2021 Columbia River Basin Water Supply Inventory Report

By

Office of Columbia River

Washington State Department of Ecology
Central Regional Office
Union Gap, Washington

April 2022, Publication 21-12-010

DEPARTMENT OF ECOLOGY
State of Washington

Publication Information

This document is available on the Department of Ecology's website at:
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Cover photo credit

- Blue Mountains, headwaters of the Walla Walla River Basin
  Photo credit: Bonnie Moreland (Ecology), 2018

Contact Information

Office of Columbia River
Central Regional Office
1250 West Alder Street
Union Gap, WA 98903-0009
Phone: 509-575-2490

Website[1]**:** Washington State Department of Ecology

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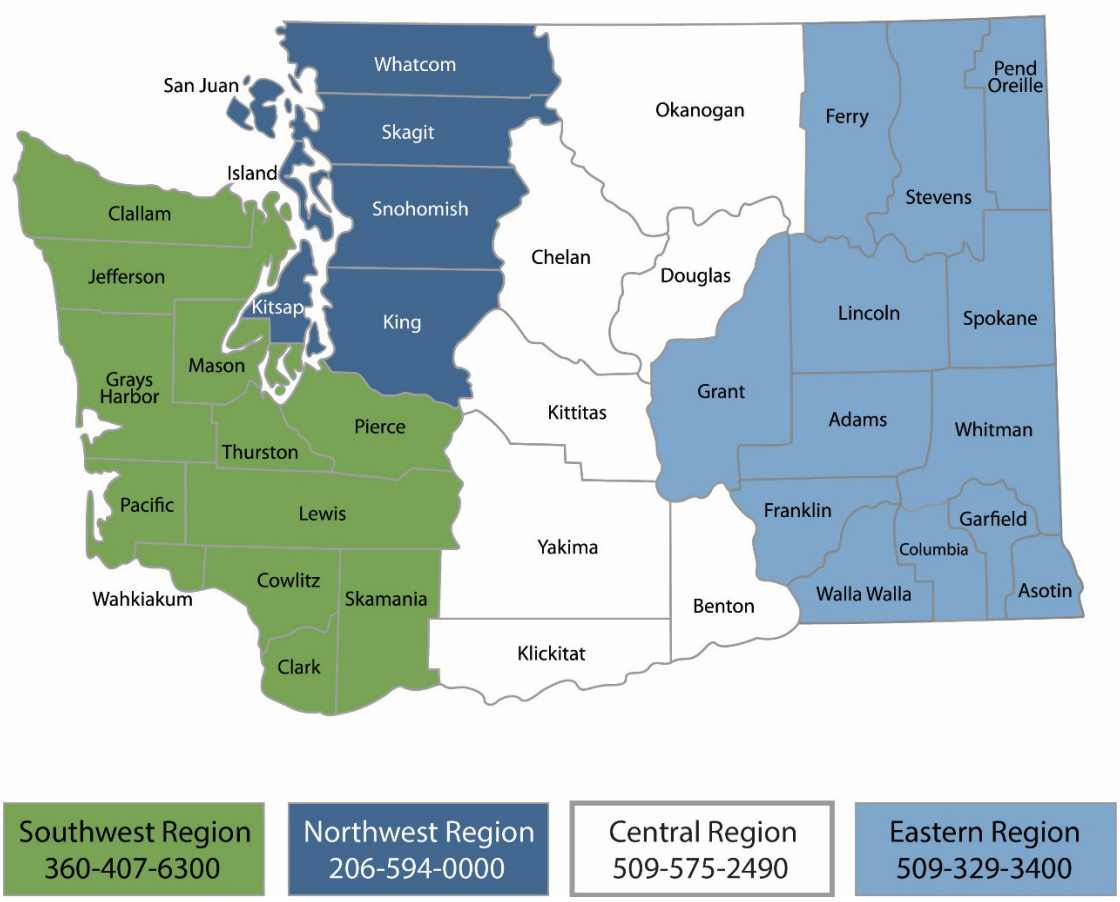
Department of Ecology's Regional Offices

Map of Counties Served



Southwest Region 360-407-6300	Northwest Region 206-594-0000	Central Region 509-575-2490	Eastern Region 509-329-3400

Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
1250 W Alder St • Union Gap, Washington 98903-0009 • (509) 575-2490
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April 22, 2022

The Honorable Jay Inslee, Governor
Honorable Members of the Washington State Legislature
Olympia, Washington

RE: Columbia River Basin Water Supply Inventory Report

The Department of Ecology's Office of Columbia River is pleased to present the 2021 *Columbia River Basin Water Supply Inventory Report* to the Legislature, meeting the requirements under RCW 90.90.040. This report is now available at the following website: https://apps.ecology.wa.gov/publications/SummaryPages/2112010.html

This annual Columbia River Basin Water Supply Inventory Report provides an updated summary of water supply development project progress, project milestones met over the past year, and an inventory list of water supplies developed since 2006.

I am extremely proud of how our team stayed focused on this crucial work for the Columbia Basin, during these challenging times, given the COVID-19 pandemic. In this report you will find important improvements and additions to the Water Supply Inventory Report since our 2020 publication.

After 16 years of work, we are excited to announce the first pumping plant and delivery system is delivering water to irrigators in the Odessa Subarea, fulfilling one of the top priorities of the Office of Columbia River's mandates.

The first pumping plant and delivery system in the Odessa Groundwater Replacement Program finished construction in 2020. Starting in March of 2021, the EL 47.5 system began delivering Columbia Basin Project surface water to 8,600 acres in the Odessa Subarea.

If you have any questions regarding this report or would like more information, please contact me by phone at (509) 952-5080 or by email at thomas.tebb@ecy.wa.gov. If you would like hard copies of the report, contact Jessica Swift by phone at (509) 379-0702 or by email at jessica.swift@ecy.wa.gov.

Sincerely,

G. Thomas Tebb, L.H.g., L.E.G.
Director
Office of Columbia River

RCW 90.90.040

Columbia river water supply inventory—Long-term water supply and demand forecast.

(1) To support the development of new water supplies in the Columbia river and to protect instream flow, the department of ecology shall work with all interested parties, including interested county legislative authorities and watershed planning groups in the Columbia River Basin, and affected tribal governments, to develop a Columbia river water supply inventory and a 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) Benefit to fish and other instream needs;

(iii) Benefit to out-of-stream needs; and

(iv) Environmental and cultural impacts.

(2) The department of ecology shall complete the first Columbia river water supply inventory by November 15, 2006, and shall update the inventory annually thereafter.

(3) The department of ecology shall complete the first Columbia river long-term water supply and demand forecast by November 15, 2006, and shall update the report every five years thereafter.

[2011 c 83 § 6; 2006 c 6 § 5.]

RCW 90.90.020

Allocation and development of water supplies.

(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, the Columbia River Basin taxable bond water supply development account, and the Columbia River Basin water supply revenue recovery account shall be allocated as follows:

(i) Two-thirds of active storage shall be available for appropriation for out-of-stream uses; and

(ii) One-third of active storage shall be available to augment instream flows and shall be managed by the department of ecology. The timing of releases of this water shall be determined by the department of ecology, in cooperation with the department of fish and wildlife and fisheries co-managers, to maximize benefits to salmon and steelhead populations.

(b) Water available for appropriation under (a)(i) of this subsection but not yet appropriated shall be temporarily available to augment instream flows to the extent that it does not impair existing water rights.

(2) Water developed under the provisions of this section to offset out-of-stream uses and for instream flows is deemed adequate mitigation for the issuance of new water rights provided for in subsection (1)(a) of this section and satisfies all consultation requirements under state law related to the issuance of new water rights.

(3) 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 streamflows; and

(d) New municipal, domestic, industrial, and irrigation water needs within the Columbia River Basin.

(4) The one-third/two-thirds allocation of water resources between instream and out-of-stream uses established in this section does not apply to applications for changes or transfers of existing water rights in the Columbia River Basin.

[2011 c 83 § 4; 2006 c 6 § 3.]

Introduction

Ecology's Office of Columbia River

In 2006, the Washington State Legislature created the Office of Columbia River, by passing Chapter 90.90 Revised Code of Washington (RCW) into law recognizing the fundamental need for a program focused on the development of water supplies for families, farms, and fish. The mission for the new Columbia River Basin water supply program was succinct; to aggressively pursue the development of water supplies in the Columbia River Basin.

To date, the Office of Columbia River (OCR) has yielded 476,007-acre feet (ac-ft.) of sustainable and reliable water supplies. This water benefits both instream flows and out-of-stream demands throughout eastern Washington. Each year OCR submits a Columbia River Basin Annual Water Supply Inventory Report to the Washington State Legislature and governor. This report summarizes both ongoing project accomplishments and major milestones met over the past year, along with efforts to improve water reliability and sustainability in the Columbia River Basin.

As with previous water supply reports, each project and program are accompanied by one or more icons (Figure 1) that represent the OCR legislative mandates that particular project or program meets. Water supplies developed under OCR projects and programs provide alternatives to groundwater for the Odessa Subarea, hydrate pending water right applications, reduce drought related impacts to interruptible water right holders, mitigate new water right permits, and help maintain healthy streamflows during drier times of the year.

In addition to this year's 2021 Annual Water Supply and Inventory Report, we are publishing our 2021 Columbia River Basin Long-term Water Supply and Demand Forecast. This Forecast provides readers with the most up-to-date information by incorporating the latest scientific data collection and analysis tools available to anticipate water needs in the basin over the next 20 years. As climate change continues to alter weather patterns, this Forecast can be a valuable tool for water managers and decision makers across eastern Washington.

Throughout the report, these symbols are used to identify the legislative directive that the project addresses:


: Alternatives to groundwater for Odessa Subarea


: Pending water right applications


: Future water supplies for interruptible water right holders


: Future water supplies for municipal, domestic, industrial and irrigation


: Instream benefits

Figure 1 Icon Legend

Over the next four years, our office anticipates that existing projects and programs will provide an additional 286,060 ac-ft. of developed water (Figure 2). This additional water will bring our total developed water supplies to approximately 762,000 ac-ft., or 76 percent of our goal of 1 million ac-ft. by 2025.

Staying on track in an unpredictable world

While OCR maintained our core work of developing new water supplies, the COVID-19 global pandemic continued to alter the way we conducted business. Project partners, clients, and staff remained in a 100 percent telework environment mandated by state officials for the safety of all residents. From March 2020 to fall 2021, our staff quickly and successfully adapted to managing projects and programs in a remote/telework setting as directed by Governor Inslee's 2021 Roadmap to Recovery[2] plan. Staff continued utilizing virtual meeting platforms, shared-access file storage programs, and other various ways of meeting and maintaining project work and permitting.

OCR has relied heavily on online software tools to conduct our day-to-day business. SharePoint is a helpful resource in maintaining data management, project tracking, and team collaboration and has allowed OCR to maintain a high level of performance in processing permits, project implementation, and publishing legislative reports. As the danger of the COVID pandemic wanes, state agencies will be adapting to what the modern work environment looks like post-COVID. We are confident in our ability to maintain a high level of quality work and customer service regardless of the location of our workspace. We accomplished a tremendous amount of work in 2021 and continue to adapt as necessary during this COVID pandemic.

2021 Accomplishments

- Turned on East Low (EL) 47.5 pumping plant, the first Odessa Groundwater Restoration Program (OGWRP) (page 10) delivery system bringing water to the parched Odessa subarea.
- Issued 52 water right change application decisions for water right holders in the Odessa subarea.
- Guided the Walla Walla Water 2050 strategic plan through development and into the final stages of publication, in coordination with Oregon Water Resources Department, and the Confederated Tribes of the Umatilla Indian Reservation.
- Started implementation of Icicle Creek Water Resource Management Strategy early action projects and moved multiple projects toward completion.
- Issued 54 water right permits across eastern and central Washington.
- Published the 2021 Columbia River Basin Long-term Water Supply and Demand Forecast.
- Supported legislation to allow for the allocation of commingled federal and state groundwater in the Pasco Basin.
- Continued fish passage improvements at Cle Elum Dam and tracking fish migration above Grand Coulee Dam.

[2] More information on the Roadmap to Recovery plan can be found online at: https://www.governor.wa.gov/

Preparing for future water needs and improving drought resiliency

As the climate continues to change, the state and region experience more frequent and significant drought conditions. Droughts have impacted the state almost every year since 2000, with the exception of 2011[3]. When broken down by severity, the state has seen five years of extreme drought (2001, 2005, 2007, 2015, and 2020), seven years of severe drought (2002, 2003, 2009, 2014, 2018, 2019, and 2021) and eight years of moderate drought (2004, 2006, 2008, 2010, 2012, 2013, 2016, and 2017).

Lower precipitation linked to droughts not only impacts agricultural crops, interruptible water supplies, and instream flows for fish, but also increases the risk of wildfires. Wildfires can cause tremendous devastation, not only to forests, but also to families, farms, and watersheds. One example of this impact is the 2017 Jack Creek wildfire in the Alpine Wilderness Area. This wildfire burned over 4,600 acres of forestland and contributed to an excess of spring snowmelt and runoff that further damaged aging infrastructure at Eight Mile Lake. Eight Mile is one of several important lakes that function as irrigation water supply for the Icicle Peshastin Irrigation District (IPID). Eight Mile, and the many other lakes that serve the irrigation district, are all within the Alpine lakes Wilderness.

In the spring of 2018, emergency actions were taken by Ecology's Dam Safety Office, Chelan County Emergency Management, and IPID to modify the dam spillway in order to prevent the dam from failing so that homes and infrastructure downstream would be protected. Damage to the dam also reduced the quantity of water supply stored in this reservoir.

These are only a few reasons why OCR works tirelessly to secure water supplies not only for today, but also for the future. In order to do this, we must know how water supplies and demands for water will change as time goes on. Therefore, our office continues to prepare for future impacts to water supplies and changes to water demands by not only developing water supplies, creative problem solving on complex water resource issues, but also by publishing a scientifically based Long-term Supply and Demand Forecast report every five years since 2006. This year, we are publishing our fourth Forecast report, building on previous reports.

Ecology is aware of climate change impacts and uses climate-driven data analysis in our determination of water supplies and demands across eastern Washington. This 2021 Forecast includes more advanced simulations of crop water requirements, residential water demand estimates, global and regional economic conditions, State-level water management actions, and groundwater trend analysis. These improvements provide a clearer picture of the vulnerabilities facing our communities and industries as water supplies and demand for water across the Columbia River Basin change.

[3] Data provided by Drought.gov: https://www.drought.gov/

Ecology's 2021-2023 strategic plan

Ecology's updated biennial 2021-2023 Strategic Plan[4] summarizes how the agency is addressing ongoing environmental challenges including climate change, pollution, and ecosystem protection and restoration to meet our mission of protecting, preserving, and enhancing Washington's environment for current and future generations.

OCR's objectives directly support goals one (support and engage our communities, customers, and employees), two (reduce and prepare for climate impacts), and four (protect and manage our State's waters) of Ecology's 2021-2023 Strategic Plan. As a leader in water supply development, OCR contributes to multiple key agency strategies while continuing to set the standard of performance in developing a holistic approach to meeting the water supply needs of growing communities, agriculture, and the natural environment of eastern Washington.

OCR aligns with the agency's 2021-2023 Strategic Plan by:

- Building innovative partnerships to deliver integrated water management solutions across central and eastern Washington.
- Aggressively pursuing and developing water supplies for families, farms, and fish.
- Planning and forecasting future water supply needs, accounting for climate change and aging infrastructure, and ecosystem restoration.
- Listening carefully, communicating in a responsive and timely manner, and valuing experience and expertise.

Farms dotting the landscape in the Walla Walla River Basin
Photo credit: Tim Poppleton (Ecology), 2019

[4] More information regarding Ecology's Strategic Plan 2021-2023 can be found online at: https://ecology.wa.gov/About-us/How-we-operate/Strategic-plan

Water Supply Development by the Office of Columbia River

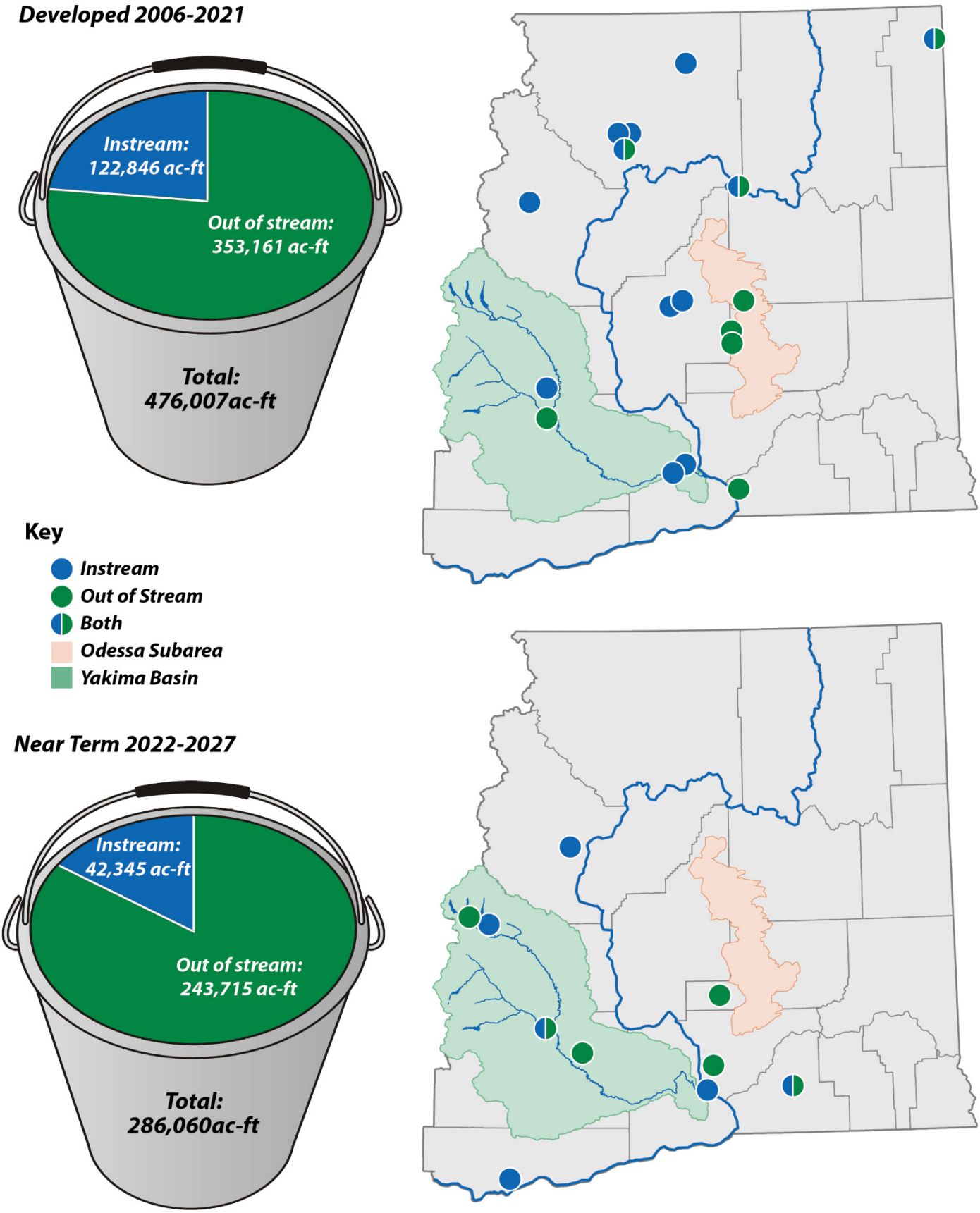
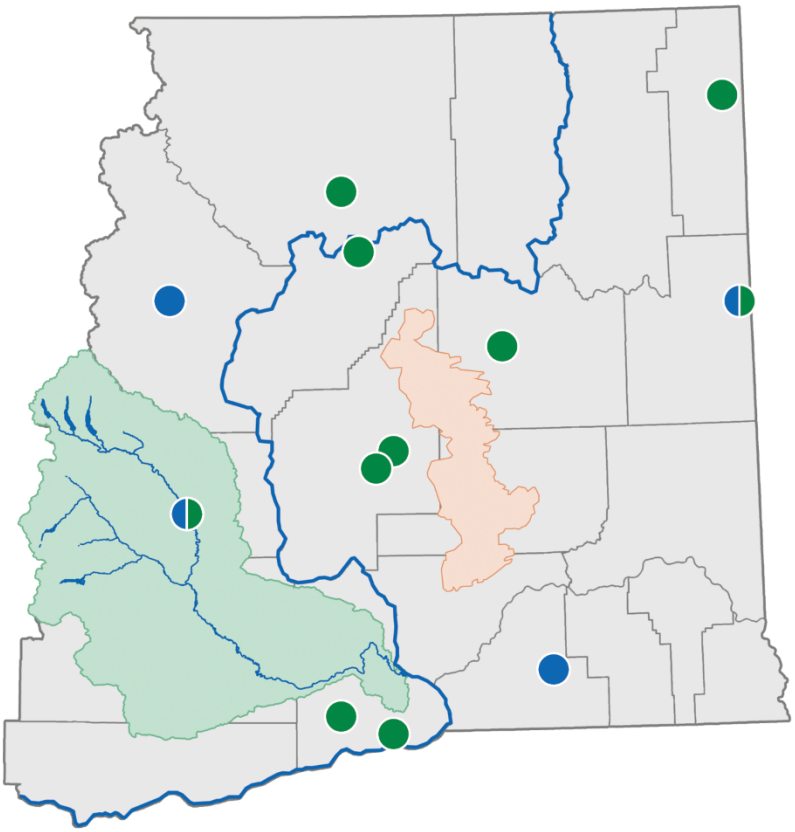
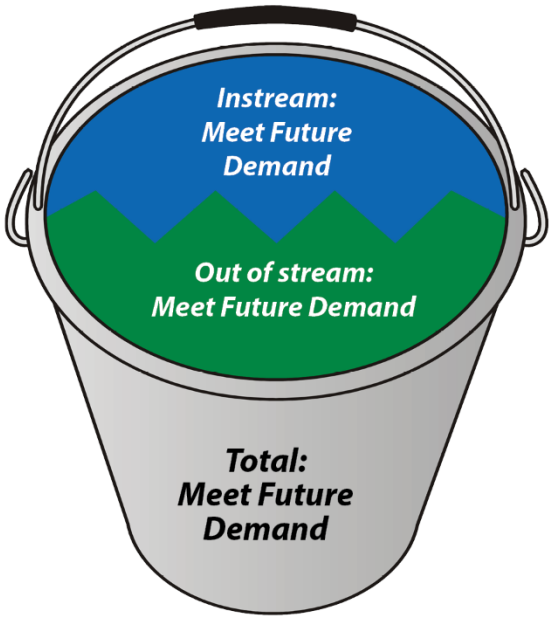


Figure 2 Water Supply Development by the Office of Columbia River



Long-term 2027+



Projects

Developed

- Barker Ranch: 6,436 ac-ft
- Columbia Basin ID Piping: 35,000 ac-ft
- Conservation Commission Irrigation Efficiency: 3,476 ac-ft
- Donations: 28,854 ac-ft
- East Low Canal Widening: (conveyance)
- Kennewick ASR: 1,659 ac-ft
- KID/Red Mountain: 11,005 ac-ft
- Kennewick General Hospital 4,000 ac-ft
- Lake Roosevelt: 132,500 ac-ft
- Lower Wenatchee Piping: 7,823 ac-ft
- Manastash: 1,300 ac-ft
- Methow Trust Water Acquisition: 79 ac-ft
- Methow Projects: 2,854 ac-ft
- Odessa Subarea: 164,000 ac-ft
- Peshastin ID Piping: 360 ac-ft
- Potholes Feed Route (conveyance)
- Pine Creek Acquisition: 900 ac-ft
- Sullivan Lake: 14,000 ac-ft
- Port of Walla Walla Leases: 4,761 ac-ft
- Upper Kittitas Tributary Enhancement (conveyance)
- Weber Siphon (conveyance)
- Yakima Basin Ag Conservation: 47,000
- Yakima City ASR: 10,000 ac-ft

Near Term

- Cle Elum Pool Raise: 14,600 ac-ft
- Columbia Basin ID Piping: TBD
- Kachess Drought Relief Pumping Plant: 200,000 ac-ft
- Icicle Creek Water Management Strategy Projects: 20,000+ ac-ft
- Othello ASR: 500 ac-ft
- Pasco Basin Water Supply: TBD
- Pasco Municipal Supply Improvements: 5,000 ac-ft
- SVID: 7,815 ac-ft
- White Salmon ASR: 145 ac-ft
- Yakima Basin Enhanced Conservation: 38,000 ac-ft
- Yakima Basin Shallow Aquifer Recharge: TBD

Long-term

- Regional Aquifer Storage and Recover: TBD
- Conservation Commission Retiming: TBD
- Goose Lake & Nine Mile Flat Storage: TBD
- Horse Heaven Hills: 61,000+ ac-ft
- Kittitas Distributed Off-Channel Small Storage: TBD
- Lincoln CD Passive Rehydration: TBD
- Mill Creek Storage: 2,000 to 11,000 ac-ft
- Peshastin Pump Exchange: TBD
- Rilette Aquifer Storage and Recovery: TBD
- Spokane-Rathdrum ASR: TBD
- Switzler Off-Channel Storage: 44,000 ac-ft
- Walla Walla Flow Enhancement: 25,500 to 58,500 ac-ft
- Yakima Basin Integrated Plan Projects: 150,400+ ac-ft

Integrated Solutions to Complex Challenges

Walla Walla Water 2050

The Walla Walla River Basin is a complex watershed spanning 1,758 square-miles (or 1.1 million acres) across the Washington/Oregon state line (Figure 3). This basin struggles to maintain sufficient instream flows vital for fish survival, irrigated agriculture, and the increasing out-of-stream demands for the growing rural and urban populations especially in the summer months when demand is the highest.

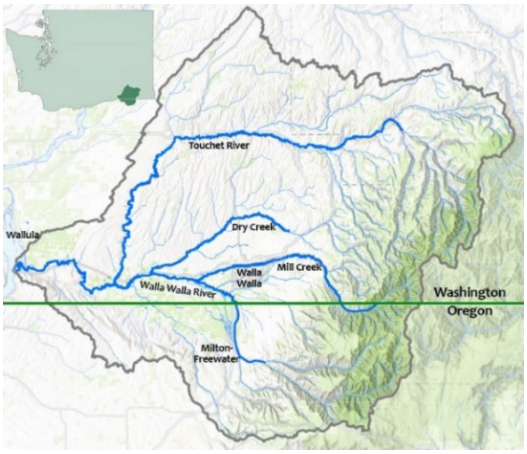


Figure 3 Map of the Walla Walla Basin

Various stakeholders from both Washington and Oregon began to collaborate and develop local water plans and water banking agreements in the early 2000s. In 2009, the Walla Walla Watershed Management Partnership (Partnership) was formed and directed under RCW 90.92 to develop and implement an innovative water management concept that enhances flexibility in water use. In their 2018 report to the legislature, the Partnership acknowledged that while they were able to save over 20,500 ac-ft. of water from relinquishment, streamflows in the basin have not improved since 2009.

In 2019, the Washington Legislature directed Ecology and the Partnership to develop a 30-year strategic water supply management plan for the Walla Walla Basin. This strategic plan, dubbed the Walla Walla Water 2050 Strategic Plan (WWW2050 Strategic Plan)[5], employs an integrated water resource management approach to achieve adequate and sustainable water supplies for the basin.

In 2020, Ecology and the state auditor's office issued findings from two audits (a performance audit and a financial audit) evaluating the partnership's ability to improve streamflows in the basin over the past 10 years. Findings from these audits confirmed a lack of improvements to in-basin streamflows.

Results from these audits (contained in a 2020 report to the legislature[6] published by the Walla Walla Partnership) included the following recommendations for the WWW2050 strategic plan:

- Assign "Responsibility for water management in the Walla Walla Basin to the Department of Ecology while maintaining the benefits of the Partnership in the form of an advisory board that includes current membership."
- Pursue an interState agreement or compact with Oregon, in consultation with the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) to address waters resource

[5] The WWW2050 Strategic Plan can be found online at: https://apps.ecology.wa.gov/publications/SummaryPages/2112011.html

[6] Walla Walla Watershed Management Partnership and Department of Ecology, *Walla Walla Pilot Local Water Management Program Legislative Report to Implement 2SSB 5352,* October 24. 2020. Full report can be found online at: https://drive.google.com/file/d/1HTiEf_wCDzsNNjCzhgHUDDEIVfR3hIi-/view

management and allocation of any new developed water supplies in the Walla Walla watershed.

- Identify Ecology as the lead to perform project management functions for continued work in the watershed.

For the better part of 2019-2021, Ecology worked collaboratively with the Partnership, Oregon Water Resources Department, CTUIR, federal agencies, local governments, and irrigators on both sides of the border, environmental non-profits, and the interested public to develop a holistic bi-State water resource management plan for the Walla Walla Basin. In June 2021, Ecology and the Partnership published the Walla Walla Water 2050 Strategic Plan (WWW2050 Strategic Plan). To accomplish this task, a Strategic Plan Advisory Committee (SPAC) and Working Groups were created and consisted of stakeholders and tribes with various interests in the basin. This collaborative effort helped identify and prioritize key strategies that balance and harmonize the basin's threatened ecosystem with continued sustainable growth and prosperity of its human inhabitants enveloped in the WWW 2050 Strategic Plan.

Strategies to meet the goals and objectives (Figure 4) presented in the strategic plan incorporate a suite of implementation tools that focus on improving one or more of the following categories:

- Water quality
- Streamflows
- Groundwater supplies
- Water use efficiency
- Floodplain function and connectivity
- Aquatic and riparian habitat
- Monitoring and metering efforts
- Policy and regulatory processes

As the Partnership expired at the end of June 2021, Ecology, Oregon Water Resources Department (OWRD), and CTUIR have created a Tri-Sovereign Committee to provide leadership to guide complex legal, technical, and funding challenges to advance the WWW 2050 Strategic Plan.

The next phase of the WWW 2050 Strategic Plan is to work with the various stakeholders to identify and address

Goals and Objectives of the WWW2050 Strategic Plan

1. **Holistically** address the basin's longstanding struggle to balance instream and out-of-stream uses and future demand to **ensure enough water for fish, farms, and people.**

2. Identify and **prioritize** the strategies, projects, initiatives, and/or programs needed to address challenges and **achieve both short and long-term goals** for the watershed.

Additional goals exist for **Phase 2** of the planning effort:

3. Develop an organizational structure that **ensures accountability** and implement the strategy.

4. Achieve **clarity around legal framework** and regulatory scheme, including **bi-State coordination** and **water rights management**.

5. Obtain adequate/dedicated **funding** to support the plan.

Figure 4 Goals and Objectives of the WWW2050 Strategic Plan

any gaps in the plan, develop a long-term governance structure moving forward, and further refine the identified strategies. Work during this next phase will also include developing an adaptive management strategy, prepare for a future Programmatic Environmental Impact Statement, and prepare goals and implementation elements of the plan and prepare to advance the WWW 2050 Strategic Plan in the 2023 legislative session for adoption.

Milestones

- Completing and publishing the WWW 2050 Strategic Plan.
- Completing the Walla Walla Basin Bi-State Flow Enhancement Study and Flow Study Update.
- Kicking off the US Geological Survey cooperative Walla Walla River Basin Groundwater Study.
- Advancing two anchor projects (pump exchange or new surface water storage) identified in the Bi-State Flow Enhancement Study to achieve streamflow targets.

Current actions

- Ongoing work to fill in data gaps of the Walla Walla Basin Integrated Flow Enhancement Study and Study Update including monitoring groundwater levels and installing two new stream gauges.
- Securing facilitation services for two years.
- Coordination amongst the Three-Sovereign Group[7] to evaluate options for multi-State water resource management in the Walla Walla Basin.
- Developing a long-term consensus-based, bi-State governance structure in the basin, building on decades of collaborative planning in the Walla Walla Basin.
- Furthering detailed development of implementation strategies.

Next steps

- Developing an adaptive management strategy for the WWW 2050 Strategic Plan.
- Developing an education and outreach for the WWW 2050 Strategic Plan.
- Developing a funding strategy to implement the WWW 2050 Strategic Plan.
- Agreeing on a bi-State management approach and administrative structure.
- Performing a programmatic environmental review of the WWW 2050 Strategic Plan.
- Securing legislative support for the WWW 2050 Strategic Plan implementation and new governance structure.
- Securing legislative changes or interState agreement needs to manage new water resources in a bi-State basin by the Three-Sovereign Group.

[7] The Three-Sovereign Group consists of the States of Oregon and Washington, and the Confederated Tribes of the Umatilla Indian Reservation.

The Odessa Groundwater Replacement Program

For over half a century, farmers in the Odessa Subarea (Odessa) have relied on groundwater as their primary source of irrigation water. As the demand for water increased in the Odessa, aquifers have not recharged fast enough, resulting in groundwater level declines. In some areas declines are in excess of 125 feet (Figure 5). This significant localized decline in groundwater levels within the Odessa Subarea is forcing some farmers to drill deeper wells. Other groundwater users of the same aquifer include residents, food processing and other commercial businesses, and municipal entities; all impacted by a declining water supply. Even if water can be found at increasing depths, water stored deep down in an aquifer is usually higher in sodium content and warmer than water drawn from shallower levels, which is not conducive for optimizing crop yields nor is the water quality ideal drinking water.

The implementation of Odessa Groundwater Replacement Program (OGWRP) builds on the efforts taken under the Columbia River Initiative Memorandum Of Understanding (MOU) signed in 2004 and is one of OCR's legislative mandates (RCW 90.90.020(3)(a)). One of the first steps taken was to identify available surface water supplies. Working with the Department of Interior's U.S. Bureau of Reclamation (Reclamation) and the East Columbia Basin Irrigation District (ECBID), OCR has secured enough water, from Lake Roosevelt Incremental Storage and Releases Program (10,000 acres), Odessa Subarea Special Study (70,000 acres), and water conserved through the Columbia Basin Project's Irrigation District Coordinated Conservation Program (7,700 acres), to convert a total of 87,700 acres of farmland irrigation from declining groundwater to surface water sources.

What started as the Odessa Subarea Special Study back in 2006, OGWRP consists of a series of projects. This ranges from securing surface water supplies, enlargement of the East Low Canal to the construction of new pumping plants that work together to replace Odessa subarea groundwater dependence with Columbia Basin Project surface water supply. The federal Columbia Basin Project area extends from Grand Coulee Dam to the confluence of the Snake and Columbia Rivers and includes portions of Lincoln, Adams, Grant, and Franklin Counties.

The East Low canal is the main conveyance system delivering surface water from Lake Roosevelt and Banks Lake to the East and South Columbia Basin Districts and needed to be enlarged to convey OGWRP water supplies. The major OGWRP water conveyance work includes the construction of seven new siphons, seven radial gates, widening and improving approximately 44 miles of East Low Canal, and 12 county road bridges. Years of planning and hard work have paid off in the transfer of 52 water right certificates from groundwater to surface water, resulting in 15,365 acres removed from groundwater dependence.

This year, OGWRP met a major milestone with East Low (EL) 47.5 pumping plant and delivery system becoming the first of eight planned water delivery systems to come online. The EL 47.5 water delivery system consists of a pumping station with five large pumps to push water uphill through 8.8 miles of pipe delivering water from up to six miles away from the East Low Canal. While the system built to deliver enough water for the irrigation of up to 10,500 acres, at this time, 8,600 acres of farmland have already enrolled in water service contracts for water delivery. To celebrate this monumental achievement, a ribbon-cutting ceremony was held on-site in May of 2021. In attendance were multiple project partners including Ecology, Reclamation, Washington State

Department of Fish and Wildlife, participating Irrigation Districts, the Columbia Basin Development League, elected officials supporting the project, and local landowners/irrigators.

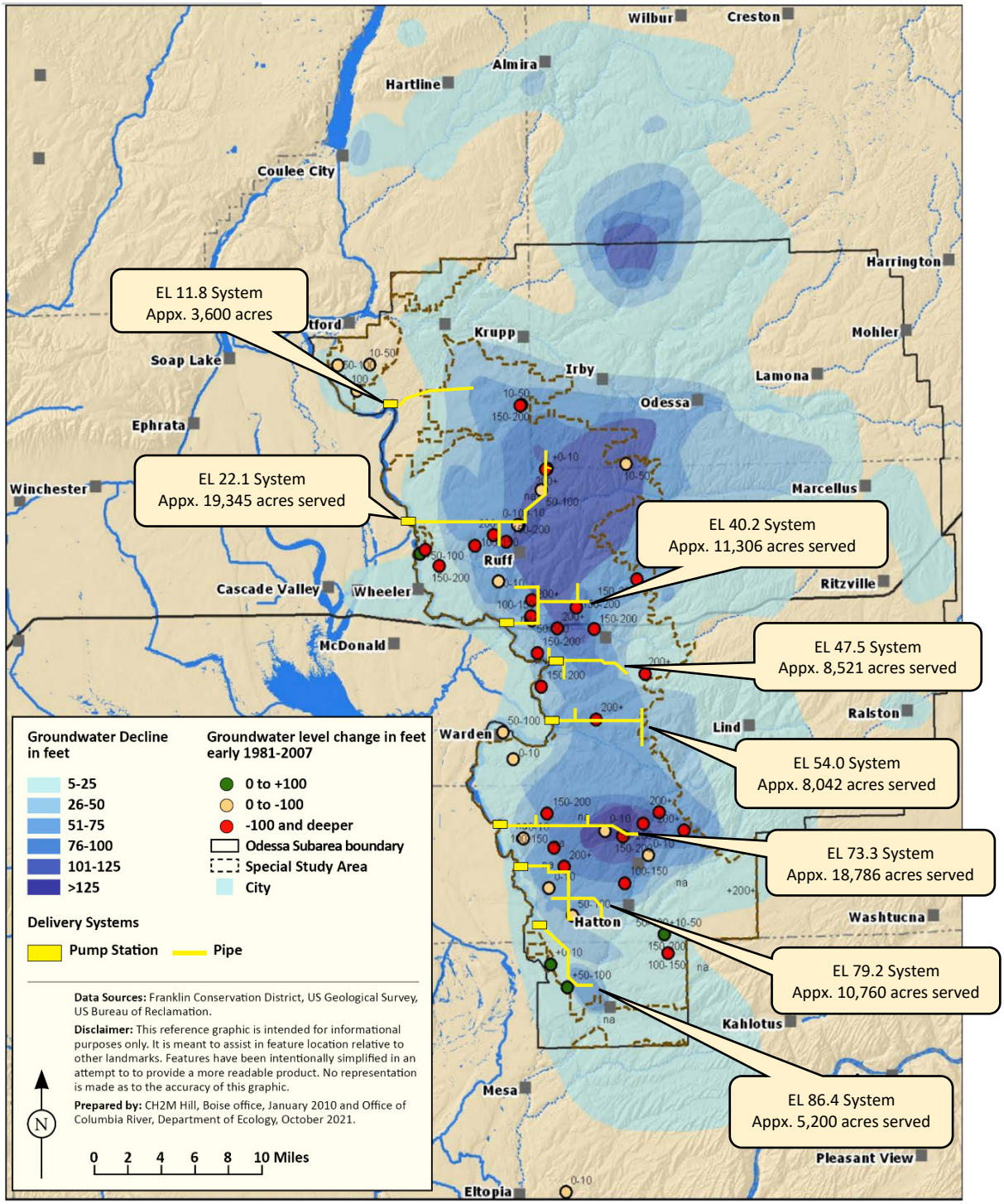


Figure 5 OGWRP Map of Proposed Pumping Plant and Delivery Systems, and Service Area
Source credit: East Columbia River Basin Irrigation District.

Current investments into OGWRP (2004 – 2021) include $126 million in state investments and $48 million in federal investments. These funds have provided the means for a wide range of required actions including:

Sprinkler line on EL 47.5
Photo credit: Tim Poppleton (Ecology), 2021

- Feasibility studies
- Engineering designs
- Hydraulic modeling
- Cultural resource surveys
- Habitat evaluations
- Land reclassifications
- Environmental Impact Statements
- Mitigation measures
- Technical support
- Conservation efforts
- Rerouting and retiming water supplies within the CBP
- Upgrading SCADA (Supervisory Control and Data Acquisition) electronic monitoring systems
- Massive infrastructure construction including
    - Installing addition siphon barrels and radial gates.
    - Installing check structures.
    - Widening East Low Canal.
    - Modifying county bridges.

However, this is just the beginning of OGWRP's success story. With EL 47.5 now complete, Ecology and OGWRP partners have shifted focus to advancing the EL 11.8, EL 79.2 and EL 86.4 system designs towards 30 percent completion and advancing EL 22.1 system designs towards 60 percent completion, during 2022. Additional work anticipated to commence in 2022 includes the design of a power grid substation that will serve the East Low 22.1 system and installation of the five remaining radial gates.

During 2021, Grant County Conservation District (GCCD) helped the EL 79.2 landowners and filed a US Department of Agriculture's Natural Resource Conservation Service (NRCS) Regional Conservation Partnership Program grant proposal. While this grant application was not successful, GCCD is working with landowners to submit other federal grant proposals such as NRCS's Watershed Program under Public Law 566 in 2021 and 2022. The OGWRP project partners, Ecology,

ECBID, and Reclamation have committed to cost-sharing these opportunistic grant funds, with a minimum of in-kind services.

Providing relief to Odessa Subarea aquifers has been a monumental effort. Substantial efforts by all parties will continue on this project to reduce Odessa subarea farmers' dependence on a declining aquifer, make water available for current municipal, domestic, and industrial needs, and prepare for climate impacts and drought resiliency. These efforts also include a groundwater monitoring study that will be conducted once OGWRP is near completion. With surface water being actively delivered to farms in the Odessa Subarea, local aquifers are now able to feel a little less pressure from water demands.

Objectives

- Develop and deliver enough surface water to convert 87,700 acres of irrigated cropland from declining groundwater sources to surface water.
- Construct siphons, pumping plants, and other infrastructure required for the delivery of the increased amount of surface water to the Odessa subarea.
- Provide an easy transition for landowners to change their existing water rights from groundwater to surface water.

Surface water provided from

- Lake Roosevelt Incremental Storage and Releases Program – 10,000 acres
- Odessa Subarea Special Study – 70,000 acres
- Coordinated Conservation Program – 7,700 acres

2021 Milestones

- Water turned on for EL 47.5 - delivering water to change 8,600 acres from groundwater to surface water.
- Reach 30 percent design on the EL 22.1.

Anticipated 2022 Milestones

- Make progress on modifying and/or replacing, the remaining 10 county road bridges along East Low Canal.
- Advance designs for the EL 11.8, 22.1, 79.2, and 86.4 pumping plant and delivery systems, including engineering designs, hydraulic modeling, cultural resource compliance, and easement acquisitions.
- Design, install, and construct utility grid improvements to adequately serve the EL 22.1 system, including overhead feeders and substation.
- Develop a long-term Odessa Subarea groundwater monitoring program.

Icicle Creek Water Resource Management Strategy

The Icicle Creek Workgroup is seeking to improve instream flows, habitat functionality, and meet out-of-stream water demands in the Icicle Creek Watershed. The workgroup continues to implement a wide range of projects that together will help meet short-term and long-term instream flow needs in the watershed. This will provide out-of-stream water reliability for out-of-stream uses, and improve water quality in the 212-square-mile sub-basin of the Wenatchee River (Figure 6). The Icicle Creek Water Resource Management Strategy (Icicle Strategy), will provide 32,000 ac-ft. of reliable and sustainable water to meet current out-of-stream demands through water saving measures, improving water quality, and creating fish passage at choke points along Icicle Creek.

Modifying the Snow Lakes Trail Bridge
Photo credit: Mary Jo Sanborn (Chelan County Natural Resource Department), 2021

By the end of 2021, five major projects are completed, bringing the plan closer to meeting the above-mentioned goals. These projects include the Boulder Field fish Passage Project, City of Leavenworth fish screen replacement, installation of flow meters for the city of Leavenworth, modification of the Snow Creek Trail Bridge, and completion of the environmental review for the Leavenworth National Fish Hatchery Surface Water Intake Fish Screens and Fish Passage Project. In-progress projects are estimated to achieve 30.5 cubic feet per second in instream flow benefits.

Additional projects underway include:

- Environmental review of the Eightmile Dam Reconstruction and Restoration Project.
- Improving Icicle-Peshastin Irrigation District water conservation measures.
- Designing automating water releases at the Alpine Lakes.
- Constructing circular tanks at the Leavenworth National Fish Hatchery.
- Sitting a new SNOTEL site in the basin.
- Commencing design on several riparian improvement projects.
- Permitting the Cascade Orchard Irrigation Company Irrigation Efficiency and Pump Exchange Project.
- Conducting Tribal fishery effectiveness monitoring.

These projects are helping to bring the Icicle Strategy closer to meeting its water management goals. Look for new outreach videos highlighting Icicle Strategy project development in 2022.

Icicle Strategy Water Management Solutions

- Alpine Lakes Reservoirs Optimization, Modernization, and Automation
- Icicle-Peshastin Irrigation District Irrigation Efficiencies
- Cascade Orchards Irrigation Company Irrigation Efficiencies and Pump Exchange
- Domestic Conservation Efficiencies
- Eightmile Lake Dam Reconstruction and Restoration
- Protect Tribal and Non-Tribal Fisheries
- Habitat Protection and Enhancement
- Instream Flow Rule Amendment
- Leavenworth National Fish Hatchery Conservation and Water Quality Improvements
- Fish Passage within Icicle Creek
- Fish Screening
- Water Marketing

Figure 6 Icicle Creek Sub-basin Map and Strategy Goals

Yakima River Basin Integrated Water Resource Management Plan

The third phase of the federal Yakima River Basin Water Enhancement Project (YRBWEP), Yakima River Basin Integrated Water Resource Management Plan (Integrated Plan) projects focused on actions benefitting the farms, families, and fish in the Yakima River Basin. Laid out as a 35-year plan, the Integrated Plan is divided into Initial, Middle, and Final Development Phases. Currently in the Initial Development Phase, the plan's federal-State-tribal-local-private stakeholders continue their commitment in funding projects spanning all seven elements of the Integrated Plan. More information regarding these projects will be available in the 2021 Yakima River Basin Water Resource Management Plan[8], which is anticipated to be available summer 2022.

Seven elements of the Integrated Plan

- Habitat/Watershed Protection and Enhancement
- Reservoir Fish Passage
- Enhanced Water Conservation
- Structural and Operational Changes
- Surface Water Storage
- Groundwater Storage
- Market Reallocation

Milestones achieved in 2021

- Implemented 85 water conservation projects, since 2013, which have achieved 60 percent of the 85,000 ac-ft. water conservation requirement set by the federal 2019 lands package (S.4710).
- Installation of a fish guidance boom and sluice gate modification at Sunnyside Dam in response to the findings from the Lower Yakima River Smolt Survival Study.
- Completion of the Yakama Nation Unit 2 Diversion dam removal and rebuild project.
- Release of the 2020 Summer Sockeye study report[9] evaluating potential fish passage issues from Roza Dam to the mouth of the Yakima River.
- Began deconstruction of Nelson Dam (Figure 7).
- Completion of the Cle Elum Fish Passage Facility 1,250-foot downstream bypass tunnel and several reservoir intake ramps.
- Start of shoreline protection at Wish Poosh Campground.
- Release of 592 Bull Trout in Gold Creek and Kachess River, near their natal streams.

[8] OCR legislative reports are available online at: https://ecology.wa.gov/About-us/Who-we-are/Our-Programs/Office-of-Columbia-River/Office-of-Columbia-River-Legislative-reports

[9] Evaluation of Factors Affecting Migration Success of Adult Sockeye Salmon (Oncorhynchus nerka) in the Yakima River, Washington, 2020. Full report can be found online at https://pubs.er.usgs.gov/publication/ofr20211075

- Yakima Basin Managed Aquifer Recharge Assessment completed by Kittitas Reclamation District, identifying and ranking potential groundwater storage opportunities in the Upper Yakima Basin.

Anticipated work for 2022

- Completion of campground improvements and installation of a new culvert promoting fish passage up Davis Creek at Wish Poosh.
- US Army Corps of Engineers release of the proposed Yakima Delta ecological restoration plan.
- Initiation of the Cities of Ellensburg and Moxee aquifer storage and recovery feasibility studies.
- Advancement of the Kachess Drought Relief Pumping Plan Tier 2 EIS towards scoping and comment period.
- Construction of Cle Elum Fish Passage remaining intakes and gates, and secant drainage system installation.

Continue

- Gold Creek and Gold Creek pond restoration work.
- Bull Trout rescue and captive rearing work.
- Agricultural and municipal enhanced water conservation efforts.
- Floodplain restoration work across the Yakima River Basin.
- Analysis of market reallocation, water banking, and smart markets.
- Groundwater recharge studies taking place across the Yakima River Basin.
- Clear Lake Dam fish passage design.

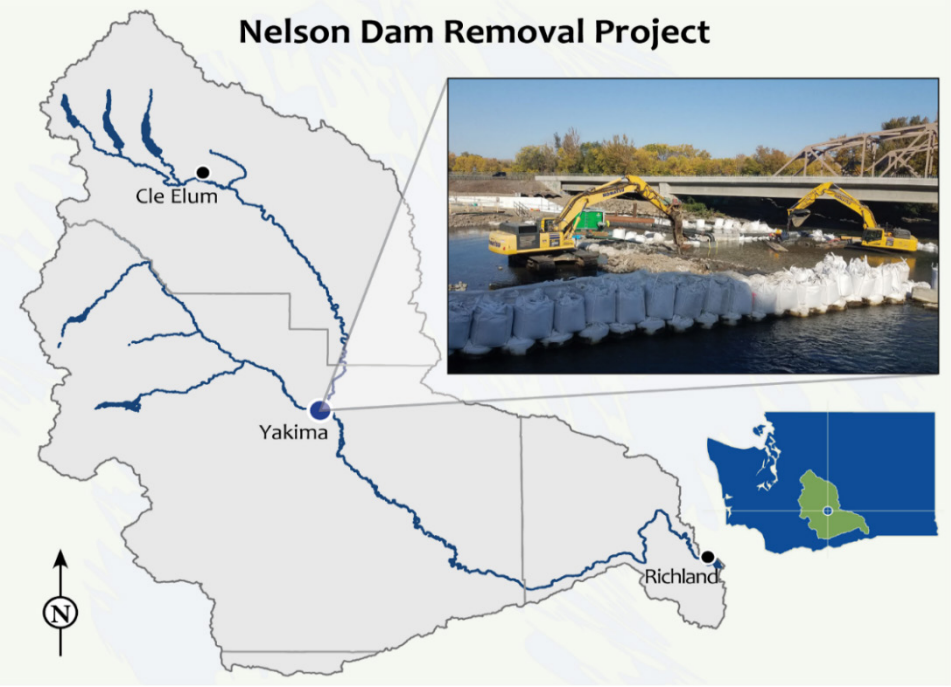


Figure 7 Nelson Dam Removal Project location map

Water Supply Development Projects

Aquifer storage and recovery

Aquifer Storage and Recovery (ASR) projects are a cost-effective alternative to traditional surface water storage. Taking advantage of native aquifers, these projects require minimal infrastructure and can be implemented in residential and urban areas, where traditional surface water storage facilities cannot be located.

Many smaller municipalities across eastern Washington are pursuing ASR as a low-cost secondary source of water that can be tapped into during times when surface water supplies begin to wane. In many cases, a single pump can be retrofitted and used to both inject water into the aquifer and to pull water back out for municipal uses (Figure 8). Existing infrastructure can then be used to convey water back into the municipal system, also a cost savings.

In addition to the monetary benefits, ASR projects are more environmentally friendly than surface water reservoirs as they do not impact upland habitats as it requires minimal additional new infrastructure and can take pressure off of surface water supplies during times of low system flows.

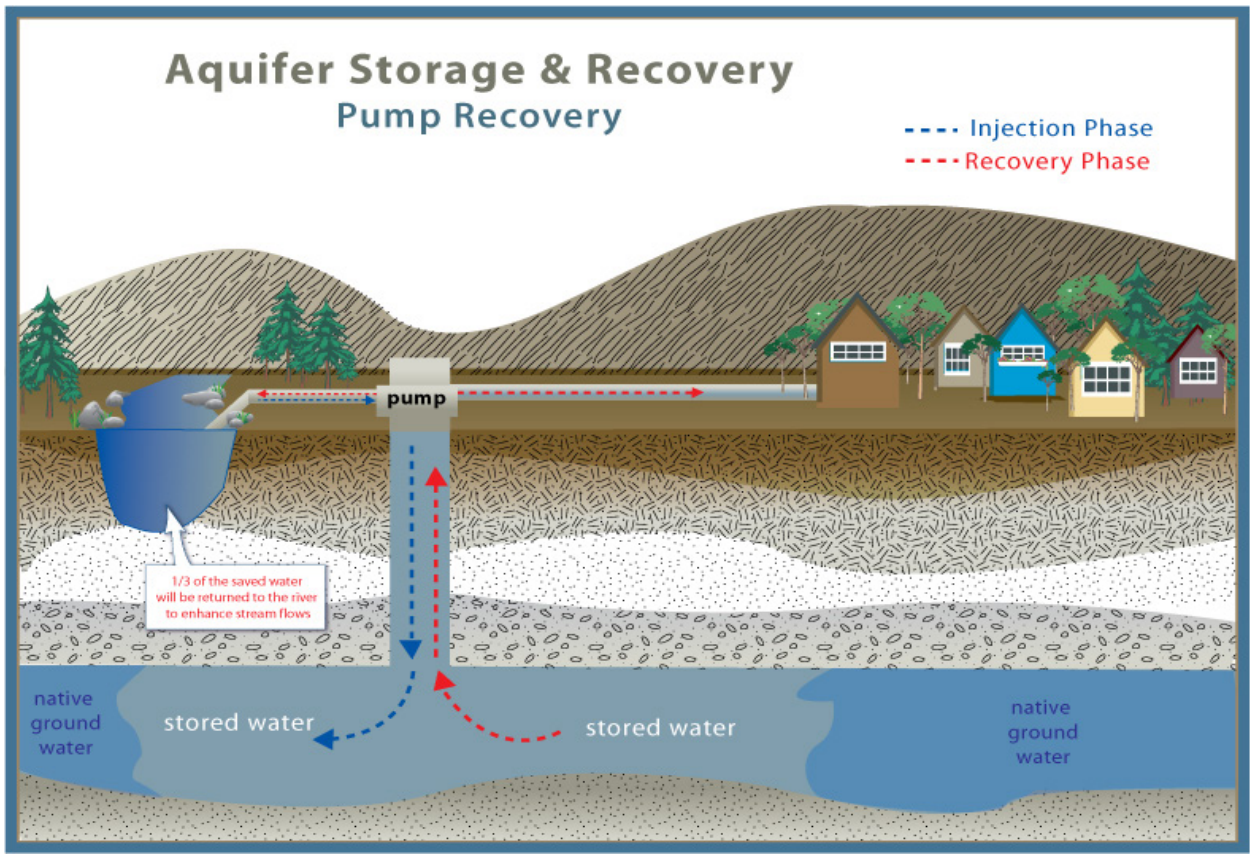


Figure 8 Aquifer Storage and Recovery Schematic

Current ASR projects

The City of Kennewick and the City of Yakima are permitted to inject water into their associated aquifers. As with many ASR projects, surface water is diverted into the aquifer during periods of high flows and withdrawn back out of the aquifer during peak demands, often when surface supplies are running low. Both cities are required to provide Ecology with the annual monitoring and reporting requirements as specified in their permit provisions.

The City of Othello is now in the process of conducting a Phase 2 pilot test to monitor long-term aquifer recharge with treated surface water. The ASR program involves obtaining seasonally available surface water from the Reclamation Columbia Basin Project, treating it to meet applicable water quality criteria, and recharging the aquifer near the City of Othello. The stored water will be recovered by the city through regular pumping for future municipal use.

The City of Pasco is continuing work on a feasibility study for an ASR project used to meet (both instream and out-of-stream) water demands during the drier months of April through September. If this study provides viable results, the city will move onto the next phase of identifying potential well sites and water sources.

The City of West Richland (West Richland) is also pursuing an ASR project to address water supply needs during peak demand periods in the summer and early fall. West Richland is proposing to inject surface water delivered by the neighboring City of Richland's intertie into the local basalt aquifer via an existing West Richland well. The project is in the initial phases of determining ASR feasibility ahead of applying for a reservoir permit and conducting pilot testing at the site.

To date, OCR has issued permits for ASR projects to the cities of Yakima, Kennewick, and White Salmon (temporary permit). Additional cities conducting ASR feasibility studies include Pasco, Othello, Quincy, West Richland, and Ellensburg.

Objectives

- Explore and evaluate potential locations throughout the Columbia River Basin/eastern Washington where local geology and conditions support ASR operations.
- Provide permitting guidance, and technical and financial assistance to develop suitable ASR systems.

Benefits

- Cost effective; requiring minimal infrastructure.
- Maintains cool water temperatures due to the natural insulating properties of aquifers.
- Can be employed where traditional surface water reservoirs cannot, such as urban and residential areas.
- Can re-time water supply by storing water during high flows and withdrawing stored water during the peak demand season.
- Relieve demands on surface water storage supplies.

Pasco Basin Subarea

For decades, irrigation practices from the federal Columbia Basin Project (CBP) have artificially recharged the Pasco Basin subarea aquifers. This "artificially stored", federal groundwater is commingling with the naturally occurring state groundwater. Ecology and Reclamation are working together on developing a groundwater co-management strategy for the subarea that will allow for the development of the comingled (federal and State) groundwater supply for agriculture, and other water uses.

Currently, the groundwater within the Pasco Subarea is managed under interim rule WAC 508-14 established in the early 1980s and encompasses Quincy, Odessa, and Pasco areas. While groundwater management programs have been established in Odessa and Quincy subareas, efforts to set up a groundwater management for the remaining Pasco Basin Subarea are ongoing.

In order to gain a better understanding of the water balance in the Pasco Basin, OCR entered into a funding agreement with US Geological Survey (USGS) to prepare a groundwater model to quantify the location and amount of commingled groundwater in the Pasco Basin, and to support groundwater management efforts. The USGS study estimated the volume of groundwater in the Pasco Basin Subarea has increased by about 6.8 million ac-ft. since the start of the Columbia River Basin Project. This increase in water is predominately due from irrigation provided by the federally managed CBP. OCR and Water Resources are working to address this long-standing issue of quantifying and allocating water supplies.

In May 2021, the legislature passed Substitute Senate Bill 5230 authorizing Ecology to enter into agreements with Reclamation for the allocation of groundwater in the Pasco Basin subarea. Ecology and Reclamation are in the process of developing a co-management strategy that includes a framework to process applications for new water allocations from this pool of groundwater.

Proposed Switzler Reservoir Storage Project

To increase surface water storage capacity in the lower Columbia River Basin, OCR, Klickitat and Benton counties are studying construction of a reservoir in Switzler Canyon, located south of Kennewick. The 44,000 ac-ft reservoir would support between 12,000 to 28,000 acres of new farmland, or 1,000 new homes, and could address curtailments for interruptible water right holders on the Columbia River mainstem.

Water would be pumped to the proposed Switzler Reservoir from the Columbia River mainstem during high flows. Later when water supply is reduced, water will be pumped back into the Columbia River mainstem to meet instream flow requirements below McNary dam and as mitigation for new out-of-stream uses.

Co-leads (OCR, Benton, and Klickitat counties) published a Determination of Significance in August 2018. Since then, the focus has shifted to completing the Proposed Switzler Reservoir Storage Project Environmental Impact Statement (EIS) with a final draft expected for review in 2023. The EIS process includes a data gap analysis, evaluation of project alternatives, and associated potential impacts to the environment.

Potential future water allocation

- Columbia River mainstem streamflow restoration/augmentation below McNary dam through reservoir releases into the mainstem when instream flows are low.
- Mitigation for new irrigation water rights covering up to 28,000 acres of new farmland.
- Mitigation for water supplies for up to 1,000 new homes.
- Mitigation for interruptible water right curtailments on the Columbia River mainstem.

Next steps

- Complete data gap analysis.
- Complete evaluation of alternatives and potential project impacts.
- Finalize EIS.

Developed Water

Water right permitting

As the demand for water supplies in eastern Washington continue to grow, so too does the need to develop more water to meet both current and future demands.

Since 2016, OCR has issued 22 permits in 11 counties (Figure 9) from a variety of developed water supply sources. Over the past 15 years, OCR has allocated 64 percent of the 38,502 ac-ft. water developed under the Columbia River Basin Water Supply program for out-of-stream use.

Breaking allocated water down by program, 20,841 ac-ft. of this water has been allocated from the Lake Roosevelt Program, 1,390 ac-ft. from Sullivan Lake Program, and 2,500 ac-ft. from Port of Walla Walla Program. In all, the 24,731 ac-ft of water has been allocated under 54 new permits with the majority of these permits issuing water from the Columbia River mainstem.

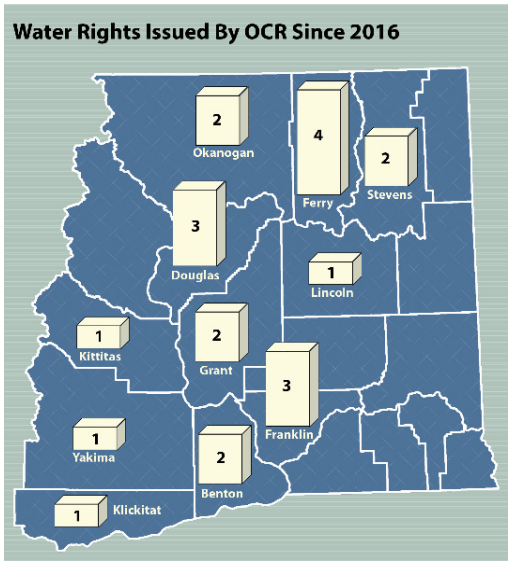


Figure 9 Number of Water Rights Issued by OCR by County since 2016

In total, 216 applications have been processed (issued, withdrawn, or cancelled) since 2016.

Available Water Supply

- Lake Roosevelt Incremental Storage Release Program (total supply 25,000 ac-ft.)
  - M&I - 4,159 ac-ft.
- Sullivan Lake Water Supply Program (total supply 9,332 ac-ft.)
  - M&I - 3,948 ac-ft.
  - Irrigation - 3,995 ac-ft.
- Port of Walla Walla Lease Program (total supply 4,170 ac-ft.)
  - Irrigation - 1,670 ac-ft.

Lake Roosevelt Incremental Storage Release Program

The Lake Roosevelt Incremental Storage Release Program (Lake Roosevelt Program) was created by water impounded behind Grand Coulee Dam, which was constructed during the 1930s. Lake Roosevelt can hold up to 9 million ac-ft. of water[10]. Through an agreement with Reclamation, OCR's Lake Roosevelt Program provides up to 132,500 ac-ft. of water for augmenting instream flows and out-of-stream uses. Lake Roosevelt Program water releases are dependent on annual water supply conditions forecast.

During normal water years, 82,500 ac-ft. of Lake Roosevelt water is available for augmenting instream flows, removing groundwater dependence in the Odessa Subarea, and providing new municipal and industrial (M&I) uses. During a year with a drought declaration, an additional 50,000 ac-ft. of released water helps to minimize drought-related impacts to instream flows and increase water supplies for those Columbia River interruptible water right holders[11]. To offset development costs associated with this program, permit holders incur a fee of $35 per ac-ft. annually.

To date, 56 permits allocating 20,841 ac-ft. under the Lake Roosevelt Program for M&I use, leaving 4,159 ac-ft. (17%) of M&I water available for new uses.

Improving drought resiliency in eastern Washington

The Washington State Drought Contingency Plan[12], approved by Congress in 2020, streamlines the State's request for federal drought relief by eliminating the Reclamation and Bonneville Power Administration drought coordination requirement. Eliminating this requirement alleviates Ecology to get congressional authority prior to accessing the 50,000 ac-ft. of water provided by the Lake Roosevelt Program during drought years. The next step will be for Reclamation and Ecology to agree on the terms of the Lake Roosevelt drought releases.

Lake Roosevelt water at a glance

- Annual Water Releases
  - Odessa Subarea - 30,000 ac-ft.
  - Instream flow augmentation - 27,500 ac-ft.
  - M&I - 25,000 ac-ft.

- Additional Water Releases during drought years
  - Instream flow augmentation/Streamflow restoration - 17,000 ac-ft.
  - Hydrate Interruptible water right permits - 33,000 ac-ft.

[10] https://www.nwcouncil.org/reports/columbia-river-history/lakeroosevelt

[11] Interruptible water rights are junior in priority date to the Columbia River instream flow rule (WAC 173-563) and first in line for curtailment in times when the Columbia River falls below minimum instream flow values.

[12] Updated Washington State Drought Contingency Plan can be found online at https://drought.unl.edu/archive/plans/drought/State/WA_2018.pdf

Objectives

- Permit all 25,000 ac-ft of water for municipal and industrial uses.
- Provide reliable water supply to interruptible water right holders.
- Provide surface water for the Odessa Subarea.
- Provide water for the augmentation of instream flows.
- Meet mitigation obligations.

Permits issued to date

- Odessa – 30,000 ac-ft.
- M&I – 20,841 ac-ft.
    - Quad cities (Kennewick, Pasco, Richland and West Richland) - 4,014 ac-ft.
    - Pasco - 10,000 ac-ft. (5,000 ac-ft. permitted with another 5,000 ac-ft. in the final steps of the permitting process)
    - All other permits (49 in total) - 6,827 ac-ft.

Sullivan Lake Water Supply Project

Pend Oreille County's scenic Sullivan Lake offers breathtaking views, miles of hiking trails, and year round fishing. The Sullivan Lake Water Supply Project is another of OCR's projects that retimes water already stored in the reservoir to improve instream flows and provide water for out-of-steam uses. By retiming runoff and storing water during wetter months of the year (October through December) and releasing water during the drier months (June through September), the Sullivan Lake Water Supply Project provides 14,000 ac-ft. of water for out-of-stream uses (9,333 ac-ft.) and instream benefits (4,667 ac-ft.) during the driest part of the year.

As directed by RCW 90.90.110, one-third of this developed water (4,667 ac-ft.) is set aside for augmenting instream flows and is protected from Sullivan Lake to the mouth of the Columbia River. This leaves two-thirds (9,333 ac-ft.) available for out-of-stream uses in northeast Washington, specifically irrigation (4,666 ac-ft.) and municipal, domestic and industrial uses (4,666 ac-ft.). To offset development costs associated with this program, permit holders incur a one-time fee of $1,500 per ac-ft. (or a repayment plan of $60 per ac-ft. for 25 years).

Sullivan Lake at a glance

Annual Water Releases

- 4,667 ac-ft. - Instream flows
- 4,666 ac-ft. - M&I
- 4,666 ac-ft. - Irrigation

Objectives

- Permit the 9,333 ac-ft. of water developed through this project for municipal, industrial, and irrigation uses.
- Provide water for the augmentation of instream flows.

Stipulations

As outlined in RCW 90.90.110, the out-of-stream uses for Sullivan Lake water are limited to Douglas, Ferry, Lincoln, Okanogan, Stevens, and Pend Oreille counties in northeast Washington.

Permits issued to date

- Irrigation - Three permits totaling 671 ac-ft.
- M&I - Three permits totaling 1,288 ac-ft.

Available water for allocation

- Irrigation - 3,995 ac-ft.
- M&I - 3,378 ac-ft.

Port of Walla Walla Lease Program

The Port of Walla Walla Lease Program provides 4,170 ac-ft. of water, on a temporary basis, for out-of-stream uses. OCR entered into a lease agreement with the Port of Walla Walla to temporarily lease water designated for a large business park that is currently in its construction and development phase. Issuing short-term permits to water users from this currently unused bucket of water will allow for new irrigation projects to come online, unauthorized water use to come into compliance, and provide adequate time for water users to find permanent sources of water. To offset development costs of this water, permit holders incur a cost recovery fee of $120 per ac-ft. per year.

The Port of Walla Walla Lease Program officially expired November 30, 2020 and ended all short-term permits issued under the initial agreement. OCR and the Port renegotiated a new agreement before the expiration date. This new agreement extends the lease program into 2030, with an option to extend an additional five years, or November 30, 2035 at the latest. Water users are encouraged to apply for new term-permits through OCR. To date, one application has been submitted that, once processed, will allocate 2,500 ac-ft. of water, leaving 1,670 ac-ft. available for other users.

Port of Walla Walla water at a glance

- 4,170 ac-ft. for out-of-stream uses potentially through 2035

Permits in progress

One application currently in the final steps of the permitting process will allocate 2,500 ac-ft. of water once the short-term permit is issued.

Objectives:

- Provide a temporary water supply that:
  - Allows for new short-term irrigation projects.
  - Allows water users time to find permanent water supplies.
  - Brings unauthorized water users into compliance.

Available Water

- Irrigation - 1,670 ac-ft. on a temporary basis.

Other Work

Improving Drought Resiliency

Following the severe drought in 2015, Ecology convened a Drought Contingency Planning (DCP) Task Force in the hope of minimize future economic losses resulting from droughts. This task force focused solely on updating the State's drought contingency plan, which had not been updated since 1992. The plan contained a number of recommendations. Most significantly, the plan urged a greater emphasis to support longer-term drought resiliency projects rather than relying primarily on emergency response actions.

Ecology published an updated Washington State DCP[13] in 2018 with the help of a federal WaterSMART grant. This updated DCP provides a suite of emergency drought response tools that state agencies can use when responding to water supply shortages associated drought conditions[14]. Filed with Congress in 2020, this updated DCP also removes the Reclamation and Bonneville Power Administration coordination requirement and streamlines the release of the 50,000 ac-ft. of water provided by the Lake Roosevelt Program during drought years. The next step will be for Reclamation and Ecology to agree on the facets of the Lake Roosevelt drought releases.

The emergency response tools in the DCP include the ability for Ecology to issue a drought advisory, emergency water right permits, emergency water right transfers, and funds for public entities with emergency infrastructure needs. When Ecology issues a drought advisory, we provide the public with information on where drought conditions have developed, impacts to senior and junior water right holders, where additional drought related information and assistance can be found, and what voluntary actions water right holders and water managers can take to alleviate impacts.

The 2015 "snowpack drought" was one of the worst droughts the state had seen in decades and resulted in approximately $773 million in estimated drought-related economic losses in the agriculture industry[15] alone. In 2020 and 2021, the Washington State Department of Agriculture collaborated with OCR and University of California - Merced to develop an economic drought assessment tool. This tool will forecast impacts from drought events and quantitatively estimate economic impacts to regions and crop groups. It will help inform how low water supplies translate to reduced crop revenues.

When water supplies begin to run short, OCR is able to provide over 54,667 ac-ft. in vital water supplies during low water supply year through the Lake Roosevelt Program and Sullivan Lake Water Supply programs. This developed water supply benefits instream flows for fish and interruptible water right holders experiencing water supply shortages. In addition to these programs, OCR continues to implement improved integrated water resource management planning programs in the Icicle Creek, Walla Walla, and Yakima Basin watersheds. These management plans directly

[13] The 2018 DCP can be found online at: https://apps.ecology.wa.gov/publications/SummaryPages/1811005.html

[14] As defined in state statute RCW 43.83B.011

[15] 20 Washington State Department of Agriculture, 2015 Drought and Agriculture, 2017, AGR PUB 104-495 (N/2/17)

address water supplies by implementing projects that target improved water reliability, habitat function, and drought resiliency.

Hanford - Natural Resources Damage Assessment and Restoration

Due to hazardous contaminant releases at the Hanford site, a council of Trustees is performing the Natural Resources Damage Assessment and Restoration (NRDAR) process. For Washington State, the Trustee is the Washington State Department of Ecology (Ecology). Ecology is leading a groundwater injury and service loss study as part of the NRDAR process. The legal, hydrogeologic, and policy frameworks necessary for the process are complete, and now Ecology is focused on performing restoration planning.

Over the last year, OCR has been a key part of Ecology's efforts on addressing groundwater restoration planning by providing advice on project development and ranking criteria for potential water supply restoration projects. In addition, OCR has been providing information to the Hanford Natural Resource Trustee Council on several of the ongoing water development projects (with a focus on restoration projects that could support water supplies in the vicinity of Hanford).

Trust and Swaps

Trust Water Right Program

Ecology's Trust Water Rights Program (TWRP) is another means to provide benefits to instream flows by offering water right holders a way to place their water on a temporary hold without the risk of relinquishment[16]. Water placed into trust primarily remains instream and contributes to streamflow improvements and groundwater recharge. Currently, more than 93,000 ac-ft[17] of surface water is "parked" in the trust water program for the purpose of instream flows within the greater Columbia River Basin. These donations originate on both the mainstem and tributaries to the Columbia River in Washington. In addition to the surface water donations, over 7,800 ac-ft. of donated groundwater also contribute to the overall water savings throughout the Basin. Most of the water temporarily donated to the TWRP is possible by fallowing irrigated fields, rotating to crops using less water, and identifying conserved water from irrigation efficiencies. Municipalities and various industries have also donated water to the program. Statewide, over 101,000 ac-ft. of water is now under temporary donation within the TWRP.

Water Swap

Stevens County is currently implementing a variety of streamflow restoration projects. Working with OCR and Ecology's Water Resource Program, the county facilitated a successful water swap project between Stevens County and the Avista Corporation. Using a streamflow restoration grant, Steven's County acquired 566.1 ac-ft. of water rights under the Sullivan Lake Water Supply Project and offered this water for irrigation use by the Avista Corporation. This allowed the Avista

[16] As defined in RCW 90.14.140

[17] Up-to-date water bank information and amounts can be found online at: https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-rights/Water-banks

Corporation to switch their water source from Waitts Lake to Sullivan Lake water. Swapping water sources benefits Waitts Creek, a tributary of the Colville River, by keeping 566.1 ac-ft of water instream. The county has also acquired water for augmenting streamflows in Stranger Creek and is working on a Managed Aquifer Recharge (MAR) feasibility study on diverting water from Reidel Creek to Haller Creek that will, in turn, provide downstream benefits to the Colville River (tributary to the Columbia River).

Environmental Justice

The passage of the Healthy Environment for All (HEAL) Act in 2021 is a historic step toward eliminating environmental and health disparities in communities of color and low-income populations. As Ecology creates their first Office of Equity and Environmental Justice to implement the HEAL act, our program works to incorporate policy and practices with Environmental Justice elements in mind. Our office is proud to be a member of this working group that focuses on remedies to issues of inequality in existing policies and procedures surrounding water supply use and development. OCR and the Water Resources Program created an Environmental Justice Workgroup to identify health equity issues in permitting, enforcement, and project evaluation.

Many of OCR's projects and programs provide reliable water supplies for rural and low-income communities while simultaneously ensuring healthy streamflows for fish. We intend to continue to look through the lens of Environmental Justice when considering new projects, policies, permits, and procedures in line with Ecology's new Office of Equity and Environmental Justice.

Budget Sustainability

The ability to utilize the $200 million appropriated by the State Legislature in general obligation bonds has driven the success of OCR's water supply development projects and programs. By the end of the 2017-2019 biennium, these funds had been fully allocated. Since 2019, OCR has been operating under a pay-as-you-go (pay-go) funding model. Pay-go funds are not as reliable as general obligation funds due to the need for the pay-go funds to be appropriated by the legislature. While pay-go is historically one of the State's most common methods to fund capital projects, it does not provide the funding security associated with previously dedicated general obligation bonds. Under pay-go, project funds must be approved for appropriation by the legislature every biennium. Long-term projects spanning multiple biennia funded by this method absorb some level of risk without the entire funding package in place at the beginning of a project.

Table 1 (next page) breaks down Columbia River Basin Water Supply Development funding sources. For the 2021-2023 biennium, OCR is allocated $45 million (m) for general support, $42m for continued implementation of the Yakima Basin Integrated Water Resources Management Plan, and $4.7m for continued implementation of Yakima River Basin Water Enhancement Project.

In order to maintain a high standard of performance in implementing the growing number of water supply development projects and programs, OCR restructured (during 2021) into two complementary teams— a permitting team, and a project/financial team, and increased capacity within Water Resources/OCR financial section at Headquarters in Lacey.

Table 1 Breakdown of Columbia River Basin Water Supply Development (CRBWSD) Funding Sources

	CRBWSD Account	CRBWSD Recovery Account	Other State Funding Sources	TOTAL
Prior Biennia Expenditures	$200,000,000	$6,600,000	$54,400,000	**$261,000,000**
2021-2023 Appropriations		$1,500,000	$43,500,000	**$45,000,000**
TOTAL	**$200,000,000**	**$8,100,000**	**$97,900,000**	**$306,000,000**

As our project portfolio continues to grow, we will add one new contract manager, one new project support staff, one new administrative assistant, and one new project and financial manager to the OCR team, bringing the total number of OCR staff to 26 FTEs. These FTEs include management, support staff, project and financial management, and permitting staff members. In May 2021, the state hiring freeze was lifted and Ecology was granted additional FTE authority, making human resources and recruitment a top priority for OCR during the latter half of the year.

Many of OCR's water supply development projects parallel other local and regional water supply goals. This allows OCR capital dollars to match local, federal, and other state funding opportunities. For example, many projects underneath the Icicle Strategy umbrella are pulling in other funding sources including a Reclamation WaterSMART grant, Icicle Irrigation District (FEMA grant), Chelan County, and Washington State Department of Fish and Wildlife fish screening design services.

Other OCR projects benefitting streamflow, habitat, and water quality improvements many qualify for grants managed by Ecology's Streamflow Restoration Program (Water Resources), Floodplains by Design (Shorelands and Environmental Assistance), and Water Quality competitive grant opportunities. Public-private partnerships and federal assistance programs are two examples of long-term funding opportunities that are continuously being pursued by OCR. OCR also has ability to recover project development costs as authorized under RCW 90.90.010(6). Entering into water service contracts with water right holders benefitting from water developed under one or more of OCR's projects and programs allows monies to be reinvested into other water development projects. These agreements allow for more affordable project developments as costs can be spread out over an extended period.

Partnerships and Public Outreach

The backbone of OCR's success is the strong partnerships created with a wide range of stakeholders across the Columbia River Basin. Building and maintaining these innovative partnerships takes a cohesive group that is willing to work through differences to reach a common goal of developing secure and reliable water supplies for instream flow needs and out-of-stream demands.

OCR holds quarterly working group meetings to discuss specific watershed needs, program policy, project development, and budget/financing concerns. These working groups include the Columbia River Policy Advisory Group (CRPAG), Yakima River Basin Water Enhancement Project Workgroup (Integrated Plan Workgroup), the Icicle Strategy Workgroup, the Walla Walla Water 2050 Strategic Plan Advisory Group, and the Columbia River County Commissioner Caucus. Each of these groups consist of representatives from tribal, federal, State, and local governments, as well as stakeholders from local municipal, industrial, agricultural interests, local community members, and

environmental and recreational groups. The public is also encouraged to attend these meetings and to provide input.

Since Governor Inslee's 2016 Executive Order 16-07 (Building a Modern Work Environment), Ecology continues to implement strategies promoting improved flexibility, collaboration, and productivity of state employees. The overall idea of a modern working environment focuses less on when and where work is done, which aided Ecology in providing remote working options during the COVID pandemic, and beyond. Some of the tools now employed include story maps, SharePoint, and virtual meeting platforms. These tools allow OCR to engage with workgroups and partners to move project development forward. Just one of the many successful milestones achieved virtually is the development and publication of the bi-State Walla Walla Water 2050 Strategic Plan. While we are thankful for these internal tools and platforms, we are hopeful to begin valuable in person meetings in 2022.

OCR's employment of story maps[18] (Figure 10) allows for visual walkthrough of projects taking place across the Columbia River Basin and easy conveyance of information and updates to on-going projects. Story maps can also utilize video and audio recordings to bring the viewer an experience close to being onsite themselves. Microsoft Office's SharePoint platform is another helpful resource OCR has invested in and relied on this last year. OCR's SharePoint page is a project hub for data management, project tracking, and team collaboration, which has allowed OCR to maintain a high level of performance in implementing projects, processing permits, tracking water supplies, and publishing legislative reports.

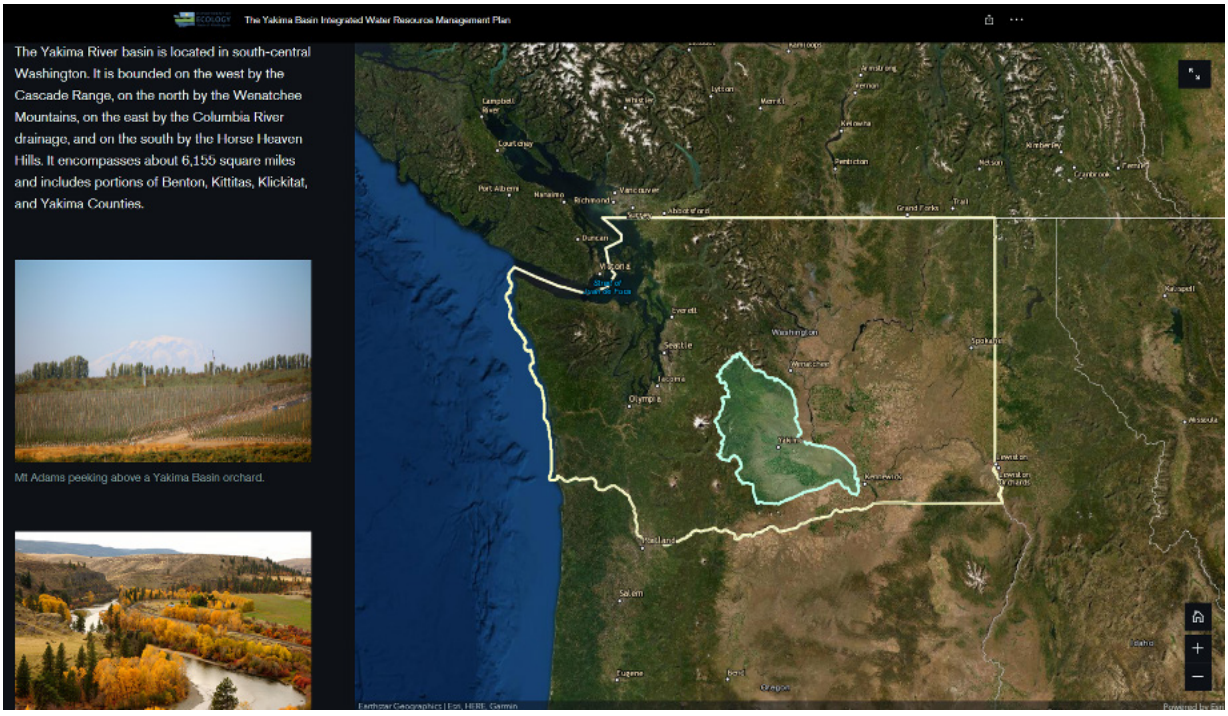


Figure 10 Screenshot of OCR's Yakima Basin Integrated Water Resource Management Plan Story Map

[18] OCR's story map can be found online at: https://waecy.maps.arcgis.com/apps/MapSeries/index.html?appid=5eddde7e2e5742ec8a858e92fb011f90

Science Driven Decisions

Sufficient data collection and analysis are fundamental to making clear and concise decisions regarding water supply project and program development at local, regional, and watershed-wide scales.

SNOTEL and LIDAR

The Snow Telemetry (SNOTEL) Network automatically collects data used to monitor snowpack depth, rainfall, temperature, and other climate conditions. Data collections can be tailored to meet the specific needs for the research conducted at a particular location by installing enhanced equipment. Additional data collection includes monitoring of soil moisture and temperature, wind speed, solar radiation, and relative humidity. Once data is collected, it is transmitted to a database for easy off-site monitoring. With this design, SNOTEL can be operated without the need for on-site monitoring or maintenance for up to a year or more. SNOTEL used in tandem with Light Detection and Ranging (LIDAR) mapping technology, which uses pulse lasers, scanners, and GPR to create high-resolution 3-D surface elevation and water depth maps, provides researchers with a comprehensive picture of a study site's physical layout to predict future snowpack levels by location.

This year, the Icicle workgroup evaluated the addition of a new SNOTEL station. This new station is set to be installed in the Icicle Creek Sub-basin in the fall of 2022. This will provide water managers with vital information used to predict water supplies provided by snowpack. For more information on the implementation of the Integrated Plan, see page 16.

OCR continues to see great value in LIDAR[19] mapping and is fully supportive of Washington's Department of Natural Resources' Statewide LIDAR mapping project. This project has already provided maps of portions of the Columbia, Teanaway, and Yakima rivers. This information helps provide a comprehensive picture of these complex riverbed landscapes that overlap where potential water supply development projects can, and are, being implemented in eastern and central Washington.

Seismic technologies

In partnership with the Washington State Department of Natural Resources, OCR continues to advance a seismometer and geophysics pilot program that uses emerging geophysical technologies to interpret local subsurface composition without the need to drill a network of monitoring wells. The sub-surface data from of this study will fill in data gaps currently existing in the Rilette well network and help refine the aquifer parameters. This information is highly valuable in evaluating potential ASR project feasibility in the area.

Additional groundwater data is currently being collected in Lincoln County by the Lincoln County Conservation District. Data gained from this study will supplement OCR's existing long-term

[19] Currently available DNR LIDAR maps can be found at https://lidarportal.dnr.wa.gov/

baseline data for the region. This is highly useful in refining hydrogeologic models, identify groundwater flow trends, and identify local groundwater availability.

Long-term water supplies and demands

In a continuous effort to grasp a better understanding of future water supply needs across the basin, OCR publishes a Columbia River Basin Long-term Water Supply and Demand Forecast every five years. This year's Forecast is the fourth in its series and is produced by OCR's partners, Washington State University (WSU), University of Utah (UU), Aspect Consulting, and the State of Washington Water Research Center. By utilizing the most recent data collection, analysis, and modeling technologies, OCR's partners are able to better calculate potential impacts to water supplies and associated challenges as they relate to population changes, climate change impacts, improved irrigation efficiencies, and other factors. The 2021 Columbia River Basin Long-term Water Supply and Demand Forecast is anticipated to be available early 2022.

Conclusion

The year 2021 marked the second year of conducting business remotely during a global pandemic, while abiding by safety guidelines as directed by Governor Inslee. Our team performed exceptionally well given the challenges presented during this historic global event. This year also marked several major milestones including the Odessa Groundwater Replacement Program's East Low Canal 47.5 pump station coming online, completion of the Walla Walla Water 2050 strategic plan, and finalizing the fish passage project at Icicle Creek's Boulder Field. As we move into 2022, we continue to incorporate a variety of new virtual meeting platforms, team hubs, and other digital tools to maintain our high level of performance in public engagement and transparency.

This 2021 Columbia River Basin Water Supply Inventory Report summarizes OCR's water supply development and delivery milestones and successes achieved during this past year. In our aggressive pursuit of water supply solutions, our office has developed 476,007 ac-ft. of water to maintain healthy instream flows and meet out-of-stream demands in the Columbia River Basin. As directed by RCW 90.90.020, one-third of developed water supplies remain instream, providing benefits to fish and aquatic habitat. The remaining water provides hydration for out-of-stream uses including, crop irrigation, domestic and municipal uses, and minimizing curtailment of interruptible water rights during droughts. Over the next 10 years, we anticipate the development of 285,000 ac-ft. of water through the construction of new surface water storage and groundwater storage projects, continued water conservation measures, and the creative and adaptable integrated water resource supply solutions already in play in the Walla Walla, Icicle Creek, and Yakima River watersheds.

While the water supplies developed under our projects and programs are a great start to meeting eastern Washington's needs, they are not enough to meet future demands. Every five years, our office publishes a Long-term Water Supply and Demand Forecast (Forecast) report that projects water supply and demands over the next 20 years. This year, we are publishing our fourth Forecast that provides water managers and decision makers with the information they need to make educated decisions necessary to secure and maintain area water supply needs. The final section of the report contains a series of snapshots outlining the specific water needs for each of eastern

Washington's watersheds. The 2021 Columbia River Basin Long-term Water Supply and Demand Forecast is anticipated to be available mid-2022.

As we near full allocation of our developed water supplies from the Sullivan Lake and Lake Roosevelt programs, we are looking towards other new possible water supply options. For example, there is a possibility for expanding the Lake Roosevelt Program water supply, with stored water in British Columbia, Canada, and/or Oregon by accessing non-Columbia River treaty storage water to supplement this water supply program.

On June 29, 2021, Washington State recorded its highest temperature to date. Two towns in Chelan County, Peshastin and Ardenvoir, hit a recorded 119-degree highs, breaking the state's all-time high of 118-degrees recorded on August 5, 1961. With these extreme events and ensuing droughts becoming more frequent, developing water supply solutions for instream and out-of-stream demands is vital for sustaining the farms, fish, and families across eastern Washington. In order to improve drought resiliency across eastern Washington, we continue to seek out new surface water and groundwater storage opportunities, continued support for water markets, and options for integrated water resource management in watersheds throughout the Columbia River Basin.

As we move into 2022, our office continues to meet our mission of developing water supplies to meet the instream and out-of-stream demands across eastern Washington. We continue to implement our vision of preserving and enhancing the standard of living for the people of Washington by strengthening economic conditions and restoring and protecting the Columbia Basin's unique natural environment.

Cascade Orchards diversion point on Icicle Creek
Photo credit: Tim Poppleton (Ecology), 2021