

FEATURE ARTICLE**FULL STEAM AHEAD FOR THE UMATILLA BASIN
AQUIFER RESTORATION PROJECT**

By Shonee D. Langford

A much-anticipated aquifer recharge project is moving forward in the Umatilla River Basin, a tributary of the Columbia River in north-central Oregon, as local governments, districts and the Confederated Tribes of the Umatilla Indian Reservation (Confederated Tribes) sign on to a key intergovernmental agreement (IGA). The project involves an ambitious plan to recharge distressed aquifers with water from the Columbia River. The primary purpose of the IGA is to create a new intergovernmental entity, pursuant to Oregon law, that will be responsible for project implementation. The parties to the IGA are Umatilla County, Morrow County, Westland Irrigation District, County Line Water Improvement District and the Confederated Tribes. The counties and Westland Irrigation District formally approved the IGA in November and early December, and the remaining parties plan to do the same by the end of the year.

During the past year, the IGA parties have worked collaboratively with other local interests through the framework of the Umatilla Basin Water Coalition, an informal association of local government entities, the Confederated Tribes, and other local interests. The coalition has worked together to better secure and increase water supplies for irrigation, environmental needs and other uses in the Umatilla River Basin. The new governmental entity created by the IGA will be known as the Umatilla Basin Water Commission (UBWC) and will have authority to implement "Stage 1" of the Umatilla Basin Aquifer Restoration Project. As one of its first official actions, the UBWC is expected to apply for \$2.5 million in State of Oregon grants funds made available for the project pursuant to Oregon State House Bill 3369 (2009 Oregon Laws, Ch 907).

Background

Before settlers arrived in the Umatilla River Basin, the basin had been home to the people of the Umatilla, Walla Walla, and Cayuse tribes from time immemorial. The waters of the Columbia and Umatilla Rivers supported large salmon runs and fishing was the primary means of livelihood for tribal members. In 1855, the Confederated Tribes signed a treaty with the United States, agreeing to live on the Umatilla Indian Reservation. Soon thereafter, settlers began using surface water from the Umatilla River to flood-irrigate crops and pasture, with the oldest water rights for irrigation having a priority of 1870. The first agricultural practice in the basin was grazing livestock, but by 1876 farmers were growing grains. Since that time, irrigation has been the predominant use of both surface and ground water in the basin. By the time the Oregon Water Code was enacted in 1909, the summertime natural flow of the river had been fully appropriated and the U.S. Congress had already authorized construction of an irrigation project.

Umatilla Basin Project

Between 1906 and 1927, the U.S. Bureau of Reclamation constructed the Umatilla Basin Project, lying just south of the Columbia River in Morrow and Umatilla Counties of north-central Oregon. The Umatilla Basin Project expanded the opportunity for irrigation through a series of storage and diversion dams and lengthy canals. The Cold Springs Dam and McKay Reservoir were constructed to store water during winter for use during the irrigation season. The federal project benefits more than 34,000 acres of land. While providing water for irrigation, project facilities also eliminated the salmon runs that were so vital to the Confederated Tribes. By 1926, fish and

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wildlife experts were reporting that there were no Chinook or Coho salmon left in the Umatilla River.

Groundwater Overdrafting and Regulation

Farmers increasingly turned to groundwater during the 1950s and 60s. This resulted in a significant increase in the amount of irrigated land as farmers began using groundwater for center pivot irrigation. However, within a short time these new irrigation developments were contributing to rapid declines in groundwater levels. Since then, many wells have experienced total water declines of anywhere from 100 to 450 feet. Studies have shown that natural recharge, particularly to the basalt aquifers, is very slow. The Oregon Water Resources Department (OWRD) sampled groundwater in the basalt aquifers to determine its age by carbon age-dating techniques and found that in some areas the water that farmers were withdrawing had been underground for 27,250 years.

Based on mounting evidence of significant groundwater declines, OWRD designated four critical groundwater areas in the Umatilla River Basin between 1976 and 1991. These critical areas encompass more than 600 square miles, including approximately 63,000 acres of farmland. Oregon law authorizes OWRD to designate such areas if “[g]roundwater levels in the area in question are declining or have declined excessively.” ORS 537.730. Pursuant to this authority, the critical areas have been closed to further groundwater appropriation and, in some sub-areas, existing water uses have been curtailed. OWRD has adopted special rules for allocation of water within the critical areas. *See*, OAR chapter 690, division 507. The rules require OWRD to determine the “sustainable annual yield” of the groundwater source, meaning the volume of water that can be pumped on an annual basis while maintaining reasonably stable water levels, and to limit annual groundwater withdrawals accordingly. The rules also require water users to submit a request for water by a specified date each year and direct OWRD to consider a number of factors, including priority dates, in allocating the sustainable annual yield. *See, e.g.* OAR 690-507-0780 and 690-507-0810. As a result of continued declines, OWRD in recent years has limited use to about 30 percent of the total amount of water for which existing groundwater rights have been issued. In terms of volume, curtailment has resulted in approximately 127,000 acre-feet of groundwater irrigation rights not being met each year.

‘Bucket for Bucket’ Water Exchanges

Beginning in the 1980s, the Confederated Tribes (holders of un-quantified federal reserved water rights under the 1855 treaty) and local irrigators joined together in an effort to improve instream flows in the Umatilla River and to restore salmon runs. One of the results of this collaborative effort was a pair of Congressionally-approved water exchanges. These “bucket-for-bucket” water exchanges allow irrigation districts to pump water from the Columbia River into their existing distribution systems in exchange for leaving an equal amount of water in the Umatilla River that the districts otherwise would have the right to divert for irrigation. The water exchanges and related efforts have greatly benefited instream flows and have contributed to the restoration of a productive salmon fishery, while also allowing established irrigation to continue. On the other hand, the exchanges have not addressed the lingering need for increased water supplies in the basin.

The Columbia River

The mighty Columbia River would seem to offer an obvious solution, with its impressive year-round flows. But water availability for the Columbia River is discussed not in terms of available flows in excess of existing water rights (the typical approach for other rivers in Oregon), but in terms of targets flows for listed fish species under the Endangered Species Act, as described in biological opinions prepared by federal agencies. Water is therefore available from the Columbia only during the times of year allowed by fisheries management agencies, which are generally the high-flow winter months. Even in the absence of federal restrictions, OWRD’s public interest standards for the protection of fish species would likely prevent the direct diversion of water from the Columbia River mainstem and tributaries above Bonneville Dam (including the Umatilla River) for irrigation purposes during the time period of April 15 to September 30. *See*, OAR chapter 690, division 33.

Aquifer Recharging

Seeing the writing on the wall, a group of irrigators formed the County Line Water Improvement District in the 1970s to implement an aquifer recharge project. The project involves storage of water diverted from the Umatilla River in a shallow alluvial aquifer to be withdrawn later for irrigation. For over 30 years,

the district has been storing an average of approximately 6,000 acre-feet of water annually. Some smaller private projects have also been developed to store winter stream flows diverted from a tributary to the Umatilla River in deeper basalt aquifers. The success of these projects played an important role in leading local stakeholders and state agencies to investigate the feasibility of a larger-scale aquifer recharge project to meet regional water supply needs.

Meeting Long-Term Water Needs

A wide variety of crops are grown on a total of approximately 200,000 acres of irrigated land in the Umatilla River Basin. These include a number of high-value crops such as potatoes, onions, sweet corns, green peas, peppermints and carrots. However, much of the high-value farmland is unused or under-utilized because of groundwater curtailment and inability to obtain new surface water rights due to Endangered Species Act constraints. Many water users have made substantial investments in land that currently does not realize its full economic potential for lack of water. Now for the first time in years, there is a legitimate plan on the table to meet the long-term water supply needs of basin stakeholders in a manner consistent with fishery protection and restoration efforts.

The Feasibility Study

In 2008, the Oregon Legislature passed Senate Bill 1069, which provided much-needed state funding for a regional aquifer recovery assessment. The legislation directed OWRD to conduct a feasibility study, including an engineering and hydrogeologic study to evaluate the potential for diversion of surface water flows from the Columbia River for the purpose of recharging aquifers in the Umatilla Basin. Senate Bill 1069 also directed OWRD to identify opportunities for the aquifer recharge project to benefit fish and fish habitat by increasing flows in the lower Umatilla River.

OWRD contracted with a team of consultants to carry out the feasibility study, which was completed earlier this year. The study results are summarized in a report dated June 30, 2009, prepared by lead contractor IRZ Consulting, LLC. The report and a series of related technical memoranda are available online at www.irz.com.

According to the study, the total estimated water need is 159,000 acre-feet. This estimate includes 114,000 acre-feet to meet curtailed groundwater rights for irrigation, 27,000 acre-feet to enhance Umatilla River flows, 7,000 acre-feet to supply domestic and municipal uses, and 11,000 acre-feet to leave in the ground for basalt aquifer replenishment.

The Proposed Aquifer Restoration Systems

The proposed project would divert water from the Columbia River during the month of October and the months of December through March (the only months when water is deemed available for new uses under Oregon law and limitations under the federal Endangered Species Act) and convey that water to aquifer recharge zones to recharge a large shallow alluvial aquifer. To the extent possible, it is hoped that water can be diverted and conveyed using existing pump stations, pipelines and canals, although additional pipelines would be necessary to reach the proposed recharge location. The primary uses of recharged water would be irrigation, instream flow enhancement and aquifer restoration.

Supply, Storage, Recovery and Distribution Systems

The feasibility report recommends three "Supply, Storage, Recovery, and Distribution" (SSRD) systems to serve different areas. The first system (SSRD 1) would supply approximately 100,000 acre-feet of water at full build-out to the Ordinance Gravel and Butter Creek Critical Groundwater areas, including 69,000 acre-feet for irrigation and 24,000 acre-feet for Umatilla River instream flow benefits. The proposal is for the system to be built in three increments, the first being for storage of 25,000 acre-feet. After further evaluation, the storage could then be increased to 55,000 acre-feet, and finally to full capacity. The feasibility report indicates that it would take a total diversion rate of approximately 560 cubic feet per second from the Columbia River over a 90-day period to attain the proposed annual volume of 100,000 acre-feet, and that the amount of water available in the Columbia River during authorized periods is more than sufficient to meet this goal.

The so-called "County Line Aquifer," covering an area of 13,500 acres in Morrow and Umatilla counties, appears to have sufficient capacity to hold the first and second increments of water. Recharge would

occur through the surface spreading of river water. Current data indicate that the soil has a sufficient infiltration rate to allow the proposed recharge of high volumes of water in this manner. However, this aquifer is not expected to hold the entire volume of water recharged through the SSRD 1 system. While a portion of the recharged water would be pumped out for direct agriculture use, the feasibility study indicates that the County Line Aquifer also could be used for temporary storage of additional water that could be pumped out and injected into basalt aquifers during the non-irrigation season. One benefit of this two-stage storage approach is the potential for the initial recharge process to provide natural filtration of the recharged water before it is injected into the basalt aquifer for secondary storage. The natural filtration is an important component of the proposed system, because it could allow stakeholders to avoid the need for costly artificial treatment systems, something that would likely render the project infeasible. Although Oregon's water quality regulations do not impose pre-treatment standards for water that is recharged through natural filtration, they do require recharged water to meet stringent drinking water standards before it can be artificially injected into the ground. *See*, OAR 690-350-0010(1)(a) and 690-350-0110(1).

The proposed SSRD systems are also intended to contribute to instream flow restoration in the Umatilla River through increased groundwater discharge to the river. Benefits could include additional flows as well as decreased river temperatures as colder groundwater enters the river. The potential benefits of groundwater recharge to the river have been simulated using simplified models and preliminary results suggest that some benefits may be realized, although additional data would be needed to predict the amount and location of increased stream flows.

If the SSRD 1 system proves to be successful, the proposed SSRD 2 and SSRD 3 systems could be used to supply up to 59,000 acre-feet of water for the Stage Gulch Critical Groundwater Area on the west and east sides of the Umatilla River.

Formation of Umatilla Basin Water Commission

Given the positive results of the feasibility study, members of the Umatilla Basin Water Coalition—consisting of local governments, the Confederated Tribes and other local interests—decided to create

a new intergovernmental entity with authority to begin project implementation. It was determined that five members of the Umatilla Basin Water Coalition would enter into an IGA to form the Umatilla Basin Water Commission. As noted above, the five IGA parties include two counties, two districts and the Confederated Tribes, three of whom already have formally approved the IGA. Although the UBWC is separate and distinct from the coalition, the IGA provides that the UBWC intends to work cooperatively and collaboratively with coalition members, other local interests and the State of Oregon in furtherance of the projects selected by the UBWC. The UBWC will be governed by a volunteer board of directors, consisting of one representative appointed by each of the IGA parties.

The general purposes of the UBWC are to implement Stage 1 of the Umatilla Basin Aquifer Restoration Project and, thereafter, if the UBWC so chooses, to further develop the project or pursue other water-related projects. The UBWC is first expected to apply for \$2.5 million in state funding available under HB 3369. Upon receipt of funding, other Stage 1 activities are likely to include contracting for design and engineering plans, applying to OWRD for initial water use authorizations, and contracting for construction of monitoring wells and other facilities as may be needed for preliminary testing of the proposed aquifer storage and recovery system.

Permitting for Aquifer Restoration Project

Oregon law authorizes OWRD to issue permits for two distinct types of aquifer storage systems: aquifer storage and recovery (ASR) and artificial groundwater recharge, commonly referred to as “aquifer recharge” (AR). *See*, ORS 537.531; 537.135. By statute and rule, ASR is defined as the “storage of water from a separate source that meets drinking water standards in a suitable aquifer for later recovery...” ORS 537.531; OAR 690-350-0010(1)(a). An ASR system uses injection wells to store water in an aquifer for later use and, prior to injection, source water must meet water quality requirements administered by the Oregon Department of Environmental Quality and Oregon Department of Human Services, Drinking Water Program. The program expressly recognizes ASR as a beneficial use “inherent” in all water rights for other beneficial uses and therefore does not require a new water right to authorize use of the injection

tion source ORS 537.531. The ASR process does, however, require a complex, two-step authorization including a testing period under a “limited license” (a temporary authorization) and a permanent authorization under a separate permit issued for ASR use. The program involves extensive water quality and aquifer testing by the applicant prior to permitting.

Other statutes and rules describe the related AR process. AR is defined as the “intentional addition of water diverted from another source to a groundwater reservoir.” OAR 690-350-0110(1). A permit is required for the appropriation of water from any source for the purpose of recharging a groundwater reservoir, and a secondary permit is required to beneficially use stored recharge water. OAR 690-350-0120(1). The procedural requirements for AR projects are generally less stringent and projects are not subject to the specific water quality limitations required for ASR. During the first five years of recharge, a secondary permit to use stored recharge water is limited to no more than 85 percent of the project’s permitted annual recharge volume. OAR 690-350-0130(3). After that time, permits may allow withdrawals that exceed the 85 percent limit if justified by recharge performance. *Id.* However, for the Umatilla Aquifer Project the percentage of recharge water available for withdrawal may be further limited if, as expected, the UBWC obtains funding for the project under HB 3369. The legislation dictates that the project must be designed:

...[t]o provide for no more than 75 percent of new stored water to be withdrawn and for not less than 25 percent of the new water to be dedicated for the purpose of providing net environmental public benefits or in-stream benefits...

The Umatilla Basin Feasibility Study recommends a combination of AR and ASR systems to meet anticipated needs. Taking the proposed SSRD 1 system as an example, it is expected that an AR system would be used to recharge the County Line Aquifer by the surface spreading of river water over recharge areas. It is also proposed that a portion of the wa-

ter stored in this manner would be pumped out for further storage in the basalt aquifers through an ASR injection system. As noted above, the feasibility study found that the initial recharge through an AR system would naturally filter the Columbia River water, and that the quality of the filtered recharge water may then be sufficient to satisfy the tougher water quality standards for an ASR system (or at least to minimize the necessity for treatment before injection into the basalt aquifers).

The near-final IGA expressly authorizes the Umatilla Basin Water Commission to apply for any water use authorizations that are necessary for preliminary testing of the project. Given the description of the project in the feasibility study, a logical starting point would appear to be an application for an AR permit to allow preliminary testing of the County Line Aquifer recharge concept. This potentially could be followed by an application for a secondary permit to use stored recharge water and, if the UBWC decides to pursue injection of stored recharge water into the basalt aquifers, an application for an ASR limited license.

Conclusion and Implications

The formation of the Umatilla Basin Water Commission is a significant step toward realizing a shared vision of local governments, the Confederated Tribes, irrigators and other stakeholders in the basin. If successful, an aquifer project of this magnitude could have major economic and other benefits in a region that depends heavily upon the agricultural industry. Other notable benefits could include instream flow enhancement for fish and fish habitat, and long-term replenishment of depleted aquifers. This promising project, and the collaborative process that led to its conception, ultimately could prove to be a model for aquifer projects elsewhere in Oregon, or perhaps in other states or nations facing similar water supply problems. Many will be watching closely as the UBWC begins putting recommendations of the feasibility study to the test.

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