as the Odessa Subarea, where aquifer levels are rapidly declining;

- Developing sources of water supply for the roughly 600 pending water right applications, some of which were 15 to 20 years old;
- Finding an uninterrupted supply of water for a class of water right holders whose water use is curtailed in drought years; and
- Developing sources of water to meet future municipal, domestic, industrial, and irrigation needs within the Columbia River and Snake River Basins of Washington State.

To guide our water supply development investments as well as to define the extent of the water supply problems that we are required to address, the legislature required that a Supply and Demand Forecast be prepared every five years beginning in 2006. In 2011, the Department of Ecology's Office of Columbia River, in collaboration with Washington State University and the Washington Department of Fish and Wildlife, released the second Water Supply and Demand Forecast prepared under the 2006 legislation. Preparation of the forecast involved a rigorous examination of instream and out-of-stream water needs and water availability for both the Columbia River and Snake River mainstems as well as all tributary basins. The forecast concluded that total out-of-stream mainstem and tributary demand for additional water supply is about 900,000 acre-feet and unmet tributary instream flow needs are about 500,000 acre-feet. About one-half of the out-of-stream demand and about one-third of the unmet instream needs is in one tributary basin, the Yakima River basin, and will be the focus of the latter portion of my testimony.

To address regional water needs, the Department of Ecology's Office of Columbia River has initiated nearly 40 water supply projects under the 2006 legislation. It is important to note that our partner in many of our water supply development activities, including the Odessa ground water replacement efforts and addressing the needs of the Yakima River basin, has been the U.S. Bureau of Reclamation (Reclamation). That collaboration has proven to be a valuable asset to the state of Washington.

By the end of this year, we anticipate that we will have been successful in developing and making available about 335,000 acre-feet of additional water supply for instream and out-of-stream uses. We have developed that supply primarily through modifications to existing surface storage reservoirs, conservation and conveyance system improvement projects, and acquisitions. We are in the process of developing aquifer storage capacity at a number of locations and expect that the next increments of additional supply will come from those sources. By the end of our current biennial budget cycle in June 2015, the projects we have progress or completed will have expended about \$175 million of the original \$200 million water supply development account.

However, on-the-ground efforts to address the serious water resource and aquatic resource problems of the Yakima River basin are just being initiated. The Yakima River basin is an approximately 6,000 square mile drainage basin in south central Washington. It supports a population of about 360,000 people and is home to the Yakama Nation. The Yakima River basin contributes over \$3 billion annually to the agricultural economy of the state of Washington.

Yakima County ranks 12th nationally in the total value of agricultural products sold. Yakima County ranks first nationally, in apple, mint, winter pears, and hop production. The Yakima Basin exports around \$1.8 billion in farm products through the ports of Seattle and Tacoma annually. Historically, the basin was the second largest producer of salmon and steelhead runs in the entire Columbia River system.

Since 1905, when the state granted rights for all unappropriated surface water in the basin to Reclamation, surface water flows in the basin have been managed by Reclamation. Reclamation operates five existing reservoirs with a total capacity of about 1,000,000 acre-feet, which is about one-third of the annual runoff in the basin. The basin is heavily dependent on east-slope Cascade Range snowpack to supply water to the semi-arid lower basin during the summer months.

Water users in the basin are a combination of the pre-1905, senior surface water right holders, direct customers in of Reclamation served water under Reclamation's 1905 water right, a small number of post-1905, junior surface water right holders, and ground water right holders, mostly with post-1905 priority dates.

The surface water resources of the basin are overappropriated, and a state court adjudication of those water rights has been ongoing since 1977. The state closed the basin to additional ground water rights in the 1990s. Recently, the U.S. Geological Survey concluded that the basin's ground water aquifers are in continuity with surface waters. Thus, rights for ground water, on which most of the basin's municipalities depend, are likely to be determined to junior to the 1905 water rights of the Bureau of Reclamation.

Frequent droughts over the past several decades demonstrated the vulnerability of the basins water supplies. During droughts in 2001 and 2005, the irrigation districts served by Reclamation, referred to as the "proratable" irrigation districts, received only about 40 percent of their water supply.

Instream flows and aquatic resources of the basin have also suffered. Out-of-basin and in-basin factors, including diminished stream flows and lack of fish passage at existing reservoirs, have combined to drastically reduce the numbers of salmon and steelhead. Runs of salmon and steelhead the once numbered at least 800,000 fish declined to about 8,000 fish by the 1980's. Sockeye, coho, and summer Chinook salmon have all been extirpated; although efforts are underway, led by the Yakama Nation, to reintroduce new stocks of those species. The basin's steelhead and bull trout are Endangered Species Act listed threatened species.

Water supply shortages coupled with severe reductions or elimination of major salmon and steelhead runs makes the need for drastic improvements to water resources and aquatic resources of the Yakima River basin imperative. Thus, since 2009, the Office of Columbia River and Reclamation have been collaborating with the Yakama Nation and basin stakeholders to formulate a comprehensive strategy to address critical resource needs. That collaboration focused on expanding the work of the 1979 federal Yakima River Basin Water Enhancement

Project (YRBWEP) and the 1994 Congressional Amendments that created Phase 2 of YRBWEP. That strategy took shape by mid-2011 when consensus was reached on the on Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan). The Integrated Plan is being proposed as Phase 3 of YRBWEP. Development of the Integrated Plan was facilitated by additional federal support resulting from the Yakima River basin being selected as the recipient of Reclamation's first Basin Study grant.

The Integrated Plan proposes a major ecological restoration of the Yakima River basin. In addition to providing for fish passage at all major in basin reservoirs to open high basin spawning and rearing areas that have been blocked for a century and to providing substantial mainstem and tributary habitat enhancements, the Integrated Plan will involve restoration of substantial portions of the upper watershed for both terrestrial and aquatic species. It provides for operational modifications to improve operational efficiency and flexibility.

The Integrated Plan also calls for substantial improvements in water supply. As noted previously, about one-half of eastern Washington's out-of-stream water needs and one-third of our unmet instream flow needs are in the Yakima River basin. The water supply improvements will come in several different forms. Efficiency of existing use of water will be improved through reducing barriers to the transfer of water between willing buyers and willing sellers. Municipal and agricultural conservation efforts will be enhanced. For example, the plan calls for supplementing the 72,000 acre-feet of conserved irrigation water achieved as part of the 1994 YRBWEP Phase 2 efforts with another 170,000 acre-feet of conservation savings. Studies are also underway to better understand the potential role of aquifer storage in providing passive recharge to the mainstem of the Yakima River in targeted locations.

However, the objectives of the Integrated Plan cannot be met without significant improvements in surface water storage. The Office of Columbia River and Reclamation determined based on an analysis of water supply needs that development of additional 450,000 acre-feet of additional water storage capacity, in the form of modified and new surface storage facilities, will be needed to provide:

- Drought relief to existing irrigators in the basin,
- Secure water supplies for our municipalities with junior water rights and to meet their future needs, and
- Adequate water for fish outmigration and pulse flows in all years.

In addition, climate modeling by the University of Washington Climate Impacts Group and the federal River Management Joint Operating Committee predict that substantial reductions in snow pack depth and duration are likely as we move towards mid-century. The Integrated Plan recognizes that the only effective means of offsetting snowpack reductions in the Yakima River basin are improving flood plain aquifer storage potential and increasing surface storage capacity. Sensitivity analysis modeling of the Integrated Plan indicate that at buildout, about 500,000 acre-

feet more water will be available under drought conditions by mid-century with the Integrated Plan than without.

There are no other sources of water supply available besides storage capable of meeting the needs of the basin. Conservation is often suggested as a substitute for water storage; however, there are severe limitations to the role of conservation as a source of water supply. As noted previously, the Integrated Plan proposes to accomplish another 170,000 acre-feet of irrigation conservation savings. Those savings will provide valuable flow improvements in targeted stream reach where those flow benefits will improve conditions for fish. However, it must be remembered that most conservation efforts focus on reducing the amount of water that leaks from conveyance systems (for example, canals or ditches) or from irrigation practices that result in more water being applied than is needed by the crops being grown. The leaked water returns through runoff or through ground water to the river at a point downstream of where it was diverted. Along the Yakima River mainstem, return flows rejoin the river within days or a few weeks after diversion and contribute to downstream river flows. If through conservation measures, the leakage or overapplication of water is reduced or eliminated, the amount of water diverted can be reduced. Those diversions savings add more flow to the river, but only between the point of diversion and the point at which return flows rejoined the river. Below the return flow point, there is no residual benefit to the river. If the conserved water described in the preceding example was used for some out-of-stream purpose, flow below the return flow point would be permanently diminished. The surest way to dry up the river would be to employ such a practice on a widespread basis.

Additionally, the amount of conservation savings that could be captured through conservation is greatly reduced under drought conditions, because, simply put, you can't conserve water that doesn't exist. The Office of Columbia River and Reclamation estimate that of the 170,000 acre-feet of average year conservation called for in the Integrated Plan, only about 50,000 acre-feet of savings would be captured in drought years like 2001 and 2005.

Earlier this year, the Washington State Legislature passed and Governor Inslee signed into law legislation authorizing the Washington State Department of Ecology to begin implementation of the Integrated Plan. At the Governor's request, the legislature also provided a substantial capital budget appropriation to initiate implementation. The state of Washington welcomes a continued federal partnership in this effort.