



# 2024 Oregon's Integrated Water Resources Strategy

Draft 1, March 2024



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# INTRODUCTION

## Oregon's 2024 Integrated Water Resources Strategy

### Oregon's Water Vision

"To address changes in climate and population dynamics, Oregonians will take care of our surface water, groundwater, and built and natural infrastructure to ensure we have enough clean water for our people, our economy, and our environment, now and for future generations. Oregonians will invest strategically in partnerships and planning, data and analysis, and water stewardship for instream and out-of-stream needs across all regions to support resilient communities, vibrant local economies, and a healthy environment for all who live here."

- Oregon Water Resources Commission (2024)

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# Oregon's Water Strategy

## Why do we have a statewide Integrated Water Resources Strategy?

Water is essential to our communities, ecosystems, and economic activities; therefore a diversity of agencies have some role in managing our water resources. In 2009, the passing of House Bill 3369 identified the need for, and direction to, develop a statewide Integrated Water Resources Strategy (IWRS or from here forward referred to as the "Strategy") to coordinate water management efforts by many agencies and partners. The Strategy was needed to carry out two goals: to **improve our understanding of Oregon's water resources** and to **meet our state's instream and out-of-stream water resource needs**. House Bill 3369 was codified into law as [ORS 536.220](#), outlining the specifics of who should participate in the development of the Strategy, what it must include, and how often it must be updated. After three years of engagement with more than 15 state agencies, 10 federal agencies, tribes, interested parties, and the public, the first Strategy was published in 2012. The [2012 Strategy](#) inspired many improvements in water resources data collection, management, planning, and funding for water projects.

In line with the statutory requirement to update the Strategy every five years, the second Strategy was released in 2017. The [2017 Strategy](#) maintained the same goals, objectives, and recommended actions outlined in the 2012 Strategy, and added nine additional recommended actions. State agencies continued to make progress on the recommended actions, as agency budgets allowed. Just as water resources require constant care and management, many of the Strategy recommended actions require consistent effort and ongoing financial support.

"Instream Use" – water that is used, but not withdrawn, from a groundwater or surface water source for such purposes as hydroelectric-power generation, navigation, ecosystem support, water-quality improvement, fish propagation, and recreation.

In 2019, former Governor Brown initiated the [100-Year Water Vision](#) (Vision), a community engagement process to elevate water concerns of Oregonians and call for strategic investments to address these challenges. Completed in 2020, the Vision called for Oregonians to "invest strategically in infrastructure and ecosystems across all regions to support resilient communities, vibrant local economies, and a healthy environment for all who live here." Following the release of the Vision, the 2021 Oregon Legislature made historic investments in Oregon's water resources by passing a \$538 million water package. This funding allowed state agencies to make significant progress toward addressing the recommended actions identified in the 2017 Strategy. Participants in the Vision process called for the Vision findings to be applied to the next Strategy. This 2024 Strategy incorporates the Vision challenges, opportunities, and call for investments, providing a place for the Vision to be carried forward.

**To streamline Oregon's water initiatives, the 2024 Strategy combines the 100-Year Water Vision and Strategy into a single document.**

"Out-of-Stream Use" – water withdrawn or diverted from a groundwater or surface water source for aquaculture, commercial, domestic self-supply, industrial, irrigation, livestock, mining, public supply, thermoelectric power, and other uses.

In line with previous versions, the 2024 Strategy places an emphasis on collaboration and voluntary efforts, as well as the need for data. It identifies areas where incentives or new policies could serve as powerful tools for progress. It also identifies where public and private partnerships could stretch our dollars and further instream and out-of-stream efforts. Just as importantly, the Strategy does not remove or jeopardize existing water rights or other local, state, tribal, and federal authorizations. The Strategy does not itself change any existing authorities.

## The 2024 Edition

The fundamental purpose of this document remains the same, to better understand and meet Oregon’s instream and out-of-stream water needs — environmental and consumptive — including water quantity, water quality, and ecosystem needs.

### Document Organization

Two prior versions built the foundation for the 2024 Strategy. Countless contributors came together and organized a Strategy around 2 goals, 4 objectives, 18 critical issues, and 51 recommended actions (2017). The goals, objectives, and most critical issues and recommended actions are still relevant today, however, there is an opportunity to refine the Strategy to reflect current interests and needs. Goals 1 and 2 remain unchanged. Objective 3, “Understand Coming Pressures that Affect Our Needs and Supplies” has been changed to “Understand the Pressures that Affect Our Needs and Supplies” so that current and future pressures are included.

The 2024 Strategy is no longer organized by one chapter per objective because actions accomplish more than one objective. For example, funding actions in Chapter 1 help us meet all four objectives. Actions found in Chapters 2 and 3 meet Objectives 1, 2, and 3. All actions under Chapter 4 help meet Objective 4.

The new document organization groups actions into four categories; funding, planning and partnerships, data and analysis, and stewardship. Each category is now a chapter.

Part 1: Oregon’s Water Context

Part 2: Strategy Actions

Chapter 1 – Funding

Chapter 2 – Partnerships & Planning

Chapter 3 – Data & Analysis

Chapter 4 - Stewardship

<b>Goal 1: Improve Our Understanding of Oregon’s Water Resources</b>		<b>Goal 2: Meet Oregon’s Water Resources Needs</b>
<b>Objective 1: Understand Water Resources</b>		<b>Objective 4: Meet Instream and Out-of-Stream Needs</b>
<b>Objective 2: Understand Instream and Out-of-Stream Needs</b>		
<b>Objective 3: Understand the Pressures that Affect Our Needs and Supplies</b>		
<b>Chapter 1 – Funding (Actions 1A-1C)</b>		
<b>Chapter 2 - Partnerships &amp; Planning (Actions 2A-6C)</b>	<b>Chapter 3 - Data &amp; Analysis (Actions 7A-9B)</b>	<b>Chapter 4 – Stewardship (Actions 10A-14B)</b>

Part 1 provides background regarding current water challenges in the State, an overview of water governance, policies, and laws. Part 2 contains all strategy actions. Chapter 1 addresses the need for funding and investments. Chapter 2 outlines actions needed to engage many people, organizations, tribes, and agencies in addressing our water challenges, including education, coordination, collaboration, and planning. Chapter 3 identifies data and analysis needs to help inform coordinated water management responses to climate change, population growth, land use change, economic development, and energy demand. Chapter 4 identifies protection, restoration, conservation, reuse, management, and stewardship actions to meet current and future water needs.



## Changes to Critical Issues & Actions

Critical issues are the topics that have actions associated with them. For example, “Healthy Ecosystems” is a critical issue that has five actions (10A-10E) associated with it. The wording of several critical issues has been simplified or changed to better reflect the critical issue content. Climate Change, Economic Development, and Population Growth appeared as critical issues on the 2017 Strategy Framework. In the 2024 Strategy, these topics are covered in many places throughout the document and do not have standalone actions associated with them. One new critical issue has been added, “Coordination & Collaboration” to reflect the call for these activities during the 100-Year Water Vision and public engagement for the Strategy.

The 2017 Strategy recommended actions, now referred to simply as just “actions,” have been updated, renumbered, and in some cases relocated under a different critical issue. Each action is still accompanied by a list of “example actions” that describe many possible ways to carry out the action. Altogether, the 2024 Strategy contains 47 actions, each accompanied with its own bullet list of example actions. A summary of new or deleted actions is provided, below. The 2024 Strategy Framework at the end of the document shows the proposed 2024 Strategy action numbers and former numbering in brackets. Appendix A provides a cross-walk of the 2017 Strategy and proposed 2024 Strategy action numbers, for comparison.

### New Critical Issue

- Coordination & Collaboration

### New Actions:

- Lead Meaningful Community Engagement (3D)
- Develop Instream & Ecosystem Water Demand Forecasts (8D)

### Actions Moved to Example Action

- Assist with Climate Change Adaptation & Resiliency Strategies (2017 IWRS 5B) – example actions distributed throughout the Strategy
- Authorize the Update of Water Right Records with Contact Information (2017 IWRS 2D) - moved to example action under 12G
- Regularly Update Oregon’s Water Related Permitting Guide (2017 IWRS 2E), moved to example action under 12G
- Continue the Water Resources Development Program (2017 IWRS 10E), moved to example action under 1C

## Action Summary Sheets

New for the 2024 Strategy, each action is presented in a summary sheet that identifies the need for the action and detailed information to assist in implementation, including the likely lead and supporting state or federal agencies and partners contributing to the action. Resources, such as funding sources, are also provided. Action summary sheets are located at the end of each “critical issue” narrative.

## Strategy Framework

The Framework (at the end of the document) presents the Strategy document organization of critical issues and actions in a one-page diagram. The Framework can be a helpful reference for viewing all Strategy actions on one page without the detail contained in the full Strategy narrative or action summary pages.

## Implementation

In line with previous Strategies, implementation occurs after the Strategy has been adopted by the Water Resources Commission.

The statute guiding the development and implementation of the Strategy was updated in 2023 to require a biennial workplan. Following the adoption of the 2024 Strategy by the Water Resources Commission, the Water Resources Department will work with the Commission, agencies, and partners to develop the workplan. Developing a workplan provides the opportunity to coordinate work across many agencies and partners and must be done in a way that protects the public interest and balances instream and out-of-stream needs.

Consistent with previous Strategies, actions are not given a prioritization. However, this can be addressed in partnership with the Governor's Office and interested parties as part of the Legislative process.

## Steps Already Underway

The Strategy includes a large number of actions needed to improve water security, but much work is already underway. Due to historic investments from the 2021 and 2023 Legislature, described in more detail under "Funding" in Part 2, Oregon has made progress on many actions in the Strategy. New funding and agency programs, and new projects take time to distribute, create, and implement and the fruits of these labors will be apparent over the coming years. Agencies and partners have begun:

- Developing a permanent Place-Based Integrated Planning Program, preparing to distribute funding in 2025
- Developing a new Community Green Infrastructure Grant Program to manage stormwater and protect water quality with the use of green infrastructure projects
- Updating the statewide Natural Hazard Mitigation Plan, due in 2025
- Developing the Oregon Water Data Portal to increase sharing and access of statewide data
- Performing the first update to the Water Availability Reporting System in nearly 30 years
- Improving public safety through the modernization of the Dam Safety and Well Construction Programs
- Engaging Oregonians in sustainable groundwater management through community participation in rules advisory committees and groundwater allocation rulemaking
- Establishing a new inter-agency statewide Abandoned and Derelict Vessel Program to protect water quality and the environment
- Evaluating state reuse programs to find ways to increase reuse opportunities and preserve freshwater resources
- Distributing funds to communities for irrigation, water, and wastewater infrastructure improvements

# PART 1 – OREGON’S WATER CONTEXT

People and the environment across Oregon are experiencing a range of water challenges, including declining groundwater, reduced streamflows, and contaminated water. Oregonians do not have equitable access to water, there is widespread ecosystem degradation, and the decline of fisheries impairs cultural values vital to tribal heritage and way of life. Oregon has identified weaknesses in water management, infrastructure, and governance that have been exacerbated by climate change.

The Strategy offers a path forward in addressing the water challenges experienced by people and the environment by identifying actions needed to be undertaken by governments, organizations, businesses, and individuals.

Part 1 provides context for the Strategy by articulating the urgency for action, the aspirational vision for the future, call for action, and current water governance structure. The narrative describes roles of tribes and state and federal water-related agencies, as well as guiding laws and policies. This information provides the foundation for the Strategy, as it looks to improve collaboration, increase enforcement of existing laws, and identify new rules or policies needed to improve our water security.

Part 2 outlines the specific actions needed to better understand and meet our instream and out-of-stream water needs. Chapter 1 describes the main types of investments that are needed and underscores the need for resources to carry out the Strategy actions. Chapters 2 outlines the partnerships and planning related actions that are needed to increase engagement and collaboration in addressing our water challenges. Chapter 3 describes the data and analysis needed to better understand our water resources and instream and out-of-stream needs. Chapter 4 calls for stewardship actions that protect and restore our environment, protect and improve water quality, and responsibly manage our water resources.

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## Current Water Challenges

### *We are not currently meeting Oregon's water needs...*

Oregon's ecosystems and human communities are both experiencing water quantity and quality challenges. There is too much demand for too little water. Some water bodies have inadequate flows and/or water quality to support fish and other wildlife. While some people may simply turn on their tap and enjoy clean water, this is not the case for every Oregonian. Some farmers do not have adequate water to grow crops or raise livestock.

Public engagement for the Strategy took place in 2023 and included in person meetings, one virtual meeting, several culturally specific conversations, youth-specific conversations, and a survey that was translated into nine languages. These engagement efforts provided an opportunity for state agencies to hear from the public about their water concerns. A [report summarizing public engagement](#)<sup>1</sup> efforts, facilitated by Oregon's Kitchen Table, revealed shared water concerns and areas where there is conflict or disagreement about what should be done. The report also outlined solutions the participants identified to address Oregon's water challenges, and specific guidance on how to strengthen Oregon's Strategy. Specific solutions identified by the public have been incorporated into the 2024 Strategy. The relevant strategy action number is provided for reference:

- Desire to educate themselves and their fellow Oregonians about water (see Actions 2A-2C)
- People want public agencies to work better together (see Actions 3A, 3B, and 5A)
- Address water equity by including communities who have historically been excluded (see Action 3C)
- More proactive and preventative infrastructure development (see Actions 5A, 6A-6C, and 13A-13C)
- Make sure we have data about Oregon's water and that data is shared widely (see Actions 7A-7D)
- Need for instream monitoring/data and adequate instream flows (see Actions 7A-7D, 8B, and 10C)
- Increased support for well testing resources for safe drinking water (see Actions 7A and 11A)
- Need accurate information/data about groundwater measurements and use and coordinated management (see Actions 7A-7D, 9A, and 10E)
- Restore and protect floodplains and wetlands as part of supporting water systems and creating storage (see Actions 10A-10E)
- Address instream pollution and impacts from timber harvest near rivers and streams (see Actions 11A-11C)
- Additional reuse and storage (see Actions 12C and 12D)
- Better financial support of small towns for water infrastructure (see Actions 1C and 13A)
- Need for incentives provided by the state (see Actions 10C, 12B, 12E, and 14B)
- Stronger enforcement of current rules and regulations (see Action 12F and 12G)

Other findings from engagement point to improvements needed to the Strategy itself, along with improvements needed in communicating progress. These included:

- Offer a website that clearly lays out each part of the Strategy and includes what has been done or is being done
- Make it clearer what agencies' roles and responsibilities are for our water needs
- Ensure the Strategy and materials are in plain language and in multiple languages
- Increase accountability measures to carry out the Strategy
- Desire for action, convey a sense of urgency in addressing Oregon's water problems
- Continue engaging with communities about water, in-person and online

## Climate Change

Over the past decade, Oregon has experienced six years that are among the hottest ten on record. In addition, the state has experienced the lowest snowpack ever observed, and had one of the most severe wildfire seasons. Since the development of the first Integrated Water Resources Strategy in 2012, research and science related to climate change has greatly increased, and Oregonians have been experiencing rising average temperatures, and increased intensities of droughts, wildfires, and floods. Climate change is no longer a separate consideration for water management, but rather an integral part of planning, monitoring, and project implementation. For this reason, the

2024 Strategy has distributed climate considerations, research needs, and adaptation and resiliency strategies throughout the Strategy actions.

The Oregon Climate Change Research Institute released the [Sixth Oregon Climate Assessment](#)<sup>2</sup> in early 2023. The assessment describes how climate change is affecting Oregon’s environment, natural systems, economy, and communities and presents projections of future impacts under varying emissions scenarios. Climate change will continue to stress ecosystems and the species that depend on them. Changes to the timing of precipitation and snow-melt alters the flows in rivers and streams. This can change the amount of stream channel that is accessible to fish and water that is available for other wildlife. Extended drought can cause wetlands to dry up and impact whole forests, causing trees to die and invasive species to take over. Some additional threats to ecosystems include:

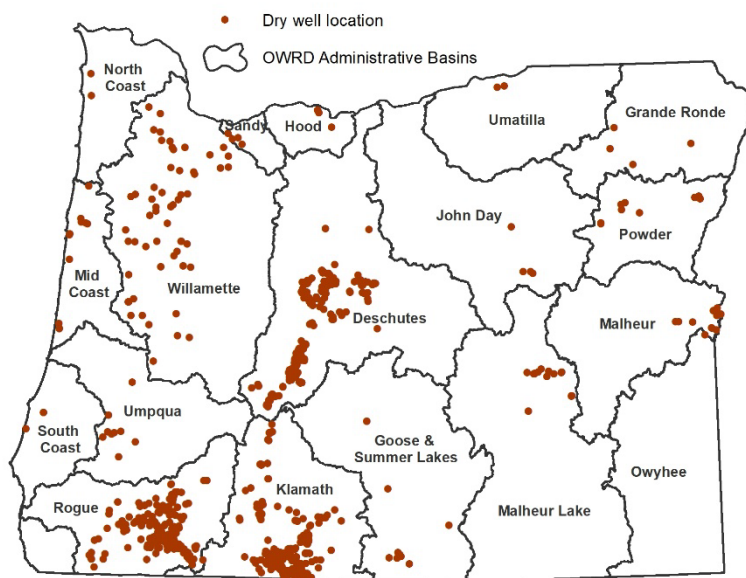
- Species mortality or displacement due to wildfires
- Arrival of exotic pests and pathogens
- Warming of freshwaters beyond thermal tolerances of some aquatic species
- Drying of some freshwater wetlands and headwater streams
- Changing of timing of biological events (e.g., migration, reproduction, flowering) potentially leading to mismatches in the life cycles of interdependent species

Climate change and ongoing drought has reduced the ability of some of our aquifers to recharge in time for the next growing season. Groundwater levels have been declining in many areas across the state, and people have been reporting dry wells. Figure P1-1 shows the distribution of over 1,200 dry wells reported to the Water Resources Department through January 2024.

Declining groundwater levels and low streamflows are also raising concerns about the ability for the state to take on additional development and growth. Doing more with less water will require a multi-pronged approach. Incentives for water efficiency and water conservation efforts will continue to be needed but the Strategy also proposes investments in planning at the state and local levels, ongoing ground and surface water monitoring, technology to improve water management, watershed restoration to retain more water in our soils, wetlands, and floodplains, and market-based approaches to keeping more water instream.

[The Business Case for Investing in Water in Oregon](#)<sup>3</sup>, published in July 2023, highlights several water challenges and related climate dynamics across Oregon and offers solutions that require investment. Commissioned by the Oregon Water Resources Department, the report outlines case studies in seven regions throughout the state. Each case study highlights a unique challenge, with the purpose of testing how choosing to invest now can reduce the economic burden of inaction. The case studies help to illustrate the integrated nature of climate change and economic security, pointing to solutions that increase Oregon’s resiliency and flexibility to ability to recover from predictable and unpredictable challenges.

**Figure P1-1: Reported Dry Wells Throughout Oregon Water Resources Department**  
January 2024



## Equity and Environmental Justice

Oregon should strive for everyone to have access to clean water. Public engagement efforts for the Strategy revealed this is not currently the case. The [State of Water Justice in Oregon](#) report, published by the Oregon Environmental Council and Oregon Water Futures in 2022, identified several ways in which Oregonians do not have equitable access to clean water.<sup>4</sup> Issues across Oregon include inadequate infrastructure and drinking water quality, lead exposure in drinking water, affordability of water utility rates, inadequate water in the workplace, and climate change impacts. Populations experiencing related challenges include frontline communities, or those that experience impacts “first and worst” and have fewer resources, capacity, safety nets, or political power to respond to water challenges. Oregon needs to find ways to improve the safety, affordability, reliability, and availability of water for all.

The 2024 Strategy seeks to infuse equity and environmental justice (EJ) into water-related engagement, decision-making, and resource allocation. It continues principles found in both the 2012 and 2017 Strategy documents related to equity for public process, specifically to *“Employ an open, transparent process that fosters public participation and supports social equity, fairness, and environmental justice. Advocate for all Oregonians.”*

Oregon state government has defined equity as “acknowledging that not all people, or all communities, are starting from the same place due to historic and current systems of oppression. Equity is an effort to provide different levels of support based on an individual’s or group’s needs in order to achieve fairness in outcomes. Equity actionably empowers communities most affected by systemic oppression and requires the redistribution of resources, power, and opportunity to those communities.”

Environmental justice is closely linked to equity regarding the fairness of those experiencing negative environmental or health outcomes. Oregon law defines environmental justice as “equal protection from environmental and health risks, fair treatment and meaningful involvement in decision making of all people regardless of race, color, national origin, immigration status, income or other identities with respect to the development, implementation and enforcement of environmental laws, regulations and policies that affect the environment in which people live, work, learn and practice spirituality and culture..”

The 2024 Strategy provides opportunities to address equity and environmental justice through funding for planning, studies, and projects (Chapter 1), partnerships and planning (Chapter 2), data and analysis (Chapter 3) and water stewardship (Chapter 4). Where appropriate, equity or EJ specific “example actions” have been included for many Strategy actions.

## Water Vision

The 2024 Strategy borrows from the 100-Year Water Vision and builds upon prior Strategy visions to provide guidance for making present-day decisions that consider future generations.

*To address changes in climate and population dynamics, Oregonians will take care of our surface water, groundwater, and built and natural infrastructure to ensure we have enough clean water for our people, our economy, and our environment, now and for future generations. Oregonians will invest strategically in partnerships and planning, data and analysis, and water stewardship for instream and out-of-stream needs across all regions to support resilient communities, vibrant local economies, and a healthy environment for all who live here.*

## Call to Action

We must both act now and plan for the long term, otherwise we will place the safety of our communities, the health of our people and environment, and Oregon's economic future at risk. How we choose to care for our surface and groundwater and our built and natural infrastructure will determine if we pass a legacy of clean and sustainable water to future generations.

A coordinated effort of immediate actions and thoughtful planning for the future are needed. The Strategy outlines the inter-agency actions and public-private partnerships needed to understand and meet Oregon's instream and out-of-stream water needs, to create a foundation for coordinated action and funding.



In Oregon, all water belongs to the public and no single agency or entity has sole jurisdiction when it comes to water management. There are many public and private organizations with specific responsibilities and authorities related to the management of water resources. These organizations reside at the state, federal, and local level, and with tribal governments within the state, and each has a different mission, funding base, and constituency.

The 2024 Strategy recognizes the importance of Oregon's legal, scientific, and institutional foundation and commits to continue to improve it. This section provides an overview of tribal, state, and federal roles and authorities regarding water management.

### Tribal Governments

#### Tribes in Oregon

Many tribes have established longstanding roots in Oregon, dating back to time immemorial, with nine of them currently holding federal recognition. Federally recognized tribes are recognized as sovereign with control their of their governance, land, and resources. This recognition establishes a formal government-to-government relationship between Oregon and these tribes. Unless otherwise specified, references to tribes in this document pertain to those federally recognized.

#### Historical Context of Sovereignty

It is critical to understand the history surrounding sovereignty of federally recognized tribes as independent nations, in order to understand the current state of water management in Oregon. Oregon's tribal history encompasses the ceding of land, reservation establishment, the loss of sovereignty during the 1950s termination era, and the subsequent efforts to reinstate sovereignty from the 1970s onwards. The impact of these events varied among tribes, with some facing challenges in fully restoring their sovereignty. There are currently at least 14 modern indigenous tribal nations in Oregon. The summary, below, provides an overview of the general history surrounding tribal sovereignty.

Excerpted from the [Oregon Blue Book, Introduction to Native Peoples of Oregon](#)<sup>5</sup>:

*"Tribal governments are separate and unique sovereign nations with powers to protect the health, safety and welfare of their enrolled members and to govern their lands. This tribal sovereignty predates the existence of the U.S. government and the State of Oregon. The members residing in Oregon are citizens of their tribes, citizens of Oregon, and since 1924, citizens of the United States of America.*

*The U.S. Department of the Interior, Bureau of Indian Affairs, oversees tribal interests and administers the federal government's trust obligations. At times, the federal government has been supportive of tribal self-determination, and in other periods, has adopted policies and passed legislation having a negative impact on the ability of tribes to govern as sovereigns. "Termination," one such policy in the 1950s, was an attempt to sever federal trusteeship and support for tribal sovereignty. Of the 109 tribes and bands terminated nationwide, 62 were in Oregon. In 1975, the federal government recognized the failure of its termination policy and passed the Indian Self-Determination and Education Assistance Act, and later, the Tribal Self-Governance Act.*

*Several tribes began the process to restore their status as sovereign nations. In 1977, The Confederated Tribes of Siletz was the second tribe in the nation to achieve restoration. Following Siletz was the Cow Creek Band of the Umpqua Tribe of Indians in 1982, the Confederated Tribes of Grand Ronde in 1983, the Confederated Tribes of Coos, Lower Umpqua and Siuslaw in 1984, the Klamath Tribes in 1986 and the Coquille Indian Tribe in 1989. Another three federally recognized tribal governments exist in Oregon: The Confederated Tribes of Warm Springs (Treaty of 1855), the Confederated Tribes of Umatilla (Treaty of 1855) and the Burns Paiute Tribe (1972 Executive Order). Fort*

*McDermitt Paiute Shoshone Tribe is a federally recognized tribe with reservation lands straddling Oregon and Nevada, but the tribe's population center is in Nevada. Celilo Village is a federally recognized tribal entity near The Dalles, jointly administered by the Confederated Tribes of Warm Springs, the Confederated Tribes of Umatilla, and the Yakama Indian Nation (Washington).*

*All Oregon tribal governments have reservation or trust lands created by treaties, statutes or executive branch actions. Tribal governments have regulatory authority over these lands, unless that authority has been removed by Congress. Nearly 904,000 acres, or at least 1.6% of land within Oregon's boundaries, are held in trust by the federal government or are designated reservation lands. Tribal governments have the authority to decide their own membership qualifications and have a right to exclude individuals from their reservations.*

*Public Law 280 gave the state certain civil and criminal jurisdiction over tribes with the exception of the Confederated Tribes of Warm Springs, the Confederated Tribes of Umatilla and the Burns Paiute Tribe, which are "non Public Law 280" tribes. Notwithstanding Public Law 280, all Oregon tribes have the authority to elect their own governments and adopt laws and ordinances. Oregon tribal governments have their own departments dealing with governmental services, including law enforcement and tribal court systems. In addition, each tribal government operates programs in the areas of natural resources, cultural resources, education, health and human services, public safety, housing, economic development and other areas to serve their members."*

Websites for each of the nine federally recognized tribal nations in Oregon provide additional information about the Tribes' history, culture, and current projects:

- [Burns Paiute Tribe](#)
- [Confederated Tribes of Coos, Lower Umpqua, and Siuslaw](#)
- [Confederated Tribes of the Grand Ronde Community of Oregon](#)
- [Confederated Tribes of Siletz Indians of Oregon](#)
- [Confederated Tribes of the Umatilla Indian Reservation](#)
- [Confederated Tribes of Warm Springs Reservation of Oregon](#)
- [Coquille Indian Tribe](#)
- [Cow Creek Band of the Umpqua Tribe](#)
- [Klamath Tribes](#)

It is important to note that there are tribes that have pursued, but not received, federal recognition. Without formal recognition, these tribes are not able to engage in government-to-government processes or benefit from some federal resources.

### **Tribal Relations with the State of Oregon**

Oregon was the first state to adopt a legal government-to-government relationship with tribes through both executive action and legislation. Even so, tribes have historically been left out of water planning and water rights decisions in Oregon. State agencies are continuing efforts to collaborate and consult with Tribes on water issues. Each state agency has a staff person assigned to the role of Tribal Liaison, and as part of this role, is tasked with identifying changes and initiatives in the agency which may impact tribes and/or tribal members, and then to engage early and appropriately with tribes. Each agency's Tribal Liaison is responsible for developing an annual Government-to-Government (G2G) report that outlines the agency's efforts and actions during the past year to consult, coordinate, collaborate, and enhance relations with tribal nations. These reports are submitted to the Legislative Commission on Indian Services.

### **Legislative Commission on Indian Services (LCIS)**

LCIS was created by statute in 1975 to improve services to Indians in Oregon. Its 13 members are appointed jointly by the Senate President and the Speaker of the House to a two-year term. LCIS members select their own officers to serve one-year terms. Prior to its establishment, there was no suitable mechanism in state government to consider

Indian concerns directly. LCIS serves as the main forum in which Indian concerns are considered. It serves as a conduit through which concerns are channeled through the network to the appropriate entity; it serves as a point of access for finding out about state government programs and Indian communities.

### **Working Groups**

There are several topic-specific working groups established between tribes and state agencies. Two groups that frequently discuss water-related work include the Cultural Resources Cluster and the Natural Resources Working Group.

### **Tribal Water Task Force**

In September of 2021, the nine sovereign tribes of Oregon wrote to the Governor addressing Oregon's 100-year Water Vision. The letter shared tribal perspectives on water and noted the importance of tribal engagement in any water planning process. The letter requested the establishment of a Tribal Water Task Force, which would serve two primary functions:

- Educate Oregon's nine Tribes to the full complement of state agencies that touch upon water and that have a bearing on one or more of Oregon's water resources
- Educate Oregon's nine water-related agencies on the full complement of Tribal interests/issues that "Oregon's Water Vision" needs to acknowledge and address

The Task Force met five times during the summer and fall of 2022 and the 2023 Legislature has allocated funding for future facilitation. The Task Force released a [summary report](#) of their findings and recommendations from the 2022 meetings, also identifying a number of shared values about water that were agreed upon between both the Tribes and the State of Oregon:

1. The foundational and inherent importance of water for life and culture;
2. The need to plan for and invest in water with a long-term vision. The Tribes have an important value of making decisions with seven future generations in mind and the State has embarked on a 100-year water vision. It is clear that all parties understand the importance and need for long term visioning and planning;
3. Importance of Tribal engagement in water planning in Oregon at all levels;
4. Recognizing and emphasizing the urgency of the current and ongoing impacts of climate change on our environment and the effect climate change has on water; and
5. Understanding that we will all be better and stronger if we work together moving forward.

### **Tribal Water Authorities**

As sovereign entities, tribal rights and authorities may be derived, retained, or defined from treaties, Congressional Acts, or Executive Orders, and are often further clarified through case law and adjudications. The right to hunt, fish, and gather is an important right to Northwest Tribes, and may extend to areas outside of reservation lands. The ability to fulfil a right to hunt, fish, and gather is notably dependent on ecosystem health, including water quality and quantity conditions necessary to sustain populations of culturally significant species.

Tribal reserved water rights are generally determined through an adjudication or settlement agreement . While several tribes are working closely with the Water Resources Department to resolve historic water right claims, many tribes hold water rights associated with the purchase of land. The priority date associated with a water right is maintained, even after the land changes ownership. Therefore, some tribes hold senior water rights based on the priority date of the water right they acquired through land purchase.

Refer to the section "Water Laws, Policies, and Regulations," below, for a more holistic description of water quantity, quality, and ecosystem regulations, including roles of tribal, state, and federal governments.

## State Government

There are several agencies in Oregon with responsibilities related to water resources. The following text provides a brief description of each agency's role, to enhance coordination and help illustrate how they might best participate in the Strategy.

### State Interagency Project Team

Many state agencies contributed to the 2024 Strategy, however, five of these agencies served on an interagency project team from 2022 to 2024 and significantly supported its development. Agencies are listed in alphabetical order.

#### Oregon Department of Agriculture (ODA)

ODA's mission is to "ensure healthy natural resources, environment, and economy for Oregonians now and in the future through inspection and certification, regulation, and promotion of agriculture and food." ODA oversees many programs that protect water quality and habitat. The Agricultural Water Quality Program implements a compliance and enforcement program, identifies Strategic Implementation Areas needing additional water quality improvement, and supports water quality monitoring. The Soil & Water Conservation District (SWCD) program administers grants to SWCDs to provide technical assistance, for education and outreach, and for voluntary water quality projects. The Confined Animal Feeding Operations (CAFO) and Pesticide Programs led by ODA also focus on collaboration and strategies to protect water quality. The Insect Pest Prevention & Management Program supports invasive species eradication.

#### Oregon Department of Environmental Quality (ODEQ)

ODEQ's mission is to "be a leader in restoring, maintaining, and enhancing the quality of Oregon's air, land, and water" and is responsible for implementing the federal Clean Water Act and state water quality law in the state. ODEQ has four Divisions: Air Quality, Land Quality, Water Quality, and Laboratory Administration. The Land Quality Division oversees programs that address pollutant management and cleanup, while the Laboratory performs various tasks in support of the agency mission, including many that are related to the Strategy, such as overseeing water quality monitoring programs. The Water Quality Division implements state and federal laws to protect and restore Oregon's rivers, lakes, streams, oceans, estuaries, and groundwater. This work plays a critical role in ensuring that Oregon's water resources are safe and available for both instream and out-of-stream beneficial uses, such as drinking water, fish and other aquatic organisms, recreation, the ability to consume fish safely, and irrigation. Programmatic and regulatory responsibilities within the Water Quality Division include: developing and implementing water quality standards and clean water plans; collecting and evaluating water quality data; developing and issuing permits for wastewater treatment systems and industrial and stormwater discharges that protect land, surface and ground waters; encouraging the beneficial reuse of wastewater and the solids from wastewater treatment through regulatory programs and oversight; protecting drinking water sources; providing grants and technical assistance to reduce and prevent nonpoint sources of pollution; and providing below market rate financing to communities to fund water quality improvement projects. ODEQ also coordinates with other state and federal natural resource agencies on actions that may affect Oregon waters including partnering with other state agencies (e.g. OHA, ODA, DOGAMI) to implement specific water quality programs.

#### Oregon Department of Fish and Wildlife (ODFW)

ODFW's mission is to "protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations." ODFW is responsible for implementing Oregon's Endangered Species Act (ORS 496.171-496.192). ODFW has three main Divisions - Fish, Habitat, and Wildlife - all of which provide some level of support for the Strategy. Fish Division programs include fish passage/screening, engineering, public education, conservation, and recovery. The Habitat Division programs collect and share data, identify conditions needed to support aquatic and terrestrial species including instream flow,, and support restoration activities. The Wildlife Division includes a conservation program that implements the [Oregon Conservation Strategy](#) and a habitat

program that oversee 16 ODFW Wildlife Areas. ODFW also co-manages an Aquatic Invasive Species Prevention Program with OSMB.

### **Department of Land, Conservation, and Development (DLCD)**

DLCD's mission is to "help communities and citizens plan for, protect and improve the built and natural systems that provide a high quality of life." DLCD fosters sustainable and vibrant communities and protects Oregon's natural resources legacy. DLCD's work is guided by Oregon's 19 Statewide Land Use Planning Goals, requiring each city and county to adopt and maintain a comprehensive plan addressing these goals. DLCD has been leading Oregon's [Climate Change Adaptation Framework](#) and Climate Change Vulnerability Assessment. Additionally, DLCD administers a variety of grants for comprehensive plan updates, public facilities plan updates, natural hazard mitigation planning, and climate change adaptation and mitigation. DLCD provides annual funding to Portland State University (PSU) to update county-level population forecasts. DLCD's work on housing production is relevant to the Strategy's focus on meeting water resource needs. Within the coastal zone – defined as the crest of the coast range out to three nautical miles offshore – the Oregon Coastal Management Program within DLCD uses its Federal Consistency authority under the Coastal Zone Management Act to review federal permits, licenses, and federal agency-led activities against the enforceable policies of the coastal program. These include state policies related to water quality, water appropriation, submerged land uses, archaeological resources, and species and habitat protection.

### **Oregon Water Resources Department (OWRD)**

OWRD's mission is "to serve the public by practicing and promoting responsible water management through two key goals; one, to directly address Oregon's water supply needs, and two, to restore and protect streamflows and watersheds in order to ensure the long-term sustainability of Oregon's ecosystems, economy, and quality of life." Under Oregon law, all water belongs to the public, and with some exceptions, all water users must obtain a permit or license from OWRD to use water from any source. OWRD collects, analyzes, and provides water quantity data to other agencies and to water users. OWRD processes water rights transactions, adjudicates claims to water uses which predate Oregon Water Law and federal and tribal reserved water claims, distributes water under the water rights system of prior appropriation, and addresses unauthorized uses of water. OWRD also protects public safety through the well construction and dam safety programs. OWRD provides planning, technical assistance, and funding to address instream and out-of-stream water supply needs. OWRD is responsible for developing and updating the Strategy, in collaboration with other state agencies, tribes, interested parties, and the public.

### **Other Water-Related State Agencies**

Many state agencies play a role in the Strategy and include natural resource agencies in addition to agencies that support economic development and public health. Agencies are listed in alphabetical order.

### **Business Oregon (BizOR)**

BizOR is the state's economic development agency, with a mission to "invest in Oregon businesses, communities, and people to promote a globally competitive, diverse, and inclusive economy." BizOR administers a variety of loan and grant programs that support site assessment, remediation, and water infrastructure planning, design, and implementation. The types of water infrastructure projects that receive funding include drinking water supply, stormwater conveyance, wastewater treatment, water storage, and levees.

### **Department of Geology and Mineral Industries (DOGAMI)**

DOGAMI's mission is to "provide earth science information and regulation to make Oregon safe and prosperous." DOGAMI works to increase understanding of Oregon's geologic resources and hazards through science and stewardship. There are two main programs at the Agency: Mineral Regulation and Reclamation (MLRR) and Geological Survey and Services (GS&S). The MLRR Program oversees the state's mineral production and works to minimize impacts of natural resource extraction and to maximize the opportunities for land reclamation. This includes extensive interagency coordination to enforce mining permits that protect water quality, among other environmental concerns. The GS&S program has much more extensive interaction with the Strategy, including earth

science data collection, information sharing, natural hazard mapping, and identification of risk reduction strategies. Staff in the GS&S program lead the [Oregon Lidar Consortium](#) which organizes the collection of lidar data in coordination with dozens of local, state, and federal partners.

### **Oregon Department of Energy (ODOE)**

ODOE's mission is to "help Oregonians make informed decisions and maintain a resilient and affordable energy system." The agency accomplishes this through a combination of data collection/analysis, education, technical assistance, regulation, oversight, and administration of energy programs. ODOE offers a variety of incentive programs to encourage energy and water conservation.

### **Oregon Department of Forestry (ODF)**

ODF's mission is to "serve the people of Oregon by protecting, managing, and promoting stewardship of Oregon's forests to enhance environmental, economic, and community sustainability." The Forest Practices Act (FPA) guides ODF's management of private and federally owned forests. Publication of the Private Forest Accord Report and legislation passed in 2022 has guided modifications to the FPA and ODF administrative rules, providing additional protections to habitat and water quality. ODF also manages over 700,000 acres of state-owned forests and the state's Common School Fund Forest Lands. Management approaches to both private and public forests provide an opportunity to protect water quality, conserve and restore habitat for native species, and eradicate invasive species.

### **Oregon Department of Higher Education, Oregon Climate Change Research Institute (OCCRI)**

OCCRI was created by the Oregon Legislature in 2007. OCCRI serves several functions regarding conducting and sharing climate change research and provides technical assistance to local governments in developing climate change policies, practices, and programs. OCCRI publishes [biennial assessments](#) on the state of climate science and the likely effects of climate change on the state.

### **Oregon Department of Human Services (ODHS)**

ODH's mission is "to help Oregonians in their own communities achieve well-being and independence through opportunities that protect, empower, respect choice, and preserve dignity." The ODHS Office of Resilience and Emergency Management coordinates with governmental and non-governmental agencies to provide food, water, and shelter during a major emergency or disaster, in accordance with [Oregon's Comprehensive Emergency Management Plan](#). In recent years, ODHS provided emergency water to communities impacted by drought, wildfire, and contaminated groundwater.

### **Oregon Department of State Lands (DSL)**

The Department's mission is "to ensure Oregon's school land legacy and protect wetlands and waterways of the state through superior stewardship and service." DSL oversees permitting associated with removal or fill in wetlands and or waterways, as defined in Oregon's Removal-Fill Law (ORS 196.795-990). The Department maintains programs and training to support natural resource identification, included the Oregon Rapid Wetland Assessment Protocol (ORWAP), Stream Function Assessment Method (SFAM), and Aquatic Resource Mitigation Framework. DSL also coordinates with state, federal, and community partners to address abandoned or derelict vessels in waterways.

### **Oregon Department of Transportation (ODOT)**

ODOT's mission is to "provide a safe and reliable multimodal transportation system that connects people and helps Oregon's communities and economy thrive." ODOT holds a single National Pollutant Discharge Elimination System MS4 permit issued and regulated by Department of Environmental Quality that covers the operation of all ODOT storm drain systems statewide. ODOT has implemented the Guide "[Routine Road Maintenance: Water Quality and Habitat Guide Best Management Practices](#)" since 1999. The guide is considered the cornerstone of ODOT's Office of Maintenance and Operations Environmental Section. ODOT Maintenance crews use the Guide to help minimize impacts to the environment while performing day to day highway maintenance activities and to comply with provisions of the Endangered Species Act.

### **Oregon Health Authority (OHA)**

OHA's mission is "ensuring all people and communities can achieve optimum physical, mental, and social well-being through partnerships, prevention, and access to quality, affordable health care." OHA is the primacy agency for implementing the federal Safe Drinking Water Act. While OHA encompasses many divisions and programs that promote public health, it is the Environmental Public Health (EPH) and Drinking Water Services (DWS) sections of the Public Health Division that includes the most relevant activities in relation to the Strategy. OHA-EPH identifies, assesses, and reports on threats to human health from exposure to environmental and occupational hazards, and also advises the people and communities of Oregon on how to best understand potential risks where they live, work and play. OHA-EPH's involvement with water is through the Healthy Waters program that includes Fish Consumption Advisories, Harmful Algae Bloom Surveillance (HABS), Beach Monitoring, and Domestic Well Safety. In addition, OHA-DWS has primacy from the federal Environmental Protection Agency to implement the Safe Drinking Water Act. OHA-DWS administers and enforces drinking water quality standards for public water systems. OHA-DWS provides water system operator training, technical assistance for water systems, emergency planning and response, and infrastructure funding for the federally regulated public water systems. OHA-DWS implements Drinking Water State Revolving Funding jointly with Business Oregon and source water protection program jointly with the Department of Environmental Quality.

### **Oregon Parks and Recreation Department (OPRD)**

OPRD's mission is "to provide and protect outstanding natural, scenic, cultural, historic and recreational sites for the enjoyment and education of present and future generations." OPRD manages and maintains state parks, campgrounds, and beaches. They administer several grant programs, all aimed at increasing access to recreation. OPRD manages the State Natural Areas Program to protect and recognize high quality native ecosystems and rare plant and animal species. OPRD also manages the Scenic Bikeways, Scenic Trails, and Scenic Waterways Programs. Waterway designation places restrictions on the types of activities that can occur within or near the banks of the waterway.

### **Oregon State Marine Board (OSMB)**

OSMB's mission is to serve "Oregon's recreational boating public through education, enforcement, access, and environmental stewardship for a safe and enjoyable experience." OSMB titles and registers motorized boats and sailboats, issues titles for floating properties, issues Waterway Access permits for nonmotorized boats a minimum of 10 feet in length, make rules for boat operation, register outfitter guides, manage mandatory motorized boater education, contract with Counties and Oregon State Police for on-water law enforcement, administer a variety of boating access grant programs, provide technical assistance to boating access facility owners to improve access at more than 1,600 locations, manage Clean Marina Program, and Aquatic Invasive Species Prevention Program in partnership with ODFW. OSMB encourages safe boating practices, such as wearing life jackets, having sound signaling devices and following all operation and waterway rules. OSMB does not own public access sites but provides significant grant funding and assistance to improve, develop and maintain access for recreational boating.

### **Oregon Watershed Enhancement Board (OWEB)**

OWEB's mission is "to help protect and restore healthy watersheds and natural habitats that support thriving communities and strong economies." The agency provides grants to a variety of public and private entities to accomplish habitat conservation, restoration, and monitoring. OWEB currently offers 17 different grant programs. OWEB's work supports the Oregon Plan for Salmon and Watersheds, including the task of coordinating watershed monitoring data from a variety of private landowners, federal, and state agencies. OWEB maintains the [Oregon Watershed Restoration Inventory](#) (OWRI) database which quantifies conservation and restoration results to inform future efforts.

## Federal Government

### Key Federal Agencies & Primary Roles

There are several federal agencies that collaborate with the tribes and state agencies regarding water management.

#### **Bonneville Power Administration (BPA)**

BPA delivers hydropower produced in the Columbia River Basin to communities across the Northwest. BPA markets wholesale electrical power from 31 federal dams in the Northwest that are operated by the U.S. Army Corps of Engineers and the Bureau of Reclamation. They also market power from one nonfederal nuclear plant and several small nonfederal power plants. BPA funds the Northwest Power and Conservation Council's [Columbia River Basin Fish and Wildlife Program](#). The program funds regional efforts to mitigate the impacts of the federal dams on the region's fish and wildlife species.

#### **Bureau of Reclamation (USBR)**

USBR's mission is "to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public." USBR is a water management agency, established in 1902, responsible for the construction of over 600 dams and reservoirs across the western United States. They provide water deliveries, conservation, recycling, and reuse and have developed partnerships with customers, states, and tribes. Most [USBR projects in Oregon](#) were built in eastern half of the state. USBR's current efforts focus on improving the safety of existing dams and reservoirs, enhancing stream flows and fish passage, and working with partners on watershed restoration projects.

#### **Bureau of Land Management (BLM)**

BLM's mission is to "sustain health, diversity, and productivity of public lands for the use and enjoyment of present and future generations." BLM manages 15.7 million acres of federal land in Oregon, providing resource management, recreation, and education. The BLM Fire Program performs fire suppression, preparedness, predictive services, vegetative fuels management, community assistance and protection, and fire prevention through education. BLM provides funding for watershed restoration projects.

#### **Federal Emergency Management Agency (FEMA)**

FEMA's mission is "helping people before, during and after disasters." They develop flood maps – identifying various flood zones, or locations likely to flood during specified storm events. FEMA manages the National Flood Insurance Program and provides resources for floodplain management and risk reduction. FEMA coordinates with the Oregon Department of Land Conservation and Development regarding Oregon's Statewide Planning Goal 7 and floodplain management. FEMA also administers the [National Dam Safety Program](#) and takes actions to encourage and promote state and federal dam safety programs to reduce risks from dam-related hazards.

#### **National Oceanic and Atmospheric Administration (NOAA and NOAA-Fisheries)**

NOAA's mission is to "understand and predict changes in climate, weather, ocean, and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources." NOAA's monitoring and research provide critical information for understanding impacts from climate change. NOAA provides funding for watershed restoration projects. The National Marine Fisheries Service (NOAA-Fisheries) is an office within NOAA responsible for the stewardship of the nation's ocean resources and their habitat. NOAA-Fisheries jointly administers the federal Endangered Species Act with US Fish and Wildlife Service and is responsible for marine and anadromous species. NOAA Fisheries manages marine and anadromous species pursuant to the Endangered Species Act, The Magnuson-Stevens Fishery Conservation Management Act, and the Marine Mammal Protection Act. NOAA's Office for Coastal Management funds the Oregon Coastal Management Program.



### **U.S. Army Corps of Engineers (USACE)**

USACE's mission is to "deliver vital engineering solutions, in collaboration with our partners, to secure our Nation, energize our economy, and reduce disaster risk." USACE has constructed many types of infrastructure including coastal fortifications and flood control systems throughout the country, including some dams, dikes, and levees in Oregon. USACE also collaborates with DSL on Clean Water Act Section 404 and Oregon's Removal-Fill permitting programs. During natural disasters and other emergencies, USACE can respond in four main ways: under its own authority, Public Law 84-99, under the National Emergency Preparedness Program, and as the designated lead agency in support of FEMA for Emergency Support Function Number 3, Public Works and Engineering.

### **U.S. Department of Agriculture, Forest Service (USFS)**

The mission of the USFS is to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The agency manages almost 16 million acres of national forest lands in Oregon which comprise about 25 percent of the state and are the source of nearly 45 percent of its mean annual water supply. USFS implements diverse watershed, forest and rangeland management and restoration practices, per its Organic Act, to "improve and protect the forest, secure favorable conditions of water flows, and furnish a continuous supply of timber for the use and necessities of citizens of the United States." The agency also conducts research and provides assistance to state and local governments, forest industries, and private landowners to help protect and manage non-federal watersheds, forests and rangelands. USFS lands support many watersheds for municipal drinking water supply within Oregon. USFS undertakes and provides funding for habitat and watershed restoration projects.

### **U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)**

NRCS's mission is to "deliver conservation solutions so agricultural producers can protect natural resources and feed a growing world." NRCS works with producers, tribes, soil and water conservation districts, and others to plan, design, and implement conservation practices and activities, while also providing funding through its programs. NRCS conservation programs help people address resource opportunities relating to soil, water, air, animals, plants, and energy.

### **U.S. Environmental Protection Agency (USEPA)**

USEPA's mission is to "protect human health and the environment" and works to ensure that Americans have clean air, land and water. USEPA develops and enforces regulations, administers grants, sponsors partnerships, studies environmental issues, and educates people about the environment. They lead the implementation of the Clean Water Act, Safe Drinking Water Act, and provide oversight of states that have been delegated to administer the federal program, such as ODEQ. USEPA provides funding for watershed restoration, water infrastructure, toxics reduction, water quality monitoring, nonpoint source pollution reduction, and environmental justice projects in Oregon. USEPA helps fund ODEQ's implementation of Clean Water Act and Safe Drinking Water Act programs through a Performance Partnership Grant. The workplan for this grant can be found in appendix C of the [Oregon Performance Partnership Agreement](#).

### **U.S. Fish and Wildlife Service (USFWS)**

USFWS's mission is to "conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people." The federal Endangered Species Act is jointly administered by USFWS and the National Marine and Fisheries Service. The USFWS primarily has oversight for terrestrial and freshwater species and some marine mammals. USFWS also implements the Bald and Golden Eagle Protection Act; and partners with all entities to conserve and restore habitats, conduct research and monitoring, and provide community education and outreach.

### **U.S. Geological Survey (USGS)**

USGS's mission is to "monitor, analyze, and predict current and evolving Earth-system interactions and deliver actionable information at scales and timeframes relevant to decision makers." They are a "primary Federal source of science-based information on ecosystems, land use, natural hazards, water use and availability, and updated maps

and images of the Earth’s features available to the public.” USGS collaborates with OWRD on basin studies and place-based planning efforts.

## Water Laws, Policies, and Regulations

The actions described throughout the Strategy fit within an existing state and federal legal framework. Some water challenges we face in Oregon can be addressed with improved enforcement of existing regulations, modifications to laws or policies, or rulemaking within an agency program. This section provides an overview of the key federal and state laws and policies that are referenced throughout the document. This section provides a single location to return to, to reduce repetition of these concepts later in the document.

Both federal and state laws operate within an intricate legal structure, each with its own jurisdiction and authorities. Federal laws, enacted by congress have supremacy and apply uniformly across all states and territories. State governments retain significant authority to legislate and regulate matters not explicitly addressed by federal law. Each type of law—statutes, regulations, and policies—carries distinct levels of authority and serves specific functions within the legal system, with statutes generally holding the highest authority. This section outlines the primary federal and state statutes, regulations, and policies that guide Oregon’s management of water quantity, quality, instream, and out-of-stream needs. The section is organized featuring federal laws first and their associated state-run programs followed by state laws.

### Federal Statutes and Associated Regulations and Policies

#### The Clean Water Act (CWA) [33 U.S.C. § 1251](#)

The primary regulatory tool used to reduce or prevent pollutants from entering surface waters is the [Federal Clean Water Act](#), which requires states to establish water quality standards to protect all beneficial uses of water. In Oregon, the Department of Environmental Quality administers the Clean Water Act with oversight from the U.S. Environmental Protection Agency. The state establishes water quality standards to protect defined beneficial uses (e.g., fish and aquatic life, water contact recreation, domestic water supply). Oregon DEQ is required to review and update standards every three years. Information about Oregon’s Water Quality Standards can be found on the Department of Environmental Quality’s [website](#).

Tribes may apply to the U.S. Environmental Protection Agency for authorization to administer water quality standards under the Clean Water Act. This means they may obtain similar authority to the Oregon Department of Environmental Quality.

#### Assessing, Listing and Reporting Requirements [Section 303\(d\) & 305\(b\)](#)

**Total Maximum Daily Loads (TMDLs)**- Requires states to identify waters that are not meeting water quality standards and establish TMDLs for those pollutants impairing water quality. TMDLs specify the maximum numerical amount of a pollutant that a water body can receive while still meeting water quality standards. As part of the 303(d) requirements, each state must assess the quality of water bodies across the state. The state must then determine TMDLs and implementation plans for all waterbodies that do not meet the state’s water quality standards. The Oregon Department of Environmental Quality is responsible for managing, implementing, and enforcing this program. Certain federal, state, and local governments and agencies, including cities, counties, and special districts, may be identified by the Department of Environmental Quality as a Designated Management Agency, with authority to manage and regulate water pollution listed in a TMDL.

**Water Quality Status and Monitoring Reports**– States are mandated to submit biennial reports known as “Water Quality Status and Monitoring Reports” to the Environmental Protection Agency. The result of these analyses and conclusions is called the “Integrated Report” because it combines

the requirements of Clean Water Act sections 303(d) and 305(b) into one report. Waters identified as not meeting water quality standards ("303(d) listed") require the development of a Total Maximum Daily Load (TMDL). These reports provide comprehensive information on the condition of waters within the state.

**Federal Certification [Section 401](#)** – Gives states and authorized tribes the authority to grant, deny, or waive certification of proposed federal licenses or permits that may discharge polluted waters into Oregon's waters to ensure they meet Oregon's water quality standards. The Department may issue a Section 401 water quality certification, along with permit conditions.

**Point Source Permitting: National Pollutant Discharge Elimination System (NPDES) [Section 1342](#)**- The Clean Water Act prohibits anybody from discharging "pollutants" through a "point source" (e.g., pesticide use, industrial or wastewater treatment plant discharge) into a "water of the United States" unless they have a NPDES permit. While a federal program, NPDES permits are issued by the state Oregon Department of Environmental Quality. The Department also issues state Water Pollution Control Facility (WPCF) permits to regulate the point source discharge of wastewater onto land. Both types of permits set limits on the amount of pollution that can be discharged and require specific practices and monitoring to safeguard surface waters and groundwater aquifers.

For livestock operations, the Oregon Department of Agriculture is the lead agency responsible for issuing WPCF permits for Confined Animal Feeding Operations (CAFOs) to owners so manure does not pollute ground and surface water.

**Nonpoint Source Pollution Program [Section 1288](#)** - - A nonpoint source of pollution is any pollution entering a waterbody, surface, or groundwater source, that does not come directly from a pipe. Nonpoint sources are often linked with agricultural, forestry, urban, and rural residential land use activities where rain or snow runs off to surface waters. As the runoff moves, it picks up and carries away pollutants (e.g., metals, nutrients, sediment) resulting from human activity, finally depositing them into lakes, rivers, wetlands, coastal waters, and groundwater. The Clean Water Act requires that each state develop a plan for controlling pollution from nonpoint sources and improving water quality. The Oregon Department of Environmental Quality is the lead agency in developing the plan. The most recent [Nonpoint Source Management Program Plan](#) was published in 2022.

Also significant in addressing nonpoint source pollution, the [Coastal Zone Act Reauthorization Amendments](#) (CZARA) established the national Coastal Nonpoint Pollution Control Program, mandating states with federally funded coastal management programs to tackle nonpoint source coastal pollution. This program is jointly overseen by the US Environmental Protection Agency and the National Oceanic and Atmospheric Administration. In 2015, Oregon's latest Coastal Nonpoint Pollution Control Program was disapproved by the USEPA and NOAA which led to temporary reductions in federal support for grant. USEPA and NOAA have said they will revisit the issue the next time they review the state's program for compliance.

**Clean Water State Revolving Fund (CWSRF) [Section 1381](#)** – The [CWSRF](#) was established by Title VI of the 1987 amendments to the Clean Water Act. The CWSRF program is a partnership between the U.S. Environmental Protection Agency and the Department of Environmental Quality to provide low-cost financing for a variety of infrastructure projects including municipal wastewater facilities, nonpoint source pollution control, decentralized wastewater treatment systems, stormwater runoff mitigation, green infrastructure, estuary protection, and water reuse.

**Beaches Environmental Assessment and Coastal Health (BEACH) Act [Section 1311](#)** – The BEACH Act amended the Clean Water Act by requiring the US Environmental Protection Agency to develop performance criteria for testing, monitoring, and notifying public users of possible coastal recreation water quality problems. The Act authorizes US Environmental Protection Agency to award grants to states, territories, tribes, or local governments to develop and implement beach monitoring and assessment programs.

**The Safe Drinking Water Act (SDWA) [42 U.S.C. § 300\(f\)](#)**

The 1974 federal Safe Drinking Water Act mandates the U.S. Environmental Protection Agency to establish and enforce standards that public drinking water systems must follow. These standards encompass a range of programs and requirements such as source water protection, treatment, monitoring, compliance, and public information. These measures aim to ensure that water system operators maintain a safe supply of drinking water for communities. The EPA delegates primary enforcement responsibility, known as primacy, to state and tribal governments.

The Oregon Health Authority administers and enforces drinking water quality and notice standards for public water systems in Oregon. Public water systems are defined as having more than three hookups or serving more than 10 people year-round. The SDWA regulates over 90 naturally occurring and man-made contaminants. Water quality data for Oregon’s public water systems can be found at [Drinking Water Data Online](#).

Oregon has more than 3,300 public water systems that are fed by more than 200 surface water diversions, nearly 4,000 groundwater wells, and 225 springs. The Safe Drinking Water Act does not regulate private wells that serve less than 25 individuals. Water quality data for Oregon’s public water systems can be found at [Drinking Water Data Online](#).

**Unregulated Contaminant Monitoring Rule [40 C.F.R. 141 Subpart O](#)**– “Emerging contaminants” are chemicals found in drinking water that might be harmful to health and are not yet regulated by the federal government. The Safe Drinking Water Act mandates the USEPA to list such contaminants every five years for monitoring by public water systems. The Unregulated Contaminant Monitoring Rule specifies which chemicals need testing and is regularly updated. Data gathered under this rule helps the USEPA assess the extent of these contaminants nationwide and informs decisions about future regulations.

**Reduction of Lead in Drinking Water Act [42 U.S.C. § 300\(g\)- 6](#)**- The Reduction of Lead in Drinking Water Act amends the Safe Drinking Water Act regarding the use and introduction into commerce of lead pipes, plumbing fittings or fixtures, solder, and flux. The Act defines the percentage of lead allowed in plumbing products and provides for exempt uses where the water is not anticipated to be used for human consumption (e.g., industrial processing, fire hydrants).

In 2017, the Oregon Legislature passed Senate [Bill 1062](#), requiring all school districts, education service districts, and public charter schools to adopt a Healthy and Safe Schools Plan. These plans must include provisions for testing and reducing exposure to elevated levels of lead in water used for drinking or food preparation, as required under guidelines adopted by the Oregon Health Authority. Rules outline that initial testing be done at all drinking and food preparation taps at all schools by 2020, and every 6 years thereafter according to a schedule determined by the Oregon Department of Education. Initial testing is intended to identify problem taps or plumbing, and once resolved, should not have issues in the future. On-going testing is required to determine whether water quality changes or plumbing deterioration has caused more lead to be released.

## **Endangered Species Act (ESA) [16 U.S.C. § 35](#)**

The federal Endangered Species Act aims to protect and restore endangered or threatened species and their habitats. "Endangered" means a species faces extinction in its range, while "threatened" means it's likely to become endangered soon. Administered by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, the former handles land and freshwater species, while the latter oversees marine wildlife and anadromous fish.

The State of Oregon and the federal government maintain separate lists of Threatened and Endangered species. Under state law ([ORS 496.171-496.192](#)) the Fish and Wildlife Commission through the Oregon Department Fish and Wildlife maintains the list of native fish and wildlife species in Oregon that have been determined to be either "threatened" or "endangered" according to criteria set forth by rule ([OAR 635-100-0105](#)). The Department also maintains a list of state sensitive species ([OAR 635-100-0040](#)). The Department leads the development of conservation and recovery plans for state ESA-listed fish species. Coordinated action with citizens, and other local, state and federal agencies is essential for successful implementation. State [plant ESA listings](#) are managed by the Oregon Department of Agriculture.

## **Oregon Statutes and Associated Regulations and Policies**

### **Water Rights - Oregon's 1909 Water Code**

In Oregon, water is recognized as a public resource ([ORS 537.110](#)). Since the enactment of Oregon's Water Code in 1909, a structured system for the allocation and management of water has been established statewide. Typically, individuals or entities seeking to utilize water from any source must obtain a permit from the Water Resources Department. Landowners do not inherently possess the right to utilize water flowing past, through, or beneath their property without appropriate state authorization, although certain exemptions from permitting requirements exist.

The allocation and use of water rights are governed by four fundamental provisions. Firstly, water may only be diverted for beneficial purposes without waste, whether from surface or groundwater sources. Secondly, the priority of water rights determines allocation during times of shortage, with older rights taking precedence. Thirdly, water rights are typically tied to the land they serve, known as appurtenancy, meaning they transfer with the land upon sale. Lastly, once established, water rights must be utilized as specified at least once every five years to remain valid. Failure to do so may result in forfeiture and potential cancellation, except under certain legal exceptions.

### **Doctrine of Prior Appropriation**

Oregon's water laws operate under the principle of prior appropriation, which dictates that the first individual or entity to secure a water right on a stream maintains priority access. In practice, this means, that when senior water rights cannot be fulfilled, junior rights may be restricted. In other words, the first person to obtain a water right on a stream is the last to be shut off in times of shortage. For more details, read *Water Rights in Oregon: An Introduction to Oregon's Water Laws*.<sup>6</sup>

### **Water Rights Permits and Certificates**

The Water Resources Department administers nearly 90,000 water rights, which includes both permits and certificates, for both instream and out-of-stream uses. When the Department evaluates new requests for out-of-stream uses, various factors are taken into account, such as the needs of existing users, including established instream protections, as well as potential impacts to sensitive, threatened, or endangered fish species, and compliance with existing water quality standards.

### **Adjudication**

Claims to the use of surface water that predate Oregon's Water Code are required to go through a formal administrative judicial process known as an adjudication. This process documents, quantifies, and eventually incorporates their water rights into the prior appropriation system. Similar procedures are conducted for groundwater uses that pre-date the Water Resources Department's authority to issue groundwater rights.

Federal and tribal reserved water rights, along with pre-1909 claims, are typically determined through adjudication processes. Federal reserved rights are linked to specific federal land allocations that require water, while tribal reserved rights may stem from treaties, executive orders, or congressional acts, covering uses associated with tribal lands or resources. These claims are not necessarily older than the water code, as their priority dates are tied to the respective federal actions or, in the case of tribal water rights, to time immemorial.

The adjudication process is time-consuming, requires significant state resources, and often takes decades. The primarily involved agencies include the Water Resources Department, Department of Justice, Office of Administrative Hearings, and many others. Strategy Action 12A addresses the need to continue undertaking adjudications.

### **Oregon's 1987 Instream Water Right Act** [ORS 537.332 through 537.360](#)

Oregon's 1987 Instream Water Right Act was designed to protect instream flows for public benefit by establishing instream water rights. Instream water rights are a legally recognized beneficial use of water. The Department of Fish and Wildlife, Parks and Recreation Department, and Department of Environmental Quality can submit applications to protect water instream. Acceptable reasons for protecting instream flows include the conservation, maintenance and enhancement of aquatic and fish life, wildlife, and fish and wildlife habitat ([OAR 635-400-0000](#)).

Since 1987, more than 1,000 instream rights have been established through this process and are held in trust on behalf of the public by the Water Resources Department. However, even as far back as the 1950s, Oregon put streamflow protections in place to support aquatic life and protect water quality. The State has converted more than 500 of these older protections, called "minimum perennial streamflows," into instream water rights, bringing the total certificated instream water rights to over 1,500.

Instream rights are usually set for a certain stream reach or at a specific point on the stream. Instream water rights have an established priority date, which means they can be regulated in a similar way as out-of-stream water rights. Many instream rights are junior water rights, the practical effect is that they are often not fulfilled during the summer months. Nonetheless, these water rights do establish flow targets essential for safeguarding aquatic life. Strategy Action 8B addresses data needs for establishing instream water rights and Action 10C identifies instream water rights as a tool for instream protections.

## **Groundwater**

### **Groundwater Act of 1955** [ORS 537.505 to 537.795 and ORS 537.992](#)

The Groundwater Act of 1955 established the authority for groundwater management and monitoring statewide for the preservation of public welfare, safety, and health. The Act directs the Oregon Water Resources Department and Water Resources Commission to determine rights to the use of public groundwater. Furthermore, it mandates managing groundwater alongside surface water within the prior appropriation system, acknowledging their interconnectedness.

The Groundwater Act also directs the Water Resources Department to determine the extent, capacity, quality, and other characteristics of its groundwater bodies. These metrics are then used to inform resource management decisions. Other important aspects of Oregon's groundwater management policy provide that rights to use groundwater be protected, reasonably stable groundwater levels be determined and maintained, and groundwater overdraft be prevented.

The Water Resources Department is in the process of undertaking groundwater allocation policy rulemaking changes. More detail is covered in Chapter 4, Action 10E.

## **Groundwater Quality Protection Act [ORS 468B.150-190](#)**

The Groundwater Quality Protection Act was adopted in 1989 and aims to prevent contamination, conserve, and restore groundwater resources in Oregon. It mandates all state agency rules and programs align with protecting drinking water resources and public health. The Department of Environmental Quality oversees groundwater quality protection and uses a combination of water quality and land use programs to implement the Act.

Under this law, the Department of Environmental Quality has the authority to designate Groundwater Management Areas when groundwater has elevated contaminant concentrations. The Department has designated three Groundwater Management Areas because of elevated nitrate concentrations.

## **Water Rights Management**

### **Administrative Basins [OAR 690-500](#)**

To allocate water resources, the Water Resources Department has organized the state into 20 administrative river basins. Basin programs are administrative rules which establish water management policies and objectives, and which govern the appropriation and use of the surface and groundwater within each of the administrative basins. The regulations categorize surface and groundwater based on permitted uses, preferences among uses, potential for withdrawing water from further appropriation, reservation of water for specified future uses, and establishment of minimum perennial streamflows. These rules supplement statewide regulations that govern the allocation and utilization of water resources.

### **Water Use Measurement & Reporting**

[ORS 537.099](#) requires government entities (e.g., federal and state agencies, cities, counties, schools, irrigation districts and other special districts) to annually report monthly water use data to the Water Resources Department. Governments and water right holders in serious water management problem areas have unique reporting requirements, outlined in [OAR 690-085](#).

### **Distribution and Regulation**

Separate and distinct from the Administrative Basins, there are 23 watermaster districts used for water right distribution and regulation. Watermasters at the Water Resources Department are responsible for distributing water in accordance with the doctrine of prior appropriation. Each summer as streamflows drop, Watermasters regulate junior users to provide water to the more senior users. By the end of summer, there is typically only enough water to supply users who established their rights in the late 1800s in many areas of the state.

### **Enforcement**

The Water Resources Department enforces the state's water laws and implements the Water Resources Commission's policies in the field. Enforcement staff are responsible for regulating water use based upon the water rights of record.

### **Conservation**

According to Oregon's Water Code, the diversion of surface or groundwater for use is permissible only when it serves a beneficial purpose and avoids wasteful practices. Many municipal and irrigation water suppliers are required to prepare and submit a [Water Management and Conservation Plan \(WMCP\)](#) to the Water Resources Department as conditions of their water use permits, a final order approving a previous plan, or permit extensions. A WMCP provides a description of the water system, identifies the sources of water, and explains how the water supplier will manage and conserve supplies to meet future needs.

The Allocation of Conserved Water Program recognizes that improved technology and distribution methods may enable water users to use less water than was required in the past. The program allows a water user who conserves water to use a portion of the conserved water on additional lands, lease or sell the water, or dedicate the water to instream use. At a minimum, 25 percent of the conserved water is allocated to the state and 75 percent to the water right holder, unless the entity proposes a higher allocation to the state, or more than 25 percent of the funds used

to finance the conservation project comes from federal or state public sources and is not subject to repayment. If non-reimbursable funds are used, the state receives a percentage equal to the percentage of funds used to finance the project. In no event, however, shall the applicant receive less than 25 percent of the conserved water unless they propose a higher allocation to the state. Use of this program is voluntary and provides benefits to both water right holders and instream values.

### **Transfers and Leases**

The use of water under a water right is restricted to the terms and conditions described in the water right certificate: place of use, point of diversion or appropriation, and character of use. The water right holder must file a transfer application with the Department to change a point of diversion, point of appropriation, type of use, place of use, or any combination of these. Permanent, temporary, and drought transfers are just a few of the types of transfers that may be applied for by an existing water rights holder.

Oregon's instream leasing program ([ORS 537.348](#) and [OAR Chapter 690, Division 77](#)) provides a voluntary means to aid in the restoration and protection of streamflow. This arrangement provides benefits to both water right holders and to instream values by providing water users with options that protect their water rights while leasing for instream benefits. Instream leases can be for up to 5 years and there is no limit on renewals.

### **Drinking Water**

#### **Oregon's Drinking Water Quality Act** [ORS 448.119 to 448.285; 454.235; and 454.255.](#)

Enacted in 1981, the Act establishes a program for drinking water systems, ensuring safe drinking water for all Oregonians, and offering a mechanism to enhance deficient drinking water systems.

#### **Domestic Well Testing Act** [ORS 448.271](#)

The Domestic Well Testing Act requires that wells that supply groundwater for domestic purposes be tested for arsenic, nitrates, total coliform bacteria, and any other contaminants of public health concern that Oregon Health Authority has established in rule. Wells must be tested when they are included in any real estate transaction and the seller accepts an offer to purchase or exchange that real estate. Only laboratories accredited according to Oregon Environmental Laboratory Accreditation Program can conduct the samples analysis. The results must be sent to the buyer and to Oregon Health Authority where they are made publicly available in the real estate transaction well report database. This data provides the public and state agencies with critical information on groundwater quality in private domestic wells, statewide. There is no enforcement mechanism with this requirement, and recent studies indicate that only about 10% of the applicable real estate transaction data is being submitted to the state.

### **Land-use Planning and Agriculture**

**Statewide Land Use Planning Goals** - The Department of Land Conservation and Development implements Oregon's land use planning program, which influences how land is used throughout the state. The program began in 1973 under [Senate Bill 100](#), it directs cities and counties to protect water resources when planning for and permitting development in their jurisdictions. The land use program plays a significant role in managing nonpoint source pollution by promoting compact urban development in designated urban areas and minimizing the impact of rural development on working lands and natural resources through rules and incentives.

**Agricultural Water Quality Management Act** - The Agricultural Water Quality Management Act enabled the Oregon Department of Agriculture to develop plans and rules to prevent and control water pollution from agricultural activities in order to achieve water quality standards. These rules both advance federal Clean Water Act objectives and serve as the foundation for Oregon's Agricultural Water Quality Program. There are 38 area [Agricultural Water Quality Management Plans](#) and Rules around the state.



## Ecosystems and Waterway Protections

### Fish Screening & Passage Laws

The Oregon Department of Fish and Wildlife oversees the state's fish screening and fish passage programs. Screens prevent fish from being caught in water diversion structures. Further, in locations where native migratory fish are currently or have historically been present, fish passage over man-made dams and diversions has also been a requirement since before statehood. Where applicable, Oregon requires fish screens, bypass devices, and/or passage as a condition of new uses (permits). Only fish screens (not fish passage) are addressed during authorized changes to an existing water right (e.g., transfers).

### Forest Practices Act

The Forest Practices Act (FPA) of 1971 sets standards for all commercial activities involving the establishment, management, or commercial harvesting of trees on nonfederal forestlands. Many of the rules are aimed at protecting water sources. For example, regulations require landowners to leave forested buffers and other vegetation along streams, wetlands, and lakes to protect water quality and fish and wildlife habitat. The Oregon Board of Forestry has primary responsibility to interpret the Act and to set rules for forest practices. The FPA statute and rules are the mechanisms to implement water quality standards and Total Maximum Daily Loads (TMDLs) on nonfederal forestlands..

In March 2022 [Senate Bill 1501](#) became effective and requires the Board of Forestry to adopt a comprehensive set of new rules and revisions to the FPA. These changes, along with the aerial herbicide buffers established in 2020 under Senate Bill 1602, are expected to significantly enhance water quality protection on private forestlands. The new rules stem from an agreement reached in October 2021 between timber industry advocates and conservation groups known as the Private Forest Accord. The Private Forest Accord also resulted in Senate Bill 1502 and House Bill 4055 which became effective in 2022. Senate Bill 1502 provides tax credits for small forestland owners complying with riparian timber harvest restrictions, while House Bill 4055 modifies taxation of forest products and allocates certain tax revenue to mitigate forest practice impacts on aquatic species. The fish-bearing stream rules for large forestland owners went into effect July 1, 2023, with other provisions going into effect January 1, 2024. Currently, the state is writing a Habitat Conservation Plan for the aquatic and riparian species covered by the PFA, and the Adaptive Management Program to review and, as needed, update the new forestry rules as operational.

State-owned forests are managed according to forest management plans that are based on geographic area (Northwest, Southwest, and Eastern Oregon). State forests are managed in compliance with and often surpass the standards established by the FPA. The State Forest program has voluntarily entered a long-term Stewardship Agreement that recognizes a commitment to meet and exceed regulatory requirements that cover forest land in western Oregon and is currently working on a Habitat Conservation Plan for aquatic, riparian, and terrestrial species-at-risk.

### Oregon's Removal-Fill Law [ORS 196.795-990](#)

Oregon's Removal-Fill Law requires people who plan to remove or fill material in wetlands or waterways to obtain a removal-fill permit from the Department of State Lands. The law applies to all landowners, whether private individuals or public agencies. The purpose of the law, enacted in 1967, is to ensure protection and the best use of Oregon's water resources for home, commercial, wildlife habitat, public navigation, fishing and recreational uses. In most cases, a permit is required if an activity involves filling or removing 50 cubic yards or more of material in a wetland or waterway. For activities in state-designated Essential Salmonid Habitat, within a quarter mile of a state-designated scenic waterway, and compensatory mitigation sites, a permit is required for any amount of removal or fill. [ORS 468B.025](#) prohibits causing pollution or discharging waste to waters of the state and other state permits from DEQ may be required for in-water activities to ensure the protection of waters of the state is consistent with the Oregon Environmental Protection Act at [ORS 468.149](#).

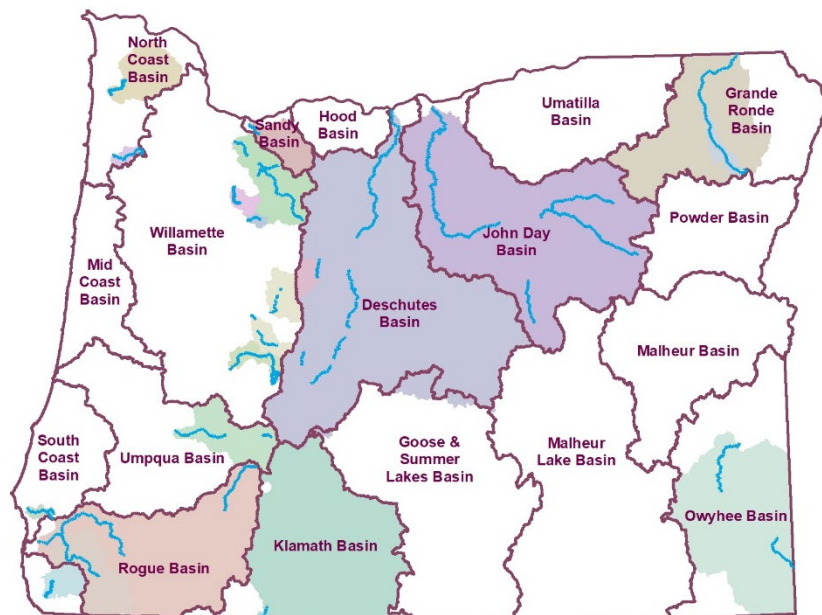
**No-Net Loss Wetland Policy** - Although Oregon’s wetland management and protection authorities date back to the early 1970s, legislation passed in 1989 adopted policies maintaining the acreage, functions, and values of the state’s wetlands. Oregon has adopted a goal of *no-net loss* of freshwater wetlands, administered by the Department of State Lands.

**Oregon’s Scenic Waterways Act [ORS 390.805-925](#)**

Oregon’s Scenic Waterways Act protects over 1,100 river miles, Figure P1-2. The Act was passed in 1970 to maintain the free-flowing character of designated rivers and lakes in quantities necessary to support recreation, fish, and wildlife. The Act includes criteria for outstanding scenic, fish, wildlife, geological, botanical, historic, archeologic, and outdoor recreation opportunities.

The Scenic Waterways Act prohibits construction of dams or other impoundments within a scenic waterway. It limits new surface water rights within or above scenic waterways as well as groundwater rights where pumping (individually or cumulatively) will reduce surface water flows. Land use activities that can affect a scenic waterway or adjacent land—such as constructing roads or buildings, mining, and forest harvesting—are limited or regulated by this Act. The Oregon Parks and Recreation Department has primary responsibility for implementing the Scenic Waterways Act and consults with several natural resource agencies, including the Water Resources Department. See Action 10C for more information about recent designations.

**Figure P1-2: State Scenic Waterways and Contributing Areas**



**Outstanding Resource Waters**

Outstanding Resource Waters are “high quality waters that constitute an outstanding state resource due to their extraordinary water quality or ecological values, or where special protection is needed to maintain critical habitat areas.” Oregon’s Outstanding Resource Waters policy is part of the state’s antidegradation policy described in [OAR 340-041-0004\(8\)](#). The public can nominate waterbodies for designation and Oregon’s Environmental Quality Commission has the ability to designate Outstanding Resource Waters. Designation adds water quality protections, including restrictions on point source discharges, to ensure that no degradation of the high water quality, exceptional ecological characteristics, and other outstanding values of the waters occurs. See Action 10C for more information about recent designations.

## Timeline of Water Resources Management

Many of the laws, plans, and policies noted in the following timeline represent major achievements and serve as a strong foundation for economic development, environmental restoration, and protection of human health in Oregon.

- 1889** Oregon enacts a state law **prohibiting pollution of waters** used for domestic or livestock purposes
- 1898** Oregon's first **fish screening law** protects fish from injury or mortality in diversion ditches, machinery, or irrigated fields
- 1909** **Oregon Water Code** creates a system of water allocation and distribution
- 1927** Oregon Legislature establishes requirements for obtaining water rights for the use of **groundwater in eastern Oregon**
- 1929** Oregon Legislature establishes current **dam safety laws**
- 1955** **Oregon's Ground Water Act** authorizes the state's management of groundwater resources statewide
- 1955** **Oregon's Minimum Perennial Streamflow Act** creates minimum flow requirements to support fish and aquatic life or minimize pollution
- 1964** **Columbia River Treaty** between the United States and Canada brings significant flood control and power generation benefits to both countries
- 1967** **Oregon's Beach Bill** gives the public free and uninterrupted use of the beaches along the Oregon Coast
- 1967** **Oregon's Removal-Fill Law**, established in 1967 and amended in 1971, requires landowners who plan to remove or fill materials in wetlands or waterways to obtain a permit from the Department of State Lands
- 1970** **Oregon Scenic Waterways Act** maintains the free-flowing character of designated rivers and lakes in order to support recreation, fish, and wildlife uses
- 1971** **Oregon Forest Practices Act** regulates commercial forest operations on non-federal forestlands, including management of soil, air, water, fish, and wildlife resources
- 1972** **Federal Clean Water Act** regulates the water quality of streams, lakes, rivers, and estuaries
- 1973** **Federal Endangered Species Act** makes all species of plants and animals, except pest insects, eligible for listing as endangered or extinct
- 1973** **Oregon Land Use Act** requires all cities and counties to develop comprehensive land use plans
- 1974** **Federal Safe Drinking Water Act**, later amended in 1996, regulates the quality of drinking water delivered through community water systems
- 1987** **Oregon's Instream Water Right Act** recognizes water instream as a beneficial use and authorizes instream water rights
- 1989** **Oregon's Groundwater Quality Protection Act** is passed to conserve, restore, and maintain the high quality of Oregon's groundwater
- 1989** **Oregon's "No Net Loss" Wetlands Policy** is designed to maintain the acreage, functions, and values of the state's wetlands
- 1989** A **Water Allocation Policy** ensures that surface waters of the state are allocated within the capacity of the resource and protected from over allocation
- 1993** **Oregon's Agricultural Water Quality Management Act** provides a mechanism for agricultural operations to address water quality problems in watersheds
- 1997** The **Oregon Plan for Salmon and Watersheds** helps restore healthy watersheds that support the economy and quality of life in Oregon
- 2000** The Water Resources Commission adopts a **Water Measurement Strategy**, focusing on diversions with the greatest impact on streamflows in areas with the greatest needs for fish
- 2001** Oregon's **State Tribal Government-to-Government Law** passed, directing state agencies to include tribes in the development of programs
- 2005** The **Deschutes Groundwater Mitigation Program** was developed to provide for new groundwater uses while maintaining scenic waterway and instream water right flows in the Deschutes Basin
- 2006** The **Oregon Conservation Strategy** provides an action plan for the long-term conservation of Oregon's native fish and wildlife and their habitats
- 2007** Oregon Legislature establishes an **Environmental Justice Task Force**, calling for a greater voice and protection for underrepresented groups in agency decisions involving natural resources (In 2022 the task force was renamed the Environmental Justice Council)
- 2009** Oregon Legislature establishes an **Ecosystem Services Policy**, focusing on the protection of land, water, air, soil, and native flora and fauna
- 2010** The Environmental Quality Commission revises water quality and human health standards based on a **Fish Consumption Rate** of 175 grams per day per person—the most protective criteria in the nation
- 2011** The Environmental Quality Commission approved rules allowing the issuance of **Graywater Permits** to reduce demand on other sources, such as potable water, surface water and groundwater
- 2012** Oregon adopts its first **Integrated Water Resources Strategy**, a blueprint for meeting the state's instream and out-of-stream needs
- 2013** Oregon delivers the **Klamath Adjudication** Findings of Fact and Order of Determination to Klamath County Circuit Court
- 2015** Oregon Chub and Modoc Sucker become first and second species in the nation to be de-listed due to recovery under the **Endangered Species Act**
- 2015** Oregon initiates **Place-Based Integrated Water Resources Planning** with local communities
- 2017** The Oregon Environmental Quality Commission designates the North Fork Smith River and its tributaries as Oregon's first **Outstanding Resource Waters**
- 2019** Foskett Speckled Dace de-listed as a federal **Endangered Species**
- 2020** Borax Lake Chub de-listed as a federal **Endangered Species**
- 2021** Waldo Lake and Crater Lake were designated as **Outstanding Resource Waters**
- 2022** Enhanced water quality protections from the **Oregon Forest Accord** and Senate Bill 1501

## References

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# PART 2 - STRATEGY ACTIONS

Engagement efforts for the 2024 Strategy identified water challenges and potential solutions that were similar to those heard during the 100-Year Water Vision effort in 2020, and reinforced the need for the recommended actions identified in the 2017 Strategy. People and the environment continue to have water challenges, although the severity or reach of the issues has increased. Therefore the 2024 Strategy carries forward most of the recommended actions from the 2017 but has placed an emphasis on making the Strategy more accessible and elevating tools to support implementation. Details about changes to the Strategy organization and modifications to the 2017 actions was provided in the Strategy Introduction.

The following four chapters include narrative describing Oregon’s critical water issues and the actions needed to address these issues. New for the 2024 Strategy, each action includes an action summary page to provide a quick reference regarding who might take this action, examples illustrating the action, and resources including existing workgroups or funding programs. Action summary pages include the following types of information:

**Lead agency** – identifies the primary state or federal agency or agencies where this action falls into their mission, current or recent activities, or an existing program. Identification as a lead agency does not indicate obligation to contribute to the action, acknowledging that participation is voluntary and dependent upon agency resources and funding. Agencies are listed in alphabetical order.

**Supporting agency** – identifies the state or federal agencies that may participate in the action but have less involvement than the lead agencies. This category recognizes agencies that provide support through technical assistance, workgroups, funding, or other contributions. Agencies are listed in alphabetical order.

**Partners** – any non-federal or state agency entity that has participated in this action, or likely would, given the type of action. Tribes are often listed as a partner to promote partnership and/or consultation when appropriate. This list is not intended to be exhaustive but highlights the major interested parties.

**Background** – succinct description of why this action is needed. More context is provided in the narrative preceding the action summary page.

**Example Actions** – black text includes example actions that were taken directly from the 2017 Strategy. Items that have been crossed out have been completed or are no longer needed. **Red text indicates a proposed addition for the 2024 Strategy.** Equity and environmental justice example actions have been added for many actions.

**Resources** – include agency programs, workgroups, websites, and documents. Documents often include state agency plans or strategies (e.g., Oregon’s Conservation Strategy), helping to show how the Strategy complements and supports other state initiatives. Other items to include here might be work products (reports, studies, etc.) from agencies working on that action.

## Agency Acronyms

The action summary pages use acronyms for the lead and supporting state and federal agencies.

### State Agencies

BIZOR	Business Oregon
DAS	Department of Administrative Services
DOGAMI	Department of Geology & Mineral Industries
DLCD	Department of Land Conservation & Development
DSL	Department of State Lands
ODA	Department of Agriculture
ODEQ	Department of Environmental Quality
ODF	Department of Forestry
ODFW	Department of Fish & Wildlife
ODHS	Department of Human Services
ODOE	Department of Energy
ODOT	Department of Transportation
OEM	Office of Emergency Management
OHA	Oregon Health Authority
OPRD	Parks and Recreation Department
OSMB	Oregon State Marine Board
OSU	Oregon State University
OWEB	Oregon Watershed Enhancement Board
OWRD	Water Resources Department

### Federal Agencies

BLM	Bureau of Land Management
BPA	Bonneville Power Administration
FEMA	Federal Emergency Management Agency
NFWF	National Fish and Wildlife Fund
NOAA	National Oceanic and Atmospheric Administration
NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

The 2024 Strategy carries forward the goals and objectives from the 2012 and 2017 Strategies. Actions needed to accomplish the goals and objectives of the Strategy are described throughout the following four chapters. Many actions accomplish more than one objective. A summary is provided below. Relevant objectives are also listed at the beginning of each chapter, under “Actions at a Glance.”

**Goal 1 – Improve Our Understanding of Oregon’s Water Resources**

**Objective 1 – Understand Water Resources**

<p><b>Chapter 1</b> Funding, Actions 1A-1C</p>	<p><b>Chapter 2</b> Education, Actions 2A-2C Coordination &amp; Collaboration, Actions 3A-3D Place-Based Efforts, Action 4A Land Use Planning, Actions 5A Natural Hazard Mitigation Planning &amp; Extreme Events, Actions 6A-6C</p>	<p><b>Chapter 3</b> Water Resource/Supply Information, Actions 7A-7E</p>
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**Objective 2 – Understand Instream and Out-of-Stream Needs**

<p><b>Chapter 1</b> Funding, Actions 1A-1C</p>	<p><b>Chapter 2</b> Education, Actions 2A-2C Coordination &amp; Collaboration, Actions 3A-3D Place-Based Efforts, Action 4A Land Use Planning, Actions 5A Natural Hazard Mitigation Planning &amp; Extreme Events, Actions 6A-6C</p>	<p><b>Chapter 3</b> Instream &amp; Ecosystem Water Needs, Actions 8A-8C Out-of-Stream Water Needs, Actions 9A-9B</p>
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**Objective 3 – Understand the Pressures that Affect our Needs and Supplies**

<p><b>Chapter 1</b> Funding, Actions 1A-1C</p>	<p><b>Chapter 2</b> Education, Actions 2A-2C Coordination &amp; Collaboration, Actions 3A-3D Place-Based Efforts, Action 4A Land Use Planning, Actions 5A Natural Hazard Mitigation Planning &amp; Extreme Events, Actions 6A-6C</p>	<p><b>Chapter 3</b> Improve Water Resource/Supply Information, Actions 7A-7E Define Instream &amp; Ecosystem Water Needs, Actions 8A-8C Define Out-of-Stream Water Needs, Actions 9A-9B</p>
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**Goal 2 – Meet Oregon’s Water Resource Needs**

**Objective 4 – Meet Instream and Out-of-Stream Needs**

<p><b>Chapter 1</b> Funding, Actions 1A-1C</p>	<p><b>Chapter 4</b> Healthy Ecosystems, Actions 10A-10E Clean Water, Actions 11A-11C Water Use &amp; Management, Actions 12A-12G Water Infrastructure, Actions 13A-13C Water &amp; Energy, Actions 14A-14B</p>
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## Guiding Principles

How Oregon carries out the development and implementation of the Strategy is guided by a set of principles, including accountability, a balanced approach, collaboration, employing an open and transparent public process, reasonable cost, science-based approaches, streamlining, and other principles memorialized as part of the Strategy's development. The guiding principles developed by the first Policy Advisory Group still ring true today.

### Accountable and Enforceable Actions

Ensure that actions comply with existing water laws and policies. Actions should include better measurement and enforcement tools to ensure desired results.

### Balance

The Strategy must balance current and future instream and out-of-stream needs supplied by all water systems (above ground and below ground). Actions should consider and balance tradeoffs between ecosystem benefits and traditional management of water supplies.

### Collaboration

Support formation of regional, coordinated, and collaborative partnerships that include representatives of all levels of government, private and non-profit sectors, tribes, stakeholders, and the public. Collaborate in ways that help agencies cut across silos.

### Conflict Resolution

Be cognizant of and work to address longstanding conflicts.

### Facilitation by the State

The State should provide direction and maintain authority for local planning and implementation. Where appropriate, the State sets the framework, provides tools, and defines the direction.

### Incentives

Where appropriate, utilize incentive-based approaches. These could be funding, technical assistance, partnerships/shared resources, regulatory flexibility, or other incentives.

### Implementation

Actions should empower Oregonians to implement local solutions; recognize regional differences, while supporting the statewide strategy and resources. Take into account the success of existing plans, tools, data, and programs; do not lose commonsense approach; develop actions that are measurable, attainable, and effective.

### Interconnection/Integration

Recognize that many actions (e.g., land-use actions) in some way affect water resources (quality and/or quantity); recognize the relationship between water quantity and water quality; integrate participation of agencies and parties.

### Public Process

Employ an open, transparent process that fosters public participation and supports social equity, fairness, and environmental justice. Advocate for all Oregonians.

### Reasonable Cost

Weigh the cost of an approach with its benefits to determine whether one approach is better than another, or whether an approach is worth pursuing at all. Actions should focus on reducing the costs of delivering services to the state's residents, without neglecting social and environmental costs.

### Science-Based, Flexible Approaches

Base decisions on best available science and local input. Employ an iterative process that includes "lessons learned" from the previous round. Establish a policy framework that is flexible. Build in mechanisms that allow for learning, adaptation, and innovative ideas or approaches.

### Streamlining

Streamline processes without circumventing the law or cutting corners. Avoid recommendations that are overly complicated, legalistic, or administrative.

### Sustainability

Ensure that actions sustain water resources by balancing the needs of Oregon's environment, economy, and communities.



# CHAPTER 1

## Funding

The chronic underfunding of state agencies, local governments, and water infrastructure has contributed to the water insecurity people and the environment are now experiencing. Climate change is increasing pressure on our ecosystems and water supplies and heightening awareness about the weaknesses in our water management systems.

Documents published in recent years further emphasize the need to invest in water:

*“The state’s water infrastructure suffers from decades of disinvestment and natural resource agencies lack funding and capacity to properly enact their duties.”*

-Secretary of State Advisory Report 2023-04 (2023)

*“Management Challenge: We have underinvested in our built and natural water infrastructure, and our ecosystems. Investments in water planning and projects are not fully coordinated at the community, regional or state levels, and there has not been a concerted conversation about how Oregon will fund its future water needs.*

*Management Opportunity: We can coordinate our current investments and seek new sustainable, dedicated public and private funding for restoration of ecosystems, and built and natural infrastructure. Coordinated and new investments will ensure communities – including Oregon’s federally recognized tribes and those people living in disproportionately impacted and rural communities - can afford and access adequate clean water, and return it to our rivers for downstream users, fish, and wildlife.”*

-Oregon’s 100-Year Water Vision (2020)

## Chapter 1 Actions at a Glance

**Objective 1: Understand Oregon’s Water Resources**

**Objective 2: Understand Instream and Out-of-Stream Needs**

**Objective 3: Understand the Pressures that Affect Our Needs and Supplies**

**Objective 4: Meet Oregon’s Instream and Out-of-Stream Needs**

**Critical Issue - Funding**

- 1A Fund Development and Implementation of Oregon’s Integrated Water Resources Strategy
- 1B Fund Water Resources Management Activities at State Agencies
- 1C Invest in Planning, Feasibility Studies, and Water Resources Projects

The 2023 Secretary of State Advisory Report regarding water security ([Report 2023-04](#)) identified that natural resource state agencies are chronically underfunded and understaffed in relation to their respective responsibilities<sup>1</sup>. Meeting the water challenges of today and tomorrow will require an increased investment in state agencies and programs.

Most Strategy actions require some type of funding, whether it is to hire or keep agency staff, purchase equipment, hire a specialist/consultant, or design and implement a project. Recent progress has been made increasing the state’s spending on water. Highlights from the 2021 and 2023 Legislative sessions are provided, below. This section concludes with three distinct Strategy Actions; funding the development/implementation of the Strategy, funding water resources management by state agencies, and assisting with local water challenges by funding planning, feasibility studies, and water projects.

### The Business Case for Investing in Water

The [Business Case for Investing in Water in Oregon](#)<sup>2</sup> outlines the risks, opportunities, and benefits associated with making some specific investments in water. The report finds that “Oregon should invest in ways that increase resiliency and flexibility and should do so in advance of crises rather than in response to crises.” Figure 1-1 outlines the reports five guideposts for investment and offers the corresponding location in the Strategy where these issues and actions are discussed.

**Figure 1-1 Business Case Guidance for Investment and Associated Strategy Actions**

Business Case Five Guideposts to Meet Oregon’s Current and Future Water Challenges	Actions in the 2024 Strategy most closely aligned with Guidepost
Invest in whole-watershed and <b>nature-based approaches</b> for a range of benefits including future avoided costs of potential negative impacts from climate change	Funding, Action 1C Land Use Planning, Action 5B Instream & Ecosystem Needs, Actions 8A-8D Healthy Ecosystems, Actions 10A-10E Infrastructure, Action 13A
Fund innovative governance and <b>policy adaptations</b> to increase flexibility of water management and capitalize on collaboration and creativity	Funding, Action 1B Healthy Ecosystems, Action 10E Water Use & Management, Actions 12E-12G
Focus on <b>modernizing infrastructure</b> across the landscape in ways that help address specific risks like flooding, stormwater management, reduced summer baseflow, shrinking glaciers, fish passage, etc.	Healthy Ecosystems Actions 10A-10B Infrastructure, Actions 13A-13C Energy & Water, Actions 14A-14B
Enhance water justice by authentically <b>engaging frontline communities</b> in policy and power and targeting investments so that benefits are distributed to these communities equitably	Funding, Action 1C Coordination & Collaboration, Action 3C
Recognize and invest to <b>support Tribal economic, spiritual, and cultural values</b> for water and fish and engage with Tribes as sovereign co-managers of the resource	Funding, Action 1C Coordination & Collaboration, Action 3A Instream and Ecosystem Needs, Actions 8A-8D Healthy Ecosystems, Actions 10A-10E Clean Water, Actions 11A-11C Water Use & Management, Action 12A

## Recent Legislative Investments in Water

### 2021 Legislative Water Package

The 2021 Oregon Legislature made historic investments in Oregon’s water future, with the passing of a \$538 million water package. Approximately \$500 million of the funding package came from the federal American Rescue Plan Act (ARPA). This funding resulted in investments in many types of water infrastructure across Oregon, through grants, loans, and direct appropriations and came at a time when many communities had experienced several years of consecutive drought and/or devastating wildfires. While funding was provided to agencies for some additional staff capacity, much of the water package included pass through funding where agencies used the money for contracting services or increasing funding through grant and loan programs. Continued funding for agency day to day operations remains a consistent funding challenge.

**Figure 1-2 Investments from the 2021 \$538 Million Water Package and Related Strategy Actions**

Investment Amount	Description	Related Strategy Actions
\$275.7 M	Direct appropriations of ARPA funding for drinking water, wastewater, and stormwater infrastructure projects throughout Oregon	1C, 11A-11C, 13A-13C
\$135.7 M	Public works funds and financial assistance programs to repair and replace water infrastructure	1C, 11A-11C, 13A, 13C
\$46.5 M	Regional and basin-specific projects (Deschutes & Willamette Basins, Wallowa & Newport dams, Umatilla County)	1B, 1C, 4A, 12B-12D, 13A-13C
\$39.9 M	Increase Oregon’s water supply	1B, 1C, 6B, 12D-12G, 13C
\$11.2 M	Modernize the data collection and technology used to monitor Oregon’s water supply	1B, 7A-7C
\$17.7 M	Water quality improvements (included research and technical assistance, TMDL development, fish screen/passage projects)	1B, 7A, 10B, 10E, 11A-11C, 13A
\$6.5 M	Make Oregon’s water infrastructure safer and more resilient	6A-6C, 11A-11C, 13A, 13C
\$5 M	Support Oregon’s 100-Year Water Vision, equitable water access, and state, local, and regional water planning	1B, 1C, 3A, 4A, 11A

### 2023 Drought Resilience and Water Security Package

The 2023 Oregon Legislature passed a Drought Resilience and Water Security Package, marking an important milestone in achieving support for many Strategy actions that address not only drought resilience, but many parts of water security. A fifteen-page summary of the [2023 Drought Resilience and Water Security Package](#) provides a list of the numerous pieces of legislation that support building drought resilience across Oregon. This funding package contains seven priority “focus areas,” related to actions found throughout the Strategy.

#### 1. Planning, Coordination, and Capacity - \$8.3M

This focus area included permanent funding for Place-Based Integrated Water Resources Planning, grants to support other types of planning and coordination, and staff to address water distribution and water rights and protest backlog reduction.

#### 2. Data and Analysis - \$8.8M

Notable investments included funding to update the statewide water availability model (WARS), continued support for the Oregon Water Data Portal, and expanded authority for the Water Resources Department to require water use reporting.

#### 3. Water for Families: Drinking Water Security - \$7.5M

Drinking water security will be enhanced by a new grant program to help water suppliers protect drinking water source areas, administered by the Oregon Watershed Enhancement Board. Additional investments include funding to research small community water system vulnerability and funding to expand the existing Water Well Abandonment, Repair, and Replacement Fund (WARRF).

**4. Water for Farms: Agricultural Resilience and Food Security - \$9.7M**

Funding has been allocated to help small-scale agricultural producers increase their resilience to drought and support the Oregon Community Food Systems Network to develop food hub infrastructure and drought resilience. Support was also provided for increasing access to agricultural water technical assistance through Oregon State University’s Extension Service and Agricultural Experiment Station.

**5. Water for Fish: Instream Priorities and Watershed Health - \$35.2M**

Increased investments were made to Oregon Department of Fish and Wildlife’s existing Fish Passage Fund and to the Oregon Conservation and Recreation Fund to improve wildlife passage and mobility and increase drought resilience in natural systems. Various funding sources were allocated for restoration across the state, including wetlands, floodplains, and watersheds impacted by western juniper.

**6. Water Project Investments – \$68.9M**

Funding associated with water project investment included direct appropriations for a range of water infrastructure projects, support for irrigation modernization projects, and a new grant program to complete feasibility studies and testing for potential aquifer recharge projects.

**7. Outreach and Engagement - \$4.4M**

This funding focus area included \$1.6M for the construction of a water system training center, to be managed by the Oregon Association of Water Utilities, facilitation support to continue the Tribal Water Task Force, and resources for the University of Oregon’s Just Futures Institute to research and address water needs of environmental justice communities.

### Remaining Funding Gaps

Even after the two consecutive biennia of significant investments in water infrastructure, planning tools, and technical assistance, funding needs remain. Underinvestment in water infrastructure has been a problem for decades and will take time to adequately address. Small communities continue to need technical and financial support for water infrastructure, including assistance in pursuing grants. Financial incentives continue to be needed to encourage the agricultural sector to or senior water rights holders to dedicate water instream. Some agencies have seen flat funding for carrying out regulatory responsibilities and water management duties that do not keep up with increased costs or increased responsibilities. Funding for technology infrastructure and administrative support have not been increased proportionally with growth in some agency programs.

### Fund Oregon’s Integrated Water Resources Strategy

Funding is needed to carry out a robust public process in updating the Strategy, as well as guiding the ongoing implementation of the Strategy actions. In 2013, the Water Resources Department was successful in establishing a full-time position dedicated to implementing, tracking, and updating the Strategy. Agency priorities later shifted, leading to a loss of the position. However, during the 2021 Legislative session, the Department was awarded one limited duration position, with the position becoming permanent during the 2023 Legislative session. The 2023 Legislative session also resulted in the addition of staff positions at other agencies to support the Strategy, including one staff member to the Department of Agriculture, two at the Department of Environmental Quality, and three at the Water Program at the Department of Fish and Wildlife.

**Action 1A**  
Fund Development and Implementation of Oregon’s Integrated Water Resources Strategy

Since 2009, Oregon has been required to update the Strategy every five years. However, in 2023, the Oregon Legislature extended this period to a maximum of every eight years, also adding the requirement for developing a biennial agency work plan to implement the Strategy. These changes go into effect after the adoption of the 2024 Strategy. Staff support across many agencies will be needed to coordinate efforts in developing the biennial work plan and implementing the Strategy’s four objectives and 47 actions.

Ongoing implementation of the Strategy requires effort for coordination and communication. Updating the Strategy involves coordination with tribes, interested parties, the public, multiple federal and state agencies, briefings of boards and commissions, and countless hours collecting information on Oregon’s water-related policies, programs, and practices. Consistent resources for Strategy coordination, implementation, and updates will allow for steady progress towards understanding and meeting our states instream and out-of-stream needs.

## Fund Water Resources Management at State Agencies

Although some of the Strategy actions fall under the purview of the private sector, nonprofit organizations, or academic institutions, the majority of actions will fall to the public sector, particularly state agencies. The state plays a complex role when it comes to water resources management—supporting economic development while also protecting the public interest in areas like the environment, public health, and public safety.

**Action 1B**  
Fund Water Resources  
Management Activities at  
State Agencies

In light of the historic investments Oregon has made in water over the last two biennia, it is important to continue to build upon these investments, while not losing sight of core responsibilities related to water. For day-to-day operations at state agencies, there are many examples of Strategy implementation activities that require funding:

- Coordinating and partnering with other agencies and public and private entities
- Updating plans and participating in federal, state, and local planning activities
- Improving scientific information, including data collection, analysis, sharing, and use in decision-making
- Updating technical tools, including software, databases, maps, models, field equipment, and education/outreach materials
- Protecting and restoring instream flow, habitat, and access, including fish passage and fish screening
- Providing engineering, scientific, permitting, regulatory and other technical expertise to partners, interested parties, and customers
- Developing, issuing, and renewing permits that are protective of water resources
- Conducting compliance, public health/safety monitoring and inspections
- Monitoring for and preventing invasive species, toxics, pollution, and hazards

## Sources of Agency Funds

The operating budgets of Oregon’s natural resource agencies depend on a variety of funding sources, and the source can dictate the activities of an agency’s time, staff, and resources. There are four primary funding mechanisms for most natural resource agencies: General Funds, which comprise the majority of agency operating budgets, lottery funds, federal funds, and fees. Economic development activities, for instance, are often partially supported by fee revenues or contract funds for work performed. Environmental protection activities have often depended on federal funds.

The General Fund is used for a variety of public purposes and the amount of General Fund is limited, meaning there is competition for these dollars. The Legislatively approved budget for 2023-25 shows the General Fund investment in natural resources agencies equated to almost 2 percent, or \$606 million, of the \$31.9 billion General Fund budget. The budget for 2021-2023 was also about 2 percent of the General Fund, however, the previous decade consistently allocated closer to 1 percent of the General Fund to natural resource agencies.

Over the years, natural resources agencies have become increasingly reliant on lottery funds and federal funds, which are often geared toward specific, local projects, rather than maintaining core functions and daily operations. Many natural resource agencies also rely on fees however, these funds do not cover the real cost of conducting transactions.

An agency's ability to maintain consistent levels of staffing and services requires consistent general fund and fee revenue. When fee revenue is low, an agency must administratively manage the budget to control costs. This includes leaving positions across the agency open as they become vacant and shifting general funds, or other available funding sources, to cover fee gaps. This ultimately results in misalignment between staffing levels and workloads agencywide. Often, as water becomes scarcer, the work required of natural resource agency staff becomes more complex and time consuming and fees are typically not enough to recoup the costs.

Federal funding sources can help support targeted agency projects, and most recently, provided a much-needed boost to help replace and upgrade water infrastructure. Many federal funding opportunities require state matching funds, highlighting the need to have state resources available to leverage federal dollars. Federal funding for many core environmental protection programs carried out by the state, such as the Clean Water Act, have remained flat for many years. As a result, program service levels have been reduced, elevating the need for additional sources of funding.

## Invest in Planning, Feasibility Studies, and Project Implementation

### Planning

Planning is done successfully by ensuring that resources exist to help organize people and facilitate the conversation. It also takes resources to gather existing information and to complete new technical assessments that fill key knowledge gaps. In any planning effort, communication and outreach are fundamentally important and require investment of both time and resources.

Investments are needed to support existing state agency planning programs and new planning initiatives. The Strategy identifies planning actions throughout Chapter 2, Planning and Partnerships (Actions 3A-6C).

### Feasibility Studies

Local communities find it most difficult to secure feasibility study funding as part of their project development. Such studies help determine the viability of a project as well as the environmental, engineering, economic, and social implications of proposed water projects.

One way Oregon can help with costs is to bridge the existing funding gap for feasibility studies. In 2008, the Water Resources Department began providing funding for Feasibility Study Grants. Since then, approximately \$9.9 million has been awarded to support 120 feasibility studies. The funding opportunity underwent a programmatic review in 2020-21 and several improvements were identified and will be implemented over time.

Business Oregon and Oregon Health Authority provide funding for feasibility studies through the Sustainable Infrastructure Planning Projects forgivable loan program. Business Oregon also funds feasibility studies through other programs, including the Safe Drinking Water Revolving Loan Fund and Water/Wastewater Financing Program.

**Action 1C**  
Invest in Planning,  
Feasibility Studies, and  
Water Resource Project  
Implementation

Oregon Watershed Enhancement Board can also fund feasibility studies through their Technical Assistance Grants, if the applicant can demonstrate it is necessary for an acquisition or restoration project. The Department of Land Conservation and Development offers Technical Assistance Grants for public facilities feasibility studies in support of housing production.

### **Water Resource Project Implementation**

The Strategy identifies many actions needed to meet instream and out-of-stream water demands. Many of these actions point to types of projects that are needed, such as ecological restoration (Actions 10A-10E), modernizing irrigation infrastructure (Actions 12B & 13A), or upgrading water infrastructure to be more resilient to climate change and natural hazards (Actions 6A-6C, 13A, and 13C). Fortunately, many state agency programs currently exist that can help fund a wide range of water projects. The Oregon Watershed Enhancement Board has grant programs that can fund many aspects of a restoration project including community engagement, technical assistance, construction, and monitoring. Business Oregon has numerous grant and loan programs that fund site assessment, remediation, and water infrastructure planning, design, and implementation. The types of water infrastructure projects that receive funding include drinking water supply, stormwater conveyance, wastewater treatment, water storage, and levees.

The Water Resources Department's Water Projects Grants and Loans Program funds evaluation, planning, and the development of instream and out-of-stream water projects that have an economic, environmental, and social or cultural benefit. The Irrigation Modernization Funding program is also led by the Department, providing grants for projects that improve water use efficiency on currently irrigated agricultural lands.

The Oregon Department of Environmental Quality leads the Clean Water State Revolving Fund, which provides below-market rate loans for water infrastructure projects. Business Oregon and the Oregon Health Authority partner on the Drinking Water State Revolving Fund which provides low-cost loans to community and non-community water systems for planning, design, and construction of drinking water facility improvements.

Many federal funding sources are available to support restoration and infrastructure projects.



## Fund Development and Implementation of Oregon's Integrated Water Resources Strategy

### Lead Agencies

OWRD

### Supporting Agencies

BIZOR, DLCD, DOGAMI, ODA, ODEQ, ODF, ODFW, ODOE, ODSL, OHA, OPRD, OSMB, OWEB, Many federal agencies

### Partners

Tribes, local governments, individuals, interested parties, Legislature

### Background

Oregon Revised Statute ([ORS 536.220](#)) directs the Oregon Water Resources Department to lead the development and implementation of the Integrated Water Resources Strategy (Strategy), with support from other agencies and with input from tribes, the public, and interested parties. Statute also identifies specific state agency roles and responsibilities. Funding is needed to guide Strategy development, updates, and implementation.

### Example Actions

- Fund implementation and OWRD-led coordination of the Integrated Water Resources Strategy
- Fund the development and implementation of biennial Strategy workplans
- Fund the required Integrated Water Resources Strategy updates, including support from partner agencies
- Fund communication resources regarding the Strategy including web-based information and translations

### Resources

#### *Agency Programs*

OWRD's Director's Office (leads development/updates to the Strategy)

Refer to state agency programs listed on Strategy Action Summaries for Actions 1B through 14B

#### *Workgroups*

Interagency IWRS Project Team, OWRD IWRS Team, Federal Liaison Team, Water Core Team, Tribal Water Task Force

#### *Authorities*

Oregon Revised Statute, [ORS 536.220](#)

### Lead Agencies

Legislature

### Supporting Agencies

BIZOR, DOGAMI, DLCD, ODA, ODEQ,  
ODF, ODFW, ODOE, ODSL, OHA,  
OPRD, OSMB, OWEB, OWRD, Many  
federal agencies

### Partners

Tribes, local governments,  
individuals, interested parties

## Background

The state's core responsibilities related to water, including those described throughout the Integrated Water Resources Strategy, must continue to receive funding to protect the public's water resources. State agencies lead the budget development process, working with interested parties, local governments, tribes, and others to understand resource needs for the next biennium. Agencies must communicate the importance of investing in water to the Oregon Legislature.

The Oregon Legislature made significant investments in water during the 2021 and 2023 sessions, and it is critical maintain the momentum and interest in water to address water security and protect Oregon's natural resource legacy for future generations.

## Example Actions

- Fund those water management activities for which the state has responsibility
- Ensure increased and adequate funding from the General Fund
- Seek additional funding sources (e.g., federal funding, bonding)
- Provide funding for agency operations and equipment (e.g., administration, information technologies, interagency coordination, data acquisition and management)
- Allow agencies to adjust fees to ensure that their programs protecting water resources are sustainably funded
- Evaluate and implement opportunities to improve equitable delivery of services by state agencies
- Support agency capacity to carry out the Strategy

## Resources

State agency biennial budgets  
[2023-2025 Governor's Budget](#)

## Invest in Planning, Feasibility Studies, and Water Resource Project Implementation

### Lead Agencies

BIZOR, DLCD, ODA, ODEQ, ODF, ODFW, OPRD, OWEB, OWRD

### Supporting Agencies

DOGAMI, ODOE, ODSL, OSMB, OHA

### Partners

Tribes, local governments, utilities, irrigation districts, SWCD's, watershed councils

## Background

Investing in planning, feasibility studies and water resources-related project implementation is critical to ensuring communities and the environment can adequately meet their future water needs. Planning is done successfully by ensuring that resources exist to help organize people, apply for and administer funds, and facilitate the conversation. It also takes resources to gather water resources information and to develop new data that fill key knowledge gaps. Feasibility studies help determine the environmental, engineering, economic, and social implications of proposed water projects prior to significant investment. Finally, reliable and sufficient funds are needed to implement a wide range of water resource projects aimed at meeting Oregon's instream and out-of-stream needs.

## Example Actions

- Continue to authorize and fund public and private investments in efforts such as Place-Based Integrated Water Resources Planning, **including plan implementation**
- Provide funding to assist small water systems to develop **and implement** water management and conservation plans
- Provide funding to support hazard mitigation planning (e.g. droughts, floods) at the local level
- Support river basin-planning updates
- ~~Continue to provide OWRD administered Feasibility Study Grants to help evaluate the feasibility of water conservation, storage, and reuse projects~~
- ~~Review and update the Feasibility Study Grants program based on lessons learned since 2008~~
- Authorize bonds to finance **these investments in water resource-related projects**
- Ensure that basic **water infrastructure** maintenance needs continue to be eligible for grant and loan funding
- Advocate for continued state and federal funding for water and wastewater-related infrastructure
- Develop funding and technical support for low-income, small communities, and districts to maintain, upgrade, and operate water and wastewater-related infrastructure
- Continue funding and support for watershed restoration and OWEB Focused Investment Partnerships
- Continue to fund ~~Oregon Water Resources Department~~ **OWRD Feasibility Study Grants, Water Project Grants and Loans, and Water Well Abandonment, Repair, and Replacement funding opportunities** ~~Program~~
- ~~Review and update the Water Project Grants and Loans program based on lessons learned~~
- **Continue to provide BIZOR and OWEB administered grants that cover feasibility studies**
- **Support water project community engagement, including participation by representatives of disproportionately impacted communities (See HB 3293 (2021) that applies to BIZOR, ODEQ, ODFW, OHA, OWEB, and OWRD)**
- **Targeting investments so that benefits are distributed to frontline communities equitably**
- **Look for ways to support the federal Justice40 Initiative, a goal that 40 percent of benefits of specific federal investments are directed toward those marginalized, underserved, and overburdened by pollution**

## Resources

### *Agency Funding Programs*

[BIZOR grant, loan, and tax incentive programs](#), [DLCD Housing Technical Assistance Grants](#) (for public facilities feasibility studies in support of housing production), [OWEB Grant Programs](#), [OWRD Place-based Water Planning Fund](#) (under development), [Feasibility Study Grants](#), [Water Projects Grants and Loans](#), [ODEQ Clean Water State Revolving Fund](#)

Many additional agency funding programs exist for project implementation

## References

Add 100 Year Water Vision  
Business Case for Water, July 2023  
State of Water Justice Report, 2022  
2017 IWRS?

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<sup>1</sup> Oregon Secretary of State. 2023. Advisory Report: State Leadership Must Take Action to Protect Water Security for All Oregonians. Salem, Oregon. <https://sos.oregon.gov/audits/Documents/2023-04.pdf>

<sup>2</sup> Pilz, D., Kruse S., Raucher R., Clements J., Gardner T., Odefey J., Madsen T., Purkey A., Sheridan C., McCoy A., Ehrens A. 2023. The Business Case for Investing in Water in Oregon. [https://www.oregon.gov/owrd/WRDPublications1/230721\\_FINAL\\_Business\\_Case\\_for\\_Water\\_in\\_OR.pdf](https://www.oregon.gov/owrd/WRDPublications1/230721_FINAL_Business_Case_for_Water_in_OR.pdf)

# CHAPTER 2

## Partnerships & Planning

Oregon must plan and prepare for existing and unexpected challenges in meeting instream and out-of-stream water needs. Multi-year droughts, floods, and extreme temperatures will continue to affect both water resources and water needs now, and into the future. Ensuring access to water is imperative, as is addressing environmental justice issues through the inclusion of impacted communities in planning. Adequate preparation for these challenges will require strengthening partnerships and providing the public broader access to decision-making processes that shape long-range plans.

The first critical step is providing a foundation of education around water, ensuring youth and adults have access to information about water science, how it is governed, water challenges, how they can conserve and protect water resources, and other stewardship practices. Expanding our collective knowledge about water can increase the attention and care we devote to protecting our shared resource.

Partnerships require coordination and collaboration at many levels, with tribal, local, federal, and state governments working closely together with a broad spectrum of people and communities. In 2016, a pilot place-based integrated water resources planning process began, led by four communities across Oregon. Place-based planning efforts hold promise by bringing together resources to help communities chart a path, in partnership with the State, towards meeting instream and out-of-stream water needs. In 2023, the Legislature authorized the Water Resources Department to establish a permanent program to support more community-initiated water planning efforts.

Beneficial water uses on land have implications for both water quantity and quality, therefore thoughtful land use planning can help communities prepare for climate, population, and economic changes. Identifying potential risk from natural hazards is also an important planning objective, so it is important to help communities prepare for extreme weather events like droughts and floods.

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## Chapter 2 Actions at a Glance

### **Objective 1: Understand Oregon’s Water Resources**

### **Objective 2: Understand Instream and Out-of-Stream Needs**

### **Objective 3: Understand the Pressures that Affect Our Needs and Supplies**

#### **Critical Issue – Education & Outreach**

- 2A Promote Community Education and Outreach
- 2B Support Implementation of K-12 Environmental Literacy Plan
- 2C Provide Career Training for Oregon’s Next Generation of Water Professionals
- 2D Identify Water Research Needs & Partnerships

#### **Critical Issue - Coordination & Collaboration**

- 3A Partner with Federal Agencies, Tribes, and Neighboring States in Long-Term Water Resources Management
- 3B Improve State Agency Coordination
- 3C Lead Meaningful Community Engagement

#### **Critical Issue – Water Planning**

- 4A Support Integrated Place-Based Planning and Other Water Planning Efforts
- 4B Coordinate State and Local Natural Resource Plans

#### **Critical Issue - Land Use Planning**

- 5A Improve Integration of Water Information and Land Use Planning
- 5B Encourage Low Impact Development Practices and Green Infrastructure

#### **Critical Issue - Natural Hazard Mitigation Planning & Extreme Events**

- 6A Plan and Prepare for Drought & Wildfire Resiliency
- 6B Plan and Prepare for Flood Events
- 6C Plan and Prepare for a Cascadia Earthquake & Tsunami Event

Pressures on our water resources, including population shifts and climate change, make careful use and management critical to Oregon's future for both people and the environment. Assisting the public with access to information and continued understanding our water resources and challenges, can help the public engage in water stewardship actions.

## Promote Community Education and Outreach

State and federal agencies offer a variety of educational resources and programs. Oregon is also home to an extensive network of community-based organizations that offer technical assistance and information on water quantity, water quality, and watershed-related issues. With 45 soil and water conservation districts and 76 watershed councils, Oregon is well positioned to advance locally-led education and outreach efforts.

### Action 2A Promote Community Education and Outreach

Many drinking water providers and non-profit organizations in Oregon have also developed their own educational and outreach materials, making them available to the public. Oregon should continue providing support and technical training to soil and water conservation districts, watershed councils, and other on-the-ground organizations. State agencies need to continue to expand their role in community education and outreach, including supporting community-based organizations and smaller water providers. One way to do this is to increase outreach and educational resources, providing communications in multiple languages and making them accessible to a variety of learning styles.

The important role that state agency field staff play in on-the-ground education is further supported by Strategy Action 12F in Chapter 4.

**Soil and Water Conservation Districts** - In 1939, the Oregon Legislature passed legislation to establish conservation districts in Oregon. Oregon's soil and water conservation districts (SWCDs) are special districts which provide for the conservation of renewable resources and serve as an important educational resource. SWCDs work with local landowners and residents, natural resource organizations, natural resource users, and local, state, and federal governments and agencies to conserve natural resources, control and prevent soil erosion, conserve and develop water resources and protect water quality. They also preserve wildlife, conserve natural beauty, and promote collaborative conservation efforts to protect and enhance healthy watershed functions. They are governed by an independently elected board of directors and are funded through grants, contracts for services, and in some cases a property tax levy. The Oregon Department of Agriculture provides statutory oversight and assistance to the 45 SWCDs, and maintains an [interactive map](#) showing district service areas.

**Watershed Councils** - The 1995, the Oregon Legislature unanimously passed House Bill 3441 to provide guidance on the formation of watershed councils. Oregon watershed councils are groups of people who meet regularly in local communities to assess conditions in a given watershed and implement projects that support ecological restoration or enhancement that benefits local economies, fish and wildlife, people, and water quality and quantity. Watershed councils work with local, state, and federal partners and private landowners and serve an important role in community education. Councils are designated by county governments and are expected to have broad and balanced representation and viewpoints. There are 76 locally designated watershed councils as defined by Oregon Revised Statutes 541.890 (14) and 541.910. Other watershed organizations and groups exist, but do not meet this definition. The Oregon Watershed Enhancement Board currently funds 56 of the 76 watershed councils and maintains an [interactive map](#) showing council service areas.



## Select Educational Resources

State and federal agencies offer a wide range of educational resources. A brief list of resources addressing water conservation, water quantity and quality, environmental stewardship, and recreation are provided below, reflecting some of the educational needs heard during the Strategy engagement efforts throughout 2023. Several resources focusing on youth-specific education are provided in Action 2B.

### Water Efficiency & Conservation

One of the most mentioned concerns during outreach and engagement for the 2024 Strategy was access to information and tools for accomplishing water conservation. Education resources are listed below, and resources for implementing conservation practices are address in Strategy Action 12B “Improve Water Use Efficiency and Water Conservation.” The Water Resources Department currently offers the following resources that provide information regarding water conservation:

- [Water Conservation Fact Sheets](#) (for residential, farm/ranch, and municipal users )
- [Allocation of Conserved Water Program](#)
- [Instream Lease](#)
- [Instream Transfer](#)
- [Water Projects Grants and Loans and Irrigation Modernization Funding](#)
- [Guidebook for Municipal Water Management and Conservation Plan](#)
- [Guidebook for Agricultural Water Management and Conservation Plan](#)

**Agriculture & Forestry** - At the federal level, the Natural Resources Conservation Service provides information about [water conservation techniques and resources](#) for farmers, ranchers, and forest landowners.

**Graywater Reuse & Rainwater Harvesting** - The Department of Environmental Quality offers information about permitting and constructing [graywater reuse](#) systems, which can conserve water by reducing a business or household’s demand on drinking water supplies. The Building Codes Division of the Department of Consumer and Business Services developed an [Oregon Smart Guide to Rainwater Harvesting](#).

### Water Quality Information and Advisories

The public must have access to information about the quality of water for drinking, recreating, or food harvesting (e.g., shellfish and fish).

The Oregon Health Authority maintains several sources of information specific to drinking water. The [Resources for Consumers](#) webpage includes helpful links to information about water quality for public systems and private wells. A [mapping tool](#) is also available depicting the location of active drinking water advisories.

Harmful algal blooms (HABs), can make water unsafe in which to drink or recreate. HABs can also make it unsafe to consume fish from affected waters. The Oregon Health Authority has expanded its [education and outreach resources](#) and offers a communications toolkit for drinking water providers. The Oregon Health Authority also provides [recreational advisories](#), informing the public about the presence of HABs, high levels of bacteria at Oregon’s beaches, and shellfish harvest closures. More information about HAB monitoring and advisory programs is provided in Chapter 4, Actions 11A-11C.

**Protecting Water Quality** – While it is important for Oregonians to know how to access information about water quality, there are also ways that individuals can participate in protecting water quality. Here are just a few examples:

- [Drug Take-Back Program](#), administered by the Department of Environmental Quality, provides a convenient and safe way to dispose of unwanted or expired prescription and over-the-counter medicines. This prevents people from flushing medicines down the drain or putting them in a landfill, where they can degrade water quality and cause environmental harm.
- Oregonians that get their water from a domestic well can learn about well stewardship in the Well Owner’s Handbook ([English](#) or [Spanish](#)), which includes information about proper installation and maintenance of domestic wells, wellhead protection, testing wells for contaminants, interpreting the results, addressing any contaminants
- Septic system owners can learn about proper care and maintenance to prevent groundwater contamination through the Department of Environmental Quality’s [Septic Systems](#) webpage. Additionally, the [Oregon Septic Smart Initiative](#) provides resources to ensure the longevity of the system and find an industry professional to inspect your system.

### **Environmental Stewardship & Recreation**

Awareness and enjoyment of water resources helps people use water responsibly and promotes water resource protection. The Recreation Trails, Scenic Waterways, and grant programs for local governments administered by the Oregon Parks and Recreation Department, for example, help increase access to water-based outdoor recreation and enhance stewardship of the state’s waterways. Support for responsible, sustainable recreation is one way to encourage social investment in protection of these resources.

Another example is the Oregon State Marine Board, which offers numerous environmental and recreation-based boating safety programs, often partnering with other agencies such as the Department of Fish and Wildlife and Parks and Recreation Department. Some of these programs include:

- [Water Wits](#), a K-12 curriculum with interactive lessons in boating, water safety, and marine stewardship
- [Interactive Boat Oregon Map](#) of public boating access facilities, launch ramps, boating obstructions, Certified Clean Marinas, pumpouts and floating restrooms, clear gasoline locations, rivers where personal watercraft (e.g. jets skis) are allowed, boating regulations, and boating waterways.
- Information on boating obstructions, found at [www.boatoregon.com/obstructions](http://www.boatoregon.com/obstructions).
- Nationally accredited [boater education courses](#)
- [Free online paddling education](#) and promotion of Oregon Water Trails
- [Aquatic Invasive Species Prevention Program](#)
- [Clean Marinas](#)
- [Clean Boaters](#)
- Oregon Department of Fish and Wildlife’s [Angler Education Program](#)

## Support Oregon’s K-12 Environmental Literacy Plan

### Environmental Literacy Plan

In 2009, the Governor and the Oregon Legislature launched the development of an Environmental Literacy Plan as part of the No Child Left Inside Act. Oregon is the first state to pass legislation directly related to the development of an environmental literacy plan. Last updated in 2013, the Environmental Literacy Plan is aimed at helping students become lifelong stewards of their environment and community, exercising the rights and responsibilities of environmentally literate citizenship, and making choices to interact frequently with the outdoor environment. The program also supports teachers by providing professional development training, guidance for conducting research and assessment, maintaining a database of resources, and building capacity through partnerships (Oregon Environmental Literacy [Resource Directory](#)). In 2014, Oregon State University became the administrative body overseeing the [Environmental Literacy Program](#) to help implement the plan.

**Action 2B**  
Support Implementation  
of K-12 Environmental  
Literacy Plan

### Other Resources

**Children’s Clean Water Festival** - The [Children’s Clean Water Festival](#), held annually in the Portland metro area, is a community-supported event, organized by public, private, and non-profit organizations committed to water and environmental education in Oregon. The festival’s goal is to teach fourth and fifth grade students that they can have positive impacts on water resources, including lessons on the water cycle, watersheds, stormwater, drinking water, water conservation, and wastewater. The festival’s [website](#) currently provides ‘Festival Lessons’ that can be accessed anytime.

**Outdoor School** - Oregon State University also serves in a leadership role for Oregon’s “Outdoor School” program, a week-long field-science curriculum for fifth and sixth graders, focusing on the environment, natural resources, economic development, and related careers. Since the late 1950s, nearly one million students have participated, studying natural sciences and the responsible use of natural resources alongside students from other schools. Participation in Outdoor School varies by school district and has not been available on a statewide basis.

**Salmon and Trout Enhancement Program’s Fish Eggs to Fry** – The Oregon Department of Fish and Wildlife’s Salmon and Trout Enhancement Program provides valuable tools, resources, and support to provide education opportunities in and outside the classroom as well as in the community. One of the most popular programs is “Fish Eggs to Fry” where salmon or trout eggs are raised in a classroom incubator, giving students first-hand experience with how water quality impacts fish survival.

**Project WET** - An additional source of high quality, water-related curricula exists for K-12 educators. Project WET, established in 1984, has a coordinating center at Western Oregon University, and other coordinating centers located nationally and internationally. Project WET’s materials, available for a fee, provide a good overview of water quality and quantity issues, focusing on topics such as watersheds, wetlands, oceans, sanitation and hygiene, water history, and more.

**4-H Youth Development** - The 4-H Youth Development Program is the largest out-of-school youth program in the United States. The program is over 100 years old and was developed to share new agricultural developments with young people in rural communities. Today 4-H opportunities are available in every Oregon county, delivered through Oregon State University Extension Service. Example learning topics relevant to water stewardship include agriculture, geology, forestry, and horticulture.

## Provide Career Training for the Next Generation of Water Professionals

Challenges posed by climate change, aging infrastructure, and population increases have increased the demand for water professionals. Water professionals are needed in a wide range of specialties, including water and wastewater treatment, well drilling, science, engineering, policy, law, planning, engagement, and science communications.

**Action 2C**  
Provide Career Training  
for the Next Generation of  
Water Professionals

An alarming national shortage of workers exists in the water utility sector, including water and wastewater treatment operators. This shortage will become more critical as a large percentage of the utility industry becomes eligible for retirement. Upcoming retirements from the Baby Boomer generation will impact other job sectors too, elevating a need for more graduates are needed to fill the demand.<sup>i</sup>

Oregon State University hosts a website of [water-related education and training programs](#) offered by Oregon's public universities and community colleges. The [Office of Community Colleges and Workforce Development](#) also provides a listing of colleges that offer water-related courses, degrees, and programs throughout Oregon. The American Water Works Association, the Water Environment Federation, and the U.S. Environmental Protection Agency have partnered to create a website to promote career choices in the water sector geared toward jobseekers of all levels: [workforwater.org](#).

### Water Utility Workforce

During the 1970s and 80s, the water and wastewater treatment industry grew rapidly to fulfill the requirements of the federal Clean Water Act and the Safe Drinking Water Act. In the next ten years, approximately one-third of drinking water and wastewater operators will be eligible for retirement, and filling those jobs requires a new set of technical skills.<sup>ii</sup> In 2020, the U.S. Environmental Protection Agency launched the [America's Water Workforce Initiative](#) to respond to this challenge, acknowledging the environmental and public health implications associated with operations and maintenance of essential drinking water and wastewater infrastructure. The Initiative identifies needed partnerships across federal, state, tribal, and local governments along with public utilities, the private sector, community groups, and educational institutions. The Initiative's goal is to help make water a career of choice through education and sustained public outreach.

The U.S. Environmental Protection Agency also developed a grant program to build a pool of skilled and diverse workers in the water and wastewater utilities sector. During 2023, the [Innovative Water Infrastructure Workforce Development Grant](#) Program offered more than \$20 million nationally for various workforce development activities.

Administrative challenges associated with providing water and wastewater services, like staffing and skilled trades to support and maintain municipal water systems, may have cascading impacts on the ability of cities and special districts to function. The Oregon Community College Association reports that out of the seventeen publicly chartered community colleges in Oregon, only Clackamas Community College offers a water and wastewater operator training program. Umpqua Community College offers a water quality technician program. Lane and Clackamas Community Colleges offer a water conservation technician program—specializing in the connection between energy and water efficiency. Certification and training programs are critical resources for plant operators.

In 2023, the Oregon Legislature authorized \$1.6 million to the Oregon Association of Water Utilities to construct a Water System Training Center.

### Oregon Science, Technology, Engineering, and Math (STEM) Hubs

Legislation passed in 2015 led to the establishment of "Oregon STEM" and several regional Science, Technology, Engineering, and Math (STEM) Hubs across the state to increase access to STEM education

and develop a skilled workforce. The program has since been expanded to include art, now referred to as “STE(A)M” learning opportunities. There are currently 13 STE(A)M Hubs that provide equitable learning opportunities for students through partnerships with local leaders, PreK-20 education, after school programs, local industry, and community-based organizations serving youth. Oregon STEM published an [impact report](#) in 2023, which included a finding that STE(A)M Hubs advance equity for historically underserved students.<sup>iii</sup>

### **Other Careers in Water**

Numerous programs for science, planning, engineering, law, and other water careers are available at community colleges and universities throughout Oregon. However, there is still a need to increase water professionals, including diversity, entering the work force to meet demand and fill openings left by retirements.

Agencies and professionals in the private sector could assist with recruitment through participation in K-12 career days, offering job shadow programs, and internships. Establishing and maintaining programs between state agencies and colleges and universities can also provide an opportunity for students to learn about water-related career paths.

## **Identify Water Research Needs & Partnerships**

The water resources sector will need to continue identifying ongoing research needs that could use assistance from undergraduate and graduate students, public and private universities, research institutions, and other partners. Partnerships between higher education and both the public and private sectors can result in innovative solutions for addressing water quantity and quality challenges.

**Action 2D**  
Identify Water Research  
Needs and Partnerships

Research collaboration between agencies and higher education may be mutually beneficial, as research institutions can bring innovative tools, technology, and other resources to the effort, while agencies can bring expertise in data, evidentiary and scientific standards, and management knowledge.

Several state and federal agencies offer internship programs for students to gain real-world experience. Business Oregon, for example, has an internship program that includes work in clean technology and renewable energy. Other agencies – the Department of Fish and Wildlife, Department of Forestry, and Water Resources Department – often provide summer internships or seasonal employment opportunities to support monitoring and assessment projects, or other field-based activities.

Some current and upcoming research needs that might be well suited for partnerships with higher education include:

- Research into the application of artificial intelligence (AI) into data processing (e.g., processing streamflow data) (also see Action 7C)
- Continued development of techniques to quantify ecological flow needs, particularly channel maintenance and pulse flows (also see Action 8B)
- Improved techniques for remote sensing of water use (also see Action 9A)
- Prediction of water temperature through remote sensing (also see Action 7A)

### Lead Agencies

DSL, ODA, ODEQ, ODF, ODFW,  
ODOE, OHA, OPRD, OSMB,  
OWEB, OWRD

### Supporting Agencies

USEPA, USFWS, USGS

### Partners

Tribes, OSU Extension Service,  
SWCD's, watershed councils,  
community-based organizations

## Background

Public engagement for the 2024 Strategy revealed a desire for more access to information about water. Oregonians want to learn more about water, how it is governed, how they can conserve and protect water resources, and other stewardship practices. State and federal agencies and partners need to increase capacity to provide this education, and partner with community-based organizations to reach more people. Communications efforts need to be responsive to community language and format needs. See Action 2B for additional educational resources.

## Example Actions

- Look for opportunities to keep the general public **Oregonians** informed about the importance of water resources **to people and the environment**
- Look for opportunities to provide outreach, **including informational materials**, about **water-related programs** **streamflow restoration, water conservation, transfers, and other programs and tools**
- Promote technical training for public and private partners
- Promote access to water-related recreational opportunities using state programs
- **Develop a centralized location and outreach materials for people to access information about water conservation**
- **Develop and distribute informational materials related to the suite of tools available to protect instream flow**
- **Partner with community-based organizations to deliver water education to the public**
- **Resource interested local organizations to conduct education and outreach to the communities they serve**
- **Increase outreach and education resources to produce communications in multiple languages and accessible to a variety of learning styles**

## Resources

### *Agency Programs*

OPRD's Recreation Trails and Scenic Waterways Programs, OSMB's Water Wits and Interactive Boat Oregon Map, Soil and Water Conservation Districts, Watershed Councils, OHA Drinking Water and Domestic Well Safety Programs, ODFW Angler Education Program, OWRD Well Safety Program, Field Services Division, Technical Services Division, and Water Rights Services Division, Interagency Pesticide Stewardship Partnership

### *Documents/Websites*

OHA Drinking Water – links to several [videos](#)  
 OHA Domestic Well Safety Program – visit [healthoregon.org/wells](http://healthoregon.org/wells)  
[2018 Water Rights in Oregon: An Introduction to Oregon's Water Laws](#)  
[2015 OWRD Fact Sheets for Strategies to Save Water](#)  
[Well Owner's Handbook](#)  
[Well Owner's Handbook \(Espanol\)](#)  
[Human Health and Well Water](#)  
[Water Quality and Pesticides](#)  
[Agricultural Water Quality Resources](#)  
[Water Wits](#)  
[Free online paddling education](#) and promotion of Oregon Water Trails  
[Aquatic Invasive Species Prevention Program](#)  
[Clean Marinas](#) and [Clean Boaters](#) Programs  
[Angler Education Program](#)

### **Lead Agencies**

Oregon Department of  
Education, OSU

### **Supporting Agencies**

BLM, ODEQ, ODFW, OPRD, OWRD, USGS

### **Partners**

Many cities, utility districts, non-  
profits

## **Background**

Oregon's Environmental Literacy Plan is aimed at helping students become lifelong stewards of their environment and community. Administered by Oregon State University Extension, the current Environmental Literacy Program [website](#) provides resources for teachers and community members. The goals of the plan are to: prepare students to understand and to address the major environmental challenges; contribute to students establishing a healthy lifestyle through outdoor experiences in the school curriculum; and give teachers opportunities for enhanced professional development.

## **Example Actions**

- Support funding for implementation (e.g., Outdoor School, Children's Clean Water Festival)
- Natural resource agencies, community organizations, and others should engage in education for environmental literacy activities
- **Incorporate environmental justice, and culturally-specific water stewardship values in environmental literacy programs**
- **Engage and support culturally-specific community-based organizations in the design and implementation of environmental literacy programs**

## **Resources**

### *Agency Programs*

Oregon's Environmental Literacy Program, Oregon's Outdoor School Program, Outdoor School Education Fund  
ODFW's Salmon and Trout Enhancement Program ([Fish Eggs to Fry](#))

### *Events*

Children's Clean Water Festival, <https://www.cleanwaterfestival.org/>

### *Documents*

[2013 Environmental Literacy Plan](#)  
[Environmental Literacy Resource Directory](#)

### **Lead Agencies**

ODA, ODEQ, ODFW, OHA,  
OWRD

### **Supporting Agencies**

NRCS, NOAA, USEPA

### **Partners**

Tribes, Oregon Association of Water Utilities, community colleges, OSU, Oregon STEM, American Water Works Assoc.

## **Background**

In the next ten years, approximately one-third of water and wastewater operators in the U.S. will be eligible for retirement. The water utility workforce has important implications for environmental and public health protections. Additionally, challenges posed by climate change, aging infrastructure, and population increases has increased the demand for a wide variety water of professionals. Water professionals are needed in a wide range of specialties, including water and wastewater treatment, well drilling, science, engineering, risk assessment, policy, law, planning, engagement, and science communications.

## **Example Actions**

- Determine whether career training programs are available and equipped to meet the coming demand for water professionals
- Offer job shadow programs to expose students to careers in water
- Continue funding support for water-related trade and science programs at Oregon community colleges
- Increase coordination between state agencies and universities to develop programs that foster interest in water-related fields and career progression for graduating students
- Offer paid apprenticeship or internship programs to expose BIPOC and underrepresented students and new professionals to careers in water
- Partner with Hispanic Serving Institutions (HSI) to increase support for water-related trade and science programs at Oregon community colleges and universities

## **Resources**

### *Agency Programs*

[OWRD Certified Water Right Examiner Annual Training](#), [OWRD Well Constructor Continuing Education](#), [OHA Drinking Water Systems Operator Certification](#)

### *Websites*

[Oregon Association of Water Utilities](#)

[Oregon STEM Hubs](#)

[Pacific Northwest Section – American Water Works Association](#)

[USEPA’s Water Sector Workforce Initiative](#)

[Workforwater.org](#) – website promoting career choices in the water sector

[Office of Community Colleges and Workforce Development](#) – provides a listing of colleges that offer water-related courses, degrees, and programs throughout Oregon

[OSU Traditional Ecological Knowledge Lab](#), <https://tek.forestry.oregonstate.edu/>

### *Funding*

[NOAA’s National Sea Grant College Program](#), <https://seagrant.noaa.gov/>

[USEPA’s Innovative Water Infrastructure Workforce Development Grant Program](#)



### Lead Agencies

DLCD, ODA, ODEQ, ODF, ODFW, ODOE, OWRD

### Supporting Agencies

DOGAMI, NOAA, NWS, OWEB, USGS

### Partners

Tribes, local governments, OSU Extension Service, public & private research institutions, Oregon Climate Change Research Institute

## Background

The water resources sector will need to continue identifying ongoing research needs that could use assistance from undergraduate and graduate students, public and private universities, research institutions, and other partners. Partnerships between higher education and both the public and private sectors can result in innovative solutions for addressing water quantity and quality challenges. Research collaboration between agencies and higher education may be mutually beneficial, as research institutions can bring innovative tools, technology, and other resources to the effort, while agencies can bring expertise in agency data, evidentiary and scientific standards, and management knowledge.

## Example Actions

- Continue to identify ongoing research needs at the local and state level
- **Support** partnerships with **state and federal agencies, tribes**, public and private institutions to address research needs
- **Fund** ~~Participate in~~ research initiatives
- **Consider research initiatives that would address frontline communities' environmental and climate justice challenges**

## Resources

### *Agency Programs*

ODA Natural Resources Programs, ODEQ Water Quality Program, ODFW Water Program, OWRD Technical Services Division and Field Services Division

### *Workgroups*

[Climate Impacts Research Consortium](#)  
[Oregon Climate Change Research Institute](#)  
[Oregon Water Futures](#)

### *Documents*

[2022 State of Water Justice in Oregon](#)  
[2022 Water Justice Framework](#)  
[2021 Oregon Climate Change Adaptation Framework](#)  
[Oregon Climate Equity Blueprint](#)

Coordination and collaboration continues to be a consistent theme in the Strategy. One of the 2017 Strategy “Guiding Principles” carried forward into the 2024 Strategy calls for collaboration to “support formation of regional, coordinated, and collaborative partnerships that include representatives of all levels of government, private and non-profit sectors, tribes, interested parties, and the public. Collaborate in ways that help agencies cut across siloes.”

Actions described below address ways to partner with the various levels of government, the public, and other interested parties to make meaningful progress on water challenges.

## Partner with Tribal Governments, Federal Agencies, and Neighboring States

Partnerships with tribes, federal agencies, and neighboring states continue to play an important and necessary role in Oregon’s management of water resources. A large percentage of Oregon’s landscape is managed by federal agencies, and Oregon shares groundwater and surface water, including three major rivers, with California, Washington, and Idaho. Oregon is also home to nine federally recognized tribes, all of which have responsibilities for protecting and managing water resources.

**Action 3A**  
Partner with Tribes,  
Federal Agencies, and  
Neighboring States on  
Long-Term Water  
Management

### State and Tribal Partnerships

The Strategy presents an opportunity to strengthen state and tribal government-to-government relationships. As described in Part 1, state agencies are directed by law to improve working relationships with the nine federally recognized tribes in Oregon. When requested by a tribe, agency directors engage in formal consultation with tribal leaders. These consultations often revolve around cultural and natural resource issues, water needs and water rights, water quality monitoring, or watershed management, protection, and restoration. Tribal members are represented on various agency boards, commissions, and committees to provide perspective and guidance.

Management of fisheries is an area where state and federal agencies work closely with tribal governments. In the Columbia River Basin, the Oregon Department of Fish and Wildlife works with the Columbia River Treaty Tribes (Nez Perce, Umatilla, Warm Springs, and Yakama), the Shoshone-Bannock Tribe, state fish and wildlife agencies in Washington and Idaho, the U.S. Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration on a variety of fisheries management and fish production issues under the [2008 - 2017 U.S. v. Oregon, Management Agreement](#).<sup>4</sup> The Agreement was developed and is being implemented under the ongoing supervision of the U.S. District Court.

To build upon existing working relationships with federally recognized tribes, the Oregon Department of Fish and Wildlife has entered into Memorandum of Agreements (MOAs) with several tribes to restore hunting and fishing opportunities and access for tribal members while increasing tribal sovereignty over management of fish and wildlife populations. The MOAs represent a voluntary, cooperative partnership to collaborate, share resources, and work as partners to develop and implement plans to protect, restore, and enhance fish and wildlife populations and their habitat within specific geographies of Oregon.

### State and Federal Partnerships

The role of the federal government in natural resources management, land management, and therefore, water resources management is significant. The federal government manages 53 percent of all land in Oregon, including 60 percent of forestlands. Part 1 discusses the roles of key federal agencies with water-related responsibilities. State

and federal agencies often work together on cooperative studies, such as groundwater basin studies, discussed in Chapter 3. Oregon also uses its Federal Consistency authority under the Coastal Zone Management Act to facilitate coordination between federal, state, and local authorities concerning federal actions in the coastal zone that have the potential to impact water resources.

The federal government also owns or manages key pieces of water infrastructure, including federal reservoirs that store water for irrigation districts, cities, industries, and landowners. Many federal projects also produce and sell power from several hydropower facilities in the Northwest. The U.S. Bonneville Power Administration manages mitigation programs to offset habitat losses associated with hydropower projects.

Biological opinions are developed by federal agencies, such as the U.S. Fish and Wildlife Service, and outline ways to reduce and minimize the effects of federally funded, authorized, or permitted actions on Oregon's species and critical habitats, making certain such actions don't jeopardize listed species or adversely modify critical habitat. Biological opinions can impact water operations and management, especially the use of stored water involving federally owned or operated reservoirs. Implementing actions in a biological opinion often requires close coordination and open communication with others, especially state agencies with water management, water quality, and fish and wildlife responsibilities.

A recent Biological Opinion by the Federal Emergency Management Agency will have implications for the State and local governments, relating to the National Flood Insurance Program. This emerging issue will require staff resources, at the state and local level, to understand and respond to the impacts of this biological opinion.

**Deschutes Basin Habitat Conservation Plan** – The Deschutes Basin is an area where irrigation interests and fish and wildlife needs have often been in conflict. Over 10 years ago, tribes, agencies, irrigation districts, and the public came together to forge a new approach to water management in the basin. The Deschutes Basin Habitat Conservation Plan (HCP) was finalized and approved by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in 2020, and 2021, respectively. The HCP offers many practices to better align the water management operations with the life-history needs of covered species. The aquatic species covered by the U.S. Fish and Wildlife Service in this HCP include the Oregon spotted frog and bull trout - both federally listed as threatened. The HCP has resulted in increased coordination across many interests which has helped the area navigate irrigation and wildlife challenges during consecutive years of drought.

## **Partnerships with Neighboring States**

Oregon shares surface water resources—the Snake River, the Columbia River, and the Klamath River, for example—with its neighboring states. It also shares significant groundwater aquifers with its neighbors, and coordinates data collection and sharing so that water managers on both sides of the border can manage the resource effectively. Oregon will continue to work with neighboring states to strive towards sustainable management of surface water and groundwater resources.

Oregon is collaborating with the State of Washington and the U.S. Geological Survey on a cooperative groundwater study in the Walla Walla Basin to better understand the hydrologic system and enable holistic water management decisions.

## **United States, Canada, and Tribes: Columbia River Management**

The [Columbia River Treaty](#) between the United States and Canada was ratified in 1964, bringing significant management efforts for flood control and power generation benefits to both countries. In 2024, certain aspects of the treaty are set to expire. The United States and Canada re-initiated earlier negotiations to modernize the Treaty in 2018. The U.S. Army Corps of Engineers and the Bonneville Power Administration, the agencies responsible for implementing the Treaty on behalf of the United States, conducted a multi-year effort to study these post-2024 Treaty issues. The [U.S. Entity Regional Recommendations for the Future of the Columbia River Treaty after 2024](#) recommends that the United States pursue a number of modifications to the Columbia River Treaty, along with

some unresolved domestic matters.<sup>5</sup> The U.S. Department of State is now leading efforts for updating the Columbia River Treaty.

On September 27, 2023 a Presidential Memorandum by the Biden-Harris Administration made a commitment to honor the United States' obligations to Tribal Nations to protect and restore America's natural wonders for future generations, while also recognizing the important co-benefits that the Columbia River provides to communities and businesses throughout the region. The Presidential Memorandum prioritizes the restoration of healthy and abundant wild salmon, steelhead, and other native fish populations to the Columbia River Basin.

### **Federal Columbia River System Operations**

The U.S. Army Corps of Engineers, Bonneville Power Administration, and Bureau of Reclamation prepared an Environmental Impact Statement under the National Environmental Policy Act for the Columbia River System in response to changing conditions in the basin. The system is comprised of 14 federal dam and reservoir projects in Idaho, Montana, Oregon, and Washington. The final Environmental Impact Statement, released in 2020, documents the review and environmental effects of implementing the Selected Alternative, proposing a variety of structural and operational changes.

### **Oregon, California, and Tribes: Restoration Agreements**

Representatives from Oregon and California, several federal agencies, tribal governments, counties, irrigators, and conservation and fishing groups signed the Klamath Basin Restoration Agreement<sup>6</sup> and Klamath Hydroelectric Settlement Agreement<sup>7</sup> in February 2010. The Upper Klamath Basin Comprehensive Agreement was later signed in 2014. These agreements set signatories on a path to comprehensive solutions for the Klamath Basin. However, Congress did not enact authorizing legislation and the Klamath Basin Restoration Agreement expired in December 2015 and the Upper Klamath Basin Comprehensive Agreement was terminated in December 2017.

The Klamath Hydroelectric Settlement Agreement has been amended twice and continues to be in place. The Agreement lays out the process for additional studies, environmental review, and a set of decisions by the Secretary of the Interior regarding the removal of four PacifiCorp dams. Removal of the four hydroelectric dams on the Klamath River, one in Oregon and three in California, are undergoing decommissioning in 2023 and 2024. A non-profit organization was formed to carry out the dam removal, the Klamath River Renewal Corporation. Following dam removal, restoration work is expected to continue for five to ten years. Over the next five years, there is a significant opportunity for the tribal nations, irrigators, and other interested parties in the Klamath to consider integrating water rights and requirements under the federal Endangered Species Act. Doing so will require collaboration to consider reworking irrigation infrastructure and water management practices while also addressing species recovery.

## **Improve State Interagency Coordination**

Given the distribution of water-related responsibilities across multiple agencies, it is critical that agencies coordinate to support one another's work. Agencies should seek to improve interagency coordination to ensure an efficient use of public resources. Communication tools are needed to help the public, local government, and community-based organizations navigate state agencies.

**Action 3B**  
Improve State Interagency  
Coordination

### **Interagency Permit and Grant Review**

Agencies utilize interagency permit review teams to enhance coordination and ensure permit conditions or limitations meet the needs of multiple agencies. The Departments of Environmental Quality and Fish and Wildlife contribute to water right permit review for the Water Resources Department, reviewing for impacts to water quality and fish and wildlife habitat.

Grants awarded for water or restoration projects often require review by multiple agencies. Some existing review teams include: Oregon Plan Monitoring Team (for the Oregon Plan for Salmon & Watersheds), Oregon Watershed Enhancement Board Technical Assistance Review Team, Water Resources Department feasibility study grants and water project grants and loans, and Business Oregon’s process for awarding water infrastructure grants and loans.

## Interagency Teams & Work Groups

Several state agencies perform monitoring activities, collect data, and have a need to share information to make timely decisions. The Oregon Stream Team represents many agencies with monitoring duties and has published a [Monitoring Strategy](#) to help guide these efforts. It is important to support work groups that provide for staff-staff coordination, as well as those that function at the leadership level.

## State Agency Coordination Program

Twenty-five state agencies have a State Agency Coordination (SAC) Program, which is intended to assure that its "rules and programs affecting land use" comply with the [statewide planning goals](#), and that agency actions are compatible with acknowledged city and county comprehensive plans and land use regulations. (See [ORS 197.180](#), [OAR 660-030](#) and [OAR 660-031](#).) Most SACs were certified by the Land Conservation and Development Commission around 1990. Since that time, only the Oregon Department of Aviation and Oregon Department of State Lands have written a new State Agency Coordination Program. State agency coordination programs must be updated to keep pace with changes to statutes, rules, and the creation of new programs or authorities.

## Lead Meaningful Community Engagement

Tribal communities, communities of color, low-income, and rural communities have faced years of inequitable environmental policies and exclusionary decision-making practices created and maintained by government institutions.<sup>8,9</sup> These communities are experts based on their lived experiences and this expertise must be centered in climate resilience and water planning work. However, common community engagement challenges such as resource allocation and trust-building with historically marginalized communities have limited meaningful engagement.

**Action 3C**  
Lead Meaningful  
Community Engagement

### Environmental Justice Tools and Resources

The U.S. Environmental Protection Agency has developed an environmental justice (EJ) mapping and screening tool called [EJSCREEN](#). It is based on nationally consistent data and an approach that combines environmental and demographic indicators in maps and reports. This screening tool highlights places that may have higher environmental burdens and vulnerable populations. EJSCREEN can also be used to support educational programs, grant writing, and community awareness efforts.

Oregon’s Environmental Justice Council was created by the Legislature to help protect Oregonians from disproportionate environmental impacts on minority and low-income populations. The Council is developing a statewide environmental justice mapping tool to provide more detail than EJSCREEN. The mapping project is scheduled to be completed in 2025.

Oregon’s Environmental Justice Council is a resource for agencies to create authentic community relationships, design inclusive programs and projects, and communicate honestly with community members to create and sustain meaningful community engagement and public participation.

[Oregon’s Climate Equity Blueprint](#) (2021) helps state agencies center equity at the forefront of climate adaptation work, not as an afterthought. The Blueprint provides a set of best practices for agencies to apply an “equity lens” as they design state policies, processes, and programs to address climate change. The Blueprint provides solutions to common challenges regarding meaningful engagement, which have been incorporated into the Action 3C summary, below.

Oregon Revised Statute 541.551 requires six state agencies to develop and adopt rules for best practices for community engagement. These practices have broad application for other state agencies as well. A report outlining the top ten best practices will be made available in 2024.

## Partner with Tribes, Federal Agencies, and Neighboring States in Long-Term Water Resources Management

### Lead Agencies

ODA, ODEQ, ODF, ODFW,  
ODOE, OWRD

### Supporting Agencies

BPA, BLM, FSA, NOAA, USACE, USBR,  
USEPA, USFWS, USGS, USDA, BIA, US  
Dept of Interior

### Partners

Tribes, State of California, State of  
Idaho, State of Washington, Canada

## Background

Partnerships with tribes, federal agencies, and neighboring states have and will continue to play an important and necessary role in Oregon's management of water resources. A large percentage of Oregon's landscape is managed by federal agencies, and Oregon shares groundwater and surface water, including three major waterways, with California, Washington, and Idaho. The Columbia Basin drainage basin includes a portion of Canada, large portions of Oregon, Washington, and Idaho, and small portions of Montana, Nevada, Utah, and Wyoming.

Oregon is also home to nine federally recognized tribes, all of which have cultural ties to and an interest in water, as well as responsibilities for protecting and managing water resources. The Strategy presents an opportunity to strengthen these government-to-government relationships.

## Example Actions

- Protect **tribal and state** Oregon's interests in shared surface water and groundwater basins
- Negotiate agreements such that water protected instream is shepherded across state lines to the mouth of the river
- Partner with **neighboring states** and tribes to continue or improve **managing shared resources** ~~access to additional sources of water~~
- **Carry out actions identified in the 2023 Tribal Water Task Force Report**
- **Coordinate with tribes on instream flow protection**
- **Conduct collaborative planning to develop water management approaches to protect species and avoid endangered or threatened listings**
- **Identify who may benefit, or be impacted by, long-term water management approaches**

## Resources

### *Workgroups*

Tribal Water Task Force  
Natural Resources Working Group  
Cultural Resources Cluster Group  
Legislative Commission on Indian Services  
Interstate Workgroups (Walla Walla, Idaho Power)  
Klamath River Compact Commission  
[Klamath River Renewal Corporation](#)  
[Kaizen pre-application teams](#)

### *Treaties, Inter-state Agreements*

Columbia Basin Fish Accords  
Klamath River Compact  
U.S. Department of State website: [Columbia River Treaty](#)  
Summary of [Active and Inactive Klamath Basin Agreements](#)

### *Documents*

[Walla Walla Groundwater Study](#)  
[Deschutes Basin Habitat Conservation Plan](#)  
[Federal Endangered Species Act species recovery plans \(USFWS & NOAA\)](#)

### Lead Agencies

BIZOR, DLCD, DOGAMI, ODA, ODEQ, ODF, ODFW, ODOE, ODOT, ODSL, OHA, OSMB, OWEB, OPRD, OWRD, and others

### Supporting Agencies

DAS

### Partners

OSU

## Background

Given the distribution of water-related responsibilities across multiple agencies, it is critical that agencies coordinate to support one another's work. Agencies should seek to improve coordination to exercise efficient use of state resources. Currently, coordination occurs through various interagency workgroups and forums, identified below. Agencies will need to collaborate on the development of interagency workplans to implement the Strategy.

Another opportunity for improved coordination is through the State Agency Coordination Program. Twenty five state agencies have a State Agency Coordination (SAC) Program, which are intended to assure their "rules and programs affecting land use" comply with the [statewide planning goals](#), and that agency actions are compatible with acknowledged city and county comprehensive plans and land use regulations. (See [ORS 197.180](#), [OAR 660-030](#) and [OAR 660-031](#).) Additional ways for agencies to improve coordination includes continuing existing or establishing new interagency permit review teams and program or topic-specific workgroups.

## Example Actions

- Update State Agency Coordination Programs in partnership with the Department of Land Conservation and Development
- ~~Design each agency permit "contingent" upon approval of all other state agency permits~~ Establish **efficient** procedures for cross-agency coordination and approval of relevant state agency permits
- **Develop interagency biennial workplan for implementing Strategy actions**
- **Develop formal memorandum of agreement/understanding (MOA/MOU) between agencies to establish clear and transparent expectations for interagency cooperation where agencies share affiliated authorities/responsibilities**
- **Support new and existing interagency review teams or interagency work groups**
- **Create tools to help the public, local government, and community-based organizations navigate state agencies**
- **Support the development and use of Oregon's Environmental Justice Mapping Tool**
- **Support interagency communication around community engagement (also see HB 3293 (2021))**
- **Address water quality and quantity concerns in Oregon's Natural Hazard Mitigation Plan (also see Actions 6A-6C)**
- **Support interagency coordination on waterway-specific management plans**

## Resources

### *Workgroups*

Conservation Effectiveness Partnership, Environmental Justice Council, Interagency Review Team, Oregon STREAM Team, Oregon Technical Advisory Committee, Regional Solutions Team, Water Core Team, Water Supply Availability Committee, Climate Change Adaptation Framework Implementation Team, Drought Readiness Council, Technical Review Teams for agency grant programs, Oregon Water Data Portal Steering Committee, Pesticide Stewardship Partnerships, Water Quality Pesticide Management Team, Willamette Action Team for Ecosystem Restoration, Natural Resource Enforcement Team

### *Documents*

[State Agency Coordination Plans](#)

[ODA-DEQ Nonpoint Source Pollution Memorandum of Agreement](#)

## **Lead Agencies**

DLCD, ODA, ODEQ, ODF, ODFW,  
OWEB, OWRD

## **Supporting Agencies**

BIZOR, OPRD, USEPA

## **Partners**

Tribes, community leaders,  
community-based organizations,  
non-profits, SWCD's, watershed  
councils, OSU Extension Service

## **Background**

Solutions to water challenges can often be found through collaboration with the impacted communities. Tribal communities, communities of color, low-income, and many rural communities have faced years of inequitable environmental policies and exclusionary decision-making practices created and maintained by government institutions. These communities are experts based on their lived experiences and this expertise must be centered in climate resilience and water planning work. Resources need to be made available for engagement, including to organizations that represent underserved/under-represented populations, as well as providing services necessary to facilitate engagement of members of those populations. Funding and resources to support participation in state-led planning, engagement, policy development and management activities will help ensure plans and projects meet the needs of those most impacted by them.

Oregon's Environmental Justice Council is a resource for agencies to create authentic community relationships, design inclusive programs and projects, and communicate honestly with community members to create and sustain meaningful community engagement and public participation.

## **Example Actions**

- Provide resources for capacity-building for community-based organizations
- Use accessible and inclusive engagement strategies
- Create opportunities for communities to identify and engage decision-makers
- Conduct outreach to invite underserved/under-represented populations to participate in planning activities
- Provide funding for agencies and organizations to sustain engagement over the life of a project
- Provide resources for facilitation and coordination, and staff experts in outreach and engagement best practices
- Use best practices for engagement as identified in the State of Oregon Diversity, Equity, and Inclusion Action Plan and other documents, including cultural and language-specific needs
- Use Oregon's environmental justice mapping tool and federal EJ Screen to evaluate potential impacted communities for state-led planning, engagement, policy development and management activities

## **Resources**

### *Policies*

Oregon's Environmental Justice Law, [House Bill 4077](#) (2021), [House Bill 3293](#) (2021)

### *Workgroups*

[Environmental Justice Council](#)

### *Documents*

[Climate Change Adaptation Vulnerability Assessment Report](#) (coming in 2024)

[State of Oregon Climate Equity Blueprint](#)

[State of Oregon Diversity, Equity and Inclusion Action Plan](#)

[State of Oregon Environmental Justice Task Force: Environmental Justice: Best Practices for Natural Resources Agencies](#)

### *Funding*

[EPA's Community Change Grants](#)



Water planning can occur in many forms and at different scales. Oregon currently has several water-infrastructure related planning mechanisms (e.g., water management and conservation plans, Goal 11 facilities plans, water master plans, wastewater facility plans) but would benefit from more holistic and integrated water planning. In the coming years, an effective statewide Strategy will require more extensive and integrated planning at the local/regional and state levels. Water is a finite resource, and effective planning will ensure its sustainable management for present and future generations. Water planning and management is crucial for balancing competing demands, mitigating water scarcity, protecting public health and the environment, and building resilience to climate change. Done properly, water planning can also facilitate dialogue, negotiation, and cooperation among stakeholders to resolve conflicts and promote equitable access to water resources.

## Place-Based Integrated Water Resources and Other Water Planning

Forging partnerships between local communities and state agencies through planning offers a unique opportunity for the implementation of a wide range of recommended actions described in the 2024 Strategy. From land-use practices to natural resources management and emergency preparedness, communities are well-positioned to build trust, hold difficult conversations, and make progress on issues beyond what state agencies can do on their own.

**Action 4A**  
Support Integrated Place-Based Planning and Other Water Planning Efforts

The 2012 Strategy tasked state agencies with creating a statewide framework for developing place-based integrated water resources plans. This resulted in the development of [Draft Planning Guidelines](#) that outline how communities can undertake place-based integrated water resources planning in partnership with state agencies. The process starts by building a collaborative and inclusive process with diverse water interests. Planning steps include characterizing water resources for the area and examining current and future instream and out-of-stream water needs. Ultimately, a place-based plan includes a set of prioritized, strategic, and integrated solutions to meet multiple water needs.

### Key Place-Based Planning Principles

- Locally-initiated and led collaborative process
- Voluntary, non-regulatory approach
- Includes a balanced representation of water interests
- Conducted in partnership with the state
- Addresses instream and out-of-stream needs, including water quantity, quality and ecosystem needs
- Utilizes an open and transparent process that fosters public participation
- Facilitates implementation of local solutions
- Builds on and integrates existing studies and plans
- Does not jeopardize existing water rights
- Recognizes the public interest in water
- Consistent with the principles in the Integrated Water Resources Strategy, and state laws and policy

### Providing Financial & Technical Assistance

In 2015, the Oregon Legislature passed [Senate Bill 266](#),<sup>10</sup> providing the Water Resources Department with authority to issue grants, enter into contracts or agreements, and provide technical assistance to pilot place-based planning. Following a funding solicitation process, four areas were selected to form planning collaboratives and develop place-based integrated water resources plans. These planning collaboratives have been able to leverage this funding to pursue significant in-kind and cash contributions from other funders and organizations.

In addition to serving an advisory role and providing financial support, state agencies also provide technical assistance to the planning collaboratives. Several state agencies – primarily Water Resources, Fish and Wildlife, Agriculture, and Environmental Quality – contributed time and resources to the planning efforts to better integrate

agency efforts at the local level. Many federal agencies, non-profits, private individuals, and foundations have also contributed resources, including staff, funding, and expertise.

Place-based planning enhanced inter- and intra-agency coordination and has improved access to agency data and information. The planning process also created the space for sharing local knowledge and agency expertise about water issues. Continued investments are critical to ensure agencies can partner with communities and provide ongoing support.

### Communities Undertaking Place-Based Planning

Consistent with the spirit of a place-based approach, the process and resulting plans reflect the unique characteristics of the areas they represent. Using the place-based planning framework, the planning groups brought together individuals and organizations representing instream interests (such as fish and wildlife needs and recreation), out-of-stream interests (such as agriculture, municipalities, domestic, and industry), as well as representatives from local, state, federal, and tribal governments.

These planning groups, in partnership with the State, continue to build the capacity to collaboratively solve water problems, improve coordination of existing information and plans, foster partnerships among different water sectors and water users, leverage public and private investments to maximize impact, engage the broader public in community conversations about water, and encourage continuous improvements in water planning and management. Place-based planning can help Oregon communities identify and develop widely supported project concepts that can meet multiple needs. Projects that are collaboratively developed and yield multiple benefits generally have a competitive edge for implementation funding.

Planning groups that formally adopt a plan can seek recognition from the Water Resources Commission. Three planning groups – the Upper Grande Ronde, Lower John Day, and Mid-Coast – have successfully adopted an integrated water resources plan, receiving the Commission’s recognition in 2022. Implementation is underway with federal funding through the American Rescue Plan Act. The Harney planning group took a slightly different planning approach due to pressing groundwater issues in the basin. The groundwater portion of the plan is complete, following an intensive groundwater study conducted by the US Geological Survey and the Water Resources Department. Partners are finalizing the surface water element of the plan and anticipate adoption and seeking the Commission’s recognition in 2024.

Place-Based Planning Groups
<b>Upper Grande Ronde River Watershed Partnership</b> Co-convener by Union County. <a href="http://union-county.org">union-county.org</a>
<b>Lower John Day Place-Based Partnership</b> Co-convener by the Gilliam County Soil and Water Conservation District and the Mid- John Day/Bridge Creek Watershed Council. <a href="http://lowerjohndaypbp.com">lowerjohndaypbp.com</a>
<b>Mid-Coast Water Planning Partnership</b> Initially co-convener by the City of Newport and the Water Resources Department. Other convener include Gibson Farms and Seal Rock Water District. <a href="http://midcoastwaterpartners.com">midcoastwaterpartners.com</a>
<b>Harney Community-Based Water Planning Collaborative</b> Co-convener by the Harney County Watershed Council and the Harney County Court. <a href="http://harneywaterfuture.com">harneywaterfuture.com</a>

### Independent Evaluation and Regional Water Planning and Management Workgroup

In 2021, the National Policy Consensus Center and Oregon State University’s Cooperative Extension Program conducted an extensive independent evaluation of the place-based planning program to document stakeholders’ perspectives regarding their experiences with the program as well as to suggest ways that the program could be improved. The [Participatory Evaluation](#) report highlights nine key lessons and notes positive outcomes from the planning process, beyond simply creating a plan.<sup>11</sup> These included productive discussions between previously polarized water interests, increased local support for plan implementation, the ability to use the plan to leverage funding, identifying key data gaps, increased knowledge of water resources, and the establishment of an actively engaged water planning network.

The independent evaluation also noted that the four planning groups and the core state agencies providing them with support, have invested considerable time, thought, and energy in putting the Legislature’s vision for place-based planning into action. The journey to completed Plans has been neither easy nor short, but much learning, skill-building, and social network building has taken place on the part of the planning groups and state agencies. State agencies now have a much better idea of where there are key data gaps and what steps the agencies can take to help fill them. By establishing a solid foundation that the state and communities can build on, the pilot place-based integrated water planning program improves the likelihood that Oregon can achieve the IWRS’ goal of meeting instream and out of stream water needs while also addressing water quantity, water quality, and ecosystem needs.

In 2022, the Regional Water Planning and Management Workgroup was formed, made up of diverse interests, place-based planning participants, tribes, and agencies to develop a framework and path for state-supported water planning and management at the region and/or basin level. After holding facilitated discussions for a year, the workgroup made a [set of recommendations](#) to inform policy development, funding, and guidance around water planning and management as well as recommendations for the next generation of place-based integrated water resources planning.<sup>12</sup>

The workgroup report highlights the need to make significant investments in water planning in order to meet statewide goals and mandates for managing instream and out-of-stream water needs with a changing climate . Specifically, any state-supported regional water planning effort must be underpinned with the budgets and capacity needed to do this work at the state level and to meet this need, state leadership must prioritize and address the current overarching system-level need for funding related to state agency data collection and analysis, agency capacity, and interagency coordination.

### **Next Steps for Place-Based Integrated Water Resources Planning**

In 2023, the Oregon Legislature made the place-based integrated water resources planning program permanent and allocated \$2 million to the Water Resources Department to support place-based planning. Work is underway to incorporate the lessons of the pilot phase, the independent evaluation, and recommendations of the Regional Water Planning and Management Workgroup into a permanent program. In order to succeed, place-based planning must be championed by local leaders, coordinated with state agencies, and supported by instream and out-of-stream interests across the state. It will require new partnerships, creative approaches to problem-solving, a continued commitment to improved coordination and integration, and sustained investments of time and money from the public and private sectors.

### **Other Water Planning Efforts**

Other communities across the state are pursuing integrated water resources planning at the basin scale. Partners in the Deschutes River Basin are developing a [comprehensive water plan](#) for the basin that aligns with Oregon’s place-based planning model, building upon years of extensive studies and collaborative projects and solutions. The State of Oregon, State of Washington, and Confederated Tribes of the Umatilla Indian Reservation co-led the development of the [Walla Walla Water 2050 Plan](#). The Partnership for Lake Abert and the Chewaucan conducted an assessment of collaborative possibilities in the Chewaucan Basin and is working on joint fact-finding and a shared narrative report. Many other places across the state are ready to engage in water planning.

Other water planning efforts should be supported. Water management and conservation plans, typically developed by larger public water suppliers, are planning tools that lay out steps to meet long-term water demands in the future. These plans can be costly and often small water systems lack the technical or financial capacity to develop these on their own. Providing funding to support development of municipal or agricultural water management and conservation plans could help those communities most in need. Refer to Action 1.C regarding investments in other water planning efforts.

Many western states have made water planning at the regional level an essential component to further develop and periodically update statewide water plans. In Oregon, water planning was completed river basin by river basin and largely implemented through administrative rule adoption. However, this type of comprehensive river basin planning has not occurred in more than thirty years. Over the years, the Water Resources Department has been able to update some of its rules with minor revisions, but a more comprehensive update would require planning-level support. Oregon will need to consider this gap in basin-level water planning in tandem with next steps for place-based integrated water resources planning. Gathering information and assessing the critical issues within each basin or region is essential for informing future updates to the Strategy.

## Coordinate Existing State and Local Natural Resource Plans

One of the major challenges of taking on a regional, more integrated approach to water planning is that in any given basin, there are multiple parties and interests to convene. These include irrigation districts, municipal water providers, conservation districts, watershed councils, drainage districts, wastewater and stormwater utilities, local governments (counties/cities), and environmental groups. In addition to this list are the state, federal, and tribal natural resource agencies with water, land, or fish management responsibilities, and other public, private, and nonprofit organizations with an interest in water management and resource issues.

Within a basin or sub-basin, multiple state and local planning documents that involve water management, directly or indirectly, exist. These plans can be contradictory or complementary. Coordination of these plans will lead to improved collaboration, resulting in greater benefits for natural resources.

In envisioning a place-based approach to water planning, these existing plans and programs do not go away, but instead provide a baseline of information, history, and rules that must be integrated into the water plan. A place-based approach can help reconcile and implement the state's programs and plans more effectively.

Any new water planning initiative should account for the time and resources needed to compile, review, and reference relevant statewide or local natural resource plans. Refer to the action summary below for a list of common state and local plans that should be consulted during new planning efforts.

**Action 4B**  
Coordinate State and  
Local Natural Resource  
Plans

### Lead Agencies

OWRD

### Supporting Agencies

DLCD, DOGAMI, ODA, ODEQ, ODFW, OHA, OWEB, USGS

### Partners

Tribes, local governments, citizens, SWCD's, watershed councils, interested parties

## Background

Forging partnerships between local communities and state agencies offers a unique opportunity for implementing of a wide range of recommended actions described in the 2024 Strategy. From land-use practices to natural resources management and emergency preparedness, communities are well-positioned to build trust, hold difficult conversations, and make progress on issues beyond what state agencies can do independently.

In 2015, the Oregon Legislature passed Senate Bill 266 giving the Water Resources Department authority to support place-based planning with grants and technical assistance. Four communities were chosen to pilot the program, using the [2015 Draft Planning Guidelines](#). The Oregon Legislature made the Place-Based Integrated Water Resources Planning Program permanent through the passage of House Bill 2010 during the 2023 Legislative Session. House Bill 2010 allocated \$2 million to the Water Resources Department to establish a permanent program and fund to assist communities with place-based planning and provided staff at several state agencies to support this work.

## Example Actions

- Promote success by continuing to support the places currently following the draft planning guidelines **and as they develop integrated implementation plans**
- Continue to provide financial and technical assistance to support collaborative water planning
- **Develop or recapitalize funding pathways for plan implementation to achieve instream and out-of-stream objectives**
- Promote peer-to-peer learning between communities pursuing collaborative water planning
- ~~Assess and review efforts thus far, soliciting input on place-based planning~~, Refine planning guidelines, and implementing process improvements
- **Update the program and establish rules in coordination with agencies identified in statute**
- **Include public outreach and engagement activities to encourage participation by under-represented populations**
- **Consider OWEB Focused Investment Partnership model to support plan implementation**
- **Offer place-based planning training for interested people and community groups**
- **Support a range of local or regional planning efforts (e.g., river basin-planning updates, water management and conservation plans)**

## Resources

### *Agency Programs*

OWRD's Planning, Collaboration, and Investment Section, OWRD's Place-Based Planning Fund

### *Workgroups*

Harney Community-Based Water Planning Collaborative

Lower John Day Basin Work Group

Mid-Coast Water Planning Partnership

Upper Grande Ronde River Watershed Partnership

Deschutes Basin Water Collaborative

Walla Walla 2050

### *Documents*

[2015 Draft Planning Guidelines](#)

2022 [Report of the Work Group on State-Supported Regional Water Planning & Management](#)

2022 [Oregon's Place-Based Integrated Water Resources Planning Program: A Participatory Evaluation](#)

### Lead Agencies

DLCD, ODA, ODEQ, ODFW, OWRD

### Supporting Agencies

USEPA, USFWS, NOAA, OWEB

### Partners

Tribes, Utilities, Irrigation Districts,  
SWCD's, Watershed Councils, Local  
gov'ts, non-profits

## Background

Within a basin or sub-basin, multiple planning documents that involve water management, directly or indirectly, may exist. These plans may be contradictory or complementary. Coordination of these plans can lead to improved collaboration, resulting in greater benefits for natural resources.

Existing natural resource plans can provide baseline information, history, and rules to consider and build upon during a place-based or other water planning efforts.

## Example Actions

- **Dedicate resources to** coordinate and reconcile existing planning documents
- **Support updates to local comprehensive land use plans**
- **Support Water Management and Conservation Plan development in conjunction with local land use planning**
- ~~Dedicate resources for state and local implementation of existing plans~~
- **Support the application of equity and social justice principals in plan reconciliation and updates**

## Resources

### *Documents*

DLCD – [Estuary Management Plans](#)

ODA - [Agricultural Water Quality Plans](#)

OWRD - [Water Management and Conservation Plans](#) (developed by municipal or irrigation water suppliers)

OWRD [Administrative Basin rules and studies](#)

ODFW - [Fish Conservation and Recovery Plans](#)

ODEQ - [Total Maximum Daily Loads](#) and associated Water Quality Management Plans

Local land use plans

[Place-Based Integrated Water Resources Plans](#)

Watershed restoration action plans

[Oregon Statewide Strategic Plan for Invasive Species \(2017-2027\)](#)

[Oregon Plan for Salmon and Watersheds](#)

[Oregon Conservation Strategy](#)

[Oregon Resilience Plan](#)

[Oregon Climate Change Adaptation Framework](#)

[Oregon Diversity, Equity, and Inclusion Action Plan](#)

[Local, Tribal and State Natural Hazards Mitigation Plans](#)

Land and water are connected in many ways. Land use planning is a process to regulate the location of different types of land uses, restricting or promoting various land uses through zoning and permitting, to protect the environment, conserve resources, and support economic growth. This is an important step in determining how best to develop the land to protect the quantity and quality of our water resources. The statewide land use program and its implementation by cities and counties is an important framework for integrating water resource issues with land use and development decisions.

This section covers considerations and regulation for land use planning which is distinctly different from regulating land management. Land management practices including pollution management are addressed in Chapter 4, under “Clean Water” identifying ways in which urban, farm, and forest practices are regulated to protect water quality for humans and the environment.

Considering Oregon’s projected changes in population, industrial, and commercial growth, communities need to adequately plan and prepare for meeting a larger demand on a shared resource. Water quality, water quantity, and ecosystems all need to be considered within the context of land use planning and development. Efforts aimed at directing development to appropriate areas and minimizing the impact of development can help meet statewide goals related to protection and use of water resources.

## Plan for Changes in Land Use

Oregon’s statewide land use planning program was designed to: foster livable and sustainable development; protect agricultural land, forest lands, and other natural resources; to conserve coastal and ocean resources; and to improve the well-being and prosperity of Oregon’s citizens, businesses, and communities. Originating in 1973 under [Senate Bill 100](#), the program positioned Oregon as a nationally recognized leader in the arena of land conservation and development.<sup>13</sup> Changes in land use in urban and rural areas can affect the function of forested lands, wetlands, riparian habitat, and other landscapes. When natural functions are impacted, there are consequences for our water resources.

### Local Comprehensive Plans

Land use planning is a function that resides with local planners, local planning commissions, boards, and councils, all of which include a public process and oversight from the Oregon Department of Land Conservation and Development. Local governments in Oregon are responsible for developing and implementing their own comprehensive land use plan that complies with the statewide planning goals, shown in Figure 2-1. The Land Conservation and Development Commission and the Department of Land Conservation and Development are responsible for reviewing city and county comprehensive plans for consistency with the Statewide Land Use Planning Goals.

When the Commission officially approves a local government’s plan, the plan is said to be “acknowledged.” Local governments then “adopt” the plan, and it becomes the controlling document for land use in the area covered by that plan. Local governments develop code to implement the plan.

**Figure 2-1: Oregon’s Statewide Land Use Planning Goals**

Oregon’s Land Use Planning Goals	
Goal 1 – Citizen Involvement	Goal 11 – Public Facilities and Services
Goal 2 – Land Use Planning	Goal 12 – Transportation
Goal 3 – Agricultural Lands	Goal 13 – Energy Conservation
Goal 4 – Forest Lands	Goal 14 – Urbanization
Goal 5 – Natural Resources, Scenic & Historic Areas, and Open Spaces	Goal 15 – Willamette River Greenway
Goal 6 – Air, Water & Land Resources Quality	Goal 16 – Estuarine Resources
Goal 7 – Areas Subject to Natural Hazards	Goal 17 – Coastal Shorelands
Goal 8 – Recreational Needs	Goal 18 – Beaches & Dunes
Goal 9 – Economic Development	Goal 19 – Ocean Resources
Goal 10 – Housing	

**Statewide Land Use Planning Goals** - There are several statewide land use planning goals that are relevant to water resources, specifically Goals 3, 4, 5, 6, 7, 11, 16, and 17. [Descriptions of all goals](#) are available on the Department of Land Conservation and Development’s website. Local governments coordinate with state agencies to ensure that land use decisions comply with statewide planning goals and local comprehensive plans as well as other applicable state regulations. This includes permit applications submitted by state agencies. State actions are needed to strengthen some of these goals. Specific needs are described below and included as example actions under Action 5A.

Goal 5 covers 13 resource categories, including wetlands, riparian areas, and groundwater resources. Goal 5 ground water resources include critical groundwater areas and restrictively classified areas designated by the Oregon Water Resources Commission, and certain wellhead protection areas. Oregon Administrative Rules for Goal 5 set procedures for local governments to identify and protect “significant natural resources.” Few local governments have completed planning for groundwater resources, particularly since completing the process for wellhead protection areas is not mandatory. Many communities have not updated their Goal 5 inventories since the 1980’s or 1990’s and therefore many important riparian, wetland, and wildlife habitat resources are not considered during the land use review process because they are not identified in the local plans. Resources are needed to support communities in updating their Goal 5 resource inventories.

Goal 7 directs local governments to adopt measures to reduce the risk to people and property from natural hazards, such as floods, landslides, earthquakes, tsunamis, coastal erosion, and wildfires. This goal directs jurisdictions to apply appropriate safeguards, such as hazard overlay area zones and review standards when planning for and authorizing new development. A local government addresses natural hazards in its comprehensive land use plan by adopting a natural hazard inventory and supporting plans and policies. A limited amount of [planning grant money](#) is available through the Department of Land Conservation and Development to help communities address these planning needs. There is no implementing rule for Goal 7, so comprehensive plans have been acknowledged for consistency with the goal based solely on participation in the National Flood Insurance Program. Additional information about planning for natural hazards is provided in the next section, Natural Hazard Mitigation Planning and Extreme Events (Actions 6A-6C). Funding for natural hazard inventories and Goal 7 rulemaking may help further protect people and the environment from flood hazards.

Goal 11 and its administrative rules require cities with populations greater than 2,500 to prepare public facilities plans addressing drinking water, wastewater disposal and treatment, and stormwater management needs. These plans focus on the costs and timing of infrastructure needs consistent with planned uses and coordination among providers within the jurisdiction. Funding the development and implementation of these plans can avoid water quality impacts associated with deteriorating infrastructure or systems operating beyond their design capacity.



**Periodic Review** - Periodic review is a process for certain local governments in Oregon to examine and, as necessary, update their comprehensive land use plan and implementing codes. The process was once mandatory, but now is voluntary. The intent of periodic review is to make sure that local comprehensive plans respond to changes in local, regional, and state conditions, are coordinated with other comprehensive plans and investments, and are in compliance with statewide planning goals, statutes, and rules. Requirements for who must complete periodic review and which statewide goals are addressed have been scaled back to focus on economic development and housing needs and no longer includes Goal 5 Natural Resources, Scenic & Historic Areas, and Open Spaces.

Excluding Goal 5 resources from periodic review can have cumulative impacts on water resources and associated sensitive habitats. In addition to updating Goal 5 inventories (described above,) there is a need to encourage and support periodic review and updates to comprehensive land use plans to reflect current Goal 5 resources.

## Plan for Population Changes in Oregon

Recent population projections indicate a slowing of statewide growth, compared with what Oregon has experienced in recent years. Oregon's Demographic and Population Outlook, published in March 2023 by the Oregon Office of Economic Analysis shows that Oregon's growth rate from 2020-2030 will be the lowest in recent history. This is due to an increase in deaths and rapid decline in births, with migration into the state providing for the only population increase.<sup>14</sup> Population changes will likely be experienced differently across the state, with some areas growing while others decline. Some areas that experienced growth in population over the last decade were also areas with known water resources issues. Planning for future development must consider pressures on Oregon's water resources, in terms of both water quantity and water quality and impacts to the environment and ecosystem services.

Each city and metropolitan area in Oregon has an [urban growth boundary](#) that separates urban land from rural land. The boundary contains a 20-year planning area for a city to plan to grow into considering the extension of public services, like water, sewer, and road networks, that will be required to serve future urban growth. By law, every city has to maintain a long-term supply of buildable land in its urban growth boundary to accommodate anticipated economic and population growth. The development of public facilities plans (Goal 11), municipal water management and conservation plan (when required by the Water Resources Department), or a Water Master Plan (when required by Oregon Health Authority) can help a municipality plan for growth.

Oregon's statewide planning program discourages "sprawling" development that takes place in rural areas, outside an urban growth boundary. However, rural development is permitted under certain circumstances. A county decides where rural development should be allowed by following what is called the "exceptions process." Rural residential, recreational, commercial, and industrial zones (in "exception areas") allow development in certain rural areas. The Land Conservation and Development Commission has listed allowed rural uses in its administrative rules. For example, non-farm and non-forest uses are permitted in exclusive farm use and forest zones. Goal 11 (public facilities) limits extension of urban services such as sewerage to areas outside of urban growth boundaries in order to lessen demand for urban development in rural areas.

### Housing

The Oregon Legislature passed House Bill 2001 in 2023 which aims to help communities meet the housing needs of Oregonians. The law requires Oregon's cities with a population over 10,000 to plan for and encourage housing production, affordability, and choice through the regular completion of a Housing Capacity Analysis and a Housing Production Strategy. The Department of Land Conservation and Development is responsible for the rulemaking associated with House Bill 2001 (2023).

This bill includes a new accountability system by which the state allocates need to all local governments, assigns housing production targets to cities above 10,000 population, and measures production and outcomes in these cities over time. If a city is falling behind relative to the region and peer cities, the Department of Land Conservation and Development is required to conduct an audit of the potential state and local barriers to production. This audit

process should take water availability and conservation measures into account in communities where future water supplies are known to be limiting factor for housing production. Meeting housing need will require cities to implement strategies that reduce per capita water demand to successfully facilitate production while minimizing impacts on water supplies. Developing or updating a Water Management and Conservation Plan may help communities plan for their housing needs, while sustainably utilizing and managing our limited water resources.

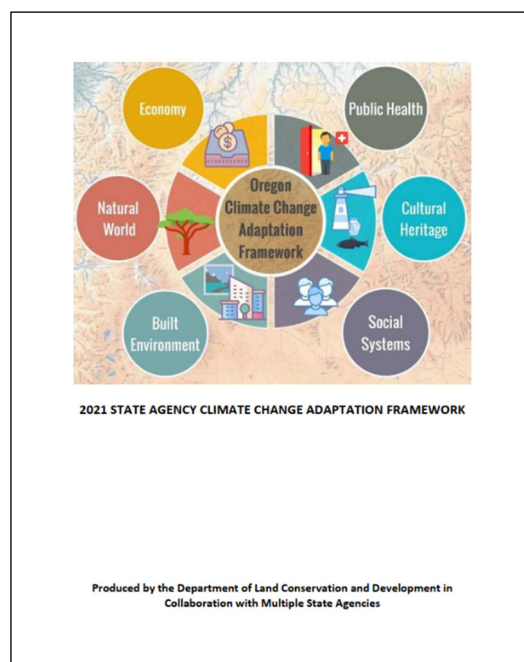
## Plan for Climate Change

Oregon’s Climate Change Research Institute published the sixth [Oregon Climate Assessment](#) in January 2023. The assessment outlines the status of climate science and future projections for temperature, precipitation, and wind speeds. The report also outlines climate-related natural hazards including extreme temperatures, drought, changes to the water cycle, wildfire, and coastal hazards and offers adaptation strategies. These assessments provide a reliable source of information for climate projections to consider for planning at the local and state level.

### Oregon’s Climate Change Adaptation Framework

The Oregon Department of Land Conservation and Development partnered with 24 state agencies to update the state’s Climate Adaptation Framework, published in 2021. The Framework addresses why we must adapt, provides guidance for implementing comprehensive climate change adaption, and describes vulnerabilities and adaptation strategies. It also includes a Climate Equity Blueprint that presents strategies for addressing climate and environmental justice. The Framework is being implemented by the Department of Land Conservation and Development hosting a weekly virtual meeting aimed at building a cooperative state agency community-of- practice around climate change adaptation.

A Climate Change Vulnerability Assessment, supporting the Framework, began in 2022 and is being completed in 2024. The Assessment will help us understand how climate change may affect existing and future social vulnerabilities across Oregon. The information gathered during the assessment will be used by agencies and policymakers to propose adaptation measures that support community needs, acknowledging that future community engagement will be needed before adaptation measures are implemented.



**Adaptation Strategies** – The Framework outlines several adaptation strategy goals that are supported by actions in this Strategy. Figure 2-2 shows the Framework goals, and corresponding Strategy critical issues and actions.

**Figure 2-2: Alignment of Framework Adaptation Goals and the 2024 Strategy**

Climate Change Adaptation Framework (2021)	2024 Integrated Water Resources Strategy
Adaptation Goals	Strategy Actions
<b>Economy</b> – Promote resilient, innovative, and inclusive Oregon economies that address climate change challenges and opportunities	Education & Outreach, Actions 2A-2C Water Resource/Supply Information, Actions 7C, 7F Healthy Ecosystems, Actions 10A, 10B
<b>Natural World</b> – Support robust functioning of Oregon’s terrestrial, aquatic, coastal, and marine ecosystems as the climate changes	Land Use Planning, Actions 5A, 5B Water Resource/Supply Information, Action 7C Instream & Ecosystem Needs, Action 8B, 8C Healthy Ecosystems, Actions 10A-10E
<b>Built Environment and Infrastructure</b> – Ensure Oregon’s building, utilities, and infrastructure are resilient to extreme weather and climate change	Natural Hazard Mitigation Planning & Extreme Events, Actions 6A-6C Water Use & Management, Actions 12B-12D Water Infrastructure Actions 13A-13C Energy & Water, Actions 14A, 14B
<b>Public Health</b> – Reduce climate-related health risks and promote Oregon community resilience, especially among people and communities who are disproportionately affected	Coordination & Collaboration, Action 3C Place-Based and Other Water Planning Efforts, Action 4A Healthy Ecosystems, Actions 10A-10E Clean Water, Actions 11A-11C
<b>Cultural Heritage</b> – Research, plan for and adapt to the impacts of climate change on Oregon’s cultural landscape	Coordination & Collaboration, Actions 3A-3C Natural Hazard Mitigation Planning & Extreme Events, Actions 6A-6C Water Resource/Supply Information, Actions 7C, 7E Instream & Ecosystem Needs, Actions 8A-8C Healthy Ecosystems, Actions 10A
<b>Social Relationships and Systems</b> – Create equitable, livable, and engaged Oregon communities in response to the impacts of climate change	Coordination & Collaboration, Action 3C Place-Based and Other Water Planning Efforts, Action 4A Natural Hazard Mitigation Planning & Extreme Events, Actions 6A-6C

## Integrate Water Information and Land Use Planning

Local government land use planners do not always have the tools or information needed to assess the positive or negative effects of their long-term planning decisions on water resources. The need to better integrate water management and land use planning is not a challenge unique to Oregon. Other states have addressed the lack of decision-making tools or information with:

- Laws and policies that force coordination through certain approval processes
- Financial incentives that link land use development proposals to beneficial water management strategies or projects (e.g., incentives for green infrastructure, see Action 5B)
- Training sessions and workshops where land use planners and water management staff interact
- Requirements for consultation with water agencies during updates to land use plans

**Action 5A**  
Improve Integration of  
Water Information and  
Land Use Planning

### How Local Governments Utilize State or Federal Agency Information

Local governments need access to information collected by state and federal agencies. Below are several examples of information or agency programs that support local land using planning.

**Natural Resource Information** - To protect and plan for Goal 5 resources, local governments may utilize data from the Oregon Department of Forestry’s stream classification maps, Oregon Department of Fish and Wildlife’s fish and

wildlife distribution maps, local, state, and federal wetland inventories, and the Federal Emergency Management Agency's floodplain maps.

**Source Water Assessments** - Source water assessments were developed by the Oregon Department of Environmental Quality and Oregon Health Authority and provide improved information about the natural- and human-caused risks within municipal drinking water source areas. Some local governments use maps showing municipal drinking water source areas and source water assessment reports (when available) to voluntarily initiate a process to protect drinking water sources. Cities and other public water suppliers are encouraged to use their source water assessment to identify risks and develop measures for protection of drinking water supply.

**Existing and Future Land Uses** - Municipalities consider water rights and their capacity to produce and distribute drinking water for uses within incorporated cities and districts. Access to existing land use data and future land use projections helps municipalities make critical water infrastructure investments to preserve and accommodate future demands.

**Demographic Information** - Population and employment forecasts are of interest to municipalities when estimating water demands for residential, industrial, and other uses. Individual studies conducted to evaluate land use requests, particularly to show that there is an adequate supply of groundwater for a proposed urban use, are frequently completed. The Portland State University [Population Research Center](#) produces county and urban growth boundary population projections, which are funded by the Department of Land Conservation and Development.

**Rural Water Supply** - Oregon's land use laws provide opportunities for counties to consider the appropriate level of rural development in areas that are not zoned for "resource" (i.e., farm or forest) use and to study whether new areas for development should be designated. Since rural development typically relies on wells, counties need data on the availability of groundwater early in the planning process to make informed decisions on what density of development to permit in rural development zones.

**Stormwater Management** - Local urban governments have many potential permitting relationships with the Oregon Department of Environmental Quality associated with stormwater. As noted in Part 1, the Department of Environmental Quality can identify certain federal, state, and local governments and agencies, including cities, counties, and special districts as a Designated Management Agency, with authority to manage and regulate water pollution listed in a Total Maximum Daily Load (TMDL) plan. Municipalities may also hold a municipal separate storm sewer (MS4) permit. A MS4 is a conveyance or system of conveyances, such as roads with drainage systems, municipal streets, catch basins, curbs, gutters, constructed channels or storm drains, owned or operated by a governmental entity that discharges to waters of the state.

Underground Injection Control systems (UICs) are a way to legally, through permit, emplace water (e.g., stormwater, remediation fluids, low-temperature geothermal return water) below ground. UICs often consist of a concrete structure (e.g., drywell), placed below ground that receives stormwater and then slowly releases it over time. The UIC program is managed by the Oregon Department of Environmental Quality and intended to prevent the contamination of groundwater. UIC locations are available to local governments and the public on a web-based map application. A user can enter an address or a latitude and longitude and check if there are permitted UICs at or near that location.

## **Data Gaps**

There are areas where data is lacking and improvements can be made to connect land use planning and water resources planning. Of primary concern, local land use decision makers need more information about groundwater quality and availability at specific locations, as well as the long-term ability of local aquifers to yield water, when making decisions about appropriate locations for development, particularly in those rural areas already designated as groundwater administrative areas. Available groundwater information tends to be either too broad (based on regional studies) or too narrow (based on specific project sites) to help with land use planning decisions. Refer to

Strategy Action 7B, calling for additional groundwater basin studies, for a list of priority basins that will be studied in the coming years.

The land use planning program at the Department of Land Conservation and Development needs accurate geographic information regarding water rights and district boundaries to better support local governments.

Land use decision makers also need better information about the cumulative impacts of development on water quantity and quality, in order to comprehensively plan land uses. Municipalities need information related to natural resources to support preservation and better information about the carrying capacity of land to absorb and/or mitigate stormwater and onsite wastewater disposal.

## Low Impact Development and Green Infrastructure

Runoff from urbanized lands and impervious surfaces such as paved streets, parking lots, and building rooftops during rainfall and snow events often contain pollutants that adversely affect water quality. This polluted runoff commonly includes heavy metals, pesticides and fertilizers, oil and grease, bacteria, and sediment that impair human health and aquatic habitat. Urban runoff is a major source of water quality impairment in surface waters and can also contaminate groundwater. In addition to pollution, the increased volume and peak timing of runoff from impervious urban areas can have negative impacts on receiving streams. This action focuses on incorporating stormwater management into planning and development. See Actions 10A, 11C, 11B, and 13A for additional ways to manage point and non-point sources of pollution.

**Action 5B**  
Encourage Low Impact  
Development Practices  
and Green Infrastructure

Low Impact Development (LID) uses techniques such as green infrastructure to manage stormwater quantity and quality close to its source. Green infrastructure, such as bioswales, rain gardens, large trees, or vegetated roofs mimic natural processes to intercept, infiltrate, evapotranspire, or retain stormwater or runoff on the site where it is generated. The goal is to treat stormwater runoff at its source before it reaches the storm sewer system, reducing downstream impacts to receiving streams.

Effective LID must be incorporated at the beginning of the project, during site analysis and planning. Site topography, soils, and previous development status (e.g., brownfield) can guide the design for specific LID strategies. LID and green infrastructure support climate mitigation, adaptation, and resiliency strategies.

The Department of Land Conservation and Development is positioned to play an important role in promoting the use of green infrastructure. House Bill 3409 (2023) established a Community Green Infrastructure Fund, directing the Department to provide grants for community green infrastructure projects, and for the development and implementation of green infrastructure master plans. Green infrastructure plans must provide social, environmental, or economic benefits to an environmental justice community and be developed in coordination with that community.

### Lead Agencies

DLCD, ODEQ, ODFW, OWRD

### Supporting Agencies

DAS, DOGAMI, DSL, ODA, ODF

### Partners

Local governments, utilities, districts

## Background

Local government land use planners do not always have the information they need when making long-term decisions that affect water resources. Oregon can help remedy this issue by improving communication and coordination between state and local governments on land use matters and water resources. Local governments need increased access to several types of agency generated information, including water availability, site suitability for stormwater and wastewater management, and the presence of sensitive natural resources. Enhanced coordination and resources also provide opportunities for improved land use protections within the local comprehensive planning process.

## Example Actions

- ~~Protect natural water bodies in the course of land use decisions, such as wetlands, estuaries, groundwater aquifers, rivers, and lakes~~ Update land use protections for water bodies incorporating best available data
- Integrate regulation of water master plans with local comprehensive land use plans to sustainably support municipalities' development
- Make accurate geographic information on water rights and district boundaries available to local governments and DLCD
- Support local governments to perform periodic review of their comprehensive plans
- Update Goal 5 resource inventories in local comprehensive plans (e.g., riparian areas, wetlands)
- ~~Locate and document Underground Injection Control Systems (completed)~~
- Develop and share information with local governments regarding the location, quantity, and quality of water resources for that can be used by local governments in land use decisions; consider mechanisms for increasing access to water data such as through the Oregon Water Data Portal
- Improve coordination, technical guidance, and assistance to local governments for land use decisions with regard to that rely on water availability or could have negative impacts to water quality
- Take next steps to implement land use goals related to water resources—establishing implementing rules, supporting local government updating updates to acknowledged plans, and the completing local government plans, applying application of appropriate safeguards during permitting
- Build partnerships with state agencies and local governments to provide share land use information, such as tax lot information
- Increase resources for local governments to update their natural hazard inventories (supporting Goal 7)
- Increase resources for local governments to update their facilities plans (Goal 11)
- Work towards achieving a statewide dataset of tax lots (identified as a priority by DAS)
- Update State Agency Coordination Programs and associated rules (see Action 3B)
- Include environmental and social justice information in land use planning

## Resources

### Agency Programs

DLCD Community Service Division, Rural Planning, Urban Planning, Housing, and Transportation & Growth Management Programs, ODEQ Underground Injection Control Program, ODFW Land Resources and Water Programs, DSL Waterways & Wetlands Program, OWRD Surface Water, Groundwater, and Planning Programs

### Documents/Websites

[Oregon's Statewide Planning Goals](#)

[State Agency Coordination Plans](#)

Integrating Water Efficiency into Land Use Planning in the Interior West: A Guidebook for Local Planners

### **Lead Agencies**

DLCD, ODEQ

### **Supporting Agencies**

BIZOR, NRCS, ODF, ODSL, OHA, OWEB, OWRD, USEPA, USFS

### **Partners**

Local governments, Oregon Environmental Council, OSU Extension Service, SWCDs, watershed councils, developers, utilities

### **Background**

Land development often alters the natural hydrology of a site, resulting in a decrease in water infiltration and increase in stormwater runoff that can pollute waterways. Low Impact Development (LID) practices, including ecologically sensitive site design and the installation of natural or green infrastructure, act to retain rainfall close to where it falls and promote infiltration and pollution reduction. The techniques appropriate for a development project need to be determined early on in project planning. LID also has the potential to provide climate resilience. Regulatory benefits include meeting requirements for a TMDL plan, meeting MS4 permit post-construction requirements, the Safe Drinking Water Act, state land use planning goals 5 and 6, and reducing impacts on Endangered Species Act listed species.

Also see related Actions 10A, 11B, 11C, and 13A.

### **Example Actions**

- **Continue to** compile and provide online information on low impact development best practices
- **Support updates to** local development codes, improving local capacity to review and permit low impact development and green infrastructure designs
- Encourage communities to consider natural infrastructure in lieu of, or as a complement to, built infrastructure
- **Consider how and where co-benefits of natural/green infrastructure will occur, including flood abatement, clean drinking water, lower water/wastewater utility rates, educational opportunities, and climate resilience**
- **Implement Green Infrastructure Grant Program**

### **Resources**

#### *Agency Programs*

DLCD & ODOT Transportation & Growth Management Program, ODEQ Total Maximum Daily Load Program, ODEQ Nonpoint Source Pollution Program, ODEQ MS4 Program

#### *Websites*

[ODEQ LID Resources](#)

[ODEQ MS4 Resources](#)

EPA - <https://www.epa.gov/nps/urban-runoff-low-impact-development>

#### *Documents*

[Low Impact Development in Western Oregon: a Practical Guide for Watershed Health](#)

LID Overview Fact Sheet [http://oeconline.org/wp-content/uploads/2014/11/LID\\_OVERVIEW\\_FACT\\_SHEET.pdf](http://oeconline.org/wp-content/uploads/2014/11/LID_OVERVIEW_FACT_SHEET.pdf)

[Oregon Smart Guide for Rainwater Harvesting](#)

2016 ODOT Green Infrastructure Study [Green Infrastructure Techniques for Resilience of the Oregon Coast Highway](#)

#### *Funding*

DLCD Green Infrastructure Grant Program

Since the adoption of the first Strategy in 2012, Oregon has recorded its warmest year (2015), experienced the lowest snowpack on record (2015), had one of the most severe wildfire seasons (2020), and declared drought emergencies in 26 counties (2021). Recognizing that natural hazards or extreme events, such as drought, floods, and earthquakes occur at great cost to society and the environment, Oregon communities must prepare themselves for these natural hazards. The negative impacts of such events can be far-reaching and may exacerbate already existing water challenges, such as water scarcity, water quality, and instream habitat conditions.

Oregon uses a natural hazard mitigation planning process to prepare for such events. Natural hazard mitigation focuses on identifying risk and taking actions to reduce potential impacts that a natural hazard might have on people, property, and the environment. Oregon has developed a Natural Hazards Mitigation Plan (NHMP) that addresses twelve hazards (coastal hazards, dam failure, drought, earthquakes, extreme heat, floods, landslides, tsunamis, volcanic hazards, wildfires, windstorms, and winter storms). The Oregon NHMP was last updated in 2020, is required to be updated and reapproved by the Federal Emergency Management Agency every five years to maintain eligibility for certain pre- and post disaster funds, and has two primary parts: (1) risk assessment - characterizing each hazard, assessing probabilities, vulnerabilities, and describing risks; and (2) mitigation strategy - mitigation goals, a capability assessment, mitigation actions, and an implementation plan. Tribes may work directly with the Federal Emergency Management Agency to develop and update their own NHMP's. Cities, counties, and special districts create and update local NHMPs. Jurisdictions the Oregon Interagency Hazard Mitigation Team oversees provides expertise and information for Oregon NHMP updates.

Public, private, tribal, and non-profit organizations working together, as well as individuals who take personal responsibility for thorough preparation, will be critical for Oregon to withstand these extreme events. Key organizations will be those who can play roles in mitigation, communication, response, and recovery. Their work will be to design resiliency into community and environmental planning, determine which communities, infrastructure, systems, and habitats are vulnerable, and document the economic, social, environmental, and other impacts of such events.

## Build Drought Resiliency in Oregon

Drought is not an abnormal occurrence in Oregon, with notable droughts in the 1930s, 1976-77, 1992, 2001-02, 2012-2015, 2018, and 2020-2023, but the severity and frequency have increased in recent years. Precipitation and temperature are the main drivers of drought, and largely determine snowpack, soil moisture, and streamflow levels, which are commonly used as indicators of drought. In Oregon, many watersheds depend heavily on snowpack for annual water supply, and the timing of peak runoff from snowmelt is critical to providing water when and where it is needed most. Climate change predictions indicate that warm winters may be more common, with more precipitation falling as rain rather than as snow, leading to earlier runoff.

In the case of severe or multi-year droughts, soil moisture does not recover in time for the next growing season. Parched soils can absorb precipitation before it can become available to streams. Increased temperatures can lead to increased evaporation and fish die-off. Groundwater levels do not rebound and refilling reservoirs can prove difficult. Fish populations may suffer loss of a year-class. These conditions can lead to limited water quality and quantity for fish, wildlife, livestock, and crops, reduced irrigation deliveries, and poor yields. Warm summer temperatures can also cause changes in the timing of water supply and water quality issues (e.g., algae blooms and waterborne diseases), as well as shift fish distribution. Because droughts are a slow-moving disaster where impacts develop over time, persisting even after the rain and snow returns, building drought resiliency in Oregon requires a portfolio of water management methods that are put into place long before the next drought arrives.

### Action 6A

Plan and Prepare for  
Drought and Wildfire  
Resiliency



## Defining Drought

As noted in Oregon's [2016 Drought Annex](#), a drought response plan within the state's emergency operations plan, droughts can generally be characterized by an increased demand or decreased supply of water.<sup>15</sup> In the early 1980s, researchers with the National Drought Mitigation Center (NDMC) and the National Center for Atmospheric Research located more than 150 published definitions of drought. To simplify analysis, the NDMC now provides five different ways in which drought can be defined.

- **Meteorological Drought** – Defined on the basis of dryness, compared to some type of normal or average amount. Due to climatic differences, what might be considered drought in one location of the state may not be the same in a different location. The concept of a "snow drought" has emerged in recent years. Experiencing below average snowpack with above average precipitation has spurred the study of snow droughts.
- **Hydrological Drought** – Occurs when surface and subsurface water supplies are below normal, caused by shortfalls in precipitation, including snow. A hydrological drought usually lags behind a meteorological or agricultural drought. Low precipitation takes longer to show up in streamflow and groundwater, for example.
- **Agricultural Drought** – Occurs when the amount of moisture in the soil no longer meets the needs of a particular crop. This type of drought links together the various characteristics of meteorological (or hydrological) drought to agricultural impacts.
- **Socioeconomic Drought** – Occurs when physical water shortages begin to affect people and the supply of economic goods and services.
- **Ecological Drought** – Occurs when as a prolonged and widespread deficit in available water supplies — including changes in natural and managed hydrology — that creates multiple stresses across ecosystems.

## Impacts of Drought

Drought impacts instream and out-of-stream uses in a variety of ways, requiring additional management actions. It is important to note that these impacts may affect communities disproportionately. Water insecurity is an environmental justice issue and can have health, environmental and economic impacts for communities.

### Fisheries

- Restricted access to habitats, fish die-offs
- Proliferation of parasites or bacterial disease
- Reduced access to fishing (curtailment by Oregon Department of Fish and Wildlife)

### Drinking/Potable Water

- Dry domestic wells
- Increased outreach efforts by water suppliers to their customers
- Municipal water conservation and curtailment requests
- Reduced water quality (e.g., concentration of contaminants, harmful algal blooms)
- Reduced water available for firefighting

### Recreation

- Reduced access to boating (waterskiing, paddling, kiteboarding, rowing etc.), fishing, hunting, skiing, swimming, diving, clamming, crabbing
- Economic impacts to tourism destinations
- Reduced access due to water quality (e.g. harmful algal blooms)

### Agricultural

- Crop damage
- Reduced yields

- Stressed livestock and reduced ranching profit
- Fallow fields
- Soil erosion

#### Wildfires

- Lost/damaged property
- Crop damage (e.g., viticulture)
- Economic losses associated with property damage/loss
- Damage to water supply systems (health and economic impacts)
- Damages from smoke (health and economic impacts)

### **A Closer Look at Drought Declarations**

County-wide drought declarations go through a two-part process before securing a drought declaration from the Governor. First, County Commissions, Boards, or Courts meet to determine whether they need to request a Governor's declaration. Then these requests go to the Water Supply Availability Committee and Drought Readiness Council (co-chaired by the Office of Emergency Management and Water Resources Department) for review and recommendation to the Governor. The Drought Readiness Council is a standing body comprised of federal and state natural resource, public health, and emergency response agencies. The Governor can issue an Executive Order to declare drought—either independently or in response to a request by counties. In recent years, these Executive Orders have been set to expire at the end of a calendar year.

A Governor's drought declaration can trigger a number of requirements and water management tools not otherwise accessible. Declarations allow the Water Resources Commission to grant a temporary preference of use of water for human consumption and/or stock watering. Drought declarations also authorize the Water Resources Commission and Governor to require state agencies and local governments to develop and file water conservation and/or curtailment plans; the Governor may require the implementation of such plans. Finally, declarations allow the Water Resources Department to use an expedited process in a number of water right areas, including the issuance of emergency drought permits for groundwater.

Communities and businesses looking to offset drought-related losses often turn to the federal government, which can provide payments or emergency loans after a federally-issued drought disaster designation by the Secretary of Agriculture. Federal drought funds generally cannot cover all losses suffered by producers, but they can help.

### **2024 Drought Vulnerability Assessment**

In 2023, the Water Resources Department contracted with the National Drought Mitigation Center, the Oregon Climate Change Research Institute, and the University of Oregon to complete a statewide drought vulnerability assessment, addressing Recommendation B from the [2016 Task Force on Drought Emergency Response](#) (HB 4113): "Provide resources for assessments of drought impacts, risks, and vulnerabilities on instream and out-of-stream sectors in order to better prepare for, respond to, and recover from drought," and part of the 2017 Strategy Recommended Action 5.5A: "Plan and Prepare for Drought Resiliency." The drought vulnerability assessment examines drought exposure, drought sensitivity, and adaptive capacity with a focus on drinking water supplies, agriculture, and water-dependent recreation. The final assessment is anticipated in 2024.

### **Drought Early Warning System**

The National Integrated Drought Information System is a program authorized by Congress in 2006 to coordinate and integrate drought research and create a national drought early warning information system. These systems explore and demonstrate a variety of early warning and drought risk reduction strategies that incorporate drought monitoring and prediction information. The [Pacific Northwest Drought Early Warning System](#) (DEWS) includes Idaho, Oregon, Washington, the western portion of Montana that feeds into the Columbia River Basin, and British Columbia. The Pacific Northwest DEWS is a collaborative federal, tribal, state, and local interagency effort to improve early warning capacity and resilience to drought in the region.

## Plan and Prepare for Flood Events

This section focuses on the public safety and emergency nature of flooding. Floodplain protection and restoration is called for in Chapter 4 under “Healthy Ecosystems” Action 10A. Dam safety is discussed in Chapter 4 under “Water Infrastructure” Action 13C. Statewide efforts to prepare and respond to floods are addressed in the Oregon Emergency Operations Flood Annex.

### Action 6B Plan and Prepare for Flood Events

Oregon’s mountain ranges are part of the reason there is tremendous variation in the types of flooding we experience. Although floods are a common natural hazard in Oregon, floods west of the Cascades tend to be large-scale events, while eastern Oregon typically experiences more localized, intensive events. The four types of flooding described in the 2020 Natural Hazard Mitigation Plan include:

- **Riverine flooding** – This is the most common flood hazard in Oregon and usually occurs during winter. The most severe flooding conditions occur in “rain on snow” events, when heavy rainfall is augmented by rapid snowmelt. Longer duration storms and floods are more common in western Oregon. Very large and widespread floods occurred in parts of western Oregon in 1861, 1891, 1948, 1964, 1996 (three separate storms), and 2007.
- **Flash flooding** – Flash floods are caused by extremely intense rainfall over a short period of time, commonly within a single drainage. Such events usually occur in the summer during the thunderstorm season. In eastern Oregon, local convective thunderstorms often produce the most severe flooding. One of the worst flash floods in history occurred in eastern Oregon in June 1903, killing 247 people (one-fifth of the population at the time) in the town of Heppner.<sup>16</sup>
- **Coastal flooding** – Coastal floods result from different conditions. Winds generated by tropical storms or intense offshore low-pressure systems can drive ocean water inland, causing significant flooding.
- **Urban flooding** – Urban floods occur because land is converted from fields or woodlands to roads, roofs, and parking lots, losing its ability to absorb rainfall. This transition from pervious surfaces to impervious surfaces results in more and faster runoff of water. During periods of urban flooding, streets can become swift moving rivers, and basements can fill with water. Storm drains may back up with yard waste, causing additional nuisance flooding.

### Dam and Levee Failure

In addition to the types of flooding described above, large precipitation events can also place stress on dams and levees. Dam or levee failures can cause catastrophic downstream flooding, risking both life and property. The Dam Safety Program, administered by the Water Resources Department, works to evaluate the safety of dams. More information about the program can be found in Chapter 4, “Water Infrastructure,” Action 13C.

### Atmospheric Rivers

Atmospheric rivers are relatively long, narrow regions in the atmosphere – like rivers in the sky – that transport water vapor from the tropics. When atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow. Although atmospheric rivers come in many shapes and sizes, those that contain the largest amounts of water vapor and the strongest winds can bring extreme rain and floods, often by stalling over watersheds vulnerable to flooding. These events can disrupt travel, induce landslides or mudslides, and cause catastrophic damage to life and property.<sup>17</sup>

The Water Resources Department is currently leading a project to analyze the extreme atmospheric river precipitation potential for Oregon. The first phase was completed in 2023, analyzing how extreme precipitation is influenced by ocean and air temperature, and other factors. The second phase, targeted for completion at the end of 2024, will provide an updated method and procedure for determining extreme precipitation in Oregon and guidance on how that precipitation could result in flooding. This project, once complete, will provide the Dam Safety Program with better information to evaluate the Probable Maximum Flood potential when assessing new and existing dams and ensuring proper design in order to prevent dam failures.

## Understanding Oregon’s Flood Risk

Similar to drought, Oregon should develop indicators of flood emergency stages that can be used as a planning, communication, and response tool. We know with reasonably high confidence that the frequency of extreme precipitation and flooding events are likely to increase around the state under a warming climate. Oregon does not have a consolidated assessment of past floods and their economic, social, and environmental impact and is one of only five states that lack up-to-date precipitation-frequency analysis prepared by the National Weather Service. Oregon also does not have a reliable extreme maximum flood document, which most other states have. Oregon should research how changes in land use, land cover, forest cover, and watersheds—including upstream impervious surfaces, geomorphology, logging, and forest fires—may change the location, strength or duration of floods, flood ways, and flood discharge. This information could be beneficial to local planning efforts.

Uncertainty in precipitation information coupled with climate change and possibly more extreme precipitation events has significant implications for the design and safety of water resources infrastructure. Oregon now relies mostly on information from 1973, with a very partial update completed in 2008. Without better information, infrastructure is more likely to fail during a major flood and as a result, imperil public safety and property.

## Increased Risk Following Wildfires

Where forest fires have burned and changed land cover, updated precipitation frequency information can be used in hydrologic models to predict new flows in the watershed. After a wildfire, the charred ground repels rainwater, increasing the risk of flooding and debris flows for several years. Intense storms can lead to severe flooding and landslides, which threatens drinking water supply, degrades aquatic habitat, and even suffocates fish. In light of frequent drought and recent wildfires, state emergency managers recognize the need to be able to respond to these environmental stressors rapidly and responsibly.

## Interagency Coordination

Dealing with floods and the potential for landslides requires interagency partnerships across multiple jurisdictions. Silver Jackets is a group of local, state, federal and tribal agencies chaired by the U.S. Army Corps of Engineers and is focused on reducing the risk of flooding and other natural disasters. Most states have a Silver Jackets program, and Oregon’s program focuses on flood preparedness, communication, and recovery. The Oregon Silver Jackets Team is a subcommittee under the State Interagency Hazard Mitigation Team. Oregon also has a Flood Core Team that is focused on updating the flood-related portion of Oregon’s Emergency Operations Annex.

## Plan and Prepare for a Cascadia Earthquake and Tsunami

Seismic activity in the state has been relatively low since the time of European settlement. Up until the mid-1980s, Oregon was not considered to be at high earthquake risk. Infrastructure built before 1980 was designed with criteria based on that seismic understanding. During the past 25 years, however, geological analyses have led to a very different understanding of seismic risk in Oregon.

**Action 6C**  
Plan and Prepare for a  
Cascadia Earthquake and  
Tsunami Event

Statewide efforts to prepare and respond to earthquakes and tsunamis are each covered in separate Oregon Emergency Operations Annexes.

## Earthquakes and Tsunamis in Oregon

The Oregon Department of Geology and Mineral Industries (DOGAMI) is the lead agency for earthquake hazards. DOGAMI has created maps that identify areas in selected Oregon communities that will suffer more damage, relative to other areas, during a damaging earthquake. A [clearinghouse of tsunami information](#) is also maintained by DOGAMI and includes information for coastal residents, visitors, planners, and scientists.

There are two major types of earthquakes that occur in Oregon: megathrust earthquakes that occur along the Cascadia Subduction Zone near the coast, and smaller crustal earthquakes. For the most part, crustal earthquakes

occur on shore on much smaller fault systems. The two largest earthquakes in recent years occurred in Scotts Mills (magnitude 5.6) in March 1993 (known as “The Spring Break Quake”) and six months later in Klamath Falls (magnitude 5.9 and magnitude 6.0), both of which were crustal earthquakes. The last major subduction zone (megathrust) earthquake and tsunami occurred more than 300 years ago in 1700.

## A Cascadia Earthquake

The Cascadia Subduction Zone fault, shown in Figure 2-1, spans from Northern California to southern British Columbia and can produce earthquakes as large as magnitude 9.0 with corresponding tsunamis. Scientific evidence indicates that an earthquake of this size occurs along the fault on average once every 200 to 500 years.

The Cascadia Subduction Zone closely mirrors the subduction zone in northern Japan that produced the 2011 Tohoku earthquake. The incredibly destructive tsunami that resulted from the Tohoku earthquake should serve as a warning to Oregon.

When a Cascadia earthquake occurs, it will affect mostly western Oregon, and in particular, coastal communities. Following such an event, it is estimated that it will take one to three years to restore drinking water and sewer services in the coastal zone.

Available studies estimate that a Cascadia earthquake and resulting tsunami could result in 1,250 to more than 10,000 fatalities, tens of thousands of buildings destroyed or damaged so extensively that they will require months to years of repair work, tens of thousands of displaced households, more than \$30 billion in direct and indirect economic losses (close to one-fifth of Oregon’s gross state product), and more than one million truckloads of debris.<sup>18</sup>

## 2013 Oregon Resilience Plan

In 2013, the Oregon Seismic Safety Policy Advisory Commission published the [Oregon Resilience Plan](#) describing likely outcomes from a Cascadia Subduction Zone earthquake event. The plan notes that while we cannot predict when the next Cascadia earthquake will occur, we can calculate odds. Experts estimate the odds that a Cascadia earthquake will occur in the next 50 years range from 7 to 15 percent for a great (magnitude of 8.7 to 9.3) earthquake affecting the entire Pacific Northwest to about 37 percent for a very large (magnitude of 8.3 to 8.6) earthquake affecting southern Oregon and northern California. The likelihood and predicted consequences of a Cascadia event during our lifetimes are both so great that it is prudent to consider this type of earthquake when designing new structures or retrofit of existing structures, evaluating the seismic safety of existing structures, or planning emergency response and preparedness.

The Oregon Resilience Plan encompasses a set of short- and long-term recommendations regarding critical and essential structures, transportation, energy, information and communication, and water and wastewater systems:

- Begin aggressive public information efforts to re-set public expectations for a realistic response time. The old guideline of having a 72-hour emergency survival kit falls far short.
- Public agencies should be advised that the Oregon Water/Wastewater Agency Response Network is a vital resource and membership is recommended.

**Figure 2-1: Cascadia Subduction Zone**



- Service providers from all sectors should be required to have a business continuity and seismic response plan that includes resources normally provided by functioning infrastructure (e.g., food, water, and communications).
- Service providers should plan for and support employee preparedness.
- Water-related industry associations and manufacturers should evaluate the need for seismic design standards for pipelines.
- Seismic vulnerability criteria should be incorporated into overall capital improvement project planning and asset management priorities, particularly updates to water system master plans.
- The Oregon Health Authority should be encouraged to include a seismic design requirement as part of routine design review of water system improvements.
- Encourage the Oregon Department of Environmental Quality and the Oregon Health Authority to establish goals and expectations for post-earthquake regulatory compliance and applicable standards. For example, will it be acceptable to discharge into waters of the state the chlorinated water from main breaks and main repairs?
- Encourage public health, water, and wastewater agencies to plan for significant water quality impacts to rivers downstream from urban areas.

The plan further describes the vulnerabilities facing our water delivery systems. These include numerous potential points of system failure at reservoirs, intakes, treatment plants, pump stations, and outfalls. Many materials are inflexible, joints are push-on, and pipelines may be prone to failure at connections to above-ground structures. Vulnerabilities also include interdependence with other potentially damaged systems, such as power, transportation, chemical, and financial industries. Water from leaks and breaks in water pipelines and private plumbing systems will cause collateral damage, drain available water storage, and contribute to loss of water supply and pressure, which will in turn result in a loss of fire protection capability.

Finally, the performance of gravity sanitation and storm sewers depends on appropriate grades and slopes, which are disrupted by ground displacement associated with liquefaction. Liquefaction is when water-logged sediments at or near the ground surface lose their strength in response to strong ground shaking. Because nearly all water and wastewater treatment plants are built near rivers, they are vulnerable to liquefaction and effective mitigation may require rebuilding these plants on more stable soils.

### **Seismic Retrofits**

Throughout Oregon, businesses and service providers are taking another look at critical infrastructure and undergoing seismic retrofits where feasible. Retrofits to roads, schools, and hospitals receive sizable sums of money from the Oregon Legislature. Water infrastructure in the agricultural, municipal, industrial, and domestic sectors also requires seismic upgrades, but have been less well funded. The Oregon Health Authority has recently started funding for seismic evaluations of water infrastructure. Some dams, transmission lines, and treatment plants have received state or federal funding for seismic study and upgrade, although more work in this area is needed.

### **Lead Agencies**

DLCD, ODA, ODEQ, ODF, ODFW, OEM, OWRD

### **Supporting Agencies**

NOAA, NRCS, ODHS, OWEB, USBR, USEPA, USFS

### **Partners**

Tribes, individuals, local governments, Oregon Climate Change Research Institute/Oregon Climate Service, utilities, irrigation districts, farmers

## **Background**

Although there have been individual years of wet conditions over the past two decades, on average the span between 2000-2021 have been drier than any other 22-year period in the past thousand years.<sup>19</sup> Drought conditions impact water supplies, streamflow, agricultural productivity, wildfire danger, and ecosystem health.

Drought is one of twelve hazards discussed in Oregon’s [2020 Natural Hazards Mitigation Plan \(NHMP\)](#). The state will release an update version in 2025. A drought vulnerability risk assessment will be developed in preparation for the next NHMP.

## **Example Actions**

- **Implement recommendations from the 2023 Drought Vulnerability Assessment**
- **Identify**, assess, and assist those communities and ecosystems most vulnerable to drought **and wildfire** (e.g., **assess water supply systems for vulnerability**)
- Develop the appropriate set of indicators that signal and forecast differing stages of drought
- Document the economic, social, and environmental impacts of drought **and wildfire**, including the frequency, distribution, intensity and duration
- Prepare for, respond to, and mitigate for the impacts of drought **and wildfire**
- Improve the drought toolbox through education and outreach, drought contingency plans, more efficient water distribution systems, and additional voluntary measures to improve streamflow
- **Increase education and outreach efforts to help landowners minimize risk to their property from wildfires**
- **Invest in built and natural infrastructure, refer to Actions 5B, 10A-10E, 12C, and 13A**
- **Provide technical assistance and funding to local governments to evaluate the need and opportunities for inter-tie projects in Local Natural Hazards Mitigation Plans**
- **Prioritize resources for planning and preparation to those most vulnerable to drought and wildfire impacts**

## **Resources**

### *Agency Programs*

DLCD Natural Hazard Mitigation Planning Program, OWRD Technical Services Division, ODHS Office of Resilience and Emergency Management

### *Workgroups*

Multihazard Mitigation Council, Drought Readiness Council, Water Supply Availability Committee, State Interagency Hazard Mitigation Team

### *Documents/Websites*

[OWRD Drought webpage](#), [OWRD Summary](#), [State Drought Declaration Process and Emergency Tools Drought.gov](#)

[Oregon’s Emergency Operations Annex – Drought](#), [Oregon’s Emergency Operations Annex – Wildlands Fire Drought and Public Health](#)

[Oregon Department of Emergency Management: Local Water Supply Emergency Planning Guidance](#)

[Drought Mitigation Policy Aid \(fema.gov\)](#)

[Federal Disaster Declaration Process](#)

### **Lead Agencies**

DLCD, DOGAMI, ODOT, OEM,  
OWRD, USACE

### **Supporting Agencies**

FEMA, NOAA, NRCS, ODA, ODEQ, ODF,  
ODFW, OHA, USEPA

### **Partners**

Tribes, individuals, local  
governments, SWCD's, watershed  
councils, diking and drainage  
districts

## **Background**

Floods are one of twelve hazards addressed in Oregon's [2020 Natural Hazards Mitigation Plan \(NHMP\)](#). The state will release an update in 2025. The plan contains mitigation actions, which are meant to reduce or eliminate the long-term risk to people and property from flooding. Potential funding sources for mitigation activities are included in the NHMP.

This recommended action focuses on the public safety and emergency nature of flooding and is further supported by several other Strategy Actions. Action 13A supports decommissioning unsafe or outdated dams and levees and Action 13C supports Oregon's Dam Safety Program and the development of a Levee Safety Program. Improvements in stream gaging data are called for in Action 7A. Floodplain protection and restoration is discussed under Action 10A.

## **Example Actions**

- Develop indicators of flood emergency stages, using information about meteorologic, hydrologic, hydraulic, and watershed conditions
- Document the economic, social, and environmental impacts of floods
- Evaluate potential for extreme flooding, under atmospheric rivers and climate change scenarios
- Establish early flood **and debris-flow** warning systems in areas where recent drought and wildfire have affected forests and vegetation
- **Complete update of precipitation frequency estimates for Oregon**
- ~~Complete the development of a statewide maximum flood document~~ **Update methods and procedure for determining extreme precipitation and flooding**
- **Support DLCD to continue providing assistance and training to local floodplain managers, property owners, surveyors, real estate agents, and other to support compliance with the National Flood Insurance Program**
- **Increase education and outreach efforts to help landowners minimize risk to their property from floods**
- **Invest in built and natural infrastructure, refer to Actions 5B, 10A-10E, 12C, and 13A**
- **Prioritize resources for planning and preparation to those most vulnerable to flood impact**
- **Develop an inventory of levees in Oregon and assess their condition and risk (also see Action 13C)**

## **Resources**

### *Agency Programs*

DLCD's [Natural Hazards Program](#), [DLCD's National Flood Insurance Program](#), OWRD's Dam Safety Program

### *Workgroups*

[USACE Silver Jackets Flood Risk Program](#), Flood Core Team, [State Interagency Hazard Mitigation Team](#)

### *Websites*

National Flood Insurance Program

### *Documents*

[2020 Natural Hazards Mitigation Plan \(NHMP\)](#)

[Oregon's Emergency Operations Annex - Flood](#)



### **Lead Agencies**

DLCD, DOGAMI, ODEQ, OEM,  
OHA, OWRD

### **Supporting Agencies**

USEPA, NRCS, ODF, OWRD,  
USFS

### **Partners**

Tribes, individuals, local governments, utilities,  
OSU Extension Service

## **Background**

Earthquakes and tsunamis are two of twelve hazards discussed in Oregon's [2020 Natural Hazards Mitigation Plan \(NHMP\)](#). DLCDC and OEM are leading an update of the Oregon Natural Hazards Risk Assessment in 2023, and a five-year update to the NHMP that will be released in 2025.

A large earthquake such as the Cascadia Earthquake could have widespread impacts on water infrastructure and water quality for years to come.

## **Example Actions**

- Follow the recommendations provided by the Oregon Seismic Safety Policy Advisory Commission, **including** in its 2013 Oregon Resilience Plan **and 2021 Tsunami Resilience on the Oregon Coast Report**
- **Incorporate earthquake and tsunami resilience regulations in local land use plans (see model policies developed by DLCDC)**
- Evaluate and retrofit dams and other water infrastructure to meet new seismic standards (**see Action 13C**)
- See recommended actions in the infrastructure section of the IWRS (~~7A-7C~~ **13A – 13D**)
- **Consult or develop a local Tsunami Evacuation Facilities Improvement Plan**
- **Prioritize resources for planning and preparation to those most vulnerable to earthquake and tsunami impacts**
- **Evaluate and mitigate the seismic vulnerability of bulk oils or liquid fuel terminals (SB 1567, 2022) that pose significant pollution risks to critical waterways**

## **Resources**

### *Agency Programs*

DLCD Hazard Mitigation Planning Program, DOGAMI Geological Survey and Services Program, OWRD Dam Safety Program

### *Workgroups*

Oregon Seismic Safety Policy Advisory Commission, State Interagency Hazard Mitigation Team

### *Websites/Documents*

[DOGAMI clearinghouse of tsunami information](#)  
[DLCDC tsunami land use planning information](#)  
[2020 Natural Hazards Mitigation Plan](#)  
[Oregon's Emergency Operations Annex – Earthquake](#)  
[Oregon's Emergency Operations Annex - Tsunami](#)  
[2020 DOGAMI Oregon Coastal Hospital Resilience Project](#)  
[2013 Oregon Resilience Plan](#)  
[2021 Tsunami Resilience on the Oregon Coast](#)  
[2012 DOGAMI Earthquake Risk Study for Oregon's Critical Energy Infrastructure Hub](#)  
[Earthquake and Tsunami Community Disaster Cache Planning Guide](#)  
[Fuel Tanks and Seismic Stability Assessments](#)

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# CHAPTER 3

## Data & Analysis

Water is one of our most precious natural resources. With more than 100,000 miles of rivers and streams, 360 miles of coastline, and more than 1,400 named lakes, Oregon is renowned for its water.

Oregon has a continuing need to understand its water resources. This includes how climate change impacts the form and timing of precipitation, the amount and timing of streamflow, the location and volume of groundwater, the quality of the water, the condition of our ecosystems, and overall accessibility of water to communities and the environment. There is also a need to understand the instream and out-of-stream demands we have for these resources, to achieve a secure water future.

While the need for more data is a consistent message throughout every update to the Strategy, it is important to recognize the recent progress that has been made possible by state and federal funding. Significant investments from the 2021 and 2023 Legislative sessions have helped Oregon make substantial progress on data needs. Groundwater studies, data modernization efforts, and surface and groundwater data collection equipment all received support from the 2021 Legislature. In 2023, almost \$3 million in carry over funds from the federal American Rescue Plan Act was authorized for water measurement cost share fund and groundwater data collection and field equipment. Over \$2 million was allocated to modernize Oregon's data, analytical, and modeling approaches to determining water availability.

The 2024 Strategy continues to be a forum for interagency collaboration. This includes a commitment to thoughtful and robust data collection, analysis, and sharing information with the public and those engaged in water management and decision-making.

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## Chapter 3 Actions at a Glance

**Objective 1: Understand Oregon’s Water Resources**

**Objective 2: Understand Instream and Out-of-Stream Needs**

**Objective 3: Understand the Pressures that Affect Our Needs and Supplies**

### **Critical Issue - Water Resource/Supply Information**

- 7A Improve Water Resource Data Collection and Monitoring
- 7B Conduct Additional Groundwater Basin Studies
- 7C Enhance Interagency Data Coordination
- 7D Support Basin-Scale Climate Change Research

### **Critical Issue - Instream and Ecosystem Water Needs**

- 8A Analyze the Effects on Water from Energy Development Projects and Policies
- 8B Determine Instream Flow Needs (Quality and Quantity)
- 8C Determine Needs of Groundwater-Dependent Ecosystems
- 8D Develop Instream & Ecosystem Water Demand Forecasts

### **Critical Issue - Out-of-Stream Water Needs**

- 9A Improve Water-Use Measurement and Reporting
- 9B Regularly Update Out-of-Stream Water Demand Forecasts

Oregon needs to understand the quantity and quality of available water to meet instream and out-of-stream water needs in a changing climate. Improving our knowledge of water resources requires investments in interagency work, analytical methods and approaches, scientific modeling tools, and platforms to share information with the public and other partners. This section includes Actions 7A-7D which address acquiring and sharing water resource quality, quantity, and ecosystem information. The following two sections cover data needs for defining instream water needs (Actions 8A-8D) and out-of-stream water needs (Actions 9A-9B), respectively.

Oregon's surface water and groundwater resources, by their very nature, are ever-changing. By day, month, and year, water and natural resources managers need up-to-date information to manage the resource and make sound decisions. This requires measurement of baseline conditions, trends over time, and evaluating the effectiveness of water monitoring programs.

The state needs to maintain and add to its monitoring networks to augment its long-term record, fulfill its day-to-day management responsibilities, and identify trends. Installing and maintaining additional monitoring stations for water supply and water use such as observation wells, streamflow gages, flowmeters, temperature probes, rain gages, snow survey equipment, soil moisture sensors, and AgriMet weather stations will need to be done in strategic locations to answer a growing list of questions.

## Improve Water Resource Data Collection and Monitoring

The Water Resources Department uses the [2016 Oregon Water Resources Monitoring Strategy](#)<sup>1</sup> to identify the Department's monitoring priorities (e.g., climate change, groundwater protection), for both surface and groundwater resources. The Department of Environmental Quality uses the [2020 Water Quality Monitoring Strategy](#) to propose, evaluate, prioritize, and implement monitoring activities.<sup>2</sup> The 2017 [Monitoring Strategy for Oregon's Waters, An Interagency Approach](#) helps natural resource agency scientists identify and collect the right information needed to inform policy-makers about emerging water issues, the status and trends of Oregon's waters, and the effectiveness of current agency actions.<sup>3</sup>

**Action 7A**  
Improve Water Resource  
Data Collection and  
Monitoring

### Monitor and Evaluate Surface Water Flows

A gage is a structure installed next to a stream that includes equipment to measure water levels. Scientists use the water level information to calculate streamflow. The Water Resources Department operates more than 260 gages on streams, canals, and reservoirs throughout the state, maintaining an extensive long-term record for about 70 of them. This network of gages informs water planning, permitting, and management decisions. About 240 of these gages are operated as near real-time, transmitting data once every hour. The state's objective is to continue expanding and maintaining this network. As shown in Figure 3-1, the Department also provides access to data from an additional 345 gages, primarily operated by the U.S. Geological Survey.

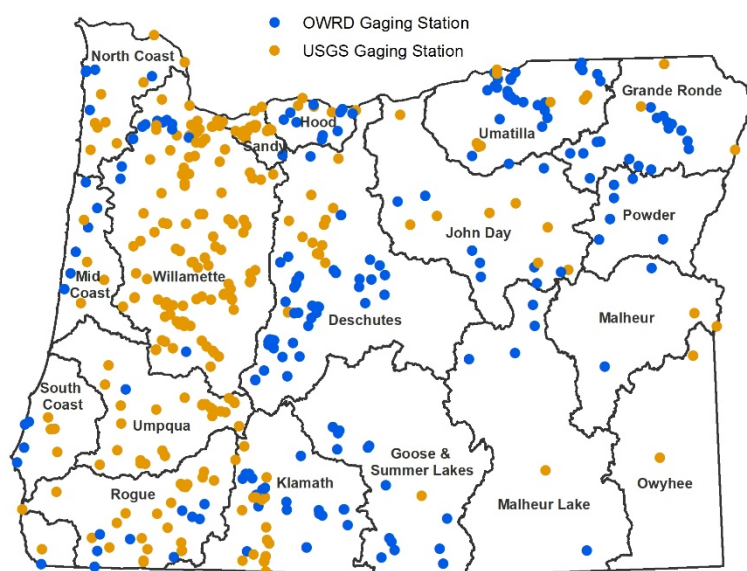
Operating a gage network requires trained hydrologic technicians to keep the equipment operating properly, to conduct regular measurements and/or observations at gages, and to input the collected information into a central database. Hydrologists review and analyze the data, make corrections based on field conditions, and finalize the records to meet computation standards established by the U.S. Geological Survey.

This network of gages is essential for the management of Oregon's surface water and groundwater resources. The data is used by a variety of agencies, water users, and other entities for making daily decisions, distributing water, protecting and monitoring instream flows, forecasting floods, and designing infrastructure such as bridges and

culverts. The data is also useful for planning for recreational activities, better understanding how much water is available for new uses, and tracking long-term trends such as climate change and drought. The Department of Environmental Quality for example, uses streamflow data to calculate the loading capacity of certain pollutants during development of Total Maximum Daily Load (TMDL) plans to improve water quality.

Since the early 1990's, the state has lacked sufficient capacity to maintain and process data from its network of stream gages in a timely fashion. This has resulted in a backlog of unprocessed records and has hindered the Water Resource Department's ability to share valuable water resources information. The public can access these records in their provisional state, but they are subject to change until they undergo final review and are published.

**Figure 3-1: Active Surface Water Gaging Stations**  
January 2024



### Surface Water Availability

The Water Resources Department maintains the Water Availability Reporting System (WARS), a decision tool for determining the amount of water available for new water right applications for most surface waters in the state. The WARS database includes stream flow data, water right information, landscape and climate characteristics, and water use data. The goal of WARS is to quantify water availability and limit appropriations such that Oregon's water supplies can sufficiently meet supply demands of water users, including both instream and out-of-stream uses. In the current iteration of WARS, water availability was calculated based on streamflow conditions representative of 1958 to 1987. Estimates of water demands were calculated based on information and research developed in the early 1990s.

With funding provided in 2023, the Water Resources Department is in the early phases of planning the first update to WARS in nearly 30 years. At a minimum, the update is focused on calculating water availability to better align with today's climate and practices in water resources management. This work includes designing a system that permits more frequent updates to WARS, incorporating more recently collected stream flow data, and utilizing technological advances in recent decades (e.g., satellite-based remote sensing data) to better understand water use and demands. The Department is also evaluating existing policies and determining policy needs to support decision making related to water allocation. Gaps exist in the monitoring network and policies that inform responsible water resources management.

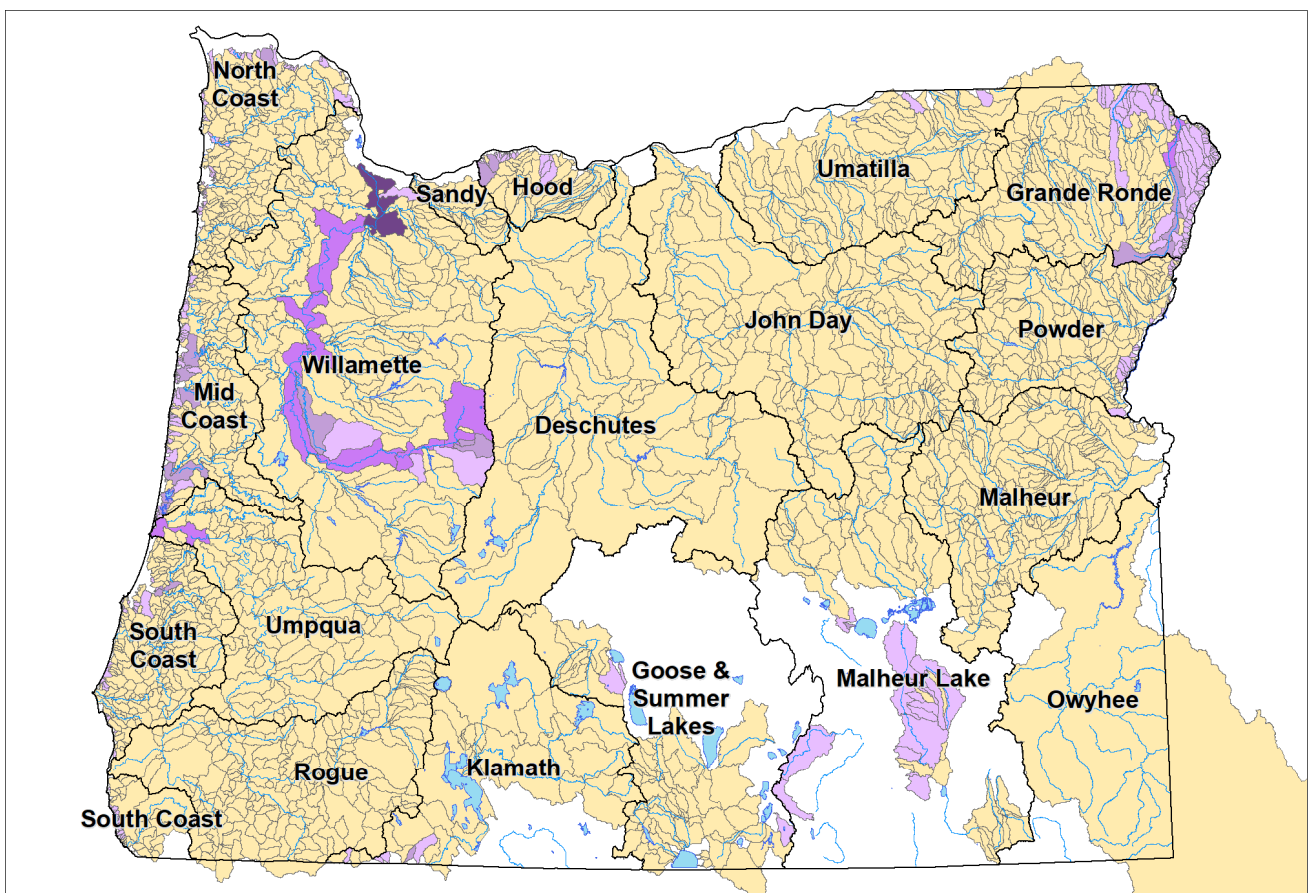
Future updates to WARS would benefit from improved understanding of surface water-groundwater interactions to better account for the impacts of groundwater pumping on water availability. Additionally, the current coverage of WARS is limited in some areas due to lack of stream gages in some areas of the state. This effort could be supported by additional staff to conduct research, perform data analysis, maintain and monitor the Department's monitoring network (including stream gages and groundwater wells), and develop decision-support tools. While WARS supports the Department's programs and operations, other agencies (i.e., ODFW, ODEQ, and OPRD) and planning groups rely and depend upon information the database provides in order to make recommendations and planning decisions.

The Water Resource Department's practice is to determine whether water is available for monthly natural flow based on water being available 80 percent of the time (80% exceedance), and 50 percent of the time (50% exceedance) for storage. Figure 3-2 shows (in shades of purple) where water is available for natural flow allocation during the month of August, the month most representative of low summer flows and high out-of-stream demands. With some exceptions, the mostly tan map indicates that throughout the state, very little surface water is available to allocate for new uses during August. However, some water is available during the winter months to allocate for storage. Figure 3-3 illustrates (in shades of purple) water availability for new uses during the month of January. Many water rights authorize storage of surface water during the winter and early spring to supplement summer water supplies.

Other administrative rules, in addition to water availability, are used to determine whether a new water right can be approved for a beneficial use. For example, although surface water is available in portions of the Willamette River Basin, many uses of water are not classified or allowable during the summer months for several reasons. Protections for water quality and habitat for sensitive, threatened, and endangered fish species are also considered when evaluating new water right applications.

Increasingly, water users are relying on tools such as water conservation, reuse, water right transfers, and water storage to meet their needs during the summer months. Some of these tools are designed to benefit instream flow. See Chapter 4 and Strategy Actions 10C, 10E, and 12B-12D.

**Figure 3-2: Available Streamflow in August**  
(calculated at 80 percent exceedance)



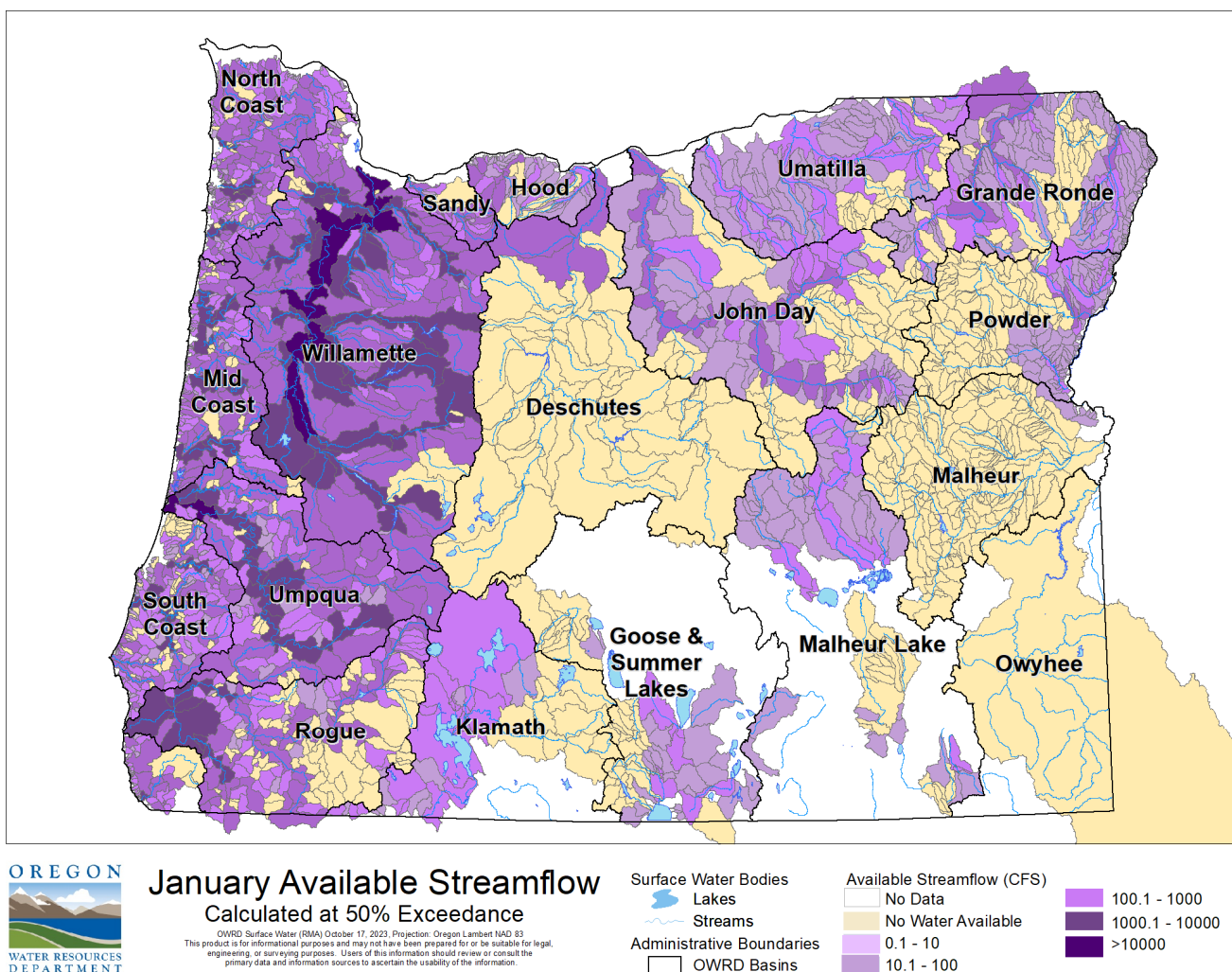
**August Available Streamflow**  
Calculated at 80% Exceedance

OWRD Surface Water (RMA), October 17, 2023, Projection: Oregon Lambert NAD 83  
This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

- Surface Water Bodies
  - Lakes
  - Streams
- Administrative Boundaries
  - OWRD Basins
- Available Streamflow (CFS)
  - No Data
  - No Water Available
  - 0.1 - 10
  - 10.1 - 100
  - 100.1 - 1000
  - 1000.1 - 10000
  - >10000



**Figure 3-3: Available Streamflow in January**  
(calculated at 50 percent exceedance)



### Groundwater – Surface Water Interaction

Groundwater is connected to surface water, and because Oregon water law recognizes this important connection, the state manages these resources as one. This is called conjunctive management.

The hydraulic connection of groundwater to surface water means that groundwater use can deplete streamflow and reduce important cold-water discharge. However, this depletion is often difficult to measure due to delayed effect and natural variability, making conjunctive management a challenge. Climate change, including multi-year droughts, intensifies this challenge.

Generally, the Water Resources Department denies or limits new groundwater applications in instances where use from an aquifer could substantially interfere with a surface water source that is already fully appropriated. One example of conjunctive management stems from a [2001 study](#)<sup>4</sup> conducted by the Water Resources Department and U.S. Geological Survey that quantified the hydraulic connection between groundwater and surface water within portions of the Deschutes River Basin. Because of this connection, and rules around protecting Scenic Waterway flows and instream rights within the Deschutes River, new groundwater withdrawals must now be mitigated with a similar amount of water placed instream, to offset the impact to surface water flows.

## Monitor and Evaluate Surface Water Quality

Water quality standards are established by the state to ensure that our lakes and streams support multiple beneficial uses, including protection of public health, recreational activity, and aquatic life. Water quality monitoring data and information on status and trends define the priorities and set the direction for programs and activities aimed at protecting and restoring water quality. State agencies and partners utilize water quality monitoring data to update water quality standards, determine causes of impairment, develop water quality improvement plans (Total Maximum Daily Loads), establish permit limits and restrictions to limit further impairment, notify the public of health advisories, measure project and program effectiveness, and modify program strategies as needed to improve water quality outcomes.

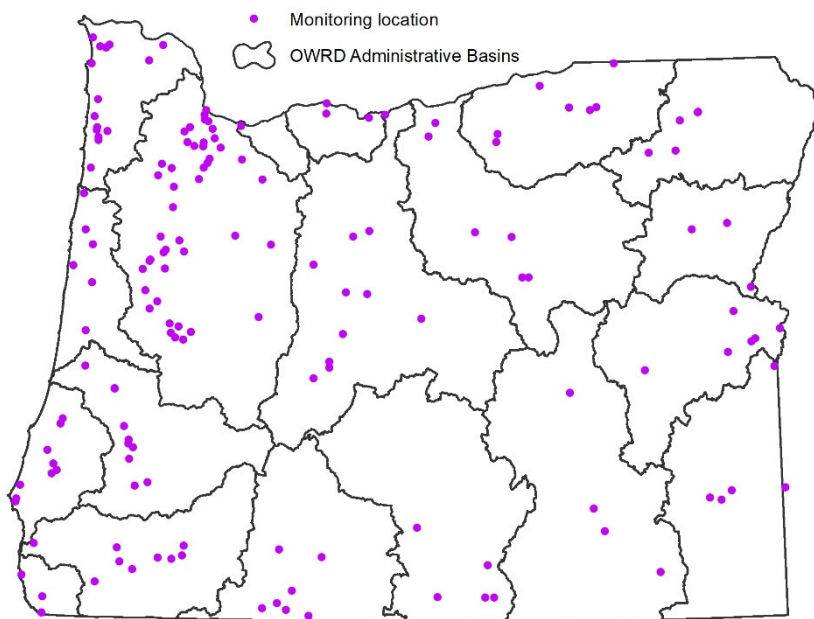
The Department of Environmental Quality monitors and evaluates water quality through a variety of programs that provide information on Oregon's waterbodies. Some of these activities are statewide assessments of water quality, whereas others focus on geographically-specific assessments of water quality or narrow categories of pollutants and/or beneficial uses. Established monitoring programs and projects include:

- Ambient Water Quality Monitoring System (AWQMS) and [Oregon Water Quality Index \(OWQI\)](#) (See Fig 3-4)
- Oregon beach monitoring (with Oregon Health Authority)
- Cyanotoxin monitoring
- Biomonitoring
- Groundwater monitoring
- Pesticide Stewardship Partnership
- Response monitoring
- Watershed monitoring (TMDLs)
- Toxics monitoring
- Volunteer water quality monitoring
- National aquatic resource surveys
- Drinking water protection
- Other special projects

**Harmful Algal Blooms (HABs)** - Historically, Department of Environmental Quality only sampled active HABs in support of Oregon Health Authority's recreational advisory program. During the 2021-23 biennium, the Department of Environmental Quality received legislative direction to start actively monitoring Oregon waterbodies to promote early detection. The summer of 2024 will include expanded monitoring efforts to include six routes throughout the state, each with 5-8 waterbodies. Rotating these weekly, the Department will sample each of about 40 waterbodies four times throughout the season. The waterbodies were selected for monitoring based on high recreational use. This active monitoring approach is in addition to ongoing recreational response monitoring which uses satellite imagery to identify HABs and prompt visual inspections. The results of satellite monitoring are published [and updated](#) regularly.

**Fish and Shellfish Monitoring** – Water quality impacts the organisms living and feeding in the water, including fish and shellfish that humans consume, for subsistence, recreational, or commercial purposes. The Oregon Department of Agriculture monitors and reports the status of shellfish for toxin levels, as part of their Food Safety Program.

**Figure 3-4: Ambient Water Quality Monitoring Stations**  
January 2024



The Department of Environmental Quality conducts fish and shellfish monitoring as part of their water quality toxics monitoring efforts.

**Water Quality Impairments and Oregon’s Integrated Report** - The Federal Clean Water Act requires the Department of Environmental Quality to report on the quality of Oregon’s surface waters every two years. Oregon’s surface waters are assessed to determine if they contain pollutants at levels that exceed protective water quality standards. The result of these analyses and conclusions is called the “Integrated Report” because it combines the requirements of Clean Water Act section 305(b) to develop a status report and the section 303(d) requirement to develop a list of impaired waters.

The [2022 Integrated Report](#) identified more than 85-percent of assessed water bodies as impaired and not meeting water quality standards, including more than 150 lakes and reservoirs, and about 2,300 stream and river segments. Additional information regarding the 2022 Integrated Report can be found on the Department of Environmental Quality’s website, including a story map, web map, and downloadable database.<sup>5</sup>

### **Monitor and Evaluate Habitat Conditions and Watershed Functions**

The Oregon Department of Fish and Wildlife, Oregon Watershed Enhancement Board, and other agencies have significant responsibilities in the area of habitat and watershed monitoring. Habitat and watershed function monitoring includes evaluating the change in river channels over time, substrate, and fish passage issues, as well as wetland and floodplain conditions. Monitoring is a broad term that encompasses baseline monitoring, compliance monitoring, status and trend monitoring, and effectiveness monitoring. Diversity of monitoring approaches is essential to building an understanding of watershed health, tracking the success of watershed improvement projects, and setting restoration priorities.

The Oregon Watershed Enhancement Board maintains the [Oregon Watershed Restoration Inventory](#) of more than 19,000 completed projects since 1995.<sup>6</sup> This database is used to report on the progress of the Oregon Plan for Salmon and Watersheds, to support effectiveness monitoring of restoration activities, and to inform watershed assessments and future restoration project planning and implementation.

Oregon continues to develop guidance for prioritizing watersheds/basins for data collection and monitoring, including recommendations for further investment. The Department of Fish and Wildlife, for example, is identifying and prioritizing areas for aquatic habitat protection and restoration using new species distribution and climate change information. Some watershed-based tools used to prioritize sensitive water bodies and habitat for future restoration efforts include Endangered Species Act Recovery Plans, the Department of Fish and Wildlife’s [Oregon Conservation Strategy](#),<sup>7</sup> watershed assessments and action plans, and the Department of State Land’s Oregon rapid wetland assessment protocol, the stream functional assessment method, and streamflow duration assessment method.

**Indicator Species** - One way of tracking the status of both water quality and ecosystem health is with a designated indicator species. The health of an indicator species can offer early warning signs of stress, such as disease or pollution.

Such indicator species include native salmonids (salmon, steelhead, and trout) that depend on cold, clean water. Since 1991, the National Oceanic and Atmospheric Administration’s Fisheries Office of Protected Resources, which monitors anadromous species that migrate between freshwater and the Ocean, has listed 15 out of 23 Evolutionarily Significant Units/Distinct Population Segments of salmon and steelhead found in Oregon under the Endangered Species Act. To date, none of them have been delisted.

In addition to these indicator species, the U.S. Fish and Wildlife Service, which has authority for monitoring non-anadromous fish species that reside year-round in Oregon’s rivers and streams, has listed five species as either threatened or endangered (Bull trout, Lahontan cutthroat trout, Hutton tui chub, and Shortnose and Lost River

suckers). Several other aquatic species are proposed for listing or being assessed for potential listing, including the Northwest pond turtle and the Western ridged mussel. The high number of aquatic species listed as threatened or endangered are worsened by declining water quality and quantity in many areas of the state during critical life history periods and can be an indicator of inadequate ecosystem health. Recovery efforts by local, state, tribal, and federal entities are underway for these listed species, which include improving habitat connectivity, increasing habitat quantity, and improving habitat quality.

As a result of such efforts, the U.S. Fish and Wildlife Service announced the removal of the Oregon chub and Modoc sucker and their associated critical habitat from the list of Endangered and Threatened Species in 2015, making them the first to be delisted due to recovery. In addition, the Fosskett Spring Speckled Dace and Borax Lake Chub were delisted in 2019 and 2020, respectively.

Impacts to indicator species can serve as an early warning sign of broader impacts to the benefits that Oregonians enjoy as a result of natural processes and biological diversity. All Oregonians benefit from a healthy aquatic ecosystem and the services it provides as freshwater is vital to human life and economic well-being. Ecosystem services provide clean air, clean and abundant water, fish and wildlife habitat and other values that are generally considered public goods.

See Strategy Actions 8B-8D for additional data needs related to ecosystems. For Strategy actions that support ecosystem protection and enhancement, see Chapter 4 Strategy Actions 10A-10E.

**Measuring Ecosystem Services** – Ecosystem services are the benefits that nature provides, including producing clean water, storing water, and cooling. The Oregon Conservation Strategy highlights ecosystem services markets as a way to create economic incentives to protect or restore the environment. More work is needed in Oregon to quantify ecosystem service benefits to support conservation, restoration, or mitigation solutions associated with environmental impacts from development. Also See Action 12E for examples of voluntary and market-based approaches for increasing environmental protection and restoration.

## Conduct Groundwater Basin Studies

### Monitor and Evaluate Groundwater Levels

Accurate well location information and water-level data are critical for assessing groundwater resources and the connections to surface water. Prior to conducting groundwater studies in a basin, it is necessary to establish long-term, water-level data sets suitable to evaluate climatic, seasonal, and groundwater development impacts on the aquifers. Today, there are more than 400 active state observation wells, and in the past five years, the Water Resources Department has measured more than 1,300 other wells. Since 2013, the Oregon Legislature has provided funds to help expand the Water Resources Department’s network of dedicated observation wells, providing staff with suitable wells for deployment of automated data recording instruments that provide high-frequency, year-round water level records. The process of siting these wells is spelled out in more detail in the Department’s 2016 [Monitoring Strategy](#).

**Action 7B**  
Conduct Additional  
Groundwater Basin  
Studies

Groundwater development has occurred primarily in areas where the geologic conditions are favorable or where additional surface water is no longer available for new allocations. In most locations, groundwater aquifers are no longer capable of sustaining additional development without leading to declining supplies for existing water users and reducing streamflows where surface water and groundwater are hydraulically connected. Groundwater quality can also limit use.

A recent increase in complaints from people experiencing dry domestic wells has elevated awareness regarding declining groundwater levels associated with climate change, consecutive years of drought, wildfire damage, and

over-pumping. The Department's Water Well Abandonment, Repair, and Replacement Fund (WARRF) awarded 202 grants in 17 counties to assist primarily low to moderate income households to repair, replace, or abandon wells between June 2022 and December 2023.

### **Prioritize Groundwater Basin Studies**

Oregon has a need for additional basin studies to further understand the relationship between groundwater and surface water, and the availability of both. Conducting groundwater studies is a priority for the state, which typically evaluates groundwater resources at the basin scale through cooperative, cost-share programs. These studies result in a conceptual model of the basin, including a description of the basin geology, groundwater flow paths, and a water budget quantifying annual volumes of groundwater recharge, discharge, and changes in dynamic storage. A numerical groundwater flow model is also developed and used to better understand the outcome of potential management scenarios.

Support for conducting groundwater basin studies has increased in recent years. The 2019 Legislature provided \$1.3 million and 2 positions to enable the agency to conduct two concurrent cooperative basin studies. The 2021 Legislature provided \$2 million and 7 positions to expand the agency's capacity for producing groundwater budgets for each basin in Oregon, expanding water level and water use data collection, and communicating the results of expanded data collection to the public. However, budget to install dedicated observation wells was eliminated in the 2023 legislative session. Groundwater basin studies and groundwater budgets are complex efforts and work will continue over the next several years.

The Water Resources Department has completed cooperative basin studies in four areas (Harney, Deschutes, Willamette, and Klamath basins) and is currently working with the U.S. Geological Survey and Washington Department of Ecology to study the Umatilla Basin's Walla Walla Sub-basin. The state has prioritized additional basins for subsequent groundwater studies. Priority areas include:

- The Umatilla Basin's Lower Umatilla Sub-Basin, where senior surface water users are asking the Department for help in addressing the cumulative impacts of alluvial and shallow basalt groundwater development.
- The Hood Basin's Fifteen Mile Creek Sub-Basin, where there are declining groundwater levels and indications that groundwater extraction is affecting surface water flow.
- The Grande Ronde Basin, where residents have asked the Department to identify potentially available groundwater and to describe potential over-allocation.
- The Powder Basin, where the county and community have asked the Department to identify potentially available groundwater and to describe potential over-allocation.

### **Groundwater Budgets for Major Hydrologic Basins**

The 2021 Legislature passed House Bill 2018 which directed the Water Resources Department to:

- Enter into a cost-sharing agreement with the U.S. Geological Survey to develop and publish groundwater budgets for all major hydrologic basins in the state,
- Contract with a qualified person to produce a peer-reviewed report on statewide consumptive water use,
- Expand the groundwater level monitoring network, and
- Help communities use the data collected under this bill to inform local water planning efforts.

The water use measurement component of this work is addressed in more detail under Action 9A.

## Groundwater Administrative Areas

The Water Resources Department oversees 22 Groundwater Administrative Areas (Figure 3-5, below) designated to limit further water level declines or groundwater interference with surface water. The Oregon Department of Environmental Quality oversees 3 Groundwater Management Areas where groundwater has elevated contaminant concentrations resulting, at least in part, from nonpoint sources. As hydrological conditions change with climate change, monitoring data may reveal the need to designate additional Groundwater Administrative Areas and Management Areas.

Specific rules apply to each Groundwater Administrative and Limited Area, but they all fit in the following categories:

- Withdrawn – prevents new allocation in specified areas or aquifers.
- Classified and Limited – limits new allocations for specified uses and areas or aquifers through Basin Program Rules (OAR 690-5XX).
- Critical – limits new appropriation, and allows for curtailment of existing uses, to address groundwater supply, quality, or thermal issues.
- Mitigation – requires mitigation for new uses to offset impacts to hydraulically connected surface water sources
- Serious Water Management Problem Areas – requires measurement and reporting of water use authorized under existing rights
- ODEQ Groundwater Management Area – related to groundwater quality and described in further detail below.

## Improve Groundwater-Related Records

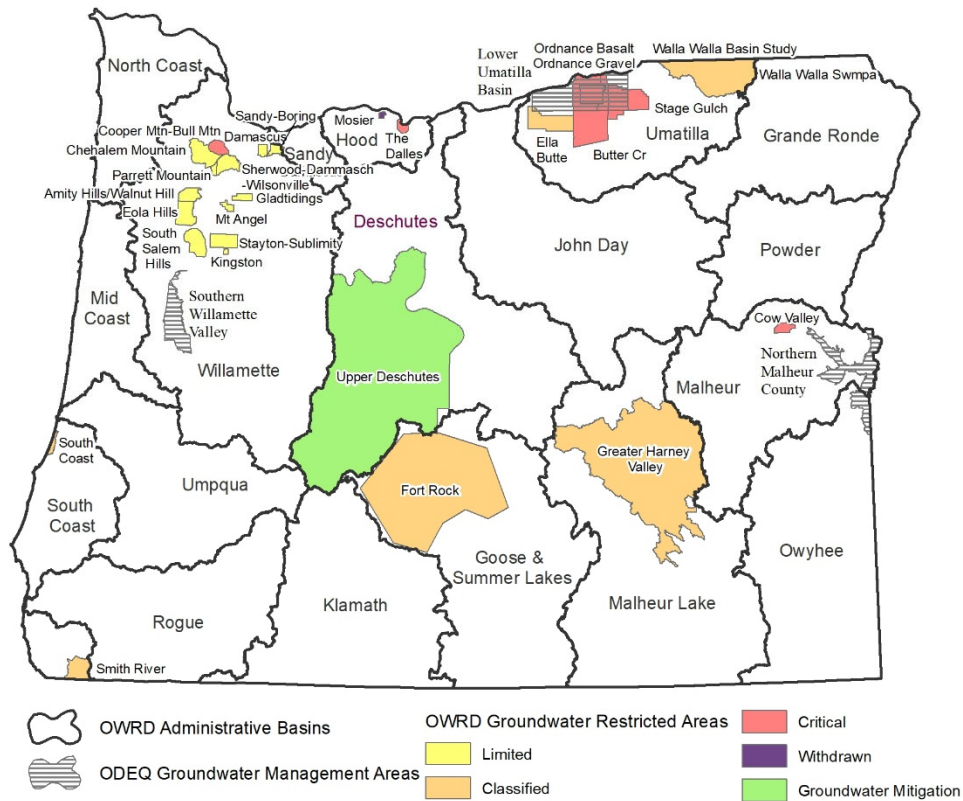
The state collects and maintains a variety of groundwater-related records that well owners, consultants, and state agencies need to better understand Oregon's water wells, some examples are described below.

**Well Location Data Gaps** – Wells were not required to be registered with the state until 1955. Since then, most well location information has been reported at a very coarse scale (within a 40-acre area). In 2009, requirements were put in place to obtain more precise location information for newly drilled exempt-use wells, which are most often used for domestic purposes. An estimated 230,000 such wells exist today, with several thousand more drilled each year. In 2014, the state updated its online mapping program to help well drillers and landowners record the location of new, existing, and unused water wells—including both exempt-use wells and permitted wells. On July 1, 2023 statutory changes require all well reports submitted to include the GPS coordinates of the well's location. Despite those efforts, Oregon has inadequate documentation of the number, location, and average water use of water wells.

**Water-Level Access** – Installation of measuring tubes help to ensure that accurate measurements or samples can be taken in water wells, without measurement equipment getting tangled in pumps or wires. This can be helpful particularly in deep wells. Several locations in Oregon, such as Eola Hills in Polk County, Pete's Mountain in Clackamas County, and Mosier in Wasco County have requirements to install measuring tubes during new well construction.

**Scheduled Measurements** – Agency scientists collect baseline information at the start of each irrigation season before any significant groundwater pumping begins. This activity is a high priority because it provides an annual snapshot of groundwater conditions that can be compared over time, and contributes to Oregon's long-term understanding of the resource. If measurements are not taken each spring, the opportunity for measurement—and therefore good information—is lost.

**Figure 3-5: OWRD Groundwater Administrative Areas and DEQ Management Areas**



### Monitor and Evaluate Groundwater Quality

Groundwater contamination is also a serious issue in some areas of Oregon. Private domestic wells may face contamination issues from nearby failing septic systems, industrial or agricultural sources, or from surface water and groundwater interactions. Naturally occurring elements such as arsenic, uranium, and boron can also make water supplies unsuitable for some uses.

The Department of Environmental Quality implements a Statewide Groundwater Monitoring Program to monitor groundwater for contaminants of concern, including nitrates and pesticides. From 2015 to 2017, the Department was able to monitor two geographic regions per year. Funding and staffing reductions now only allow for monitoring in one region every other year. The monitoring data are used to determine: areas of the state that are especially vulnerable to groundwater contamination; long term trends in groundwater quality; status of ambient groundwater quality; emerging groundwater quality problems; and potential risks from contamination. Increased resources for groundwater monitoring can help protect public health.

**Groundwater Management Areas** - The Oregon Department of Environmental Quality designates an area as a “Groundwater Management Area” (Figure 3-5, above) when groundwater has elevated contaminant concentrations. Commonly analyzed contaminants include nitrates, bacteria, and arsenic. Once a Groundwater Management Area has been declared, a local groundwater management committee is formed and then works with state agencies to develop an action plan to address the contamination. Three Groundwater Management Areas have been designated in Oregon due to elevated nitrate concentrations in groundwater:

- Lower Umatilla Basin
- Northern Malheur County
- Southern Willamette Valley

**Testing Private Drinking Water Wells** – Private drinking water supply wells are not routinely tested for water quality issues, although state law requires testing at the time of a real estate transaction. A homeowner selling a property with a drinking water well must test the water for nitrate, total coliform bacteria, and arsenic. Within 90 days after the seller receives the test results, the seller must submit the results to the buyer and to the Oregon Health Authority. The data has potential to provide a broad overview of groundwater quality in the state, however compliance for reporting has been low. This points to a need to amend the Domestic Well Testing Act to require laboratories to electronically report domestic well testing results associated with real estate transactions to the State.

Domestic wells located in an area impacted by wildfire should be tested to ensure water is still safe to drink. Oregon Health Authority recommends testing for arsenic, nitrate, bacteria, lead, and, depending on damage assessment results, benzene, toluene, ethylbenzene, and xylenes, commonly referred to as “BTEX.”

## Enhance Data Coordination

Data-sharing among agencies supports informed decisions and more efficient management of water resources. As one example, the Department of Environmental Quality and Department of Fish and Wildlife provide information and advice on water allocation decisions made by the Water Resources Department per agency rules and statutes. Their understanding of species and water quality needs helps determine whether a proposed use of water is in the public interest.

As another example, the Department of Forestry uses water right information from the Water Resources Department to determine whether forest streams are sources of drinking water. Streams that serve as a drinking water source trigger more stringent forestry protections. There are many examples among local, state, federal, and tribal agencies where current and accurate water resources information from one agency partner affects whether the other agency can effectively carry out its mission.

Monitoring Oregon’s water resources is not limited to just state agencies. There are several federal agencies whose data collection and analysis are critical to the understanding and management of Oregon’s surface water and groundwater resources, including the Natural Resources Conservation Service, the National Weather Service, and the United States Geological Survey. Local partners, including soil and water conservation districts and watershed councils, collect valuable monitoring data too.

**Action 7C**  
Improve Interagency Data  
Coordination

The lack of stable resources to maintain the state’s monitoring networks, to collect and share data, to conduct studies, and to develop modeling tools presents a significant, ongoing challenge. Several years’ worth of water quantity and quality data still needs to be processed, analyzed, and shared with the public and other partners. Methods to enhance data collection, processing and sharing include:

- **Coordination** – Better integration of federal, state, and local data collection efforts, including staffing to coordinate data across agencies, while adhering to quality control standards (e.g., interagency temperature data coordination)
- **Management** – Resources need to be allocated for data infrastructure and data stewardship
- **Training** – Improving data collection standards, manuals, training, and technical support
- **Access** – Providing on-line platforms for data submittal, retrieval, and quality control
- **Real-Time** – Adding remote and real-time monitoring to existing stations
- **Backlogs** – Processing the backlog of water quantity and water quality data



## A Strategic Enterprise Approach to Monitoring

Oregon's interagency Strategic Enterprise Approach to Monitoring (STREAM) Team was created in June 2013 and is made up of many of the state's natural resources agencies, all of which monitor Oregon's waters for various public purposes. The STREAM Team facilitates collaborative decision-making to support a healthy environment through coordinated planning, monitoring, and communication of water-related data and information. The work of the STREAM Team directly supports the intent of the Strategy, improving water resources data collection and monitoring by coordinating interagency efforts.

Thus far, the STREAM Team has developed a collaborative workspace for agency partners and a monitoring calendar and associated map that are updated annually. Members meet regularly, where agencies provide input on statewide water-related monitoring issues, such as new stream gages, harmful algae bloom coordination, environmental data management strategies, and more. They published a [statewide monitoring strategy](#) in 2017.

## Make Water-Related Information Available Electronically

Water-related program information, contact information, and data are often not available from state agencies, or sometimes difficult to find and use, though agencies do try to keep fact sheets and how-to-guides accurate and up to date. While agencies have made great strides scanning older documents and making newer documents available online in a searchable format, investments in information technology have been insufficient. In a culture that relies on instant access to information, agencies are still in the process of making historic documents available while working to make data more interactive.

A significant milestone in the process to share information among agencies and with the public has been achieved through the initiation of the [Oregon Water Data Portal](#) Project in 2022.<sup>8</sup> The project, led by the Department of Environmental Quality, is still in the early phases including developing a beta version of the portal during the 2023-2025 biennium. Eventually, if funded, the portal will be a single location for agencies and the public to access a variety of data that has been collected by many agencies and partners.

**Statewide Lidar** – Oregon's Lidar Program (Airborne Light Detection and Ranging) uses a remote sensing tool to provide three-dimensional surface terrain data (i.e., topographic information) for the state. In 2007, the Oregon Legislature designated the Department of Geology and Mineral Industries as the lead agency for lidar acquisition in Oregon. The Department established the Oregon Lidar Consortium to build funding for the acquisition of large swaths of lidar across the state. These data help create geologic maps, flood hazard maps, evaluate tidal channel topography, locate infrastructure, model water quality, delineate wetlands, evaluate habitat restoration, assess hazards, and inventory forests. As of 2020, the Oregon Lidar Consortium has acquired high-resolution lidar data for approximately 48 percent of the state. A web-based [mapping application](#) shows which parts of Oregon are completed or in-process for lidar coverage.<sup>9</sup>

## Support Climate Change Research and Partnerships in Oregon

Many local, state, federal, and tribal governments are conducting climate change research, identifying and assessing risks and actions specific to the Pacific Northwest. These research efforts will help water managers and natural resources agencies develop place-based strategies for addressing climate-related impacts on water quality, water quantity, and ecosystems. Today, there are many opportunities to further collaborate between local partners, governments, and research institutions.

**Action 7D**  
Support Basin-Scale  
Climate Change Research

## Oregon Climate Change Research Institute

The Oregon Climate Change Research Institute (OCCRI) has been tasked by the Oregon Legislature to lead climate change research among faculty of the Oregon University System. In 2023, OCCRI released the [Sixth Oregon Climate Assessment](#), a compendium of research on climate change and its impacts on Oregon.<sup>10</sup>

Researchers at OCCRI are examining climate change impacts on a regional scale, looking specifically at risks to the Pacific Northwest. The National Oceanic and Atmospheric Administration awarded a five-year grant to establish and coordinate a regional consortium of climate variability assessment, research, and outreach in the Pacific Northwest. Funds were used to establish the Climate Impacts Research Consortium, which includes OCCRI and other researchers from universities and extension services within Oregon, Washington, and Idaho. The Consortium provides information and tools for making decisions about landscape and watershed management and has been home of the Regional Integrated Sciences and Assessments (RISA) for the Pacific Northwest since September 2010, one of ten RISAs in the country. In 2022, Congress directed changing the name of the RISA program to “Climate Adaptation Partnerships.”

## Oregon’s Climate Change Adaptation Framework

[Oregon’s Climate Change Adaptation Framework](#), introduced in Chapter 2, provides a broad-scale qualitative assessment of risks to people, infrastructure, communities, and natural resources that are expected to result from the effects of variable and changing climate conditions.<sup>11</sup> The Framework calls for additional research in several areas, including social, economic, and climate change impacts related to forest management and other types of management.

## Oregon Climate Action Commission (formerly Oregon Global Warming Commission)

In 2007, the Oregon Legislature, through passage of [House Bill 3543](#), established the goal of reducing greenhouse gas emissions by 10 percent below 1990 levels by the year 2020.<sup>12</sup> By 2050, those emissions have to be at least 75 percent below 1990 levels. That legislation also created the Oregon Global Warming Commission, which is tracking progress towards the goal. The Oregon Department of Energy provides support for the Commission.

In 2023, the Oregon Legislature ([Senate Bill 522](#)) changed the name of the Oregon Global Warming Commission to the Oregon Climate Action Commission. The Commission developed an [Oregon Climate Action Roadmap](#) that provides foundational information on state climate impacts, emission trends, and progress towards achieving Oregon’s greenhouse gas emissions goals. The Commission has also authored several other documents including the [2021 Natural and Working Lands Proposal](#), in collaboration with the Department of Agriculture, Department of Forestry, and the Oregon Watershed Enhancement Board.

## Next Steps

Oregon should continue collaborating with existing climate change research organizations and institutions to improve climate change projections at a basin scale. Basin-scale data are needed to help Oregonians prepare responses and strategies to address climate change.

These include: identifying basins susceptible to changing flow regimes, establishing gages to quantify the rate of change in the magnitude, frequency, duration, and timing of streamflow; identifying groundwater systems with areas of recharge within the rain-snow transition zone; monitoring groundwater level responses to climatic impacts; and working with the U.S. Geological Survey and other partners to support long-term, natural streamflow monitoring stations that have previously been used to assess climate impacts on water supplies (e.g., U.S. Geological Survey Hydro-Climatic Data Network stations, and Geospatial Attributes of Gages for Evaluating Streamflow stations).

### **Lead Agencies**

ODEQ, ODFW, OWEB, OWRD, OHA

### **Supporting Agencies**

BLM, BOR, NRCS, ODA, USEPA, USFS, USGS, NOAA-NWS, USACE

### **Partners**

Local governments, irrigation districts, watershed councils, SWCD's

## **Background**

Oregon has several water resource data collection and monitoring programs. However, resource constraints limit the geographic scope and frequency of data collection and analysis. On-going statewide groundwater and surface water quantity monitoring supports active management of the resource and establishes long-term data sets to evaluate climatic, seasonal, and water use impacts on rivers and aquifers. Additional resources are needed for surface water monitoring and data analysis to identify impaired waterbodies and measure the effectiveness of actions taken to meet water quality standards. Monitoring data are also pivotal for ensuring that water quality improvement strategies and investments, such as ecological restoration, achieve the desired habitat function or water quality targets and are cost-effective.

## **Example Actions**

- Use agencies' monitoring strategies, or similar methods, to design, expand, and maintain real-time monitoring networks **for surface water and groundwater quality and quantity**
- Prioritize basins for data collection and monitoring **by centering the needs of people and ecosystems most affected by water quantity or quality challenges**
- Improve agency capacity to collect, **share**, analyze, and report data, bringing records to final form **and make them available to the public**
- ~~Implement an on-going~~ **Assure that** statewide groundwater quality monitoring programs **are responsive to community need**
- ~~Update water quality standards and develop additional TMDLs (see Action 11C)~~
- Increase the number of stream gages with reportable water temperature data to support water quality programs
- **Increase resources to help disadvantaged** homeowners and renters access water quality testing in private drinking water wells; update real estate transaction database **and pursue statutory changes to increase compliance with the Domestic Well Testing Act**
- Monitor habitat and watershed conditions and evaluate the effectiveness of restoration efforts (e.g., **OWEB restoration inventory**)
- **Establish methods for measuring ecosystem services and incorporate results into planning efforts (moved from 10A)**
- **Increase monitoring and evaluate the effectiveness of pollution control plan implementation (moved from 12C)**
- **Identify and address gaps in staffing or process that prevent agencies from sharing in the collection of, or already collected, data (e.g. temperature data)**
- **Work with water distribution partners (BOR, Irrigation Districts) to develop funding and staffing structures that allow for effective gaging and staffing of storage and irrigation distribution systems**
- **Work with state, federal, and local monitoring partners (e.g., USGS) to analyze gage network to identify gaps**

## **Resources**

### *Agency Programs*

ODEQ Water Quality Programs, ODFW Water Program, OWEB Oregon Watershed Restoration Inventory Program, OWEB Grant Programs, OWRD Technical Services Division

### *Documents/Websites*

[OWEB Oregon Watershed Restoration Inventory](#), [OWRD 2016 Monitoring Strategy](#), [OWRD Surface Water Availability Reporting System \(WARS\)](#), [Groundwater Information System \(GWIS\)](#), [Groundwater Administrative Areas/Critical Groundwater Areas](#), and [Realtime Streamflow and Lake Level Data](#), [ODEQ Water Quality Monitoring Strategy](#), [Groundwater Management Areas](#)

### *Workgroups*

Oregon Plan Monitoring Team, Water Quality Pesticide Management Team, Oregon STREAM Team, Oregon Water Data Portal Steering Committee and [Oregon Water Data Portal](#)

### Lead Agencies

ODEQ, OWRD, USGS

### Supporting Agencies

DOGAMI, ODA, ODFW, OHA, USEPA, USFS

### Partners

Tribes, local governments, OSU Extension Service, Universities

## Background

Accurate well location and use information, aquifer water-level data, and water quality data are critical for assessing groundwater resources. Oregon has a need for additional basin studies to further understand the relationship between groundwater and surface water, and their availability. Conducting basin studies is a priority for the state, which typically evaluates groundwater resources through cooperative, cost-share programs with federal agencies.

OWRD's groundwater administrative areas should be periodically evaluated to assess whether these areas are meeting the goals of groundwater stabilization, groundwater recovery, and protection of existing water rights. The state needs to dedicate resources to determine whether additional areas require groundwater designations. Additionally, ODEQ needs additional resources to support the Statewide Groundwater Monitoring Program, which has seen funding and staffing reductions since 2017.

## Example Actions

- Install and maintain dedicated state observation wells in priority basins
- Partner with ~~U.S. Geological Survey~~ USGS to conduct and cost-share additional groundwater ~~recharge studies and basin studies investigations.~~
- Evaluate existing and potential establishment of new groundwater administrative areas; review time-limited permits more efficiently
- Locate and document water wells, including exempt use wells, permitted wells, and unused wells
- Ensure ~~high-quality~~ groundwater level measurements **are high-quality**; install measuring tubes and make scheduled measurements
- **Investigate connections between groundwater and surface water, particularly where groundwater sustains summer low flows and/or discharges cold water**
- **Support and coordinate with ODEQ's Groundwater Monitoring Program (water quality)**
- **Incorporate groundwater quality and quantity information into Oregon's Environmental Justice Mapping Tool**

## Resources

### *Agency Programs*

ODEQ Groundwater Protection Program and Groundwater Monitoring Program, [OWRD Groundwater Monitoring Program](#)

### *Workgroups*

ODEQ & OWRD Groundwater Technical Advisory Team

### *Documents*

[2021 Oregon Groundwater Resource Concerns Assessment](#)

[2021 Review of Deschutes Groundwater Mitigation Program Report](#)

[2021 DOGAMI Bulletin 108 - Geology of the North Half of the Lower Crooked River Basin, Crook, Deschutes, Jefferson, and Wheeler Counties, Oregon](#)

### *Data*

[OWRD Groundwater Information System \(GWIS\)](#)

### Lead Agencies

DSL, ODA, ODEQ, ODF, ODFW,  
OWEB, OWRD

### Supporting Agencies

BLM, BPA, DLCDD, NRCS, , NWS, USACE,  
USBR, USFS, USGS

### Partners

Tribes, Local Gov'ts, SWCD's,  
watershed councils, OSU

## Background

Federal, state, and local agencies monitor and study Oregon's waterways. This data collection and analysis is critical to the understanding and management of Oregon's surface water and groundwater resources. The lack of stable resources to maintain the state's monitoring networks, to collect and share data, to conduct studies, and to develop modeling tools presents a significant, ongoing challenge. Consistent coordination among agencies can support efficient use of limited resources. Several years' worth of water quantity and quality data still needs to be processed, analyzed, and shared with the public and other partners.

## Example Actions

- Improve ~~coordination of data sets~~ **integration of federal, state, and local data collection efforts while adhering to quality control standards**
- Improve data **sharing and** availability using on-line platforms and emerging technologies, mobile apps, and open standards
- Develop or update modeling and other decision-support tools
- Encourage inter-agency work among a variety of partners
- **Provide resources for interagency data management, including data infrastructure and stewardship, as well as participation in the Oregon Water Data Portal**
- **Support the development, implementation, and ongoing maintenance of the Oregon Water Data Portal Project**
- **Provide interagency training to improve data collection standards, including manuals and technical support**
- **Invest in information technology and modernization of databases and applications**
- **Improve public access to water data and provide a centralized location to access various types of water data**

## Resources

### *Agency Programs & Workgroups*

DSL Waterways & Wetlands Program, ODA Agricultural Water Quality Program, ODEQ Water Quality Program, ODF Compliance Monitoring Program, ODFW Water Program, OWEB Effectiveness Monitoring Program, OWRD Surface Water Hydrology Section, OWRD Groundwater Hydrology Section  
Conservation Effectiveness Partnership, Oregon Plan Monitoring Team, Water Quality Pesticide Management Team, Oregon STREAM Team, Oregon Water Data Portal Steering Committee and [Oregon Water Data Portal](#)

### *Documents*

2017 [Monitoring Strategy for Oregon's Waters: An Inter-Agency Approach](#)  
[Oregon Open Data Portal](#)  
[DEQ Water Quality Monitoring Data](#)

### Lead Agencies

DLCD, ODA, ODEQ, ODFW,  
OWRD

### Supporting Agencies

DOGAMI, NOAA, NRCS, USFWS, OWEB,  
USGS,

### Partners

Tribes, OSU, OCCRI, Oregon Climate  
Action Commission

## Background

Many local, state, federal, and tribal governments are conducting climate change research, identifying and assessing risks, and developing actions specific to the Pacific Northwest. Basin-scale research aids water managers and natural resources agencies in developing strategies for addressing climate-related impacts on water quality, water quantity, and ecosystem health.

## Example Actions

- Make improvements in surface water and groundwater monitoring, flood and drought frequency projections, and long-range forecasts
- Improve climate change projections at the basin-scale
- Develop reliable projections of basin-scale hydrology and associated impacts on built and natural systems, including aquatic species and habitat
- Analyze how instream and out-of-stream water rights will be met with hydrologic changes
- Investigate potential shifts in the hydrograph, fish distribution/life history timing and impacts to agriculture and irrigation seasons
- Investigate new crop types suitable to a changing climate
- Investigate increased risks to water supply and wastewater management infrastructure associated with wildfires, particularly in environmental justice communities
- Finalize and implement ODFW's Aquatic Habitat Prioritization assessment which incorporates climate projections for water quantity and temperature when evaluating future habitat suitability for sensitive aquatic species
- Coordinate data collection into the Oregon Water Data Portal Project
- Include an assessment of vulnerable water supply systems and identify those in environmental justice communities
- Consider the increased risk to water infrastructure by wildfire in environmental justice communities
- Look for equity impacts of climate change (i.e., climate justice)

## Resources

### *Agency Programs*

DLCD Natural Hazards, ODA Natural Resources, ODEQ Water Quality, ODFW Water Program, OWRD Field Services and Technical Services Divisions

### *Policies*

ODFW's Climate and Ocean Change Policy

### *Workgroups*

OWEB's Climate and Water Committee, Climate Impacts Research Consortium

### *Documents/Websites*

[OWRD 2016 Monitoring Strategy](#)

[2023 Final Report: Foundational Elements to Advance the Oregon Global Warming Commission's Natural and Working Lands Proposal](#)

[2022 State of Water Justice Report](#)

[2021 Oregon's Climate Change Adaptation Framework & Equity Blueprint](#)

[South Slough National Estuary Research Reserve](#) (research regarding watershed health and resiliency)

[2024 Climate Change Vulnerability Assessment](#)

“Instream” means within a stream channel, lake bed, or place where water naturally flows or occurs. “Instream flow” means the minimum quantity of water necessary to support the public use requested by an agency ([ORS 537.332](#)). Instream flows sustain fish, wildlife, and the habitats they depend on as well as overall ecosystem health. Instream flows provide ecosystem services that support society’s economic development needs, including energy production, navigation, transportation of goods, recreation, tourism, and fishing.

This section describes the data and studies needed to better understand instream water needs in the context of a changing climate. Actions to protect and enhance ecosystems and secure instream water rights are discussed in Chapter 4, Actions 10A-10E.

The practice of securing a water right and taking water out of streams and aquifers to use, in addition to a changing climate, has resulted in reduced amounts of water instream. Without adequate water in the system and legal protection of water instream, instream uses and the associated economic and ecological benefits are threatened and further degraded.

## Water Instream Supports Economic Health

### Energy

Hydropower facilities at dams produce affordable energy, however, statewide goals to reduce greenhouse gas emissions elevates the need for improving efficiency of existing facilities and developing alternative energy projects. Dam operations, including procedures for maximizing power production, can alter streamflow amounts and timing and oppose needs for fish and other aquatic wildlife.

**Action 8A**  
Analyze the Effects on  
Water from Energy  
Development Projects and  
Policies

There is an increasing global demand for lithium, a mineral used in cell phone and electric vehicle lithium-ion batteries. Oregon’s climate goals call for an increase in the use of electric vehicles, increasing the demand for this mineral. Lithium deposits are known to exist in Oregon but have not been commercially extracted. The Department of Geology and Mineral Industries is responsible for mine permitting.

There is a need to analyze the impact of existing and potential energy development projects and policies on both water quality and quantity. Energy is discussed in more detail in Chapter 4, Actions 14A and 14B.

### Navigation

Oregon’s waterways have long served as important routes for travel and trade. According to the American Society of Civil Engineers ([ASCE](#)),<sup>13</sup> Oregon boasts 680 miles of inland waterways, ranking 15<sup>th</sup> nationally. Many of the agricultural products grown in Oregon and elsewhere in the United States move down the Columbia River by barge. Instream flows facilitate ocean-going and river-going commerce and promote economic activity at ports and cities throughout Oregon.

### Water-Related Recreation and Tourism

The focal point of many recreational activities in Oregon is often a river, waterfall, lake, wetland, or snow-covered mountain. Water resources offer opportunities for skiing, boating, kayaking, rafting, canoeing, camping, hiking, fishing, and observing wildlife, all of which greatly contribute to Oregon’s economy. In their [2020 analysis](#), Earth

Economics<sup>14</sup> estimated that all outdoor recreation in Oregon generates \$15.6 billion annually in consumer spending, and supports 224,000 direct jobs—\$9.3 billion in wages and salaries.

Many of Oregon’s counties receive a significant boost to their local economy from those who travel to participate in fish and wildlife recreation activities. The economic value of fish and wildlife recreation is one of the many reasons for protecting water instream for the benefit of future generations.

Many of the state’s day-use parks and overnight camping facilities reside along rivers and lakes. The Oregon Parks and Recreation Department manages more than 250 properties that include day-use areas and overnight camping facilities available for public use. Each year, these facilities<sup>15</sup> host over 50 million daytime visitors and 3 million campers.

Boating and kayaking are popular recreational activities as well, with more than 159,000 recreational boats in the state.<sup>16</sup> According to the Earth Economics analysis of outdoor recreation in Oregon, in 2019, boaters spent over 6.8 million activity days power boating, over 650,000 activity days canoeing, kayaking, rowing, or tubing, and over 500,000 activity days on personal watercraft (jet skis, etc.). Boaters divide their time evenly between rivers and lakes/reservoirs. The Columbia and Willamette Rivers are the most popular rivers, and Lake Billy Chinook, Brownlee Reservoir, Detroit Lake, Wallowa Lake, Prineville Reservoir, and Diamond Lake are the most visited lakes and reservoirs.

## **Fisheries**

Healthy fisheries support the traditional and cultural identity of many Oregon communities. Northwest tribal communities, for example, have historically relied on salmon and other fish species as a major food source and a foundation of life, culture, economy, and spirituality. Because of Oregon’s collective interest in the health of its fisheries, management responsibilities are shared among state, federal, and tribal agencies.

Adequate instream flows are necessary to support tribal treaty rights and Oregon’s recreational and commercial fisheries. Native fish such as salmon, steelhead, and trout are an Oregon icon and support a vigorous recreational and commercial fishing economy. In their 2020 analysis of outdoor recreation in Oregon, Earth Economics reported that in 2019, anglers spent over 3.5 million activity days fishing Oregon’s waters. The [Recreational Boating & Fishing Foundation](#)<sup>17</sup> reported that, as of 2019, the number of anglers in America aged 6-years or older reached 50.1 million, accounting for approximately 1/6 of all Americans.

According to an Oregon Department of Fish and Wildlife briefing report on the commercial fishing industry,<sup>18</sup> more than 334 million pounds of fish were delivered to Oregon ports in 2019. The harvest value of onshore landings was \$160.7 million. The estimated total personal income generated by Oregon’s commercial fishing industry (onshore and distant water fisheries) in 2019 was \$558 million. The Dungeness crab fishery typically dominates the commercial fishing industry, accounting for about 22% of the state’s economic contributions from major fisheries in 2019. In 2019, commercial fisheries supported over 9,000 jobs and a number of communities along the Oregon Coast, providing up to a third of the annual earned income in some towns. A healthy fishery can support a cluster of fish processing plants, mechanics, machine shops and welders, refrigeration specialists, marine electronics sales and service firms, boat yards, and marine suppliers.

## **Hatcheries**

The construction of dams, beginning in the 1800’s, has had negative impacts to fish populations, leading to the construction of fish hatcheries to mitigate fish losses and augment the fish populations. The need for hatcheries continues today, with hatcheries distributed across the state.

The Oregon Department of Fish and Wildlife operates more than 30 hatcheries and several rearing ponds statewide. Five of the hatcheries include tribal co-management. These facilities raise salmon, steelhead, and several species of trout. Hatcheries play a vital role in the state’s overall efforts to maintain healthy fish populations and



supplement recreational and commercial harvests. Each year, the state raises and releases 45 million fish on average from hatcheries. Clean, cold water is critical for the proper functioning of these facilities.

## Water Instream Supports Ecosystem Health

Along with supporting the economy, water is needed within the environment to ensure overall ecosystem health. Streamflow from rainfall and snowmelt sustains aquatic and terrestrial life. Springs, rivers, lakes, and wetlands are also dependent on the discharge of groundwater to the surface. Other ecosystems, such as riparian areas, wetlands, and some types of forests are dependent upon a water table located close to the surface. Aquifer and subterranean ecosystems rely on groundwater further below the surface.

There are certain stream conditions that are necessary to support the life cycle of fish species. The water quality, water quantity, and habitat needs also vary by species. Coho salmon, for example, need clean gravels of various sizes to create nests and deposit their eggs. They prefer to spawn and rear in small, relatively flat streams. Adequate amounts of cool, clean water are a requirement for all life stages of salmonids, as well. Wetlands, off-channel pools, and other slackwater areas provide small fish (fry) with safe areas to reside during the winter when the current is swift. The complexity of the habitat directly contributes to the health and function of fish-bearing streams.

Salmon and steelhead need cold water refugia during their migrations upstream on the way to spawn and for rearing during the heat of summer when stream temperatures are at their highest. Such safe havens play an important role in the survival and migration of adult and juvenile salmon, steelhead, and trout as rivers warm to lethal thresholds during the summer. Identification, protection, and restoration of cold water refugia is critical, as climate change holds the potential for hotter, drier summers.

In 2015, the Oregon Department of Environmental Quality, U.S. Environmental Protection Agency, and the National Oceanic and Atmospheric Administration developed a partnership under the Clean Water Act to locate, protect, and restore zones of cold water habitat for fish in the Columbia and lower Willamette Rivers.<sup>19</sup> [The Lower Willamette River Cold-Water Refuge Narrative Criterion Interpretation Study](#) was submitted to the National Oceanic and Atmospheric Administration by the Department of Environmental Quality in March of 2020, and the [Columbia River Cold Water Refuges Plan](#) was prepared by the U.S. Environmental Protection Agency in 2021.

## Determine the Flows Needed to Support Instream Needs

Healthy streams are dynamic, and different streams exhibit different patterns of variability to which native species are adapted. Ecosystems and species depend upon a range of flow conditions (such as frequency, magnitude, and timing). Site-specific data and studies are typically required to quantify these variable instream flows throughout the year. This section looks at next steps for understanding instream flow needs.

**Action 8B**  
Determine Instream Flow  
Needs (Quality and  
Quantity)

### Data Needs for Instream Water Rights

Instream water rights – a water right held in trust by the Water Resources Department and described in Part 1 – are one tool that can be used to protect instream needs (Action 10C). Approximately 10,000 river miles in Oregon are covered by an instream water right, but the state has very little capacity to monitor whether instream water rights are being met. There are more than 1,500 certificated instream water rights across the state, and while the state has taken steps to enhance measurement activities, only 205 of them have an associated stream gage in place to monitor whether the instream flows are being met.

There is also a need to identify ecological and environmental flows needed to support future instream water rights applications. Understanding the full suite of flows needed to support stream ecosystems can better inform future management actions.

**Ecological Flows** – These flows are defined as “quantifiable metrics that describe ranges of flows that must be maintained within a stream and its margins to support the natural functions of healthy ecosystems” (California Environmental Flows Working Group, 2021)

**Environmental Flows** – These flows include the quantity, timing, and quality of water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and wellbeing that depend on these ecosystems (Arthington et al., 2018). The inclusion of human needs is an important distinction in this definition. Spiritual, recreational, and tribal access to First Foods should also be considered.

Some water projects receiving funds from Water Projects Grants and Loans from the Water Resources Department under [Senate Bill 839 \(2013\)](#)<sup>20</sup> will need flow prescriptions that describe the duration, timing, frequency, and volume of flows required to maintain the biological, ecological, and physical functions of the watershed.

There are other mechanisms that can be used to protect water instream, such as water leases and transfers. Additional discussion about these tools can be found in Chapter 4, Action 10C.

## Assess Groundwater-Dependent Ecosystems

Groundwater is vital to both ecosystems and human communities, as groundwater discharges and supplies water to wetlands, rivers, and lakes. Groundwater provides late-summer flow for many rivers, and creates cool-water upwellings critical for aquatic species during the warmer summer months. Groundwater-dependent ecosystems contain species and habitats that rely on groundwater for some or all of their life cycle. These ecosystems form the interface between groundwater and surface water, and due to their unique hydrology, often harbor many rare species native only to these locations. Groundwater-dependent ecosystems still need to be fully identified and characterized across the state, including their groundwater quantity and quality requirements.

**Action 8C**  
Determine Needs of  
Groundwater-Dependent  
Ecosystems

Oregon has a wide distribution of groundwater-dependent ecosystems. In 2022, the Nature Conservancy published the [Oregon Atlas of Groundwater Dependent Ecosystems](#), documenting the abundance and distribution of groundwater dependent ecosystems. This report identified nearly 30,000 springs and found that approximately 33-percent of all rivers, 45-percent of all wetland area, and 63-percent of total lake area are groundwater dependent. The report also noted over 3,100 observations of groundwater dependent species.

While some continued characterization of these systems is needed, the next important step is to quantify their groundwater quantity and quality requirements. This information can be used to help meet the needs of people, species, and ecosystems. For example, in the Oregon Dunes National Recreation Area, municipal wells pump water from an unconfined sand dune aquifer that also supports two sensitive species of amphibian that breed in the swale wetlands. By quantifying the groundwater needs of amphibians and wetland plants, compatible pumping levels supportive of wetland species were identified.<sup>21</sup>

## Develop Instream & Ecosystem Demand Forecasts

The state has completed two long-term demand studies (2008 and 2015) that focused on forecasting water demands for agricultural, municipal, domestic, and industrial uses (See Action 9B). A parallel statewide analysis is needed for instream needs. Climate change will continue to affect water timing, availability and use, and balanced solutions are not achievable without understanding the full suite of instream and out of stream needs.

**Action 8D**  
Develop Instream &  
Ecosystem Water Demand  
Forecasts

### **Lead Agencies**

ODOE, ODEQ, ODFW

### **Supporting Agencies**

BPA, DLCD, NOAA, OWRD,  
USACOE, USFWS

### **Partners**

Tribes, Public Utility Commission, Oregon  
Climate Action Commission

## **Background**

Energy projects have the potential to impact both water quantity and quality. The development of renewable power systems to achieve a cleaner energy mix and new economic opportunities brings with it as-yet-unquantified demands for water. An analysis of water demands for energy development projects and policies across energy technologies (e.g., hydroelectric, solar, wind, geothermal, bio-energy, natural gas, etc.) is needed. This analysis would provide a better scientific understanding of the state's future water commitments.

## **Example Actions**

- Analyze **and project** the water demand and water quality impacts of current and proposed energy development projects (hydroelectric, solar, wind, geothermal, bio-energy, and natural gas) **in the context of climate change and greenhouse-gas reduction strategies**
- **Analyze the siting impacts of proposed energy projects on wetlands**
- **Evaluate where impacts to water quantity and quality associated with energy projects have been experienced, including environmental justice communities, and look for opportunities to recognize and avoid or mitigate in future energy projects**

## **Resources**

### *Agency Programs*

ODOE Energy Planning & Innovation Division, ODEQ Water Quality Program, ODEQ Section 401 Hydropower Program, ODFW Land Resources Program, OWRD Hydroelectric Program

### *Workgroups*

Hydroelectric Application Review Team (ODEQ, ODFW, OWRD)

### *Documents*

2022 ODOE's [Biennial Energy Report](#)

2021 [Oregon's Climate Change Adaptation Framework](#)

### Lead Agencies

ODEQ, ODFW, OPRD, OWRD

### Supporting Agencies

BPA, NOAA, ODA, ODF, ODSL, OWEB,  
USACE, USEPA

### Partners

Tribes

## Background

Oregon's water resources directly support the habitat needed for species to live and thrive. Our rivers and streams, lakes, reservoirs, aquifers, wetlands, and estuaries all contribute greatly to our economy and health. Without adequate water quality and supply, instream uses and their associated economic and ecological benefits are greatly diminished. Instream flows are also critical for spiritual and recreational opportunities and supporting Tribes' access to First Foods. To improve instream flow protections (Action 10C), Oregon should prioritize identifying ecological flow criteria (metrics characterizing the range of flows needed to support ecosystem health) for streams throughout the state.

## Example Actions

- ~~Prioritize and install gages in additional locations to monitor the status of instream flows and water rights (See Action 7A, and bullet below)~~
- ~~Use existing data to develop statewide preliminary ecological flow criteria for streams~~
- ~~Identify~~ **Prioritize** basins with listed species and install monitoring equipment to help characterize the **full** suite of flows through these basins
- ~~Conduct instream needs studies, such as base flow studies and elevated~~ **ecological and environmental** flow requirements or prescriptions, **including pollution abatement, recreation, spiritual, and cultural needs**
- Pursue a consistent, model-based framework for characterizing long-term instream need **in the context of climate change to support the development of a long-term instream forecast (Action 8D)** ~~and integrate projections of future climate for planning purposes~~
- **Review, synthesize, and update** ~~Develop~~ models/studies to quantify the **ecological**, economic, social, and cultural value of instream uses
- Support state agency instream flow efforts and programs (e.g., ODFW, ODEQ, OPRD)
- **Support ODFW and ODEQ collaboration regarding temperature modeling**
- **Support ODFW and OWRD collaboration regarding monitoring for instream water rights**
- **Fill data gaps regarding fish passage barriers**
- **Conduct studies to determine if wetland restoration or reconnection to streams could benefit instream flow**

## Resources

### *Agency Programs*

ODEQ Water Quality Program, ODFW Water Program, OPRD Scenic Waterways, OWRD Water Rights Division, OWRD Technical Services Division

### *Workgroups*

Oregon STREAM Team

### *Policies*

Oregon's Instream Water Right Act

### *Documents*

[Oregon Plan for Salmon and Watersheds](#)

[2023 ODFW Guidance for Determining Instream Flow Needs](#)

### **Lead Agencies**

ODEQ, ODFW, OWRD

### **Supporting Agencies**

DLCD, DOGAMI, ODF, USFS, USFWS, USGS

### **Partners**

Tribes, The Nature Conservancy

## **Background**

Groundwater is vital to both ecosystems and human communities, as groundwater discharges and supplies water to wetlands, rivers, and lakes. Groundwater provides late-summer flow for many rivers, and creates cool-water upwellings critical for aquatic species during the warmer summer months. Groundwater-dependent ecosystems contain species and habitats that rely on groundwater for some or all of their life cycle. These ecosystems form the interface between groundwater and surface water, and due to their unique hydrology, often harbor many rare species native only to these locations. Groundwater-dependent ecosystems still need to be fully identified and characterized across the state, including their groundwater quantity and quality requirements.

## **Example Actions**

- Identify and characterize groundwater-dependent ecosystems and prioritize systems for long-term study
- Perform an in-depth analysis of accessible springs
- Monitor springs and seeps across the state to understand their contribution (quality and quantity) to streamflows
- Quantify Identify the water quantity and water quality needs of groundwater-dependent species and ecosystems
- Conduct seepage studies on priority streams to quantify groundwater exchange
- Evaluate impacts to groundwater ecosystems from fish passage and transportation maintenance projects

## **Resources**

### *Agency Programs*

ODEQ Water Quality Program, ODFW Water Program, ODFW Technical Services Division

### *Documents/Websites*

Online mapping tool by The Nature Conservancy, [Global Groundwater Dependent Ecosystems](#)

### **Lead Agencies**

ODEQ, OWRD

### **Supporting Agencies**

DLCD, DOGAMI, ODA, ODFW, USGS

### **Partners**

Tribes, local gov't's, municipal  
water providers

## **Background**

There is a need to understand how the demand for water instream, is projected to change over time. This can help inform planning and water management decisions to anticipate these demands and respond to climatic impacts that alter water timing and availability. The state has created two water demand forecasts quantifying only out-of-stream needs (see Action 9B). A parallel statewide analysis is needed for instream needs. Climate change will continue to affect water timing, availability and use, and balanced solutions are not achievable without understanding the full suite of instream and out of stream needs.

## **Example Actions**

- Develop a statewide instream water demand forecast in collaboration with an update to the statewide out-of-stream water demand forecast
- Periodically update demand projections with new climate projections
- Study potential impacts to environmental justice and other frontline communities in demand forecasts

## **Resources**

### *Agency Programs*

ODFW's Water Program, OWRD's Planning, Collaboration, & Investment Section, OWRD Technical Services Division

### *Documents*

[2015 Statewide Long-Term Water Demand Forecast](#)

Out-of-stream uses are those that divert water from the environment, from a stream, reservoir, or from below ground, to serve a beneficial purpose. The major uses of diverted water in Oregon are to supply the water needed for agriculture, municipal, industrial/manufacturing, and domestic purposes (e.g., drinking water, bathing, laundry). Uses that divert water are often considered a “consumptive” use, or water that is not returned to its source. It is important to consider that freshwater is a finite resource and Oregon water law requires that it be used without waste. With few exceptions, water users must apply for water rights to use either surface water or groundwater for a beneficial use. Additional information about water rights can be found in Part 1 “Water Laws, Policies, and Regulations.”

A changing climate has the potential to reduce water supplies, in the form of snowpack and rain, leaving less water available to meet instream and out-of-stream needs. Oregon has been working to increase its accounting of out-of-stream water use to inform basin strategies for integrated water management. Out-of-stream water use supports many sectors of Oregon’s economy – reinforcing the need to better understand these uses to avoid negative economic impacts.

### Out-of-Stream Water Uses

#### Statewide Consumptive Use Estimates

House Bill 2018, passed in 2021, called for the production of a report on statewide consumptive water use. The Water Resources Department is leading this work and expects to have consumptive water use estimates for all major hydrologic basins in Oregon in 2024. In absence of this more detailed data, generalizations about out-of-stream water use are summarized below using the 2023 Business Case for Investing in Water report. The report utilized data from the U.S. Geological Survey.

#### Water Use in Agriculture

The majority of water diverted for out-of-stream use is for irrigation to grow crops. According to the [2023 Business Case for Investing in Water in Oregon](#)<sup>22</sup>, almost 80-percent of all water withdrawn from surface or groundwater sources is used for irrigation (Figure 3-6).

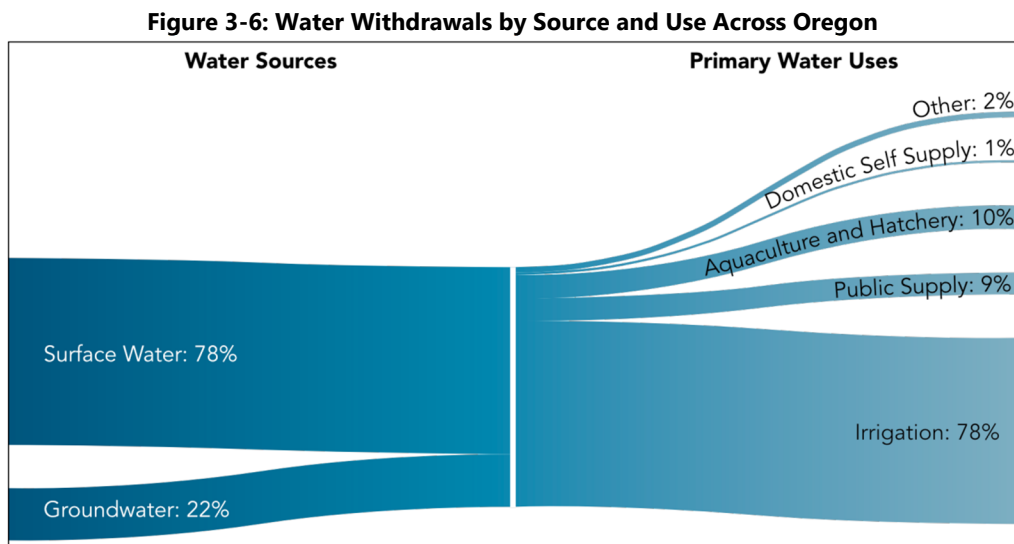


Image Source: AMP Insights, Data Source: USGS Water Use Data for Oregon<sup>23</sup>

Increases in agricultural water demand are expected from a range of possible changes in the climate, including increased temperatures and drier summers, resulting in prolonged agricultural growing seasons and increased evapotranspiration. Many basins are over appropriated, meaning there is not enough water to meet the full water rights held by people. This means that increasing irrigation to respond to warmer, drier conditions may simply not be an option. Actions including increasing irrigation efficiency, water conservation, water reuse, storage, and market based solutions are all potential management approaches outlined in Chapter 4, Actions 12B-12E.

Irrigated agriculture contributes significantly to the economy, food supply, and to local communities. The Department of Agriculture reports that Oregon's 37,200 farms produced more than 220 different products in 2021.<sup>24</sup> Oregon agriculture directly and indirectly contributes 686,518 jobs, \$29.71 billion in wages, \$12.12 billion in taxes, and \$2.85 billion in exports to the state. In Oregon, irrigation with its related water rights more than doubles the value of crop land, from \$2,340 per acre to \$5,800 per acre, according to the 2022 Oregon Agricultural Statistics and Directory.<sup>25</sup>

Although much of the water is used to irrigate crops, there are many other uses for water within agriculture, such as water for livestock operations, which supports one of Oregon's highest-ranking commodities – cattle and calves – valued at almost \$588 million in 2020.

**Food Processing** – Oregon hosts hundreds of food manufacturing companies that play an essential part in food production by cooking, freezing, and packaging products for consumers. The food processing industry handles crops from cherries to onions and includes bakery and dairy products, fruits and vegetables, meat, poultry, and seafood. Water is needed for washing, processing, and packaging food. Finding a high-quality water supply to meet the needs of this industry is sometimes a challenge.

### **Public Supply – Municipal, Commercial & Industrial Water Use**

Municipal water systems may be shared water systems operated by homeowner associations, larger systems managed by private water companies, or public systems operated by cities, towns, or water districts. Most commercial, industrial, and high-tech facilities receive water from municipal water systems. Public supply to meet municipal, commercial, and industrial demands, account for approximately 9 percent of out-of-stream diversions (Figure 3-6).

Municipal water systems are crucial to the state's economy, serving as a backbone of economic development, public health, and safety in many Oregon communities. These water providers supply clean and reliable water to residences, schools, parks, hospitals, industries, businesses, and other public and private facilities. In the past decade, manufacturing has largely been located in urbanized areas where access to a public water system has played an important role. The ability of municipal water systems to deliver reliable, high quality water supplies is one factor that has attracted industry to Oregon.

Industrial use involves using water within the processing or manufacturing of a product. Water can be used to construct, operate, and maintain industrial sites and facilities. Commercial use is very similar. It includes the use of water for the production or delivery of goods, services, or commodities, along with the use of water to construct, operate, or maintain a facility.

Economic growth in Oregon depends, in part, on the availability of water and wastewater services, and the ability of municipalities to serve these needs. Through their planning efforts, municipalities will continually need to estimate long-range water supply demands and to identify options, including water conservation programs, to meet future needs. Municipal Water Management and Conservation Plans, introduced in Part 1, are one such tool to plan for the future.



**Self-Supplied Industries** – Self-supplied industrial and commercial facilities maintain their own water supplies and water rights independent of public water systems. It is important to recognize that much of the state’s industries are supported by municipal systems and not “self-supplied.”

### **Domestic Wells**

Domestic self-supply makes up just one percent of the water withdrawals. While this is not a large amount of the total water diverted in the state, this water supply is critical to meeting many people’s basic household needs. Nearly 23 percent of Oregonians rely on domestic or private wells as their primary source of potable water.<sup>26</sup>

## **Improve Water-Use Measurement and Reporting**

Objective water management decisions are made possible when they are based on reliable information about water use. Availability of water use data is fundamental to ensure efficient water management, effective water distribution, determine the effectiveness of water conservation actions, accurately characterize water budgets, account for water use in basin studies, and to help plan for future water needs. The information is also used to ground-truth demand projections or models. The Water Resources Department has the authority to require users to measure water use; however, there was historically limited authority to require reporting of the resulting data. This has changed with the passing of House Bill 2010 in 2023, now providing the Department with broader authority. Water users who do keep track of their use are better able to demonstrate the validity of their water rights, to develop water management and conservation plans, and to determine the design and funding needs of their future water systems.

### **Action 9A** Improve Water Use Data and Reporting

### **2022 Legislative Report on Water Use Measurement and Reporting**

The [2022 Legislative Report on Water Use Measurement and Reporting](#), published by the Water Resources Department, outlines recommendations for improving collection and use of water use data.<sup>27</sup> Implementation of these recommendations is expected to provide information needed to facilitate planning, protect existing water right holders, maximize instream and out-of-stream beneficial uses, and minimize costly water conflicts. The report’s six key recommendations include:

1. Improve water use reporting database functionality and public access
2. Integrate accurate, transparent statewide water use summaries
3. Invest in evapotranspiration monitoring and programs
4. Invest in water use measurement devices in priority watersheds
5. Install groundwater observation wells
6. Increase understanding of statewide water use through investments in field and technical staff

**Integrate Accurate, Transparent Statewide Water Use Summaries** – Basin studies, water budgets, and planning efforts would all benefit from accurate data of water use by water right. A robust data set is also needed to develop reports on water use by watershed, including cross-boundary watersheds, and support modeling efforts used in many planning initiatives. The Water Resources Department received funding for this effort and is working to identify staffing and specific activities needed to develop these much-needed statewide summaries.

**Invest in Evapotranspiration Monitoring and Programs** - Evapotranspiration (ET) is water that transpires from the leaves of plants and evaporates from soil and reservoirs. ET data can be used to quantify how much water is consumed by irrigated agriculture and other lands (e.g. forest, lawn). Understanding how much water crops use can help farmers, water managers, and communities manage current supplies and plan for their future needs. The Water Resources Department uses estimates of ET for several important programs and projects ranging from studies to water right transfers.

Satellite-based ET data provides more accurate data over a larger area, over a broader period of time, and more affordably than any other approach. The Water Resources Department uses satellite imagery, supported with ET models, and other well-established methods to calculate consumptive water use from irrigated fields and open water bodies. With legislative support from House Bill 2018 in 2021 and House Bill 2010 in 2023, the Department is working to establish a consistent, accurate, and well-validated ET and water use dataset across Oregon to support water planning and management.

Future applications of satellite-based ET data sets include:

- Compute water use in Walla Walla Basin and future groundwater basin studies
- Develop consumptive use values for statewide water budgets prescribed under House Bill 2018 (2021)
- Support enrollment and validation of historical use; monitoring compliance for the Harney Basin Groundwater Conservation Reserve Enhancement Program (CREP)

**Water Measurement Cost Share Revolving Fund** – Federal support through the American Rescue Plan Act State Fiscal Recovery Funds provided \$1 million to the Water Resource Department’s Cost Share Measurement Program to assist water users with the installation of measuring devices.

## Regularly Update Out-of-Stream Water Demand Forecasts

The most recent water demand forecast was developed by the Water Resources Department in 2015. Oregon’s [2015 Long-Term Water Demand Forecast](#)<sup>28</sup> describes potential long-term consumptive use demands in Oregon that may not be able to rely on historic patterns to predict future rainfall and snowpack. The 2015 scenarios and assumptions included both a projected increase in population and a longer, warmer growing season, leading to more demand by agricultural, commercial, residential, and industrial water uses in 2050. The forecast was done at a coarse scale, offering projections in increased water demands at the county level.

Strategy Action 9A described improvements needed to statewide water use measurement and reporting. These improvements, outlined in the [2022 Legislative Report on Water Use Measurement and Reporting](#), are needed to develop the data and modeling tools needed to improve our statewide approach to water demand forecasting. Future out-of-stream water demand forecasts must be produced at the appropriate scale to inform collaborative approaches to water planning and management. Demand forecasts should identify trends in water use, economic development, urban-rural population growth/shift, per capita demands, and changing crop water requirements due to a changing climate.

Out-of-stream water demand forecasting is needed to support future place-based, integrated water resources planning and other planning efforts. For further discussion of place-based planning, refer to Chapter 2, Action 4A.

Forecasting is also needed for instream flow and ecosystem needs, see Action 8D.

**Action 9B**  
Regularly Update Out-of-Stream Water Demand Forecasts

### Lead Agencies

OWRD

### Supporting Agencies

ODEQ, ODFW, USGS

### Partners

AgriMet, water rights holders,  
OSU Extension Service

## Background

Objective water management decisions are made possible when they are based on reliable information about water use. Availability of water use data is fundamental to ensure efficient water management, effective water distribution, and to help plan for future water needs. The information is also used to ground-truth demand projections or models. The Water Resources Department has the authority to require new users to measure and report water use and can require existing users who already measure water use to report the resulting data. Water users who keep track of their use are better able to demonstrate the validity of their water rights, to develop water management and conservation plans, and to determine the design and funding needs of their future water systems.

## Example Actions

- Continue to **work with Information Services** to improve the software and tools used for water-use measurement and reporting
- ~~Improve the state's~~ **Implement new authority that allows OWRD** to require reporting of water use, **where measurement is required, including aligning the reporting with the Water-Use Reporting program**
- Update and implement the Water Resources Commission's Strategic Measurement Plan, measuring significant diversions
- Coordinate the Water-Use Reporting Program and **Water Resource** Commission's Strategic Measurement Plan
- **Review the effectiveness of the 2000 Strategic Measurement Plan and associated OWRD key performance measure, and determine appropriate path for measurement and documentation of water use in Oregon**
- **Improve Water Use Reporting Database functionality and public access, including establishing and maintaining quality assurance procedures to verify the accuracy of water use and other data**
- **Invest in water use measurement devices in priority watersheds**
- **Invest in evapotranspiration monitoring and programs**
- **Develop accurate statewide annual water use summaries for water rights using all available water use data sets**
- **Produce annual values of consumptive use by water right to allow for analysis of trends in water use over time**
- **Install and monitor groundwater observation wells**
- **Provide resources to assist with installation of measurement devices; update cost-share program**
- **Work with USGS to integrate water use data from OWRD into USGS water use products**
- **Seek authority to require water use reporting in areas of scientific interest in preparation for Serious Water Management Problem Areas (SWMPAs), basin studies, or planning exercises like updates to basin plan rules**
- **Increase documentation and data collection of decommissioned wells and well construction history**
- **Include equity considerations for assistance through measurement cost share programs**

## Resources

### *Agency Programs & Workgroups*

OWRD Water-Use Reporting Program

### *Funding*

OWRD Water Measurement Cost Share Program

### *Documents*

[2022 OWRD Legislative Report on Water Use Measurement and Reporting](#)

[2000 Oregon Water Resources Department Strategic Measurement Plan](#)

### Lead Agencies

ODEQ, OWRD

### Supporting Agencies

DLCD, DOGAMI, ODA, ODFW, USGS

### Partners

Tribes, local gov't's, municipal water providers

## Background

There is a need to understand how the demand for water, across many use sectors, is projected to change over time. This can help inform planning and infrastructure decisions to anticipate these demands and respond to climatic impacts that alter water timing and availability.

Oregon must regularly update its fifty-year forecast of out-of-stream water needs and coordinate this effort with understanding instream forecasted needs(See Action 8D). These updates to the forecast should include identifying trends in water use, economic development, urban-rural population growth/shift, per capita demands, and changing crop water requirements due to a changing climate.

## Example Actions

- Periodically update demand projections with new population, per capita water demand, industrial demand, crop water use, and climate projections
- Develop models/studies to quantify the economic, social, and cultural value of consumptive uses of water **and publish outcomes**
- Employ remote sensing and crop water demand modeling to improve crop water use estimates
- **Provide data in a method consistent with needs of the public, and involve water users in the development of demand products**
- **Study potential impacts to environmental justice and other frontline communities in demand forecasts**

## Resources

### *Agency Programs & Workgroups*

OWRD's Planning, Collaboration, & Investment Section, OWRD Technical Services Division

### *Documents*

[2015 Statewide Long-Term Water Demand Forecast](#)

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# CHAPTER 4

## Stewardship

All Oregonians serve as stewards of water as a public resource—managing water simultaneously for economic development, human health and safety, and for environmental protection. Oregon has an opportunity to integrate strong planning and partnerships (Chapter 2) with data and analysis (Chapter 3) into meaningful stewardship actions that help meet Oregon’s instream and out-of-stream needs.

Chapter 4 describes a host of actions needed to adapt and mitigate for climate change and build a more secure water future for people and the environment. Protection, enhancement, and restoration of our ecosystems is needed to increase resiliency by increasing natural storage capacity, improving instream habitat and fish passage, protecting and restoring wetlands and water instream, eradicating invasive species and protecting native plant communities, and protecting groundwater-dependent ecosystems. Land management activities need to protect and improve water quality, including protecting our watersheds and drinking water sources from contamination and pollution. Voluntary and regulatory approaches can help keep toxics and pollutants out of our waterways.

Water management activities shared across agencies, tribes, businesses, and individuals are needed to ensure adequate water now and into the future. Water conservation and reuse, and in some cases storage, can all help stretch our supplies further. We also need to develop non-regulatory water management approaches and water conservation incentives. Agencies need continued support to implement permitting programs and need adequate field staff to support water users and protect both water quality and quantity. Responsible water management also includes maintaining, upgrading, and sometimes decommissioning infrastructure to protect public health and safety and our environment. Acknowledging that water use has an energy demand associated with it, and that we rely heavily on hydropower to meet our energy needs, we need to continue to explore creative approaches to energy conservation and production.

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### Objective 4: Meet Instream and Out-of-Stream Needs

#### Critical Issue - Healthy Ecosystems

- 10A Improve Watershed Health, Resiliency, and Capacity for Natural Storage
- 10B Protect and Restore Instream Habitat and Fish Passage/Screening
- 10C Develop Additional Instream Protections
- 10D Prevent and Eradicate Invasive Species
- 10E Develop Additional Groundwater Protections

#### Critical Issue - Clean Water

- 11A Ensure the Safety of Oregon's Drinking Water
- 11B Reduce the Use of and Exposure to Toxics and Other Pollutants
- 11C Implement Water Quality Pollution Controls

#### Critical Issue - Water Use & Management

- 12A Determine Unadjudicated Water Right Claims
- 12B Improve Water-Use Efficiency and Water Conservation
- 12C Encourage Water Reuse Projects
- 12D Improve Access to Storage
- 12E Reach Environmental Outcomes with Non-Regulatory Alternatives
- 12F Provide an Adequate Field Presence
- 12G Strengthen Oregon's Water Quantity and Water Quality Permitting Programs

#### Critical Issue - Water Infrastructure

- 13A Maintain, Upgrade, and Decommission Water and Wastewater Infrastructure
- 13B Encourage Regional (Sub-Basin) Approaches to Water and Wastewater Systems
- 13C Support Dam and Levee Safety

#### Critical Issue - Water & Energy

- 14A Use Existing Infrastructure to Develop Non-Traditional Hydroelectric Power
- 14B Promote Strategies that Increase/Integrate Energy and Water Savings

Responsibility for stewarding Oregon’s ecosystems, including protection and restoration, falls to all Oregonians across a broad range of local, state, federal, and tribal agencies, as well as on private landowners and local organizations. Oregon has a rich history of work in this area, using numerous tools and institutions to help address and improve ecological conditions. Chapter 3 described the actions needed to support measurement and monitoring efforts, and better define instream and ecosystem water quantity and quality needs. The Healthy Ecosystems section describes five actions to improve ecosystem function and resilience. Actions address improvements needed in watershed protection and restoration, instream habitat and fish passage, instream flow protections, invasive species eradication, and groundwater protections.

## Ecosystem Services

Generally, the term “ecosystem” refers to a system of interdependent relationships between organisms and their surrounding environments. Healthy ecosystems provide a wide variety of benefits and services to our communities. Oregon’s ecosystems sustain economically viable activities such as farming, ranching, fisheries, timber harvesting, power generation, and outdoor recreation, while providing high quality water, carbon sequestration, flood control, fish and wildlife habitat, and productive soils.

By degrading or neglecting the natural functions of ecosystems, we risk jeopardizing our own quality of life as well as the fish and wildlife that depend on these systems. Degradation subsequently results in a need to engineer solutions that attempt to mimic ecological functions, often at a great expense that yields a lesser quality function. For instance:

- It costs far more to obtain drinking water when treated by a multi-million-dollar facility than maintaining a relatively healthy watershed that naturally provides a clean source of water;
- Flooding is far more frequent and costly when waters cannot be well absorbed by the physical environment and wetlands or stream floodplains cannot attenuate flood waters;
- Crop production costs are higher when soil productivity is compromised; and
- Fish and wildlife populations are more expensive to maintain through restoration actions and hatchery operations than through the maintenance and protection of natural habitat and watersheds that provide clean, cold water.

## Habitat & Ecosystem Functions

**Floodplains** - Floodplains are diverse habitats, adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. These areas, if left undisturbed, act to store excess floodwater which can protect downstream property from flooding and release water slowly, later in the year. They also provide valuable habitat for fish and wildlife. In the Willamette River Basin, flood control modifications have largely disconnected the Willamette River from its braided channels, oxbows and sloughs—wetland types that are remnants of its historical river channel. This fundamental disconnect in the valley’s hydrologic regime has changed the character of the valley’s floodplain and wetlands and greatly altered their storage, filtration, and habitat functions.

Actions such as reconnecting rivers and streams to their floodplains; restoring stream channel location and complexity; removing dikes and revetments; allowing seasonal flooding; restoring wetland and riparian habitats; and removing priority high-risk structures within floodplains<sup>1</sup> and other actions described in [Oregon’s Conservation Strategy](#) can restore floodplain functions.

**Flowing Water and Riparian Areas** – Flowing water habitat includes all naturally occurring freshwater streams and rivers, including intermittent streams, as well as springs and seeps. These systems support a wide variety of species, including fish, invertebrates, amphibians, birds, plants, and algae. Human activities such as constructing dams, deepening, widening, or straightening stream channels has had the unfortunate impact of degrading habitat and water quality. See Action 10B for recommendations regarding improving flowing water (e.g., stream) habitat including stream channel restoration and fish barrier removal. Mechanisms to enhance the amount of water remaining instream are discussed in Action 10C.

Riparian areas are plant communities located in a zone of transition from an aquatic ecosystem to a terrestrial ecosystem, often containing a mix of trees and shrubs adjacent to a stream or river. Riparian areas provide important functions like bank stabilization, shade to keep water cool for fish, filtration of runoff before it enters the stream, and habitat for many species. Riparian habitats directly affect natural water storage, hydrology, water quality, water temperature, and habitat quality through their ability to hold and slowly release water, filter and biologically process nutrients, and provide shade and habitat. Riparian ecosystems are dependent upon surface or subsurface water through the zone's soil-vegetation complex to support their overall health.

Oregon should continue encouraging efforts to prevent further degradation and improve riparian conditions through voluntary restoration, such as the efforts conducted under the [Oregon Plan for Salmon and Watersheds](#)<sup>2</sup>, [Oregon's Agriculture Water Quality Management Plans](#)<sup>3</sup>, [Forest Practices Act](#)<sup>4</sup> and [Riparian Lands Tax Incentive Program](#)<sup>5</sup>.

**Wetlands** - Wetlands are distinct ecosystems that are flooded or saturated with water either temporarily (seasonally) or permanently. They provide valuable functions such as nutrient cycling, water storage, and support a high diversity of microbes, insects, amphibians, birds, and other species. Wetlands can be found in wide variety of locations, within floodplains, isolated in uplands, or near the ocean and are classified by tidal dynamics, landscape position, vegetation, and hydrologic regime.

Large wetlands in Oregon, such as the Klamath Basin National Wildlife Refuge Complex and Malheur Wildlife Refuge support continental bird diversity by providing habitat for migrating species. In southern Oregon, the Klamath National Wildlife Refuges' shallow marshes, open water, and grassy uplands support one of the most biologically productive refuges within the Pacific Flyway migration route. Approximately 80 percent of the flyway's migrating waterfowl pass through the Klamath Basin on both spring and fall migrations.<sup>6</sup> The refuge provides habitat for 25 species of special concern listed as threatened or sensitive by California and Oregon.

Oregon has lost about 40 percent of its original wetlands. The [U.S. Fish and Wildlife Service estimates](#) that Oregon has 1.4 million acres of wetlands today, compared to about 2.3 million acres of tidal and non-tidal wetlands that covered the same area in the late 1700s.<sup>7</sup> Oregon must protect our remaining wetlands through rigorous permitting (e.g., Removal-Fill) and conservation on public and private lands. The state must also restore degraded wetlands to regain water storage capacity and other hydrologic benefits and support the many declining species reliant on these ecosystems.

**Estuaries** - An estuary is a zone of transition between the marine-dominated systems of the ocean and the upland river systems, a zone which yields one of the most biologically productive areas on Earth. Estuaries provide important habitat for many fish and wildlife species for rearing, nesting, foraging, and as a migration route. They also provide valuable flood attenuation, an important consideration under climate change scenarios that predict sea level rise and more frequent coastal storms. Numerous species can be found in Oregon's estuaries, such as salmon, herring, flounder, crabs, oysters, clams, ducks, geese, shorebirds, and harbor seals.

There are 22 major estuaries in Oregon. Although most estuaries along the coast are relatively small, the Columbia River estuary at Astoria is the largest in area at more than 80,000 acres. Some of the issues affecting the health of Oregon's estuaries include increased sedimentation and nutrient loading, introduced nuisance and invasive species,

recreational and development pressures, and low freshwater inflows. Managers along the West Coast are concerned about how sea-level rise and ocean acidification will alter estuaries and impact threatened species.<sup>8</sup> Some communities are restoring tidal inundation to estuarine lands to build resiliency for coastal sea level change and tidal flooding.

**Forests** - Oregon's forests help filter drinking water, keep water cool, provide habitat for diverse animal and plant species, supply oxygen, moderate temperatures and rainfall, store atmospheric carbon, and support Oregon's economy. Healthy forests promote soils that provide natural filtration to keep streams clean and water quality high. Nearly 50 percent of the state, or 30 million acres, is classified as forestland.

Most of Oregon's municipal water systems rely on water that originates from forestlands, including those managed for wood production. At the state scale, data collected from the Department of Environmental Quality's ambient monitoring network indicates that public forestlands have the highest percentage of excellent or good water quality sites, compared to agriculture, urban areas, rangelands, and mixed land uses.<sup>9</sup>

Forests are part of the essence of Oregon, and our waters benefit from their sound management. However, many federal forestlands, particularly in drier regions, have massive ecological restoration needs. The rising expense of owning forestland and the land's growing value as real estate increases economic pressure to sell private forestland for development. As forests are converted to other uses, this leads to habitat fragmentation and displaces the species that rely on forest ecosystems. Increased home density within forested areas, coupled with increased wildfire risk from climate change, elevates the need for restoration actions that address fire mitigation.

Forest diversity can offer a range of benefits when land managers account for values such as wood production, aesthetics, recreation, habitat, water quality, and clean air. The [Forestry Program for Oregon](#) emphasizes the importance of efforts to maintain healthy, resilient, and functional forested areas, in part, for the benefit of water resources.<sup>10</sup> Keeping forests as forests, however, requires public support, investment, and resource protection policies that make continued forest ownership an economically viable alternative to conversion.

## Improve Watershed Health, Resiliency, and Capacity for Natural Storage

Ecosystem resilience is the capacity to absorb and adapt to disturbance and change—while maintaining essential functions. Healthy water resources are directly related to the resiliency of an ecosystem. Oregon's floodplains, rivers, riparian areas, wetlands, estuaries, forests, and other uplands provide valuable ecosystem services and essential habitat for fish and wildlife. These places have been modified to support human needs including flood control, irrigation, navigation, hydropower, recreation, and land development and use. Watershed restoration is needed at many scales, including uplands and lowlands, to improve degraded habitat, restore resiliency, improve water quality and capacity for natural storage. While this Strategy action addresses the need to improve watershed health, the next action, Action 10B, specifically addresses instream habitat improvements including fish passage.

**Action 10A**  
Improve Watershed Health,  
Resiliency, and Capacity for  
Natural Storage

This section describes existing statewide planning documents guiding ecosystem protection, restoration, and recovery. Actions outlined in these documents must be supported by public-private partnerships and a variety of funding sources.

### The Oregon Conservation Strategy

The [Oregon Conservation Strategy](#) was developed in 2006, for the goal of maintaining healthy fish and wildlife populations by maintaining and restoring functioning habitats, preventing declines of at-risk species, and reversing declines where possible. The Conservation Strategy is revised every 10 years, with the next updated version available in 2026. The Oregon Department of Fish and Wildlife leads the implementation of the Conservation Strategy.

The Oregon Conservation Strategy takes a non-regulatory, statewide approach, while recognizing that conservation issues vary by region and must be tailored to the unique needs of the fish, wildlife and human communities that coexist. The Oregon Conservation Strategy engages citizens in addressing Oregon’s conservation needs by offering recommended voluntary actions and tools and encourages monitoring key species and attributes of ecosystems as well as measuring the effectiveness of conservation actions.

The Conservation Strategy has several components, including identifying key conservation issues (e.g., climate change, water quantity/quality), conservation opportunity areas, and 294 strategy species of greatest conservation need.

### **The Oregon Plan for Salmon and Watersheds**

The [Oregon Plan for Salmon and Watersheds](#) (the “Oregon Plan”), is a statewide initiative launched in 1997 to help restore healthy watersheds that support the economy and the quality of life in Oregon. The Oregon Plan has a strong focus on salmon, largely because of the significant cultural, economic, and recreational importance to Oregonians—and because they are important indicators of watershed health. The Oregon Plan makes recommendations to improve water quality and quantity and to address factors that contribute to declines in fish populations and watershed health. Many of these measures are voluntary and depend upon the willingness of private citizens to implement restoration projects. These voluntary measures continue to be fundamental to the success of the Oregon Plan.

Landowners and other private citizens, community organizations, interest groups, and all levels of government come together to organize, fund, and implement these measures in a coordinated manner. Oregon’s watershed councils and soil and water conservation districts assist landowners with projects and lead restoration efforts in many watersheds throughout the state. The Oregon Plan has bolstered interagency and state-federal coordination and collaboration.

Along with the Oregon Watershed Enhancement Board, several state agencies, federal agencies, and non-profit organizations provide financial assistance for these restoration projects. The U.S. Department of Agriculture’s Natural Resources Conservation Service, U.S. Bureau of Land Management, National Fish and Wildlife Foundation, the U.S. Environmental Protection Agency, the U.S. Forest Service, the U.S. Fish and Wildlife Service, NOAA Fisheries, and the Oregon Departments of Fish and Wildlife and Environmental Quality are actively funding watershed restoration projects. As part of its responsibilities, the Bonneville Power Administration funds regional efforts to protect and enhance fish and wildlife populations affected by federal dams in the Columbia River Basin. Other state agencies may administer programs or undertake actions that help advance the work of the Oregon Plan.

Future conservation efforts will be enhanced by continuing to implement and build upon the successful collaborative efforts of the Oregon Plan for Salmon and Watersheds, and other relevant documents including the Oregon Conservation Strategy, Northwest Power and Conservation Council’s Columbia River Basin Fish and Wildlife Program, Conservation and Recovery Plans and Biological Opinions, and water quality implementation plans. The Integrated Water Resources Strategy should be used to strengthen and forge new partnerships.

### **A Restoration Tool – Beaver Modified Landscapes**

American beaver (*Castor canadensis*), Oregon’s state animal, are common to Oregon’s riparian areas and waterways (rivers, streams, lakes, ponds, marshes, and wetlands) where they have an ample supply of food and year-round water flow for shelter and protection from predators<sup>11</sup>. Beaver-modified floodplains and wetlands can trap sediment, filter or bind excess nutrients and toxic chemicals, thereby improving water quality. The sponge-like properties of these floodplain-wetland habitats may also reduce the severity of drought, wildfire, or flooding events.<sup>12</sup> Many planning and conservation efforts have identified the importance of beaver and beaver-modified habitats (e.g., beaver dams, pools, and wetlands) for Oregon’s state sensitive and federally listed fish and wildlife species in a changing climate<sup>13,14,15,16,17,18,19,20</sup>. In 2023, the Oregon Department of Fish and Wildlife published the 3-Year Action

Plan for Beaver-Modified Landscapes, August 2022-2025, which outlines goals and actions to be taken by the Department to advance the protection and restoration of beaver-modified habitat in Oregon<sup>21</sup>.

Wetlands and slow-moving water created by beaver dams provide key habitat for amphibian, reptile, and bird populations. Beaver dams, pools, and off-channel habitats such as side-channels and meanders, can provide juvenile rearing and overwintering areas for salmon and steelhead.

Legislation from the 2023 legislative session (House Bill 3464) acknowledged the benefits of beaver to fish, wildlife, habitat, and humans in a changing climate and removes beavers from the “predatory animals” definition under ORS 610.002 to simplify management of beaver in Oregon. While beavers play an important role in healthy ecosystems, their burrowing, foraging, and damming activities can damage timber, crops, landscaping, human infrastructure, and property.

Installing planting protections (e.g., fencing, gritted paint) or beaver flow devices (e.g., pond levelers, culvert exclusion devices) can reduce beaver-human conflict and prevent further property damage. Oregon Department of Fish and Wildlife’s [Living with Beaver](#)<sup>22</sup> guidance document provides facts about Oregon’s beaver and tips for coexisting with them on the landscape. Additionally, the U.S. Fish and Wildlife Service developed a [Beaver Restoration Guidebook](#), updated in 2023, summarizing information for landowners, restoration practitioners, managers, and other parties who are interested in working with beaver to restore streams, wetlands, and floodplains.

## Protect and Restore Instream Habitat and Fish Passage

Freshwater ecosystems including rivers, perennial and intermittent streams, and wetlands are essential for providing habitat to many at-risk species, including important spawning and rearing habitat for salmonids, amphibians, freshwater mussels, and other invertebrates. However, most river systems in Oregon have been heavily modified to achieve various flood control, irrigation, navigation, hydropower, recreation, and other water supply benefits. The construction of roads and their associated bridges, culverts, and tidegates have altered many river and stream systems. These modifications have greatly reduced the amount of accessible stream habitat for many aquatic species, degraded habitat and water quality, and caused the decline of many species and subsequent Endangered Species Act listings.

Oregonians can be proud of the work that has been done to protect and restore the condition of rivers and streams throughout the state. Tens of thousands of degraded stream miles have been improved through riparian habitat projects, removal of fish passage barriers, instream habitat enhancement, and restoration of streamflows. All of these efforts have helped improve the ecological and economic health of Oregon’s communities. Our cooperative, community-level approach to watershed and stream restoration, through the Oregon Plan for Salmon and Watersheds and partnerships with watershed councils, has significantly improved water quality and fish and wildlife habitat. Oregon should build upon this good work to further enhance stream restoration and fish protection efforts.

**Action 10B**  
Protect and Restore  
Instream Habitat & Fish  
Passage/Screening

### Habitat for Aquatic Species

Freshwater habitats contain an incredible proportion of Oregon’s biodiversity. Water is crucial for all fish and wildlife, and high quality freshwater aquatic systems provide essential habitat for many at-risk species. Beyond the multitude of Oregon’s iconic fish species, many species of wildlife, such as the Oregon Spotted Frog, rely on instream habitat for a portion or all of their life cycle.

Ways to improve instream habitat conditions include protecting streams from degradation, including channelization, riparian vegetation removal, erosion, runoff, and pollution, and restoring channel and floodplain function and complexity with restoration projects. For example, ongoing efforts to replace culverts present

opportunities for developing, testing, and implementing methods to maximize habitat connectivity for a variety of aquatic and terrestrial species. There are many regional, state, and local documents and plans outlining species-specific protection and recommended habitat improvements, including the [Oregon Conservation Strategy](#). For example, the Oregon Conservation Strategy provides a list of “[Strategy Species](#),” or species of greatest conservation need, along with voluntary conservation actions and resources.

**Fish Passage** – Barriers such as dams, dikes, road fill, culverts, and tide gates change hydrological conditions and alter natural flow regimes. Many of these artificial obstructions create safety hazards for fish, can prevent fish passage altogether, alter transport of sediment, boulders, gravel, and wood, and create an uneven distribution of habitat. Since the early 1990s, the state has required fish passage as a condition of approval for applicable surface water and reservoir permits.

The Department of Fish and Wildlife works with owners or operators of artificial obstructions in several ways to address barriers to fish passage. Recognizing the unique nature of migratory fish in the Pacific Northwest, many other agencies and organizations have helped Fish and Wildlife to compile data on fish passage barriers throughout the state. Compiling this information is a first step in a long-term process to fill existing gaps related to fish passage data and fish habitat distribution data, with the hope of integrating the two datasets to further fish passage restoration opportunities.

This ongoing effort has resulted in the identification of approximately 45,000 potential barriers to fish passage, which includes both natural (waterfalls, steep gradients, etc.) and artificial obstructions (dams, bridges, culverts, tide gates, etc.). Almost 70 percent of the potential barriers that were compiled are culverts. Although significant progress has been made to compile data on fish passage barriers and fish habitat distribution, more work is needed to fill data gaps, including the inclusion of several local, county, tribal, and federal agency inventories.

**Fish Screening** – Another aspect of fish protection is fish screening, an important part of the Oregon Plan’s efforts for the protection, restoration, and recovery of native migratory fish, such as salmon and steelhead. Fish screening significantly reduces juvenile fish mortality at water diversions by preventing fish from entering diversion ditches, machinery, pumps, or irrigated fields. Since the early 1990s, the state has required fish screening and/or bypass devices as a condition of approval for surface water permits and transfers, when applicable. The Department of Fish and Wildlife operates the state’s fish screening program and has helped install more than 1,500 fish screens through its cost-share and tax credit programs. The 2023 Legislature extended the sunset for fish screen tax credits through January 1, 2030.

Installing fish screens, replacing culverts with bridges, building fish-friendly culverts, constructing fishways, stabilizing road fill material, and removing obsolete infrastructure (also see Action 13A) are all techniques that can be used to restore and protect habitat and passage for fish.

### **Historic Klamath Dam Removal Effort**

As introduced in Chapter 2 (Action 3A), a historic dam removal project in Oregon and California is underway. Four PacifiCorp dams, JC Boyle, Copco No. 1 & 2 and Iron Gate, located on the Klamath River are slated for removal with the purpose of returning a free-flowing river and providing access to over 400 stream-miles of historic spawning and rearing habitat for Chinook, Coho, steelhead, and lamprey. The dam removals are also expected to improve water quality, reducing stagnant water that can support harmful algal blooms (HABs), and support the cultural lives, health, and economic well-being of Native American communities in the Klamath Basin.

This dam removal project took decades of negotiations and is currently the largest dam removal project in the country, possibly the world. As of February 2024, the initial drawdown phase of emptying water from behind the dams is now complete. The Klamath River Renewal Corporation leading the effort has contracted with the Yurok Tribe to begin revegetation of the land exposed from draining the dams. Physical removal of the dams will happen

later this year. Restoration activities along the Klamath River will continue for about the next 10 years. More information about the project can be found on the Klamath River Renewal Corporation's [website](#).

## Develop Additional Instream Protections

In many areas of Oregon, streamflows are very low or even non-existent during late summer months, largely due to anthropogenic causes. Low streamflow conditions are further exacerbated by periods of intensive water use or drought. Low streamflows often mean higher water temperatures and increased nutrient concentrations, contributing to poorer water quality for humans and fish and wildlife. Oregon needs to conserve and protect streams by developing additional instream flow protections and finding opportunities for enhancing streamflow and streamflow restoration.

**Action 10C**  
Develop Additional  
Instream Protections

Part 1 described several laws, policies, and regulations that can be used to protect Oregon's rivers and streams. Links have been provided back to Part 1 for this information to reduce redundancy. Recent efforts utilizing these tools are provided below.

### Scenic Waterways Designation

Oregon's Scenic Waterways Act provides for state designation that may be granted to a river or lake to protect its unique character and protect it from future degradation. A portion of the Nehalem River was the most recent waterbody receiving scenic waterway designation, in 2019. There are currently portions of 22 rivers and one mountain lake [designated as scenic waterways](#).

### Outstanding Resource Water Designation

Outstanding Resource Waters designation, by Oregon's Environmental Quality Commission, adds water quality protections, including restrictions on point source discharges, to ensure that no degradation of the high water quality, exceptional ecological characteristics, and other outstanding values of the waters occurs. In July 2017, the North Fork of the Smith River and its tributaries and associated wetlands became the first Outstanding Resource Water designated in Oregon. In 2021, Waldo Lake and Crater Lakes were designated as Outstanding Resource Waters.

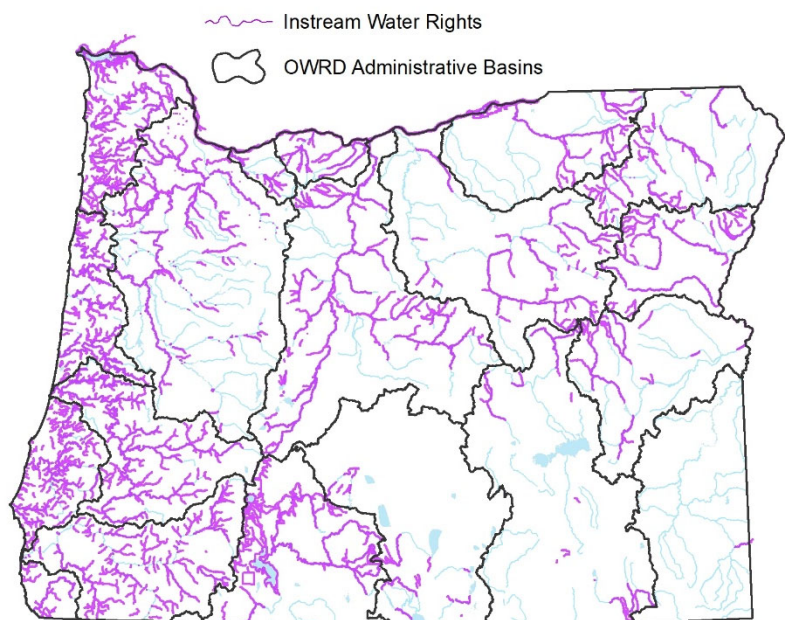
### Instream Water Rights

As described in Part 1 under the Instream Water Rights Act, the Department of Fish and Wildlife, Parks and Recreation Department, and Department of Environmental Quality can submit applications to protect water instream. The State's policy is to obtain an instream water right on every stream river, and lakes which can provide significant public benefits. Oregon is working to establish additional instream water rights to protect instream flows and continues to resolve existing protested instream water right applications (Figure 4-1).

Additional data needs regarding instream water rights were discussed in Chapter 3, Action 8B, including the need to identify the full suite of flows necessary for creating and maintaining habitat (e.g., ecological flows) and

**Figure 4-1: Instream Water Rights**

January 2024





inform the amount of flow requested in the instream water right application. Mechanisms should be explored to protect these types of flows, including a potential Department of Fish and Wildlife rule change to accommodate ecological and environmental flows in future instream water rights. In most instances, achieving instream water right flow targets will depend on voluntary partnerships with senior water right holders to be effective.

### **Instream Transfers and Leases**

Water users with valid, existing surface water rights can voluntarily transfer water instream to restore streamflow, through a program administered by the Water Resources Department. An out-of-stream use, such as irrigation for agricultural crops, can be transferred instream to restore flows on a temporary or permanent basis. The water user has the option of transferring an entire water right instream, or a portion thereof. One of the basic tenets of instream transfers and instream leases is ensuring that other water users are not injured as a result of the changes to the use. Incentives are needed to encourage voluntary actions such as instream transfers or leases.

Instream flow restoration activities have predominantly occurred in a handful of basins, although streamflow restoration needs have been identified in every basin. As of 2022, there were 452 active instream leases and instream transfers in place. Active instream leases resulted in 4993.92 cubic feet per second (cfs) protected instream, with most of that flow reflecting leases for power rights protection. Approximately 422 cfs is kept instream associated with permanent or long-term transfers. In addition, the majority of water put instream on a permanent basis is associated with senior water rights, resulting in an impactful instream benefit.

Flow restoration through instream transfers and leases benefits greatly from active partnerships between private landowners and Oregon’s conservation organizations, including The Freshwater Trust, the Deschutes River Conservancy, and Trout Unlimited. Incentives offered by these organizations and others can help land remain productive and profitable, while also benefitting freshwater ecosystems.

**Allocation of Conserved Water** - The Allocation of Conserved Water Program at the Water Resources Department allows a water user who conserves water to use a portion of the conserved water on additional lands, put the portion of water to a new use, lease or sell the water, or dedicate the water to instream use. In order to participate in the program, the water user must make a physical change to their water delivery system, being a change to how the water is distributed (piping of a canal) or making efficient changes to the on-farm delivery system (changing from pivots to drip irrigation). Use of this program is voluntary and provides benefits to both water right holders and instream values. By the end of 2022, the Water Resources Department had approved 99 applications resulting in approximately 250.23 cfs both permanently protected and temporarily reserved instream.

### **Prevent the Spread of Invasive Species**

The Oregon Invasive Species Council defines an invasive species as a non-native species that can cause economic or environmental harm or cause harm to human health. It can be a plant, animal or any other biologically viable species that enters an ecosystem beyond its native range. Invasive species disrupt the natural function of an ecosystem by competing and replacing native species and disrupting the natural habitat.

**Action 10D**  
Prevent and Eradicate  
Invasive Species

Oregon experiences threats from invasive species in both aquatic and terrestrial ecosystems. Aquatic invasive species can flourish in waterways, reducing water quality, competing with native plants, and clogging boat, hydropower, municipal, and irrigation infrastructure. Native plant species in riparian and wetland areas adjacent to waterways face competition from invasive species, limiting their capacity to provide benefits such as shade, shelter, and food. Invasive species can also impact the health of uplands, where well-managed forests are critical to protecting source water quality.

## Aquatic Invasive Species

Quagga and zebra mussels, along with hydrilla (a waterweed), and Northern Pike are currently among the top aquatic species of concern to keep out of Oregon. Quagga and zebra mussels and aquatic vegetation can be easily transported by trailered watercraft and have spread rapidly in portions of the United States due to their adaptability, lack of natural predators and physical transport. Species like Eurasian watermilfoil and New Zealand mudsnails already contaminate some Oregon waterbodies.<sup>23</sup>

The [Aquatic Invasive Species Prevention Program](#) and invasive species actions contained in the Department of Fish and Wildlife’s Oregon Conservation Strategy are key tools for fighting invasive species. Key elements of the Conservation Strategy are to prevent new introductions of invasive species, control the scale and spread of infestations, and eradicate invasive species, if possible through boat inspection stations. Inspections act as a line of defense and an opportunity to educate the public about the risk of aquatic invasive species entering our state.

**Ballast Water** – The discharge of ballast water, used to provide stability for large commercial ships, is a primary pathway of concern for introducing non-native species from foreign ports, potentially threatening our regional waterways. The Department of Environmental Quality implements and enforces ballast water management regulations in an effort to reduce the risk of introducing new aquatic invasive species by prohibiting ballast water discharge unless it meets specified criteria. Since 2012, the Department of Environmental Quality ballast water program has been supported by a 50-50 cost share between the General Fund and a fee on regulated vessels using Oregon waters. In addition to monitoring vessels for pre-arrival ballast management compliance, the Department identifies high-risk arrivals and conducts vessel inspections and compliance verification sampling on at least 12 percent of vessels calling on Oregon ports.

## Invasive Species in Forests

Invasive species also cause issues in uplands, and their impact on Oregon’s forests can lead to water quality and quantity concerns. Diseased or dying trees, on a large scale, are unable to provide the watershed benefits of filtering and storing water. The Oregon Department of Agriculture and Oregon Department of Forestry coordinate on monitoring and response to invasive species on forestlands.

Invasive Species Common in Oregon Forests and Uplands	
<b>Insects:</b>	<b>Diseases:</b>
<a href="#">Asian giant hornet</a>	<a href="#">Sudden oak death</a>
<a href="#">Elongate hemlock scale</a>	<a href="#">White pine blister rust</a>
<a href="#">Emerald ash borer</a>	<a href="#">Port-Orford-cedar root disease</a>
<a href="#">Larch casebearer</a>	
<a href="#">Mediterranean oak borer</a>	
<a href="#">Spongy moth</a>	

## Invasive Species in Agriculture

Invasive species in the agricultural landscape can pose water quality challenges if pesticides or herbicides are improperly used. Pesticide residue or runoff can find its way into local waterways, potentially harming aquatic wildlife or polluting drinking water sources. The Oregon Department of Agriculture leads the Oregon Invasive Species Council, which provides extensive resources on their [website](#). They have developed a [Digital Information Hub](#) that provides species profiles of the numerous invasive species of concern for agricultural landscapes.

## Develop Additional Groundwater Protections

The Oregon Atlas of Groundwater Dependent Ecosystems, published in 2022, found that more than a third of all streams and rivers depend on groundwater, and about two-thirds of all lakes and ponds do as well<sup>24</sup>. Groundwater discharge contributes to springs, wetlands, and streamflow throughout the state, often providing sustained flows and vital cold water for aquatic species during summer months. Contributions from groundwater support ecosystems (known as groundwater-dependent ecosystems) and human systems alike. Just as this Strategy calls for the development of additional instream protections (Action 10C), it also calls for the development of additional groundwater protections. Such protections should support a goal of sustainable groundwater management to benefit groundwater dependent ecosystems as well as water rights and public health.

### Action 10E Develop Additional Groundwater Protections

In some locations of the state, groundwater withdrawals are occurring at a rate greater than what can be replaced with rain or snow. Consecutive years of drought and climate change are intensifying this situation. Groundwater contamination is also an issue, with ongoing nitrate contamination in the Lower Umatilla Basin Groundwater Management Area proving to be a difficult problem to improve or resolve.

The Groundwater Act of 1955, described in Part 1, established the authority for groundwater management and monitoring for the preservation of the public welfare, safety, and health. There are existing regulatory programs designed to protect groundwater quantity and quality, however, they are limited in effectiveness by the resources allotted to the respective responsible agencies and programs. Additionally, rules that guide groundwater management sometimes need to be updated to reflect new scientific analyses and current conditions.

### Groundwater Management Rulemaking Underway

The Water Resources Department engaged in two rulemakings to address groundwater management. In 2023 and 2024. One effort focuses on future groundwater allocation state-wide while the other focuses on curtailment of existing uses to address over-appropriation in the Harney Basin.

Water Resource Department worked with the Water Resources Commission to conduct rulemaking to update the state's process for issuing new groundwater rights in a manner more sustainable and more protective of existing water rights. The updates focus on the definition of "water is available" for future allocation, and redefines the criteria for determining availability based on best available science and honoring the doctrine of prior appropriation. For example, the Ground Water Act of 1955 refers to determining and maintaining "reasonably stable groundwater levels," but the term is not defined in rule. Acknowledging the hydraulic connection between surface water and groundwater, these updated rules also set criteria to address the potential impacts of new groundwater permits on already depleted streams and other surface waters.

The Water Resources Department is also working with various community working groups in the Harney Basin to reduce groundwater use. This rulemaking is in response to findings from the Water Resource Department's observation wells and the 2022 Harney Basin groundwater study which found that groundwater withdrawals are not being recharged, where groundwater withdrawals in the lowlands of the basin exceed natural recharge by 110,000 acre-feet per year. The proposed rules designate a Critical Groundwater Area to control groundwater use in over-appropriated areas of the basin.

### Voluntary Agreements

Voluntary agreements are a cooperative management tool available to groundwater users. Oregon Revised Statute 537.545 authorizes the Oregon Water Resources Commission to approve such agreements among groundwater users from the same basin or sub-area within a basin. These agreements must align with the intent, purposes, and requirements of the Ground Water Act of 1995, including the provisions pertaining to the designation of Critical Groundwater Areas. As of yet, this tool is untried; however, the Oregon Water Resources Department is exploring

opportunities to encourage its use among groundwater users as a means of either avoiding a Critical Groundwater Area designation or in place of one. The primary goal of these agreements is to reduce water use in basins and sub-areas experiencing excessive groundwater declines. One means of achieving this goal is for groundwater users to agree to use only a portion of their fully allocated groundwater right.

## **Related Strategy Actions**

Many Strategy actions seeking to improve water management, increase water efficiency and water conservation, and protect people and the environment from pollution have the combined benefit of protecting surface as well as groundwater. Just a few such actions are listed below to illustrate the wide range of Strategy actions that seek to protect groundwater quantity and quality:

### **Strategy Actions to Protect Groundwater Quantity**

- Fund water resource management activities such as distribution (Action 1B)
- Provide outreach and educational resources for communities regarding water conservation (Action 2A)
- Conduct additional groundwater studies (Action 7B)
- Improve water use measurement and reporting (Action 9A)
- Restore wetlands and floodplains to increase capacity for natural storage (Action 10A)
- Improve water-use efficiency and water conservation (Action 12B)
- Encourage water reuse projects to reduce use of potable water for non-potable uses (Action 12C)
- Support voluntary programs to reduce the amount of irrigated land (e.g., Conservation Reserve Enhancement Program) (Action 12E)
- Provide an adequate field presence to identify illegal water use (12F)
- Strengthen water quantity permitting programs (12G)
- Support modernization of Oregon’s Well Construction Program (13A)

### **Strategy Actions to Prevent Groundwater Contamination**

- Fund water resource management activities such as groundwater quality monitoring (Action 1B)
- Provide outreach and educational resources regarding domestic well and septic system maintenance/ownership (Action 2A)
- Engage with communities to develop plans to address contamination (Action 3C)
- Plan and prepare for flood events to minimize water quality issues (e.g. sewage releases into the environment) (Action 6B)
- Protect and restore watersheds, including wetlands, floodplains, etc. (Action 10A)
- Protect municipal drinking water source areas (Action 11A)
- Reduce pesticide use and educate pesticide users through the Pesticide Stewardship Partnership (Action 11B)
- Provide an adequate field presence to identify sources of pollution (12F)
- Strengthen water quality permitting such as the TMDL program (Action 12G)
- Protect groundwater quality from contamination through proper well construction or decommissioning (Action 13A)
- Support modernization of Oregon’s Well Construction Program (13A)
- Repair or upgrade wastewater infrastructure that poses a risk to groundwater contamination (Action 13A)

### Lead Agencies

ODA, ODEQ, ODF, ODFW, DSL, OWEB

### Supporting Agencies

BLM, BPA, DLCD, NOAA, NRCS, OPRD, OWRD, USBR, USFS, USFWS

### Partners

Tribes, local governments, utilities, private landowners, watershed councils, SWCD's, non-profits, forest collaboratives

## Background

Protecting and restoring ecological function to Oregon's watersheds supports adaptation to disturbance and climate change, provides habitat, protects water quantity and quality for humans and the environment, and supports Tribal access to First Foods. Many riparian areas, floodplains, wetlands, estuaries, and uplands have been significantly modified by human activities over the last 150-200 years. Restoration of Oregon's natural infrastructure provides many human and environmental co-benefits and can be a more cost-effective solution to constructing built infrastructure to accomplish things like water storage, flood control, and temperature regulation.

## Example Actions

- **Protect and restore watersheds to build climate change resiliency**
- Improve **and protect** riparian conditions to **provide habitat and protect** create a healthy buffer between **sensitive** aquatic ecosystems **and adjacent land use and development to be protective of water quality standards and terrestrial ecosystems**
- Restore **meadows**, wetlands, and **hydraulic connectivity to side channels** and floodplains to maintain critical functions like processing nutrients, providing habitat, and **natural storage storing water**
- Protect **and restore** estuarine conditions to maintain a healthy buffer between the natural mixing of freshwater and marine systems and **allow for safe tidal inundation to build resiliency for sea level change and flooding**
- ~~Establish methods for measuring ecosystem services and incorporate results into planning efforts (moved to 7A)~~
- **Protect and restore beaver habitat and beaver-modified habitat**
- **Protect and restore floodplains and native riparian-floodplain vegetative communities**
- ~~Protect upland and forested areas, in part to maintain source water quality~~ **Identify and implement actions to protect and maintain drinking water source areas quality and quantity in upland and forested areas**
- **Collaborate with Tribes and the state to prioritize locations targeted for protection and restoration and restore access to First Foods**
- **Invest in restoration projects led by Tribes, low-income communities, and communities of color to discover new approaches and best management practices that meet community goals for clean water**
- **Support juniper removal (where applicable) and the development of marketable juniper products**
- **Strengthen protections under Oregon Statewide Land Use Planning Goal 4 which limits development on non-federal forestlands.**

## Resources

### *Agency Programs*

BPA's Fish and Wildlife Program, Private Forest Accord Grant Program, [OWEB Grant Programs](#), Oregon Conservation and Recreation Fund, ODFW Private Forest Accord Mitigation Program, OWRD Water Projects Grants and Loans, ODF's Forest Resources and Urban and Community Forest Programs

### *Documents/Websites*

[Oregon Plan for Salmon and Watersheds](#)

[Oregon's Conservation Strategy](#)

[Oregon Forest Practices Act \(January 2024\)](#)

[Oregon's Agriculture Water Quality Management Plans \(38 total\)](#)

[Oregon Removal/Fill Guide](#)

[The Beaver Restoration Guidebook](#)

[ODFW's 3-Year Action Plan for Beaver-Modified Landscapes August 2022 – 2025](#)

[South Slough National Estuary Research Reserve](#) (research regarding watershed health and resiliency)

### Lead Agencies

DSL, ODEQ, ODF, ODFW, ODOT, OWEB, OWRD

### Supporting Agencies

BPA, BLM, NFWF, NRCS, NOAA, USBR, USEPA, USFS, USFWS

### Partners

Tribes, local governments, utilities, private landowners, watershed councils, SWCD's, non-profits

## Background

The quality of instream habitat has been degraded by modifications to rivers and streams including floodplain development, channelization, large woody debris and riparian vegetation removal, and bank instability worsened by livestock access. Changes in the hydrologic regime, older culverts, and many dams or other impassible barriers have greatly reduced historically accessible habitat for many aquatic species. Appropriate fish screening and fish passage barrier removal should be coupled with stream channel restoration efforts to improve habitat conditions.

## Example Actions

- Continue to update the inventory of fish passage barriers **and high priority screening sites**
- Remove fish passage barriers and support fish screening efforts
- Build upon existing ecological planning and restoration efforts **by incorporating fish screening and passage needs and enhancing instream habitat conditions (e.g., water quality, channel complexity)**
- Update streamflow restoration priority areas using new species distribution, ~~and~~ climate change projections, **hydrologic data, and water quality impairments related to low flow**
- **Couple stream restoration projects with voluntary flow restoration projects (see Action 10C)**
- **Restrict livestock access to riparian areas and streambeds through cooperative fencing programs/efforts**
- **Provide financial and technical assistance for landowners implement projects that improve fish habitat and mitigate risks to natural resources (e.g., road construction with fish-friendly culverts, large wood placement)**
- **Identify opportunities to fund fish screening and/or adding or improving fish passage at the time of FERC hydroelectric project relicensing or when adding hydroelectric generation to an unpowered dam**

## Resources

### *Agency Programs*

DSL's Waterways & Wetlands, ODFW Fish Screening and Passage Program, ODFW Water Program, ODFW Western Oregon Stream Restoration Program, OWRD Dam Safety Program, ODOT Environmental Program

### *Funding*

ODFW's Oregon's Fish Screening and Passage Cost Sharing Program, OWEB's Grant Programs, ODF Small Forestland Investment in Stream Habitat (SFISH) Program

Many Federal Sources: BPA, BLM, USDA-NRCS, NFWF, USEPA, USFS, USFWS, NOAA

### *Documents*

[Oregon Plan for Salmon and Watersheds](#)

[Oregon Conservation Strategy](#)

Northwest Power and Conservation Council's Strategy for Salmon

2020 ODOT's Routine Road Maintenance: Water Quality and Habitat Guide Best Management Practices

### Lead Agencies

ODEQ, ODFW, OPRD, OWRD

### Supporting Agencies

BPA, DSL, NFWF, NOAA, OWEB,  
USGS

### Partners

Tribes, irrigation districts, private landowners, Deschutes River Conservancy, National Fish and Wildlife Foundation, Pelton Round Butte Water Fund, The Freshwater Trust, Trout Unlimited

## Background

In many areas of Oregon, streamflows are very low or even non-existent during late summer months, which may be exacerbated by water withdrawals for irrigation, drinking water, industrial processes, hydropower, and other beneficial uses. During a drought, low, or no-flow conditions can extend for many months of the year, threatening aquatic species' short and long-term survival. Low streamflows often mean higher water temperatures and increased nutrient concentrations, contributing to poorer water quality. During the winter, high flows are necessary to maintain aquatic habitat and trigger migration.

## Example Actions

- Designate Scenic Waterways where needed to protect recreation, fish, and wildlife uses
- Designate Outstanding Resource Waters where needed to protect extraordinary water quality or ecological values
- Establish additional instream water rights where needed to protect the full suite of flows for fish and wildlife, water quality, recreation, and scenic attraction
- Utilize voluntary OWRD programs including Allocation of Conserved Water and instream transfers and leases
- Expand education, funding opportunities, and use of voluntary programs to protect and restore streamflow, lake levels, and cold water refugia
- Expand the geographic range and increase effectiveness of flow restoration efforts by identifying flow restoration priorities and focusing resources to priority areas
- Update ODFW Rules (OAR 635-400; last modified in 1989) to incorporate a broader range of techniques to determine flow amounts to protect ecosystem needs
- Effectively regulate and enforce water rights (Also See Actions 12F and 12G)

## Resources

### *Agency Programs*

ODEQ's Outstanding Resource Waters, ODFW Water Program, OPRD Scenic Waterways, OWRD's Water Rights Services Division

### *Policies*

Allocation of Conserved Water Act, Instream Water Rights Act, Scenic Waterway Act, ODEQ's Antidegradation Policy, Outstanding Resource Waters Policy

### *Funding*

OWEB Grant Programs, OWRD Water Projects Grants and Loans, BPA & NFWF Columbia Basin Water Transaction Program

### *Documents/Websites*

[OWRD Allocation of Conserved Water Program](#)  
[OWRD Instream Transfer Program](#)  
[OWRD Instream Leasing Program](#)  
[Oregon Plan for Salmon and Watersheds](#)

### Lead Agencies

ODA, ODEQ, ODF, ODFW, OSMB

### Supporting Agencies

OWEB, USDA, USFS

### Partners

Tribes, OSU Extension Service, private landowners, watershed councils, SWCD's

## Background

The Oregon Invasive Species Council defines an invasive species as a non-native species that can cause economic or environmental harm or cause harm to human health. It can be a plant, animal, or any other microorganism that enters an ecosystem beyond its native range. Invasive species disrupt the natural function of an ecosystem by competing and replacing native species and disrupting the natural habitat. Preventing and removing invasive species helps support watershed health and resiliency.

## Example Actions

- Support and continue funding for the Aquatic Invasive Species Prevention Program
- **Support and continue funding for the Oregon Invasive Species Council**
- **Identify and implement projects to** support the Oregon Conservation Strategy's seven statewide actions to prevent new introductions, and decrease the scale and spread of infestations
- Continue to implement and enforce ballast water management regulations
- **Provide technical assistance and landowner education for invasive species detection and potential control and management actions on agricultural and forestlands**
- **Prioritize eradication projects that can be complimentary to water quantity projects**
- **Couple invasive species eradication with native species restoration efforts (see 10A)**
- **Support protection of culturally significant plants, animals, and ecosystems from invasive species**

## Resources

### *Agency Programs*

ODA's Insect Pest Prevention and Management Program, ODFW & OSMB's Aquatic Invasive Species (AIS) Prevention Program, ODF Forest Health Unit, OWEB Grant Programs

### *Workgroups*

[Oregon Invasive Species Council](#)

### *Documents/Websites*

[Oregon Statewide Strategic Plan for Invasive Species \(2017-2027\)](#)

[Oregon Conservation Strategy](#)

[ODA Noxious Weed Profiles](#)

[ODA Insect Pest Alerts](#)

[USDA National Invasive Species Information Center](#)

[ODF Forest Health Unit](#)



### Lead Agencies

ODEQ, OWRD

### Supporting Agencies

DLCD, DOGAMI, ODFW

### Partners

Tribes, local governments,  
utilities, well owners

## Background

Groundwater discharge contributes to springs, wetlands, and streamflow throughout the state. Contributions from groundwater support ecosystems and human systems alike. Protecting groundwater from over-use or contamination benefits groundwater-dependent ecosystems as well as existing water users. This action acknowledges the need for additional voluntary, incentive-based, and regulatory approaches to achieve sustainable groundwater management.

Related Actions 11A-11C, and 13A address specific ways to prevent sources of groundwater contamination.

## Example Actions

- ~~Develop a long-term plan~~ **Implement actions** for sustainable groundwater management **through voluntary, incentive-based, and regulatory means**
- Develop clear objectives and metrics **for defining sustainable groundwater management**
- ~~Sketch out the necessary timelines, staffing, and resource needs~~
- **Protect groundwater through proper well construction (also see Actions 11A, 13A)**
- **Identify and protect and/or restore springs, cold water discharge to surface water, and wetlands (also see Action 10A)**
- **Prioritize resources where frontline communities are experiencing unsafe drinking water, with potentially serious health consequences**

## Resources

### *Agency Programs*

ODEQ Water Quality Program, OWRD Technical Services Division, OWRD Policy Section

### *Agency Policies*

The Groundwater Act of 1955, The Groundwater Quality Act of 1989, Areas of Groundwater Concern, Groundwater Management Areas

### *Documents*

[2019 ODEQ Groundwater Quality Protection in Oregon](#)

Tools to protect water quality, and thereby protect public health and the environment, are shared among many entities. Actions described throughout this section are needed to further the protection of our drinking water, reduce the use and exposure to toxic chemicals and other pollutants, and reduce point and nonpoint sources of pollution of our surface and groundwater through sound land management and implementation of regulatory authority.

## Ensure the Safety of Oregon's Drinking Water

Drinking water is vulnerable to contamination from many potential threats. Climate change contributes to decreases in supply, increases in contaminant concentrations, and the potential for harmful algal blooms (HABs). Some drinking water contaminants, such as bacteria, can cause acute health effects that generally occur within a few days or weeks. Prolonged exposure of chemical contaminants, such as nitrate or arsenic, can cause cancer or organ damage.

**Action 11A**  
Ensure the Safety of  
Oregon's Drinking Water

Part 1 provides an overview of the laws and regulations protecting surface and groundwater quality and drinking water quality. The Oregon Health Authority and water system operators are instrumental in making sure the water that enters our homes is safe for consumption and use. Links to Part 1 are provided for the following:

- Federal Safe Drinking Water Act
- Oregon's Drinking Water Quality Act
- Oregon's Reduction of Lead in Drinking Water Act
- Oregon's Domestic Well Testing Act

### Drinking Water Source Protection

Whether people obtain their drinking water from a private well, a small community system, or a large municipal system, the original source of that water is from groundwater, surface water, or a combination of the two. Therefore, the means for protecting the safety of Oregon's drinking water includes protecting those sources. Protecting the source of our drinking water can be accomplished by many parties, including individuals, private landowners, businesses, municipalities, tribes, and agencies. Land use planning, land use management, land acquisition, proper well construction, and wellhead protection are all useful ways to protect Oregon's drinking water.

**Land Use Planning** – Described in Chapter 2, land use planning has the potential to protect drinking water sources from incompatible land uses. Data regarding the location of drinking water supplies (e.g., private wells, watersheds for municipal systems) can be used to inform land use zoning. Planning and implementing low impact development techniques can protect water resources. Also see Strategy Actions 3B, 5A, and 5B.

**Land Use Management** – The way we manage land for urban, agricultural, and forestry uses impacts the quality of water within a given watershed. Land management practices such as limiting stormwater runoff, minimizing erosion, limiting use of pesticides and herbicides, maintaining septic systems, and maintaining healthy vegetation and stream buffers can all reduce impacts to our shared water resources. Existing laws and regulations aim to limit the pollution of surface and groundwater sources but require adequate resources to implement and enforce. Also see Strategy Actions 10A, 11B, 11C, 12G, and 13A.

**Land acquisition** – Responsible land acquisition and ownership of land within a community's drinking water source area is an effective way to manage water quality and quantity. Land ownership includes land management, this creates the opportunity to implement practices that maximize watershed health, groundwater recharge, and natural

filtration. Limited water supply options on the coast have led many coastal communities to prioritize acquisition of their watersheds to protect the quality and reliability of their water supply. The 2023 Legislature ([House Bill 2010](#)) allocated \$5 million and directed the Oregon Watershed Enhancement Board to develop a fund to “protect, restore, or enhance sources of drinking water,” which can be used for land acquisition.

**Proper Well Construction** – Proper well construction is critical for anyone using groundwater for domestic, municipal, industrial, environmental monitoring, or agricultural purposes. The Well Construction and Compliance Section at the Water Resources Department is responsible for several program areas to ensure that wells are properly constructed, altered, maintained, and decommissioned to prevent contamination, loss of artesian pressure, and waste of Oregon’s groundwater resources. Also see Strategy Actions 10E and 13A.

**Wellhead Protection** – A local government could choose to protect any wellhead protection area that is within their jurisdiction. Often wellhead protection areas extend into other jurisdictions, for example, from a city into a county. Periodic review of a county comprehensive plan may increase the opportunity to adopt protections for wellhead protection areas identified by a city. Also see Strategy Actions 3B, 4B and 5A.

## Source Water Assessments for Public Water Systems

A source water assessment evaluates the potential contamination sources to a public water supply. An assessment is used to develop and voluntarily implement a drinking water protection plan. The Department of Environmental Quality has completed source water assessments for public water supplies that use surface water as their source. The Oregon Health Authority is updating delineated drinking water source areas and potential contaminant inventories for groundwater-supplied systems.

Many municipal watersheds are located on U.S. Forest Service lands, however source areas for smaller communities often include multiple private and public landowners. Source water assessments include property ownership information that allows drinking water providers to involve potentially affected parties when developing protection strategies for source water protection.

Source water assessments also provide key information that enable communities to focus limited resources on higher risks within their drinking water source area. The information can be supplemented with local water system and community knowledge and help address local water quantity and water quality challenges.

## Desalination

Rising sea levels, over-pumping, or storm surges may lead to salt-water intrusion in some coastal aquifers.<sup>25</sup> Desalination is a technique that allows communities to stretch limited water resources by removing salt and other contaminants using reverse osmosis technology. Some of the greatest challenges to building a desalination plant include intense energy requirements to treat the water; expansive coastline to site an energy source, pumps, pipes, inflows, and outfalls; damage to marine organisms during water intake; and brine disposal options. These challenges make desalination one of the most expensive sources of drinking water.

In spite of the challenges associated with desalination, California has decided to invest in desalination, including it in [California’s Water Supply Strategy: Adapting to a Hotter Drier Future](#).<sup>26</sup> The California strategy acknowledges a

### Find Data on Public Water Systems

<https://yourwater.oregon.gov/>

Oregon Health Authority Drinking Water Services maintains an online searchable platform to display data on public water systems in Oregon. You can find data such as coliform and chemical test results, violations, enforcements, public notices, and basic system information, such as sources used, treatment applied, and contact information.



preference for projects that desalinate brackish water instead of seawater, as much less energy is required to treat brackish water. California is part of the US Department of Energy's five-year \$100 million desalination innovation hub, looking for technological solutions to the challenges associated with desalination.

## Regulating Public Water Systems

The Oregon Health Authority administers and enforces drinking water quality standards for public water systems. Public water systems are defined as having more than three service connections (i.e., hookups) or serving more than 10 people year-round. Service connections are defined as a piping connection that conveys water from a public water system to a user's premise (e.g., real estate and the structures on it). For example, a standpipe at a campground or RV park is not a "premise" so all standpipes at the campground are considered as one "connection." Public drinking water systems are regulated differently, depending on how many people they serve and/or the number of service connections.

The Oregon Health Authority has developed a [Public Water System Classification Guide](#) to help classify different types of public water systems into community, non-transient/non-community, transient non-community, and Oregon very small water systems. Oregon Health Authority maintains a webpage outlining [Oregon Drinking Water Rules](#), including recent rulemakings that address arsenic treatment monitoring and lead service lines.

**Oregon Very Small Water Systems** - Effective January 1, 2022, water systems that were called "State Regulated" have been renamed to "Oregon Very Small" (OVS) systems. The technical description of an OVS is a system serving 4 to 14 service connections and commercial or public premises used by 10 to 24 people at least 60 days per year. State resources to regulate or support these systems are limited, leaving OVS users potentially exposed to contaminants in drinking water. These systems would benefit from state technical support regarding contaminant standards, source water treatment options, and best practices to help prevent drinking water contamination. The [Oregon Health Authority website](#) provides several links to helpful resources for Oregon's very small water systems.

The Oregon Legislature has recently demonstrated support for increasing resources for OVSs. House Bill 2010 (2023) allocated funding for the Oregon Association of Water Utilities to study the needs and vulnerability of small and very small community water systems, design and construct water utility training center, and for the state to hire staff to provide related support and resources.

## Private and Domestic Sources

**Private and Domestic Wells** – In rural areas, private wells are more commonly used to provide drinking water than public water systems. In fact, more than 90 percent of people living in rural areas rely on groundwater from such wells to meet their drinking water needs. The Safe Drinking Water Act applies to public water systems; however, it does not regulate private wells providing water for fewer than 25 individuals.

Pursuant to Oregon's Domestic Well Testing Act, the owner of a property with a private well must test for nitrate, coliform, and arsenic, but only if the property is being sold or changing ownership. There is currently no authority for the Oregon Health Authority to enforce this requirement. Public health officials estimate a 10 to 20 percent compliance rate. An amendment to the Domestic Well Testing Act requiring laboratories to electronically report testing results associated with a real estate transactions could increase compliance and improve public safety.

The Oregon Health Authority's Environmental Public Health Program administers the [Domestic Well Safety Program](#), providing information about water quality testing, treatment, maintenance, and other resources. In 2015, the Water Resources Department partnered with Oregon Health Authority to develop and distribute a [Water Well Owners Handbook](#) for rural homeowners.<sup>27</sup>

**Private and Domestic Surface Water Systems** – In rural areas, some private and domestic water supplies are sourced from surface water. Just like domestic wells, these systems are not regulated for drinking water quality.

## Contaminants of Emerging Concern (CECs)

Improved testing methods now reveal some chemicals previously undetected during sampling events. These chemicals referred to as “contaminants of emerging concern” (CECs) because the risk to human health and the environment associated with their presence, frequency of occurrence, or source may be unknown. State and federal agencies are working to improve the understanding of a number of CECs, particularly pharmaceuticals, personal care products, and perfluorinated compounds, among others. Increased monitoring of public drinking water for CECs can determine the occurrence and concentration of contaminants. This data is crucial to assess whether and how such contaminants may pose individual, cumulative, or synergistic health risks to the public. This monitoring data can be used in conjunction with the U.S. Environmental Protection Agency’s [Unregulated Contaminant Monitoring Rule](#) data to evaluate connections among source sensitivity, potential contaminant sources in the area, and overall system vulnerability to contamination.

**Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)** – The recent discovery of the widespread presence of perfluoroalkyl and polyfluoroalkyl substances (PFAS) in drinking water sources has gained attention from the U.S. Environmental Protection Agency and will likely result in future testing and treatment requirements. PFAS are also referred to as “forever chemicals” as they break down very slowly. The [Oregon Health Authority’s website](#) provides a list of potential health risks from PFAS including reproductive, developmental, liver, kidney, and immunological effects. Between 2021 and 2023, the Oregon Health Authority sampled 143 public water systems, finding that 22 of the systems had detections of at least one PFAS compound. Sampling results can be found at [Drinking Water Data Online](#).

The U.S. Environmental Protection Agency is continuing to study PFAS. Their [website](#) provides resources for better understanding the topic, and actions they are taking to address PFAS.

**Manganese** – Manganese is a naturally occurring element found in rocks, soil, water, air, and the food we eat. Humans need to consume small amounts of manganese to stay healthy. Some parts of Oregon have been identified as having elevated manganese in their drinking water which, may not be safe for long-term consumption. With additional study, manganese may eventually become regulated under the Safe Drinking Water Act. The Oregon Health Authority has developed a Manganese Fact Sheet in [English](#) and [Spanish](#).

## Drinking Water Emergencies

Equipment failures, harmful algal blooms, natural hazards including drought (Action 6A), floods (Action 6B), and earthquakes (Action 6C), and chemical releases/spills (also see Action 11B) are just some events that can contribute to drinking water emergencies. The Oregon Health Authority requires public water systems to develop and maintain an emergency response plan. Community water systems serving more than 3,300 people also must conduct a risk and resilience assessment.

Oregon’s statewide emergency response system must be designed to quickly respond to drinking water emergencies. All water providers should be encouraged to join the [Oregon Water/Wastewater Agency Response Network](#), a statewide mutual aid agreement specific to water and wastewater agencies that provides access to equipment and personnel. The Regional Disaster Preparedness Organization and the Regional Water Providers Consortium in the Portland Metro area are two such networks that can help with the development of regional emergency preparedness, response and recovery, and coordination of resources.

### Access and Affordability

Access to drinking water in Oregon is not equitable, with some people experiencing contaminated water coming from their tap, others unable to afford their utility bills, while others lack water access in workplaces. The [State of Water Justice in Oregon report](#) and [Secretary of State Advisory Report 2023-04](#) outline these and many other challenges facing frontline communities across the state.

House Bill 2010 (2023) directed the Legislative Policy and Research Office to research and report on approaches and funding sources for an ongoing statewide assistance program for low-income ratepayers of drinking water, wastewater, and stormwater services. This legislation also expanded eligibility for the Water Well Abandonment, Repair, and Replacement Fund (WARRF) to cover household water wells with contamination levels that exceed drinking water standards. The Water Resources Department administers the WARRF program, prioritizing financial assistance for low-to-moderate income households in areas impacted by drought or wildfire.

Addressing water access and affordability at a statewide scale will continue to be challenging, as water distribution happens at many scales (e.g., domestic well, municipal water system, etc.) and does not lie within the purview of one agency. Solutions to water access and affordability will need to reflect the varied circumstances found across urban and rural parts of the state.

## Reduce Use of and Exposure to Toxics and Other Pollutants

Protecting Oregonians from the impacts of toxic pollutants is a top priority for the Department of Environmental Quality and Oregon Health Authority. Thousands of toxic chemicals are in products that are used daily. Old chemicals that may not be sold today but are stored in homes, schools, and businesses also pose risks. These chemicals are released into Oregon’s air, water, and land as toxic pollutants in a variety of ways. Once in the environment, toxic pollutants can adversely affect the health of people and other living organisms. Additional pollutants including plastics and micro-plastics also pose risks to human and aquatic life, with the full impact of these waste products still being studied. Accidents, including chemical spills and train derailments also pose environmental and public health risks, emphasizing the need for prevention, planning, and expedient clean-up. Toxic pollutants that affect air, land, and water quality intersect with and become cumulative their impacts disproportionately affect frontline environmental justice communities.

**Action 11B**  
Reduce the Use of and Exposure to Toxics and Other Pollutants

Addressing permitted discharges of pollutants, TMDLs, point and nonpoint sources of pollution, are covered in Strategy Action 11C.

### Toxics Reduction Strategy

Oregon Department of Environmental Quality’s 2018 [Toxics Reduction Strategy](#) emphasizes collaboration and partnerships with other agencies and organizations to reduce priority toxic chemicals in the environment and exposure to such chemicals by people.<sup>28</sup> The Strategy emphasizes reducing toxic pollutants at the source, rather than managing them after they are generated. In addition, [Executive Order No. 12-05](#) (“Environmentally Friendly Purchasing and Product Design”) provides additional support for Department of Environmental Quality’s Toxics Reduction Strategy by focusing the work of other state agencies on reducing toxics.<sup>29</sup> The Executive Order has become the official policy of the Department of Administrative Services and resulted in low toxicity procurement guidelines for state agencies, and other public entities that join state price agreements.

Two other high priority short-term actions identified in the 2018 Toxics Reduction Strategy were to expand and enhance the Pesticide Stewardship Partnership program and ensure support for pesticide waste collection events.

## Water Quality Pesticide Management Plan

As the lead agency for the Federal Insecticide, Fungicide, Rodenticide Act, the Oregon Department of Agriculture's Pesticides Program holds the primary responsibility for pesticide registration and use regulation. Oregon's Pesticide Management Plan for Water Quality Protection outlines the roles, policies, and legal authorities of each government agency with responsibilities to protect Oregon's water resources from pesticides and the process by which these activities will be coordinated. Under this plan, the Oregon Department of Agriculture created an interagency team, the Water Quality Pesticide Management Team (WQPMT), composed of representatives the Department of Forestry, Department of Environmental Quality, Oregon Health Authority, Oregon Department of Fish and Wildlife, and Oregon State University. The goals of the WQPMT are to:

- Select and prioritize pesticides of interest and pesticides of concern;
- Establish guidelines and reference points;
- Conduct watershed vulnerability assessments;
- Design, conduct, and guide monitoring efforts (including the Pesticide Stewardship Partnership Program monitoring);
- Recommend and facilitate management options; and
- Develop communication strategies.

## Pesticide Stewardship Partnerships

The Pesticide Stewardship Partnership (PSP) Program, led by the Oregon Department of Agriculture, is a voluntary program that relies on local partnerships to monitor pesticide levels in waterways and implement solutions to protect water quality while managing pests and maintaining crop yield. Efforts include technical assistance, outreach, and education-based projects. The PSP works as a feedback loop with the water quality sampling data continuously being used to evaluate pesticides of concern, the effectiveness of education, and collaborative projects on an annual basis. Many pesticide users support the PSP Program because it allows for voluntary pesticide management changes prior to the possibility of regulatory action by the Department of Environmental Quality.

The goals of the PSP Program are to:

- Identify potential concerns and improve water quality affected by pesticide use around Oregon.
- Combine local expertise in water quality sampling results to encourage voluntary changes in pesticide use and management practices.
- Find ways to reduce pesticide levels while measuring improvements in water quality and crop management.
- Advance measurable environmental improvements, making Oregon waters safer for aquatic life and humans.

As of 2023, there are PSPs established in nine watersheds: Amazon, Clackamas, Hood River, Middle Deschutes, Middle Rogue, Pudding, Yamhill, Walla Walla, and Wasco. PSP areas and sampling locations can be found at the [Oregon Department of Agriculture website](#). Several of the partnerships have shown improvements in water quality in response to education created around water quality data and subsequent changes in pesticide management practices. These successes demonstrate the Pesticide Stewardship Partnership approach can be an effective alternative to traditional regulatory approaches dealing with "nonpoint" sources of chemicals in water.

**Pesticide Waste Collection** – Pesticide waste collection events are part of the PSP program and provide an opportunity to bring pesticides from agricultural growers and other commercial or institutional pesticide users for free disposal. Some state pesticide collection funds are transferred to county and regional entities (representing Hood, Sherman, and Wasco counties) that operate permanent hazardous waste collection facilities to support periodic free agriculture pesticide collections for local growers and other pesticide users.

## Contaminated or Hazardous Sites

Sites, facilities, or structures that were once used for industrial, military, transportation, energy, or other purposes may have historical releases of hazardous substances that pose a threat to water resources. The nature and degree

of such threats depend on the types and amounts of contaminants, when they were released, the likelihood of migration to surface water or groundwater, and remedial actions completed, if any.

Addressing hazardous and contaminated sites is not only important for protecting environmental and public health, but can also lead to economic development opportunities for local communities. The redevelopment of brownfields—sites where future use may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant—is changing the way contaminated property is perceived and addressed. In Oregon, brownfields have been cleaned up and turned into new businesses and creating new jobs. Brownfield redevelopments include urban community gardens; mixed-use developments that include housing, retail, and commercial facilities this includes food bank operation centers; thrift stores; and health-care centers in rural Oregon communities. Community health concerns and environmental justice are integrated throughout brownfield redevelopment and reuse planning to prevent future exposure to contamination.

**Underground Storage Tanks** – Oregon’s Leaking Underground Storage Tank Program, administered by the Department of Environmental Quality, identifies and addresses hazardous or contaminated sites and prioritizes investigative and remedial actions based on threats to human health and the environment – with a focus on protecting sensitive water resources. Site owners complete most work on a voluntary basis, with program oversight. The program uses enforcement mechanisms to eliminate or treat discharges to sensitive water resources as needed. This includes use of the Department of Environmental Quality’s Orphan Site Account when site owners are unknown – or unable (and in some cases unwilling) – to perform immediate cleanups.

**Abandoned and Derelict Vessels** – There are hundreds of hazardous boats and ships in Oregon’s public waterways, including large tugboats, barges, and former military vessels as well as recreational vessels. In April 2023, the Department of State Lands began working to propose a comprehensive program for abandoned and derelict vessels in Oregon, including identifying funding needs and potential sources. The passage of [House Bill 2914](#) (2023) directed the Department of State Lands to develop the program in coordination with other state agencies including the State Marine Board, Department of Environmental Quality, and the State Parks and Recreation Department.

**Polychlorinated Bisphenyls (PCBs)** – Monsanto Company manufactured many products (e.g., coolants, hydraulic oils, paint, caulk, copy paper, etc.) that contained PCB’s. PCB’s are highly toxic and were banned in 1977, however, they persist in Oregon’s land and water. In December of 2022, [Monstanto was ordered to pay Oregon \\$698 million](#) to address remediation associated with PCBs. House Bill 1561(2024) has resulted in the establishment of the Oregon Environmental Restoration Fund to distribute money received from the Monsanto Settlement Agreement.

### **Unused Medications**

Often, unused or expired medications are disposed of by flushing down drains in homes, care facilities, medical clinics, and hospitals. Wastewater treatment plants and septic systems, depending on the level of treatment, may only partially treat pharmaceuticals which allows certain chemical compounds to reach surface water or groundwater resources. Risks to aquatic organisms by long-term exposure to pharmaceuticals is still being studied.

More than 50 Oregon communities have established permanent, free collection boxes for unused medications, which can be located at the [Oregon Health Authority website](#). The U.S. Drug Enforcement Agency offers a national drug take-back event twice a year, in April and October. The Oregon Department of Environmental Quality also administers a [drug take-back program](#), in partnership with the Oregon Board of Pharmacy.

### **Public Health Advisories**

Public health advisories alert the public to water quality issues and help prevent exposures to toxics and other pollutants that may negatively impact human health. Millions of people participate in recreational activities each year, including harvesting shellfish, fishing, swimming, boating, and enjoying Oregon’s coastline. State agencies use a variety of approaches and tools to protect people living, working, and playing near beaches, rivers, lakes, and



other water bodies. In addition to advisories, it is critical that land management activities do not contribute to further water quality degradation (see Action 11C).

**Harmful Algal Bloom (HAB) Advisories** – An overgrowth of cyanobacteria in lakes, rivers, and ponds can result in the development of a harmful algal bloom (HAB), which can produce extremely dangerous toxins (cyanotoxins) that can sicken or kill people and animals. HABs have become increasingly common across Oregon, impacting recreational waters as well as drinking water supplies. In July 2018, the City of Salem’s drinking water source, Detroit Lake, became contaminated with cyanotoxins, causing a public health emergency. Since then, the Oregon Health Authority has developed regulations that require drinking water systems using surface water sources susceptible to HABs to routinely test for cyanotoxins. Additional cyanotoxin resources for drinking water can be found on the Oregon Health Authority [website](#). See Action 11C for the Department of Environmental Quality’s HABs Strategy for reducing the occurrence of HABs.

The Oregon Health Authority is the agency responsible for posting warnings and educating the public about HABs at waters used for recreation. In Oregon, HAB advisories are issued for lakes, reservoirs, and rivers only after a lab has verified the presence and quantity of a harmful algae species or the toxins they produce. Current cyanobacteria recreational advisories can be found on the Oregon Health Authority [website](#).

**The Oregon Beach Monitoring Program** – The Oregon Health Authority and the Department of Environmental Quality are responsible for monitoring recreational water quality at coastal beaches in Oregon. Marine waters are tested for the bacterium enterococcus, which is an indicator of the presence of other illness-causing organisms. Enterococcus is present in human and animal waste and can enter marine waters from a variety of sources such as streams and creeks, stormwater runoff, animal and seabird waste, failing septic systems, sewage treatment plant spills, or boating waste. When bacteria levels are above normal, a water contact advisory is issued.

The goal of the program is to protect public health by providing information about water quality, monitoring water quality standards at beaches, and promoting scientific research. The public can sign up for [email alerts](#) to receive notices when advisories have been issued at certain beaches.

**Fish and Shellfish Consumption** – When fish and shellfish accumulate toxic chemicals because of legacy contamination, spills, or toxic algal blooms, they can pose health risks to those who consume them. The Department of Environmental Quality establishes the level of protection needed to ensure public health, by setting human health toxics criteria based on fish consumption rates. Oregon’s fish consumption rate is 175 grams per day is one of, if not the highest in the nation, in recognition of the consumption rates by tribes, subsistence fishers, and Asian and Pacific Islanders in the Pacific Northwest. The Oregon Health Authority issues [fish consumption advisories](#), due primarily to moderate-to-high mercury levels or PCBs (polychlorinated biphenyls) found in locally-caught fish. The Departments of Agriculture and Fish and Wildlife jointly issue [shellfish safety closures](#) to protect recreational shellfish harvesters from consuming clams or mussels contaminated with harmful biotoxins. The Department of Agriculture also maintains an online website with biotoxin results, recent news releases, and encourages the public to call the shellfish safety hotline before harvesting.

## Implement Water Quality Pollution Controls

In addition to reducing the use of toxics and notifying the public of health risks (Action 11B), it is important that land management activities and their associated point and nonpoint sources of pollutants are managed to protect water quality for humans and the environment. As described in Part 1, the Clean Water Act, administered by the Oregon Department of Environmental Quality, provides the regulatory structure for addressing point and nonpoint sources of pollution.

### Action 11C Implement Water Quality Pollution Controls

#### Total Maximum Daily Load (TMDL) Implementation

A Total Maximum Daily Load (TMDL) describes the maximum amount of a pollutant from all sources: municipal, industrial, commercial, surface runoff and background; that can enter a waterway without violating clean water standards associated with the Clean Water Act. TMDL implementation involves actions to be taken across agricultural, forest, urban, and rural residential land uses to reduce pollutants and improve water quality.

It is important to continue developing and implementing TMDL plans for waterbodies that do not meet water quality standards. This includes developing TMDLs for the remaining waterbodies and pollutants on Oregon's 303(d) impaired waters list and for those added in the future, in accordance with the federal Clean Water Act. It also includes reviewing and updating existing TMDLs and providing oversight to ensure that TMDL implementation measures are effective. By the end of 2023, the Department of Environmental Quality completed 46 TMDL actions that require pollutant reduction on more than 200,000 miles of streams and rivers in Oregon. In total, these TMDLs address 28 water quality parameters listed on the 303(d) list of impaired waters. The map in Figure 4-2 summarizes the number of parameters that have been addressed by a TMDL for each subbasin in Oregon. The full list of water quality parameters addressed can be found on the [Department of Environmental Qualities website](#).

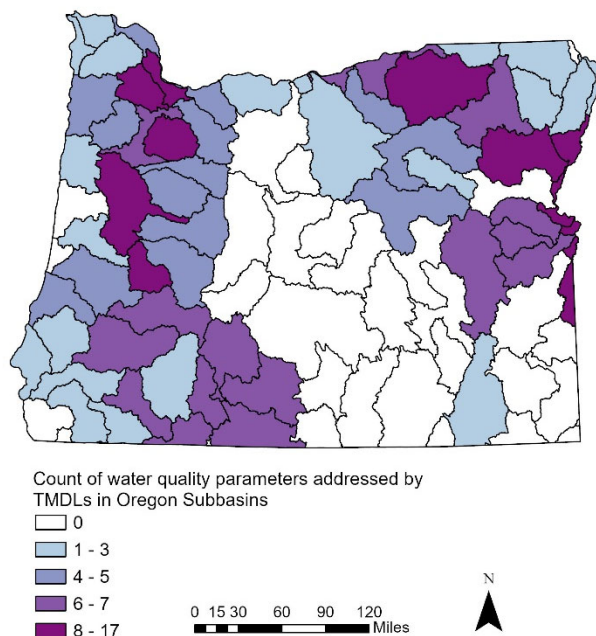
#### Oregon's Nonpoint Source Management Program Plan

A nonpoint source of pollution is any pollution entering a waterbody that does not come directly from a visible source such as a pipe or ditch. Unlike end-of-pipe (point source) pollution that originates from industrial and sewage treatment plants, nonpoint source pollution comes from many diffuse sources, including runoff from agricultural, forest, and ranching activities, construction sites, home landscaping, and road surfaces.

The Department of Environmental Quality leads the development of the statewide [Nonpoint Source Management Program Plan](#), which identifies programs and actions that will be implemented by multiple state agencies, local governments, non-governmental organizations, and local citizens. The Program's multi-agency strategy, including the Departments of Agriculture and Forestry, involves using water quality management programs in conjunction with regulatory, voluntary, financial, and technical assistance. The program's primary components are assessment, planning, implementation, and education.

The federal Clean Water Act provides states, territories, and tribal governments opportunities for funding, commonly referred to as Section 319 grants. These grants can be used for technical assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. In 2010, Oregon was awarded more than \$1.38 million in Section 319 grants for 33 projects that address nonpoint source pollution. Since 2015, the amount of 319 funds Oregon has received annually has been reduced by 30-percent due to the disapproval of the states Coastal Nonpoint Source Pollution Program under the Coastal Zone Reauthorization Amendment (CZARA). In 2022 and 2023 only \$135,067 and \$137,567, respectively, in 319 grant funds were available to support on the ground projects from the state's total 319 allocation. To receive additional funding, Oregon must meet CZARA requirements.

**Figure 4-2: Number of 303(d) listed parameters addressed by TMDLs in each Oregon sub-basin**



The Nonpoint Source Management Program Plan refers to many other state programs that manage nonpoint sources of pollution. A selection of these programs is described, below.

**Agricultural Water Quality Management Plans** – The Department of Agriculture’s Agricultural Water Quality Program is part of the state’s effort to address the federal Clean Water Act, ensuring that farmers and ranchers do their part in meeting water quality standards. There are 38 area [Agricultural Water Quality Management Plans](#) and rules around the state. Water quality specialists with the Department of Agriculture work with farmers, ranchers, community leaders, and other interested parties who serve as members of local advisory committees for each management area. Each committee identifies local agricultural water quality problems and opportunities for improvement.

**Coastal Nonpoint Pollution Control Program** – The Coastal Zone Act Reauthorization Amendment (CZARA) established the national Coastal Nonpoint Pollution Control Program requiring coastal states to address nonpoint source pollution. The Departments of Land Conservation and Development and Environmental Quality lead the state’s management of the program. Oregon has not met CZARA requirements since 2015 due to forestland management issues. New rules and rule revisions to the Forest Practices Act in 2022 are expected to result in improved water quality associated with private forestland management along the coast.

**Farm Bill Programs** – There are several Farm Bill conservation programs, administered through the Natural Resources Conservation Service, for agricultural producers and landowners. Oregon ranchers have worked with public and private sector partners to install and monitor effective habitat restoration techniques, including fencing and building stock water troughs to protect sensitive riparian areas from livestock.

**Forest Practices Act Implementation** – Non-federal forestland is managed in accordance with the Forest Practices Act (see Part 1), as well as individual management plans based on geographic area (Northwest, Southwest, and Eastern Oregon). Example actions that can help prevent pollution of waterways include leaving vegetated buffers adjacent to streams, road placement and drainage to minimize runoff, and avoid harvesting on steep slopes.

**Harmful Algal Blooms (HABs) Strategy** – Once a waterbody is identified as having HABs, the Department of Environmental Quality is responsible for investigating the causes, identifying sources of pollution, and writing a pollution reduction plan. The Department developed a [Harmful Algal Bloom Strategy in 2011](#) to describe and recommend improvements to an overall strategy that they can implement in order to prevent and control, where possible, HABs in Oregon.<sup>30</sup> In 2023, the Department also published a [Freshwater Cyanobacteria Harmful Algal Blooms Strategy](#) that supports the continued implementation of many of the actions in the 2011 Strategy, but is written more specifically for agency staff and identifies additional needs to expand current operations<sup>31</sup>.

### **Stormwater in Urban Areas**

Stormwater runoff often contains pollutants that can adversely affect water quality. Strategy Action 5B calls for promoting low impact development and green infrastructure practices to reduce and manage stormwater. Strategy Action 13A supports the need to maintain and upgrade stormwater infrastructure, which is often a combination of built and natural infrastructure.

National Pollutant Discharge Elimination System (NPDES) permits, issued by the Department of Environmental Quality, are required for certain stormwater discharges that leave a site through a “point source,” often a pipe, and reaches surface waters either directly or through storm drainage. A municipal separate storm sewer system, or “MS4”, is a conveyance or system of conveyances (e.g., roads with drainage systems, municipal streets, catch basins, curbs, gutters, manmade channels or storm drains) owned or operated by a governmental entity that discharges to waters of the state. The population of an urban area determines whether they require an MS4 discharge permit. Oregon needs to ensure the effective management and oversight of stormwater in urbanized areas through the implementation of NPDES and MS4 permits, TMDL Implementation Plans for Urban Designated Management Agencies, best management practices, or through comparable voluntary plans.

### **Septic Systems in Rural Areas**

State law provides the Department of Environmental Quality with regulatory authority over on-site (e.g., septic) sewage treatment and disposal. More than one million Oregonians, or about 35 percent of the state’s population, use on-site sewage systems, also known as septic systems. Most of these are single-family homes in rural areas without access to community sewer systems.

A failing septic system increases the risk of contamination of both surface water and groundwater and can be a public health hazard. Septic systems are required to be inspected at the time of construction to ensure they are correctly installed and functioning properly. Ongoing maintenance carried out by the system owner is critical to avoid system failures. Businesses that install septic systems or provide pumping services are regulated through a statewide licensing program. The Department of Environmental Quality provides direct service for on-site system permitting and installation in the counties of Baker, Coos, Curry, Grant, Jackson, Josephine, Morrow, Union, Wallowa, and Wheeler. The 26 remaining counties work directly with their local governments for permitting and installations, with oversight from the state.

The Department of Environmental Quality has established a new program, [Oregon Septic Smart](#), to provide Oregonians with easy access to information and improve access to certified industry professionals that can perform septic system inspections. The Department also administers an Onsite Financial Aid Program to provide grants and low-cost loans to address failing septic systems. The program will utilize \$15 million in federal American Rescue Plan Act funds that the 2021 Oregon Legislature allocated to the Department. The Department maintains a list of additional financial resources for onsite septic systems on their [website](#).

**Lead Agencies**

ODEQ, OHA, OWRD

**Supporting Agencies**

ODA, ODF, USEPA, USFS

**Partners**

Tribes, local governments, utilities, municipalities, domestic well owners

**Background**

Whether people obtain their drinking water from a private well, a small community system, or a large municipal system, the original source of that water is from groundwater, surface water, or a combination of the two. Therefore, the means for protecting the safety of Oregon's drinking water includes protecting those sources, for example, through thoughtful land use planning, land use management (including ecological restoration, Action 10A), land acquisition, proper well construction, wellhead protection, and implementation of a drinking water protection plan.

Climate change may contribute to variabilities in supply, increases in contaminant concentrations and harmful algal blooms (HABs), and decreases in access and affordability of drinking water. Municipalities, utilities, and small/very small water systems that deliver drinking water need adequate resources to address the increasing challenges associated with climate change and changing regulatory environment. Upgrading and maintaining infrastructure (Action 13A) also contributes to protecting Oregon's drinking water.

**Example Actions**

- Assist drinking water systems of all sizes; increase **technical, administrative, and funding** resources for small **and very small** water systems (less than 15 connections)
- Protect drinking water sources (e.g., **proper well construction, onsite septic system maintenance, responsible land management, nutrient reduction, riparian/upland/forest restoration, watershed land acquisition**)
- Increase understanding of occurrence and health implications of contaminants of emerging concern (e.g. **pharmaceuticals, personal care products, microplastics, perfluoroalkyl and polyfluoroalkyl substances (PFAS)**).
- Encourage water providers to join the Oregon Water/Wastewater Agency Response Network
- Increase domestic well testing and provide updated support materials and education (**including translations, when needed**) (Also see Action 7A)
- **Amend Domestic Well Testing Act to require laboratories to electronically report domestic well testing results associated with real estate transactions to the state**
- **Increase resources for education, outreach, monitoring, and treatment for disadvantaged/underserved domestic well users**
- **Support resiliency efforts for maintaining operation of drinking water systems during emergencies (e.g., solar/renewable energy, battery storage)**

**Resources***Agency Programs*

ODA's Agriculture Water Quality Program, OHA/ODEQ Drinking Water Protection Program, ODEQ's Underground Injection Control Program, OHA's Drinking Water State Revolving Fund, upcoming OWEB grants for source water protection

*Workgroups*

Drinking Water Advisory Committee

*Policies*

Clean Water Act, Safe Drinking Water Act, Domestic Well Testing Act, Forest Practices Act, Reduction of Lead in Drinking Water Act

Reduce the Use of and Exposure to  
Toxins and Other Pollutants**Lead Agencies**

DSL, ODA, ODEQ, ODF, OHA

**Supporting Agencies**

DAS, ODFW, ODOT, OWEB, USEPA

**Partners**Tribes, OSU, PSU, local governments,  
farmers and farmworkers, utilities**Background**

Protecting public health and the environment from the impacts of toxic pollutants for all Oregonians is a top priority for ODEQ and OHA with regard to air, water, and land. Thousands of toxic chemicals are in products that individuals and businesses use daily. Old chemicals that may not be sold today but are stored in homes, schools, farms, and businesses also pose risks, including herbicides, pesticides, and fertilizers. Whether used in their raw form or in products, these chemicals can be released into Oregon's air, water, and land. Once in the environment, toxic pollutants can adversely affect the health of people and other living organisms. The accumulation of toxins in fish is a major concern for high fish consuming populations including many tribal members. Actions are needed to both reduce the use of toxics and adequately notify the public when health risks are present.

**Example Actions**

- Update and implement the Department of Environmental Quality's 2018 Toxics Reduction Strategy
- Implement green chemistry executive order, including revising purchasing practices related to toxic chemicals
- Update and implement Water Quality Pesticide Management Plan
- Support Pesticide Stewardship Partnerships and enhance program to focus on environmental justice communities
- Continue "take back programs" and develop partnerships with community-based organizations and tribes to facilitate culturally relevant "take back programs"
- Continue to identify and address hazardous or contaminated sites, including brownfields and abandoned, derelict vessels
- Prevent blue-green algae (including Harmful Algal Blooms or HABs) from forming beyond natural background levels and support advisory/notification efforts
- Update the 2011 Harmful Algal Bloom Strategy to reflect current climate, health, and equity factors and priorities Support implementation of the 2023 ODEQ Freshwater Cyanobacteria Harmful Algal Bloom Strategy
- Monitor recreational waters and inform the public when contaminants are present, including communications to reach non-English speaking, low-income, tribal, and rural residents and businesses
- Update Oregon's water quality criteria for toxic pollutants to protect aquatic life and human health based on the latest science
- Support programs and organizations to help communities and utilities prepare for and respond to chemical spills
- Engage historically or currently impacted communities in design of toxics source reduction and clean-up efforts so that they can experience the benefits of the effort, such as utilizing Community Benefits Agreements

**Resources***Agency Programs*

ODA Agricultural Water Quality Management Program, Pesticide Stewardship Partnership, ODEQ Air, Land, and Water Programs,, ODOT's Spill Prevention, Control and Countermeasure Program, DSL's Abandoned and Derelict Vessels Program, OHA's Safe Drinking Water Program and fish consumption/HABs advisory programs, DEQ's drinking water source water protection program, OWEB Grant Programs

*Policies*

Executive Order No. 12-05 ("Environmentally Friendly Purchasing and Product Design"), Forest Practices Act

*Workgroups*

Abandoned and Derelict Vessels Workgroup, ODEQ Team Toxics, Water Quality Pesticide Management Team, Legislative Policy & Research Office Harmful Algal Bloom Workgroup, Coordinated Streamside Management

*Documents*

[2018 ODEQ Toxics Reduction Strategy](#), [2023 ODEQ Freshwater Cyanobacteria Harmful Algal Blooms Strategy](#), [2011 Oregon's Water Quality Pesticide Management Plan for Water Quality Protection](#)

**Lead Agencies**

ODA, ODF, ODEQ

**Supporting Agencies**ACOE, BLM, ODFW, ODOT, DSL, NRCS,  
USEPA, USFS**Partners**Tribes, private landowners, private  
businesses, local governments, utilities,  
irrigation districts, SWCD's, watershed  
councils**Background**

Land management activities and their associated point and nonpoint sources of pollutants must be managed to protect water quality for humans and the environment. The Clean Water Act, administered by the Oregon Department of Environmental Quality, provides the regulatory structure for addressing point and nonpoint sources of pollution in the state. The Oregon Department of Agriculture and Department of Forestry play important supporting roles.

Nonpoint sources of pollution include runoff from agricultural, forest, and ranching activities, construction sites, home landscaping, and road surfaces. The ODEQ Nonpoint Source Pollution Program requires resources to address these sources of pollution using water quality management programs, in conjunction with regulatory and voluntary compliance and financial and technical assistance.

Oregon must continue developing and implementing Total Maximum Daily Loads (TMDLs), or pollutant reduction plans, for waterbodies that do not meet Oregon water quality standards. This includes developing TMDLs for the remaining waterbodies and pollutants on Oregon's 303(d) impaired waters list and for those added in the future. It also includes reviewing and updating existing TMDLs and providing oversight to ensure that implementation measures are effective.

**Example Actions**

- Continue to develop and implement TMDLs for water bodies that do not meet water quality standards
- Continue to address nonpoint sources of pollution across all land uses
- ~~Increase monitoring and evaluate the effectiveness of pollution control plans~~ (moved to 7A)
- Ensure effective management and oversight of stormwater in urbanized areas
- Assist communities with septic system challenges, **including technical and funding resources for underserved communities**
- **Continue to update and revise TMDLs to conform with current temperature standards**
- **Continue to work with Designated Management Agencies, as defined in each TMDL, to achieve water quality standards**
- **Develop more programmatic implementation plans for common TMDL issues**
- **Continue to meaningfully engage with communities within the boundaries of new and updated TMDL's**
- **Review TMDL prioritization process to ensure geographic equity among places with a completed and approved TMDL**

**Resources***Agency Programs*

ODA Natural Resources Program, ODEQ Total Maximum Daily Load, Nonpoint Source Pollution, Water Quality Permitting, and Onsite Wastewater Management Programs

*Funding*

Clean Water State Revolving Fund

*Policies*

Clean Water Act, Forest Practices Act

*Documents*

[Agricultural Water Quality Area Plans \(38 total\)](#)

Water Quality Management Plans (and implementation plans for an approved TMDL)

2020 ODOT's Routine Road Maintenance: Water Quality and Habitat Guide Best Management Practices

Oregon has developed several helpful management tools to meet its water needs today and into the future. The techniques and tools discussed in the Strategy should be considered and evaluated as part of any effort to address Oregon's instream and out-of-stream water needs as effectively as possible.

Several such tools are described further in this section: determining unadjudicated water right claims, water-use efficiency and conservation, water reuse, built storage, non-traditional techniques, the importance of a strong field presence, and strengthening our water permitting programs.

### Determine Unadjudicated Water Right Claims

Part 1 describes the process for obtaining water rights in Oregon, and the need to resolve claims to the use of surface water that predate Oregon's 1909 Water Code. Adjudication is a formal administrative judicial process where water right claims are quantified, documented, and eventually incorporated into the prior appropriation system. In addition to pre-1909 claims, federal and tribal reserved water rights are generally determined through an adjudication. There are similar procedures for conducting adjudications for groundwater uses that pre-date the Water Resource Department's authority to issue groundwater rights.

**Action 12A**  
Determine Unadjudicated  
Water Right Claims

The ability to manage water resources has been greatly facilitated in Oregon where adjudications have been concluded. Adjudicating water right claims creates an enforceable system that is protective of senior users in times of shortage. Without the adjudication process, these claims cannot make calls for their water or, take advantage of water management tools, such as transfers or leases.

The Federal Court ruled in *US v Oregon* that the US Government along with Indian Tribes must participate in Oregon's General Stream Adjudication and have their rights to water quantified. Following this ruling both the Federal Government and the Klamath Tribes filed claims in the Klamath Basin Adjudication. In 2013, the Water Resources Department completed the administrative phase of the Klamath Basin Adjudication, submitting the Findings of Fact and Order of Determination (FFOD) to the Klamath County Circuit Court for review. A year later in 2014 the Department issued the Amended and Corrected Findings of Fact and Order of Determination (ACFFOD). The court remanded portions of the ACFFOD back to the Department for further findings. At the conclusion of the judicial phase, the Court will issue a water rights decree, either affirming or modifying the ACFFOD. The Water Resources Department can then issue water right certificates in accordance with the decree.

The remaining unadjudicated areas for surface water consist primarily of river basins located west of the Cascades. In some instances, federal reserved rights, including tribal claims, still have not been determined in basins that have been adjudicated. Tribes and federal agencies play an important role in the resolution of water rights claims in basins throughout the West. The need to resolve tribal and federal rights in Oregon is real and significant.



## Improve Water-Use Efficiency and Water Conservation

One of the more widely recognized approaches to managing demand for water—and stretching supplies of water—is water conservation. Water conservation, as defined in state law, is a means of eliminating waste or otherwise improving the efficiency of water use by modifying the technology or method of diverting, transporting, applying, or recovering water.

**Action 12B**  
Improve Water Use  
Efficiency and Water  
Conservation

This section notes many of the programs and funding resources that exist today and makes recommendations for improving access to information, incentives, and program participation. The next section, “Encourage Water Reuse” addresses the water savings that might be gained from a reuse or recycled water project, Action 12C.

### Water Conservation within the Home and Cities

Water conservation is a tool that can be implemented in any water use sector, and much has already been done to conserve water within our homes and businesses. Replacing certain appliances, such as toilets, dishwashers, and washing machines with more water efficient models, adding faucet aerators to bathroom and kitchen sinks, or installing low flow showerheads to use less water are common activities today. However, outdoor water use for residential or municipal irrigation (e.g., lawns, parks, and golf courses) provides a continued opportunity for water savings. The U.S. Environmental Protection Agency notes that outdoor water use accounts for more than 30 percent of total household water use, on average, but can be as much as 60 percent of total household water use in arid regions.<sup>32</sup> Water-saving technologies such as irrigation controllers, soil moisture sensors, and rain sensors can be incorporated into irrigation systems to improve their efficiency.

Municipalities or water utilities often provide residential customers with guidance or technical assistance to reduce residential water use. Many water providers in Oregon offer rebates for the purchase and installation of water efficient appliances; some also provide shower timers and leak detection kits free of charge to homeowners and businesses alike.

**WaterSense Program** - [WaterSense](#), a partnership program started by the U.S. Environmental Protection Agency in 2006, offers a quick and simple way to find water-efficient products and services. A WaterSense label means a product has been certified to use at least 20 percent less water, save energy, and perform as well as or better than regular models. Since the program’s inception through the end of 2022, it has helped consumers save a cumulative 7.5 trillion gallons of water and \$171 billion in water and energy bills. In Oregon, more than 40 organizations, including non-profits, drinking water providers, and various distributors promote WaterSense labeled products.<sup>33</sup>

The WaterSense program also provides tips for reducing outdoor water use for household irrigation. The [WaterSense Water-Smart Landscapes Guide](#) provides information about choosing native or drought-tolerant plants, supporting soil health, and proper maintenance.

**Municipal Water Management and Conservation Plans** – Described in Part 1, some municipal water providers are required to prepare and submit a Water Management and Conservation Plan to the Water Resources Department. Examining conservation-based rate structures is a required element of Water Management and Conservation Plans. As a result, some water providers have modified their water rates, further driving down demands for water.

### Water Conservation within Industry

Water conservation in business and industry not only saves money by using less water, it can also save on energy required to heat water and run equipment. In manufacturing operations, service and retail establishments, and other businesses, there are ample opportunities to use water efficiently. Just like in the home, water-efficient toilets, faucets, showerheads, clothes washers, and dishwashers used in the industry setting can save significant amounts of water.

Water-intensive industries in particular have an opportunity to use more efficient processes, or even recycled water (see Action 12C), for washing or flushing, in industrial processes, in chillers, and in cooling towers. Several water providers offer walk-through inspections to help commercial customers detect leaks or develop additional water-saving ideas. Some businesses also take the opportunity to convert their greenspaces to xeriscapes, or to install weather-based irrigation systems to improve irrigation efficiencies.

### **Water Conservation within Agriculture**

Diverting an estimated 80 percent of the total water diverted in the state, agriculture is the largest user of water in Oregon, and therefore, offers the highest chance of conserving measurable amounts of water.<sup>34</sup> Statewide efforts should focus on increasing voluntary conservation and efficiency efforts in the agriculture sector. This could result in significant water savings statewide. Although there are several water conservation and efficiency technologies already in use by the agricultural community, there needs to be an increase in funding and incentive opportunities.

Many irrigators have worked extensively with both public and private sector partners to install and model some of the most modern water conservation techniques. These include more efficient irrigation systems, including weather-based irrigation systems, soil moisture controls linked to weather data and computer-controlled irrigation, drip irrigation, variable speed pumps that adjust to water-use needs, and piping or lining canals. Agricultural practices such as no-till, dryland, and/or regenerative agriculture, and permaculture strategies also contribute to water conservation. Several irrigation districts, particularly in Central Oregon, have improved their water delivery systems through lining and piping projects to better manage water supplies. Many of these projects have been funded by Water Resources Department's Water Project Grants and Loans Program, which may include dedicating water in-stream all or a portion of water savings due to infrastructure upgrades. The [Farmers Conservation Alliance](#) and [Energy Trust of Oregon](#) have also helped support the irrigation modernization and water conservation projects.

The potential for reduced return flow or injury to other water users are also factors to consider when designing a water conservation project. Piping, lining, or other water efficiencies can greatly reduce the quantity and rate of return flows that traditionally make their way back to the stream or groundwater reservoir. However, return flows can also be a major source of nutrient, sediment, and thermal loading to waterbodies. Some Agricultural Water Quality Management Plans call for a reduction in return flows for that very reason.

A number of funding resources exist to help water users make water-use efficiency gains. The Bureau of Reclamation offers competitive WaterSMART Water and Efficiency Grants, providing [grants for water and energy efficiency projects](#). Examples of past awards to Oregon irrigation districts have helped pay for piping or lining canals and ditches and installing telemetry systems and related micro-hydro projects.<sup>35</sup> Federal funding for this program has been enhanced through the Bipartisan Infrastructure Law, which designated \$140 million for Water and Efficiency grants in 2023. Other funding sources are available from USDA's Natural Resources Conservation Service, Oregon Water Resources Department, and Oregon Watershed Enhancement Board.

**Agricultural Water Management and Conservation Plans** – Introduced in Part 1, irrigation districts and other agricultural water suppliers may be required to prepare and submit a Water Management and Conservation Plan to the Water Resources Department. Application of appropriate conservation tools may also lead to an increase in available water supplies to better meet their patrons' crop demands. Irrigation districts with plans approved by the Water Resources Department can take advantage of certain statutory provisions that allow the transfer of water rights from one district user to another to prevent forfeiture of the rights due to non-use.

**Allocation of Conserved Water Program** – Described in Action 10C, Oregon's Allocation of Conserved Water Program allows a water right holder who plans to implement a water conservation project to legally use a portion of the conserved water on additional lands, while another portion is permanently protected instream. Examples of eligible conservation projects include lining or piping open or leaky canals or ditches, or changing from a less efficient water distribution system, such as flood irrigation, to sprinkler or drip irrigation.

## Future Water-Use Efficiency and Conservation Programs

Water users in Oregon have many tools available to encourage water conservation and more efficient use of water resources. However, the state does not have a coordinated program to promote such tools. Developing such a program could include creating a user-friendly website, conservation materials for use by public and private partners, an on-line clearinghouse that highlights best management practices, funding, and technical resources. A clearinghouse could help water providers identify the potential for conservation and then design or improve their programs.

Conservation tools, such as those offered by the Alliance for Water Efficiency and the Water Research Foundation that help entities calculate the economic benefits of conservation programs, are good examples to feature in the clearinghouse. Having analytical tools easily available is of critical importance in determining the feasibility of investing in water efficiency and conservation programs. Lastly, because water and energy are so closely tied, water conservation goals and efforts should be coordinated with energy efficiency programs, see Action 14B.

## Encourage Water Reuse

Water reuse is the practice of treating “used” water (or effluent) and making it available for another beneficial use. Reusing water can be an environmentally sound way to manage graywater or wastewater while conserving surface water and groundwater supplies.

**Action 12C**  
Encourage Water Reuse  
Projects

Reusing water can provide many benefits to both water quantity and quality. Reuse can provide a benefit to water quantity by reducing the demand on municipal drinking water. In general, recycled water places fewer demands on freshwater, leaving more water instream or in the ground for other uses. Laws allowing reuse projects take into consideration potential environmental and public health impacts.

### Reuse Terminology

There are many terms used regarding wastewater treatment and reuse, and the use of some of these terms varies by state agency or local government. The national organization [WateReuse](#) provides the following descriptions for commonly used water reuse terms:

- *Reused water* - water that is used more than once and has been treated to a level that allows for its reuse for a beneficial purpose
- *Recycled water* - treated domestic wastewater that is used more than once before it passes back into the environment
- *Reclaimed water* - used water that has been treated to be fit-for-purpose for reusing or recycling

### Agency Roles

Oregon’s policies encourage the reuse of water, so long as the use protects public health and the environment. Several agencies, including the Oregon Health Authority, Department of Environmental Quality, Department of Fish and Wildlife, Water Resources Department, and Department of Consumer and Business Services (Building Codes Division), are all involved in different aspects of water reuse projects.

The Department of Environmental Quality is the lead agency in regulating the use of recycled water. The Department of Fish and Wildlife identifies potential impacts to fish and wildlife and instream flow targets from proposed projects.

The Water Resources Department refers to recycled water as “reclaimed” water. The Department determines whether the reclaimed water use will cause harm to other water rights; it also tracks the reclaimed water use in the Water Rights Information System database, noting the source of the water and where and how the water will be

reused. The Water Resources Department has two exemptions in statute where a new water right permit is not needed for recycled water; when water is used for municipal purposes and when groundwater associated with an industrial or Confined Animal Feeding Operations permit is used for irrigation.

## Types of Reuse

Three general categories of water reuse include:

- **The Use of Graywater** – Graywater refers to water from showers, baths, bathroom sinks, kitchen sinks, and laundries. Graywater can be reused for limited activities, such as subsurface irrigation, with minimal treatment. Homeowners and small businesses can reuse graywater for toilet and urinal flushing with the appropriate plumbing permit from a local building department. Outdoor reuse of graywater can occur by carefully planning reuse activities and obtaining a Water Pollution Control Facility graywater reuse and disposal system permit from the Department of Environmental Quality.
- **The Use of Domestic Recycled Water** – Recycled water refers to treated effluent from a municipal wastewater treatment facility. Oregon has approximately 340 wastewater treatment facilities and there are more than 120 municipal facilities operating recycled water programs throughout Oregon. Communities have been taking advantage of State Revolving Fund loans for developing and upgrading recycled water systems, with seventeen such requests in 2022 alone.
- **The Use of Industrial Wastewater** – Industrial wastewater refers to treated effluent from an industrial process, manufacturer or business, or from the development or recovery of any natural resource. An example of industrial wastewater is water derived from the processing of fruit, vegetables, or other food products. A more recent development in industrial wastewater is the water left over from use as cooling water in data centers throughout Oregon.

Although water reuse activities have been traditionally limited to non-drinking water purposes, a wide range of activities can occur, including irrigation of crops and pastureland and irrigation of urban landscapes. Cities commonly use recycled water to irrigate golf courses, athletic fields, and business parks. Recycled water can also be used for industrial cooling, dust control, street sweeping, and artificial recharge of groundwater.

Specific water reuse activities depend on the level of treatment and resulting quality. More reuse activities can occur with higher-quality water. As public awareness of water reuse benefits increase, additional innovative uses of water will become more common.

## Recent Legislative Support

In 2023, the Oregon Legislature enacted provisions for expanding the application of reuse. The Department of Environmental Quality, in consultation with other state agencies such as the Water Resources Department, must submit a report to the Legislature in 2024 that addresses:

- Changes agencies can make to their internal policies, guidance, or processes to increase reuse
- Recommended changes needed to administrative rules, or new rules needed
- Recommended changes need to amend existing law, or new laws needed
- Programmatic needs to support access to water reuse and beneficial land application projects
- Technical assistance resources and incentives needed to support jurisdictions in evaluating and pursuing reuse and beneficial land application projects

## Innovative Approaches

**Direct-Potable Reuse** – Direct-potable reuse refers to the treatment of wastewater to a quality high enough that it can be used for drinking water. The technology used to accomplish this treatment is often at the municipal scale and includes reverse osmosis or other membrane technology. Direct potable reuse projects can include piping

highly treated water directly into a water distribution system or blending the treated water with raw water supply right before the drinking water treatment plant. States that commonly experience water supply shortages, such as Texas and California, have been using direct-potable reuse and other states are positioned to follow. In 2013, Texas became the first state to operate a direct potable reuse facility in the country.<sup>36</sup>

Regulations ensure that direct potable reuse projects manage risk to drinking water supplies and public health. Projects must comply with the Clean Water Act and Safe Drinking Water Act.

**Environmental Restoration** – Water recycling can support environmental restoration efforts, or provide a co-benefit to the environment when restoration is not the primary driver for the project. Recycled water can recharge groundwater (see Action 12D) and has the potential to augment streamflows, supporting species that have been impacted by declining groundwater and low stream flows.

**Fertigation** – “Fertigation” generally refers to combined delivery of fertilizer in irrigation water. [Oregon State University](#) has been conducting studies on the use of wastewater effluent to fertilize crops, avoiding the need for chemical fertilizers. The technology used to treat and reuse the wastewater includes a two-stage hybrid membrane filtration that would remove bacteria but keep valuable nutrients including nitrogen, phosphorus, and potassium. The studies will help determine if this technology is economically viable for use by farmers.

**Portland Living Building** – The PAE Living Building in Portland provides a novel example of water conservation and reuse. The five-story office building collects rainwater from its roof to provide 100 percent of the buildings water demand. Graywater is collected, treated, and reused onsite, and composting toilets reduce water demand and wastewater production. The building was opened to the public in 2022.

## Improve Access to Storage

The history of storing water in Oregon dates back to the 1800s when projects consisted mostly of ponds or small dams across streambeds. As the state’s population grew, so did the scale and purpose of these projects. Before long, developers and governments were building major dams and reservoirs to meet the increasing water demands for power production, flood protection, and out-of-stream needs during the dry summer months.

### Action 12D Improve Access to Storage

In Oregon today, there are more than 15,000 water rights authorizing the storage of surface water in reservoirs. Another 5,000 ponds were registered with the state in the mid-1990s. The Water Resources Commission adopted the state’s water storage policy, identifying water storage as an integral part of Oregon’s strategy to enhance public and private benefits from use of the state’s water resources.<sup>37</sup> The policy acknowledges that both structural and nonstructural methods should be used in Oregon to store water, with preferences for storage that optimizes instream and out-of-stream public benefits and beneficial uses. In 1993, the Oregon Legislature codified the state’s policy regarding water storage facilities, declaring it a high priority to develop environmentally acceptable and financially feasible multipurpose storage projects, and to enhance watershed storage capacity through natural processes using non-structural means (e.g., floodplain restoration). Watershed protection and restoration to improve natural storage capacity is addressed Action 10A.

### Below-Ground Storage — Aquifer Storage and Recovery and Artificial Recharge

Oregon can improve access to groundwater storage by encouraging the increased use of Aquifer Storage and Recovery (ASR) and Artificial Recharge (AR) for water storage. The use of these techniques is gaining interest, particularly in the northwest and north-central regions of Oregon, due to the smaller environmental footprint, moderate cost, and potential associated benefits for water quality, compared to above-ground storage. Areas of Oregon designated as “groundwater limited” or “critical groundwater areas” may have greater capacity to develop ASR and AR projects.

Forming partnerships between different user groups, such as a municipality that treats water and an irrigation district needing an alternative source of water, could help meet the financial and water quality obligations for ASR injection, but risks and unintended impacts to water quantity also need to be considered.

Water that is treated to standards safe enough for drinking water is the only source water allowed for ASR projects. Direct injection of water must be geochemically compatible with natural groundwater as well. This protects the groundwater resources, but can be an expensive standard to meet, particularly for non-municipal projects with large tracts of land. Grants for feasibility studies from the Water Resources Department have been used to explore potential aquifer storage projects. Business Oregon also offers an Aquifer Recharge Due Diligence Grant and Forgivable Loan Program.

The state has issued authorizations for approximately 20 ASR and 10 AR projects. The reasons for aquifer storage range from municipalities that need to supplement their water supplies for their communities, as in the case of Baker City and the City of Beaverton, to farmers and ranchers, who can use the tool to supplement irrigation water during the summer months. A barrier to advancing AR/ASR projects includes a lack of Water Resources Department’s agency staff capacity. Figure 4-3 compares both technologies.

**Figure 4-3: Comparing Artificial Recharge and Aquifer Storage and Recovery Technologies**

Category	Artificial Recharge (AR)	Aquifer Storage and Recovery (ASR)
<b>Water Use</b>	Primarily irrigation, industrial	Primarily drinking water
<b>Recharge Method</b>	Seepage systems, injection wells	Injection wells only
<b>Water Quality Requirements</b>	Recharge water cannot impair or degrade groundwater quality	Recharge water must meet drinking water standards
<b>Water Rights</b>	Permits required to appropriate source water and to pump recharged groundwater	Can use existing rights to store and recover the water
<b>Oregon Revised Statutes (ORS) Oregon Administrative Rules (OAR)</b>	ORS 537.135 OAR 690-350-0120	ORS 537.531 to 537.534 OAR 690-350-0010 to 690-350-0030

**Identifying Potential Below-Ground Storage Sites** – In 2009, the Water Resources Department created an [inventory](#) of potential below-ground reservoir sites from past surveys conducted by different entities.<sup>38</sup> The purpose of developing the inventory was to create a clearinghouse of storage information. Unfortunately, no attempt was made to assess the ecological or economic feasibility of these sites, so additional work is needed to fully utilize the inventory. The Department has provided this information so that communities can avoid “reinventing the wheel,” in terms of site investigation.

### **Above-Ground Storage — Reservoirs**

Reservoirs have existed as a critical piece of Oregon’s stored water landscape for many decades. They allow water to be captured and stored for later use, and some even generate hydropower. However, changing patterns of precipitation, snowpack, and heat have impacted the efficacy of existing water storage systems. Diminished rainfall and snowpack are resulting in less water available for use during the high demand summer season, while earlier spring temperature increases and intensifying summer heat waves are increasing evaporation loss in reservoirs and further diminishing supplies. These issues, combined with competing environmental demands, complicate considerations for new above-ground reservoirs.

**Federal Reservoir Systems** – The U.S. Army Corps of Engineers (USACE) and the U.S. Bureau of Reclamation (USBOR) are key partners in the operation and management of key pieces of water infrastructure, including reservoirs used for power production, irrigation, and flood control.

Recently, the USACE completed a feasibility study, co-sponsored by the Water Resources Department, to determine the potential to use stored water from the Willamette Valley Project reservoirs for multiple purposes. The study was needed because demands on the basin's water supplies have changed significantly since the dams were constructed, due to increasing population, development, irrigation needs, and the listing of fish species under the Endangered Species Act. The study evaluated several options for reallocating storage space that could better meet water needs not only for irrigation—the only use allowed under existing water rights—but also as a source of drinking water for communities, industries, and instream flow needs for listed fish species in the basin.

In 2020, the U.S. Congress approved the reallocation of storage space, designating 69 percent for fish and wildlife, 21 percent for agricultural irrigation, and 10 percent for municipal and industrial uses. There is a strong interest and desire among agencies, basin stakeholders, and others to contribute to a longer-term water management plan that optimizes the use of a shared resource for all uses of water, both instream and out-of-stream. To fully carry out reallocation, several steps need to occur, including additional consultation under the Endangered Species Act, a water rights transfer, a new contracting process for municipalities and industries, as well as securing instream water rights to protect the release of stored water for fish and wildlife purposes.

**Identifying Potential Above-Ground Storage Sites** – As part of the Oregon Water Supply and Conservation Initiative (2008), the Department conducted an inventory of potential above-ground storage sites. Most of these potential dam sites in the inventory are located on major stream channels. Since the time of these surveys, Oregon has moved away from locating dams on significant stream and river channels, in large part because of effects on fish and aquatic life that must migrate through these streams and water quality parameters such as temperature and dissolved oxygen. There has been very limited evaluation of above-ground storage sites that are located off-stream, on very small stream channels, or at sites with little or no effect on migration of fish and other aquatic life. Additional work is needed to locate and evaluate impacts of potential reservoir sites in these more favorable locations.

**Evaluating Storage Infrastructure** – Oregon should evaluate the status of its existing storage capacity and infrastructure, including determining the maintenance and rehabilitation needs of dams. To improve access to stored water, Oregon should continue to support the Dam Safety Program, and identify multipurpose ways to expand the capacity of existing above-ground storage projects—by raising a dam's height, removing sediment, or repairing dams where safety restrictions have required lower water levels. Fish passage and other environmental issues must be considered when evaluating raising a dam's height.

In some cases, storage capacity has diminished due to sediment accumulation and could be restored to its original capacity with dredging. Reservoir owners should be aware that dredging activities fall under the State Removal Fill laws enforced by the Department of State Lands and requires a permit. Reservoir dredging is intended to restore the original capacity, not to increase capacity.

**Evaluating Reservations for Storage** – A reservation sets aside an amount of unappropriated water in some basins for storage to meet future needs. Although it assigns a priority date, it is not the same as a water right application or permit. For example, approval of a reservation does not mean that any future application will be approved, or that a reservoir may be constructed. Water users wishing to access reserved water must submit a water use application to the Water Resources Department, referencing the reservation. The Department then reviews the application based on current, applicable public-interest review standards and applicable basin rules regarding the reservation.

Reservations are in place in six basins: Grande Ronde, Hood River, Malheur, Malheur Lake, Owyhee, and Powder River, and are established by rule in basin programs.

## Reach Environmental Outcomes with Non-Regulatory Alternatives

Water conservation, storage, and reuse are a set of conventional tools for meeting water needs, used in conjunction with state and federal regulatory tools that protect water resources for future generations. We also need to consider non-regulatory and market-based approaches to meeting our collective and often competing demands for water and consider holistic strategies to meet water quality, water quantity, and ecosystem needs.

**Action 12E**  
Reach Environmental  
Outcomes with Non-  
Regulatory Alternatives

Potential solutions include voluntary actions by water users that often include funding and technical assistance from agencies. Oregon should continue to explore new alternatives and promote and expand existing programs.

### Example Strategy Actions

Many actions already described throughout the Strategy require voluntary participation to impart positive environmental outcomes, and many require strong partnerships with senior water users. These programs and related Strategy Actions include:

- Ecological restoration on public or private property, Actions 10A and 10B
- Water transfers and leases, Action 10C
- Voluntary agreements among water users within one basin to limit water use, Action 10E
- Water efficiency/conservation projects and allocation of conserved water, Actions 10C and 12B
- Pesticide Stewardship Partnership participation, Action 11B
- Aquifer Recharge (AR) and Aquifer Storage and Recovery (ASR) projects, Action 12D

### Conservation Reserve Enhancement Program (CREP)

The Conservation Reserved Enhancement Program (CREP) is administered by the U.S. Department of Agriculture Farm Services Agency and supports private-land conservation. This voluntary program pays farmers and ranchers to remove environmentally sensitive land from production, paying them an annual rental rate and other incentives. A CREP contract period is typically 10-15 years. In 2018, eligible partners expanded beyond individuals, state and tribal governments to also include non-governmental organizations such as non-profits, private companies, and foundations.

### Water Quality Trading

The Oregon Environmental Quality Commission approved rules in 2015 establishing a voluntary water quality trading program to facilitate pollution reduction and protect the quality of Oregon's waterways. The rules provide clarity for regulated entities, the public, and Department of Environmental Quality staff.

Both the City of Medford and Clean Water Services have utilized water quality trading to address temperature pollution challenges. The City of Medford partnered with The Freshwater Trust to establish leases with landowners to plant trees along the Rogue River. Clean Water Services implements a water quality credit trading program that includes flow enhancement and riparian planting activities. The Clean Water Services 2022 Annual Water Quality Trading Report said they had implemented 200 planting projects along streams in the Tualatin River Watershed that have generated a total of 614 million kcal/day of thermal credit since they established the program in 2004.

### The Deschutes Water Bank

The Deschutes River Conservancy is developing an expanded water bank program to help manage water resources in the basin. The Deschutes Water Bank provides a platform for both permanent and temporary voluntary water transactions among water users in the region. The goal of the Bank is to support flexible market-based opportunities to help address and balance complex water use and water management objectives. Example water



transactions include permanent instream transfers, instream leasing, irrigation district “district-to-district” transfers, and mitigation banking.

## Provide an Adequate Field Presence

A number of Oregon’s natural resources agencies have personnel in the field. Adequate field capacity is needed for data collection, inspections, technical assistance, and effective coordination between agencies and partners.

**Action 12F**  
Provide an Adequate Field Presence

Field personnel are well positioned to work with local, state, and federal water managers, watershed councils, local planners, county commissions, and other entities in the community with responsibility for water. These individuals are also on the front lines of public education with broad and deep policy, technical, and legal expertise in their disciplines. They are the state’s first responders to requests for technical assistance or information and an integral part of fulfilling the agencies’ statutory authorities. The state’s watermasters, biologists, water quality specialists, basin coordinators, and other field staff have a unique opportunity to strengthen ties and build relationships with local communities.

**Data Collection** - Field personnel collect data, including hydrological, biological, and chemical data. Field-related work also involves installing and calibrating water measurement and monitoring equipment as well as conducting instream flow studies.

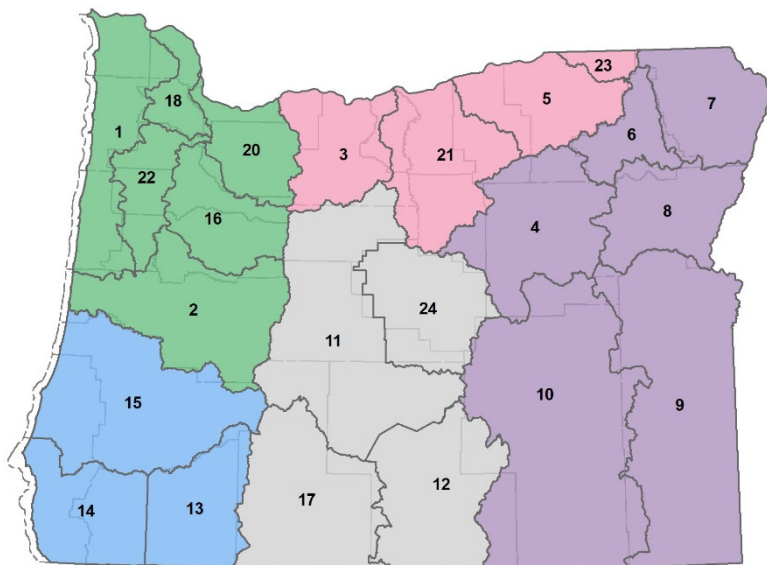
**Inspections and Enforcement** – Field personnel protect public and environmental health through inspections and enforcement activities. Field personnel conduct site inspections, confirm compliance with permit conditions, guard against waste and contamination, inspect for hazards, and pursue enforcement actions when necessary. Inspection activities associated with dam safety are supported by Action 13C.

Partnerships between the Oregon Liquor and Cannabis Commission, the Department of Agriculture, Water Resources Department, and local law enforcement have been instrumental in identifying and halting illegal water use associated with hemp and marijuana growing operations.

**Water Distribution** – At the Water Resources Department, field personnel implement [Oregon water law](#) and the Doctrine of Prior Appropriation. Under the Doctrine, field personnel—the state’s watermasters and assistant watermasters—are responsible for regulating and distributing water, curtailing the water use of junior water right holders during times of water shortage.

The Department’s limited number of field staff is noteworthy, given the large geographic territory and responsibilities (Figure 4-4). In southeast Oregon, District 10, has just two staff responsible for regulating and distributing water in an area covering 11,700 square miles, the largest district in the state. In northwest Oregon, the District 16 watermaster oversees several hundred dams of various sizes and configurations that need routine inspection and site visits. In this district alone, there are 14,700 water rights that authorize the use of groundwater, surface water, and storage for a variety of uses.

Figure 4-4: OWRD Watermaster Regions & Districts



### **Support Needed for Field Personnel**

**Training** – Investing in field activities means more than just increasing the number of staff, it also refers to investing in technical training and distribution of workload. There is a need for more advanced equipment and software. Utilizing new tools and technologies may require additional education, training, and certification. Agencies also see the benefit of cross-training staff in the field, so that employees are familiar with multiple issue areas and can assist in the work of other staff or even other districts.

**Regulatory Tools** – The legal and statutory framework underpinning agency activities needs to be up-to-date, clear, and responsive enough to keep up with modern day water use. Needs vary across agencies, but for the Water Resources Department, they include improving property access agreements and making enforcement tools more responsive. Communities exemplify compliance with rules and laws in areas where field presence is robust and public education is strong and consistent. Areas of the state with a long tradition of regulation and partnership have higher rates of compliance, resulting in more timely and efficient water management.

Technology that is available to field staff (information, equipment, communications platforms, and transportation) must be efficient and accessible to be useful.

**Coordination and Communication** – Strengthening Oregon’s field-based work will require financial investments in communications equipment, information platforms, and outreach materials. It also means researching more efficient ways to coordinate and partner with other agencies to carry out our shared responsibilities. The Department of Fish and Wildlife and Water Resources Department are examples of state-agency partners. Department of Fish and Wildlife field staff provide expertise on instream flow needs and can help prioritize streamflow restoration efforts, water use measurement projects, and voluntary initiatives or projects. Department of Fish and Wildlife staff determine potential impacts to fish, wildlife, and habitats from proposed allocations of water and can recommend conditions and/or mitigation to offset the impacts.

## **Strengthen Oregon’s Water Quantity and Water Quality Permitting Programs**

Several natural resources agencies in Oregon are engaged in water-related permitting. Just like the field staff described earlier, permit reviewers frequently answer calls or questions from water users, realtors, and others, conduct records research, and process case files. It is imperative that agencies have sufficient numbers of well-trained permitting staff in place to process requests in a timely, accurate manner.

**Action 12G**  
Strengthen Water Quantity  
and Water Quality  
Permitting Programs

For staff to be effective, improving and expanding staff training and interagency coordination is critical. Investments need to be made to update technologies, manuals, and procedures that continue to improve transparency, efficiency, permit application processing time, and consistency between sections of the respective agency. Staff also need appropriate communications resources to inform permittees about their permit conditions.

### **Water Quantity Permits**

As described in Part 1, the Water Resources Department administers several water right programs. Staff are responsible for preparing, reviewing, and processing water use permits, limited licenses, temporary drought permits, permit amendments, extensions, transfers (temporary and permanent), certificates, instream leases, conserved water projects, hydroelectric permits, reclaimed water use registrations, among others. The Department oversees water management and conservation planning efforts of local entities and completes adjudication proceedings.

There is a need for the Department to also evaluate each permitting program to ensure that it is helping the Department to accomplish its mission to ensure sustainable water supplies for both instream and out of stream purposes. For example, the Department is currently evaluating its groundwater allocations rules.

**Water Right Permits and Certificates** - In Oregon, reviewing water right permits is done in partnership with other state agencies. The Oregon Departments of Fish and Wildlife and Environmental Quality regularly review new water use permit applications to ensure that the proposed use is not detrimental to fish, wildlife, and habitats and the use is consistent with existing water quality standards, as outlined in Department rules. In many cases, a new permit application can only be approved if it is conditioned in certain ways or mitigation is provided to offset impacts due to water quality and quantity already being impaired across much of the state.

Failure to meet some permit conditions cannot be rectified and can result in cancellation of the permit. Early, up front customer service at permit-issuance helps water users avoid later compliance issues.

The Water Resources Department was allocated \$3 million of American Rescue Plan Act (2021) funding to work on water right related backlogs for the 2021-23 biennium. The Department focused resources on three major backlog areas: water rights, transfers, and reviewing claims of beneficial use for possible certificate issuance. Approximately \$1.5 million of the funding remained unused at the end of the biennium, however the 2023 Legislature reauthorized the remaining amount to be used on backlog reduction throughout the 2023-25 biennium. Figure 4-5 shows the progress that has been made on reducing the three different types of permit and certificate backlogs.

**Figure 4-5 Water Resources Department Backlog Reduction Efforts Between 2021 and 2024**

Date	Water Rights	Transfers	Claims of Beneficial Use	Total
July 1, 2021	657	310	1220	2187
January 1, 2024	561	398	882	1841

**Water Right Transfers** - Having a water right certificate opens the door to other tools, such as transfers, that allow water users to change where their authorized water is diverted from, where it is used, or what it is used for. There is growing interest in the use of water right transfers to move water around to support out-of-stream uses, streamflow restoration, and economic growth. This interest is driven by the fact that most of the surface water in the state has already been allocated and securing additional water through a new water use permit is difficult. This is especially true for obtaining water during the summer, when instream and out-of-stream demands are high, and supplies are scarce.

The filing of transfer applications has steadily increased during the past twenty years, a growing trend in most western states. The program includes options for permanent transfers, temporary transfers, and instream leases. The Allocation of Conserved Water Program, discussed earlier in this chapter, is an innovative conservation tool available as part of the water right transfer program.

### Water Quality Permits

The Department of Environmental Quality administers several water quality related permits and the Department of State Lands administers removal/fill permits. These programs need continued evaluation and support to improve permitting effectiveness. Permitting managed by the Department of Environmental Quality includes:

- National Pollutant Discharge Elimination System (NPDES)
- Water Pollution Control Facility (WPCF)
- Onsite Septic System
- Municipal Separate Storm Sewer System
- Section 401 Certifications
- Underground Injection Control
- Graywater Reuse and Disposal System

### Lead Agencies

OWRD

### Supporting Agencies

USBR, ODEQ, ODFW

### Partners

Tribes, private landowners

## Background

In many parts of Oregon, landowners began using water long before the Oregon Water Code was enacted. Passage of the Water Code by the Legislature in 1909 established, for the first time in Oregon, a centralized administrative system for acquiring and recording rights to the use of surface water. These water rights are managed within a prior appropriation system of water allocation that gives priority to senior rights in times of shortage. Similar actions were taken for groundwater in the 1955 Groundwater Act. Court cases over the years have further established federal and tribal "reserved" water rights.

Adjudications may be conducted to determine pre-1909 Water Code surface water rights, and pre-1955 Groundwater Act groundwater rights, as well as federal and tribal reserved water rights. The ability to manage water resources has been greatly facilitated in those areas of the state where adjudications have been concluded. Adjudicating water right claims creates an enforceable system that is protective of senior users in times of shortage. Without the adjudication process, these claims cannot make calls for their water or take advantage of water management tools, such as transfers or leases.

Federal and tribal reserved water rights still have not been determined in many basins that have been adjudicated. The need to resolve tribal and federal rights in Oregon is real and significant.

## Example Actions

- Conduct surface water and groundwater adjudications
- Settle federal reserved claims, including tribal claims

## Resources

### *Agency Programs*

OWRD's Water Rights Program

### *Documents*

[Water Rights in Oregon](#)

### Lead Agencies

ODA, OWEB, OWRD

### Supporting Agencies

ODEQ, ODFW, ODOE, USBR, NRCS

### Partners

Utilities, municipalities, irrigation districts, individuals, farmers, ranchers, SWCD's, watershed councils, OSU Extension

## Background

Water conservation is one of the more widely recognized approaches to managing water demand and stretching limited water supplies. Water conservation, as defined in state law, is a means of eliminating waste or otherwise improving the efficiency of water use by modifying the technology or method of diverting, transporting, applying, or recovering water. Water conservation can also be accomplished through reuse, addressed in Action 12C. Water conserved through the Allocation of Conserved Water Program can benefit water instream, Action 10C.

The state lacks a comprehensive program to lead a coordinated approach to conservation across multiple water use sectors to provide a central point of guidance, technical assistance, and information regarding existing incentives or funding resources. Additional incentives are needed to expand water conservation in Oregon.

## Example Actions

- Establish a **comprehensive** water-use efficiency and conservation program that provides **incentives and** technical assistance to water users in all sectors
- Conduct a statewide water conservation potential assessment, **considering high priority water management needs**
- Prioritize **and provide funding for** agricultural water-use efficiency and conservation **projects (often saving energy and supporting Action 14B)**
- **Develop or continue municipal incentives (e.g., xeriscaping rebates, metering, tiered rate structures)**
- Develop an outreach strategy to expand participation in already-existing water-use efficiency and conservation programs
- **Develop outreach materials, a user-friendly website, and online clearinghouse that highlights best practices, funding, and technical resources**
- **Ensure disadvantaged communities are not overburdened by mandatory or voluntary water conservation measures**
- **Borrow best practices and experience from energy efficiency programs in implementing water efficiency programs**
- **Partner with broadly supported well-developed energy efficiency programs that also save water (See Action 14B)**

## Resources

### *Agency Programs*

OWRD's Water Management and Conservation Planning Program, OWRD's Allocation of Conserved Water Program

### *Funding*

OWRD's Grants & Loans Program, Statewide Irrigation Modernization Program, OWEB Grant Programs, USBR's Water and Energy Efficiency Grants, Energy Trust of Oregon incentive programs

### *Resources*

[Water Conservation Fact Sheets](#) (for residential, farm/ranch, and municipal users )

[Allocation of Conserved Water Program](#)

[Instream Lease](#)

[Instream Transfer](#)

[Water Projects Grants and Loans and Irrigation Modernization Funding](#)

[Guidebook for Municipal Water Management and Conservation Plan](#)

[Guidebook for Agricultural Water Management and Conservation Plan](#)

[Oregon Smart Guide: Rainwater Harvesting](#)

[Alliance for Water Efficiency](#)

[Water Research Foundation](#)

### Lead Agencies

ODA, ODEQ, OWRD

### Supporting Agencies

OHA, ODFW, DCBS

### Partners

Tribes, local governments, Oregon Association of Clean Water Agencies, Recode, utilities

## Background

Water reuse is the practice of treating “used” water (or effluent) and making it available for another beneficial use. Examples include treating municipal wastewater effluent for golf course irrigation or treating and reusing water within a closed loop (e.g., industrial data center cooling). When considering water reuse, it is most cost effective to match the correct level of treatment to the planned secondary use of the water.

Reusing water can provide many benefits to both water quantity and quality. It can provide a benefit to water quantity by reducing the demand on municipal drinking water. In general, recycled water places fewer demands on freshwater, leaving more water instream or in the ground for other uses. Laws allowing reuse projects take into consideration potential environmental and public health impacts.

## Example Actions

- Conduct a statewide assessment of the potential for additional water reuse, **considering impacts and benefits to water quantity and quality**
- Ensure that state agencies coordinate and communicate various policies, procedures, and regulations to facilitate reuse projects
- Provide incentives to increase and track water reuse
- **Complete evaluation and updates of ODEQ and OWRD water reuse programs as required in 2023 legislation (House Bill 2010)**
- **Develop technical assistance capacity to promote and inform water reuse practices and projects**
- **Develop and maintain adequate staffing to support increased utilization of state reuse programs**
- **Develop water reuse rules to ensure implementation of an effective and protective reuse program**
- **Connect reuse actions to the Water Management and Conservation Plan Program**
- **Explore opportunities for the state, tribes, and other interested parties to partner on water reuse projects**
- **Evaluate who benefits, or is negatively impacted by, reuse projects**

## Resources

### *Agency Programs & Workgroups*

ODEQ's Water Reuse Program, OWRD's Reclaimed Water Program, DCBS Building Codes Division

### *Funding*

ODEQ Clean Water State Revolving Fund, OWRD Water Projects Grants and Loans

### *Websites*

[Oregon Association of Clean Water Agencies](#)

[WaterReuse.org](#)

[Recode](#), frequently asked questions about reuse alternatives

### Lead Agencies

ODEQ, OWRD

### Supporting Agencies

ODA, ODFW, USFWS, USBR, USACE

### Partners

Tribes, local governments, utilities,  
irrigation districts

## Background

Storage has the potential to extend access to water for both instream and out-of-stream uses during dry summer months and provide resilience in the face of climate change. The Oregon Water Resources Department can authorize storage in reservoirs or ponds through the water right permitting process. Oregon's storage policy acknowledges that both structural and nonstructural methods must be encouraged to enhance watershed storage capacity, with preferences for storage that optimize instream and out-of-stream public benefits and beneficial uses. In 1993, the Oregon Legislature codified the state's policy regarding water storage facilities, declaring it a high priority to develop environmentally acceptable and financially feasible multipurpose storage projects, and to enhance watershed storage capacity through natural processes using non-structural means (e.g., floodplain restoration). Restoration activities, which accomplish many other benefits including natural storage, are outlined in Action 10A.

## Example Actions

- Encourage increased use of **environmentally acceptable** below-ground storage sites **and practices**
- **Assess and make improvements to the Aquifer Storage and Recovery and Artificial Recharge Programs to promote and increase the use of this tool**
- ~~Re-allocate water in federal reservoir systems that have not undertaken formal allocation processes in Oregon~~
- **Carry out implementation of the Willamette Basin reallocation recommendations**
- Investigate potential off-channel sites for above-ground storage projects
- Evaluate the status of storage infrastructure, including the maintenance and rehabilitation needs of reservoirs, **and potential for expanding existing storage capacity**
- **Investigate the use of** ~~Incorporate~~ existing reservations of water **during** planning efforts
- **Consider equity, environmental justice, and water insecurity in the prioritization of storage sites**

## Resources

### *Agency Programs*

BIZOR's Aquifer Recharge Due Diligence Grant and Forgivable Loan Program, OWRD Groundwater Hydrology Section and Water Projects Grants and Loans Program

### *Documents/Websites*

[2009 OWRD Inventory of Potential Below Ground Storage Sites](#)

[OWRD Artificial Groundwater Recharge \(AR\)](#)

[OWRD Aquifer Storage and Recovery \(ASR\)](#)

### Lead Agencies

ODA, ODEQ, ODF, ODFW,  
OWEB, OWRD, USDA

### Supporting Agencies

DSL, USEPA

### Partners

Tribes, local governments, SWCD's,  
watershed councils

## Background

Water conservation, reuse, and storage are a set of traditional tools for meeting water needs (Actions 12B-12D). These traditional water supply tools are used in conjunction with state and federal regulatory tools that protect water resources for future generations. Today, however, we also need to consider forward-looking approaches to meeting our collective and often competing demands for water and consider holistic strategies to meet water quality, water quantity, and ecosystem needs. These alternatives require strong partnerships with senior water users. Potential solutions include voluntary actions by water users that often include technical assistance from agencies. This action overlaps with programs described in Actions 10A-10C, 11B, 12B, and 12D.

## Example Actions

- ~~Assist in the~~ Research and development of **voluntary**, non-regulatory tools to meet environmental outcomes
- Continue to develop water **quantity and** quality trading programs
- Develop protocols for translating streamflow restoration into credits and accounting strategies
- **Investigate and establish incentives for voluntary efforts to achieve positive environmental outcomes**
- **Make improvements to transfer processes and develop potential adaptive transfer tools**
- **Develop an outreach strategy for informing the public about non-regulatory alternatives**
- **Support agencies to provide technical assistance regarding voluntary efforts**
- **Develop a voluntary agreement framework (O.R.S. § 537.745) for water right holders**
- **Partner in implementation of federal Conservation Reserve Enhancement Programs**
- **Identify community benefits from improved environmental outcomes**
- **Support the development of managed aquifer recharge and aquifer storage and recovery projects to improve water quantity and quality (also see Action 12D)**

## Resources

### *Agency Programs*

ODA Strategic Implementation Areas, ODF & ODA Stewardship Agreement Program, ODEQ Water Quality Trading Rules, ODFW Grant and Tax Incentive Programs, OWEB Grant Programs, OWRD Transfer and Conservation Section, OWRD Water Projects Grants and Loans, Pesticide Stewardship Partnership, USDA Farm Services Agency [Conservation Reserve Enhancement Program](#)



### Lead Agencies

ODA, ODEQ, ODF, ODFW, OLCC,  
OSMB, OWRD

### Supporting Agencies

DSL, OHA, OPRD

### Partners

Tribes, community-based organizations,  
SWCD's, watershed councils, local and  
state law enforcement, city/county  
planning/building departments

## Background

Oregon's natural resources agencies have personnel in the field that are responsible for data collection, site inspections, education, permit compliance, conducting enforcement activities, and responding to inquiries, complaints, or emergencies. Communities have strong compliance with rules and laws in areas where field presence is robust and public education is strong and consistent. Areas of the state with a long history of regulation and partnership with the state have higher rates of compliance, resulting in more timely and efficient water management.

Strengthening Oregon's field-based work will require financial investments in staff capacity, communications equipment, information platforms, and outreach materials. It also means a look at more efficient ways to coordinate and partner with other agencies to carry out our shared responsibilities and modernize and streamline regulatory and enforcement processes. Field staff can also benefit from actions to streamline data reporting outlined in Strategy Actions 7C.

## Example Actions

- Review and assess **agency staff** workloads; establish priorities and seek efficiencies
- Improve regulatory tools, including updating ~~the legal and statutory foundation~~ **laws**, modernizing technology and enforcement tools, and providing (cross) training
- Improve the ability for field staff to conduct education and outreach within their districts; **develop outreach materials to have on hand when interacting with the public**
- Enhance ~~Department of Fish and Wildlife's capacity~~ **all natural resource agencies capacity to conduct field studies and work directly with water users and conservation interests**
- **Support cross-agency communication to expedite regulatory enforcement**
- **Employ staff in rural and remote areas to respond to and assist more communities across the state**
- **Increase field staff capacity to build and maintain relationships with communities, community-based organizations, and farmworker advocates**
- **Provide access to training that addresses equity, environmental justice, and community engagement**
- **Develop culturally appropriate education materials**

## Resources

### *Agency Programs*

ODA Natural Resources Program, ODEQ Water Quality Program, ODF Compliance Monitoring Program, ODFW Water Program, ODFW & OSMB Aquatic & Invasive Species Prevention Program, OWRD Dam Safety Program, OWRD Regulation Program, OWRD Enforcement Section, OWRD Well Construction & Compliance Section

### *Policies*

[2022 Water Hauling & Cannabis Laws](#)

### *Websites*

Locate your local [Watermaster](#)

### Lead Agencies

DSL, ODA, ODEQ, OWRD

### Supporting Agencies

ODFW, USACE, USEPA

### Partners

Certified Water Rights Examiners, SWCD's, watershed councils

## Background

Several natural resources agencies in Oregon are engaged in water-related permitting. Permit reviewers frequently answer calls or questions from water users, permit holders, and realtors, conduct records research, and process case files. It is imperative that agencies have enough well-trained permitting staff to process requests in a timely and accurate manner.

Water rights permits and certificates, water rights transfers, and well construction special standards are examples of permitting programs through the Water Resources Department. There are many types of water quality permits administered by the Department of Environmental Quality through the National Pollution Discharge Elimination System (NPDES) and Clean Water Act 401 Water Quality Certifications. Other agencies also administer permitting systems, often associated with water quality; for example, the Department of State Lands issue removal/fill permits, while the Oregon Department of Agriculture administers Confined Animal Feeding Operations Permits. State agencies also provide permit review for other agencies and provide recommendations to regulators.

## Example Actions

- Expand staff training opportunities, **including interagency trainings**; provide adequate staffing
- Update technologies, processing manuals, and **expand** guidance documents **for transparency**
- Develop outreach materials and follow-up procedures to help water users understand the application process and permit, transfer, or extension requirements
- Develop a **statewide** mitigation strategy
- Create stronger linkages among partner agencies
- Develop and implement a workplan to improve the quality and timeliness of individual NPDES ~~National Pollutant Discharge Elimination System~~ permits
- **Authorize the update of water rights records with contact information (moved from 2017 Strategy Action 2D)**
- **Regularly update Oregon's water-related permitting guide (moved from 2017 Strategy Action 2E)**
- **Improve the timeliness of water right transactions and reduce backlogs**
- **Create and modernize for more efficient and user-friendly permitting processes**
- **Develop programs and resources to support BIPOC farmers and business owners, as well as farmers and business owners for whom English is not a primary language, in obtaining and managing permits and other authorizations**
- **Improve resources for NPDES monitoring and permitting to help attain water quality that aligns with fish consumption standards for Oregon Tribes**

## Resources

### *Agency Programs*

DSL Removal-Fill Permits, ODA Water Quality Program, ODEQ Water Quality Program, ODEQ 401 Hydropower Program, ODFW Aquatic Invasive Species Prevention Program, ODFW Water Program, OWRD Water Rights Program, OWRD Well Construction & Compliance Program

### *Documents/Websites*

[2012 State Water-Related Permits User Guide](#)

[OWRD Certified Water Rights Examiner \(CWRE\) training materials](#)

Infrastructure to store, transport, distribute, disperse, collect, and treat water is an important, but often overlooked, piece of our collective water management and stewardship responsibilities. Maintenance of our water and wastewater infrastructure is critical for maximizing equipment longevity and minimizing the risk to water resources from equipment failures. Ensuring that Oregon’s water-related infrastructure is well maintained and functioning is important for a variety of public health and safety reasons, but also for meeting our state’s economic needs.

It takes an extensive system of pumps, pipes, treatment, and storage facilities to deliver water to our homes, businesses, and fields every day. Water infrastructure includes storage, drinking water, stormwater, irrigation-related, and wastewater treatment infrastructure.

Examples of water infrastructure include:

- Storage facilities, e.g., dams and reservoirs
- Levees
- Wells
- Municipal/community drinking water treatment systems
- Canals and pipelines
- Pumps and pumping stations
- Headgates, headworks, and valves
- Spillways, siphons, drains, penstocks, and transmission lines
- Telemetry systems
- Measurement devices
- Fish screens and fish passage facilities
- Drainage pumps, ditches, and tiles
- Municipal/community wastewater treatment systems
- Stormwater conveyance and treatment systems
- Septic systems

## Maintain, Upgrade, or Decommission Water Infrastructure

In addition to the need for ongoing maintenance, climate change and associated changes in weather patterns have implications for infrastructure. Infrastructure may need to be upgraded to improve resiliency, also providing an opportunity to improve fish passage (Action 10C), and improve water and energy efficiency and water conservation (Actions 12B and 14A). When wells or dams have significantly deteriorated, the costs of repair may exceed the expected benefits, and proper decommissioning may be a less expensive and more environmentally beneficial alternative.

**Action 13A**  
Maintain, Upgrade, or  
Decommission Water  
Infrastructure

### Protect and Enhance Natural Infrastructure

Built infrastructure, such as pipes, tanks, dams, reservoirs, and wastewater treatment plants, are constructed by humans to accomplish a water management objective such as flood control, conveyance, storage, and treatment. In contrast, natural infrastructure can meet an infrastructure need, but using a naturally occurring feature (e.g., floodplain, forest, wetland) or created or enhanced natural feature (e.g., constructed wetland) to provide multiple benefits for humans and the environment. Investing in natural infrastructure projects helps communities adapt to and mitigate for climate change. There is overlap between this action and Action 10A, to protect and enhance the natural infrastructure that provides valuable ecosystem services and can sometimes reduce our reliance on built infrastructure to accomplish a similar function. For example, it can be more cost effective to enhance riparian vegetation to cool water rather than construct infrastructure to accomplish the same task.

Natural infrastructure can provide co-benefits such as flood abatement, clean drinking water, lower water/wastewater utility rates, educational opportunities, and climate resilience. Natural infrastructure projects should be located to benefit environmental justice communities.

## Plans Guiding Infrastructure Investments

**Public Facilities Plans** - Discussed in Chapter 2, Statewide Planning Goal 11 and its administrative rules require cities with populations greater than 2,500 to prepare public facilities plans addressing drinking water, wastewater disposal and treatment, and stormwater management needs. These plans focus on the costs and timing of infrastructure needs and coordination among providers within the jurisdiction. Funding the development and implementation of these plans can avoid water quality impacts associated with deteriorating infrastructure or systems operating above their design capacity.

**Water Master Plans** – Oregon Health Authority requires existing and new Community public water systems with 300 or more connections to develop a Water Master Plan. The master plan considers a 20-year period, and includes extensive system information including present and future system deficiencies, alternatives to address deficiencies, implementation schedule, and a financing program for construction. Business Oregon provides funding to help Community systems prepare their Water Master Plans and offers grant and loan programs to finance system improvements.

**Wastewater Facility Plans** – As described under Action 11C, failing wastewater systems increases the risk of contamination of both surface water and groundwater and can be a public health hazard. A wastewater facility plan presents alternatives to meet a community's wastewater needs and is often required when seeking funding for improvements. Oregon Department of Environmental Quality must review wastewater plans at least every five years. Business Oregon provides support for developing wastewater plans and financing system improvements.

## Support Irrigation Infrastructure Modernization

Irrigation infrastructure is used throughout Oregon, from small-scale to large-scale applications. Oregon is home to many irrigation districts, water control districts, drainage districts and water improvement districts which manage the distribution of irrigation water. In central and eastern Oregon, these districts often utilize manmade canals or flumes to convey and distribute water. Water losses often occur in unlined canals through porous soils, and evaporative losses occur from the water surface from both canals and flumes. In the last twenty years, irrigation districts have been implementing projects to pipe their distribution canals to reduce these losses. In cases where a state funding source is used to finance a portion of the piping, some or all of the conserved water is allocated to remain instream, through the Allocation of Conserved Water Program at the Water Resources Department.

There a need to continue supporting irrigation modernization projects that lead to water conservation and benefit agriculture as well as fish and wildlife. The Oregon Watershed Enhancement Board's Irrigation Modernization Grants and Oregon Water Resources Department's Water Projects Grants and Loans are just two funding sources that help finance irrigation infrastructure improvements.

## Support Oregon's Well Construction Program

Oregon's well construction standards are designed to protect groundwater resources and the public by preventing contamination, waste, and loss of artesian pressure. With several thousand wells drilled each year, state agency oversight and inspection is critical to ensure wells are constructed using proper methods, materials, and equipment. The Water Resources Department has made important efforts to modernize policies and procedures for well construction in order to provide more timely well inspections and better protection of the groundwater resources (House Bill 2145, 2021).

Homeowners with old unused, neglected, or poorly maintained wells should contact the Water Resources Department for information regarding the proper methods of decommissioning their wells.

The Water Well Abandonment, Repair, and Replacement Fund (WARRF), established by House Bill 2145 in 2021 authorized the Water Resources Department to provide financial assistance to low or moderate income households where the well has gone dry or is no longer able to provide sufficient water for household use. The Special

Legislative Session in December 2023 modified the focus of the fund to prioritize financial assistance to those domestic wells in areas recently impacted by drought or wildfire. In 2023, House Bill 2010 revised WARRF again to include eligibility for wells with contamination levels that exceed drinking water standards. As of January 2024, WARRF provided funding that restored water to 175 homes located within 17 counties across Oregon.

## **Improve Oregon's Levees**

Levees are used around the country to protect low lying areas from river flooding, coastal flooding, and other floods that are intensified by high tides. Levees are very similar to embankment dams, in that they are generally constructed of local soils and intended to retain water without leakage or overtopping. Levees can affect riparian and floodplain functions and only provide flood protection if they are of sufficient height and stability. Even then, levees must be monitored during flooding, with leakage and overtopping identified correctly and immediately addressed. Failure of levees in some cases can be catastrophic, as was the case when a levee adjacent to the Columbia River failed, killing 15 people and destroying the City of Vanport in 1948. At the time, it was the second largest city in Oregon and the largest public housing project in the nation.

The U.S. Army Corps of Engineers sponsors and certifies a portion of the levees in Oregon. The Corps keeps an inventory of those levees it sponsors and certifies. In exchange for assistance with inspections and emergency response, owners of those levees are required to maintain them to federal standards. These levees are well inventoried, regularly inspected and have a reasonable margin of safety. The Corps is not routinely involved in levees constructed to manage coastal (tide related) flooding. There are other levees in Oregon that have not been maintained to federal standards, nor are they part of the Corps of Engineers certification program. Some of these other levees have been inventoried, while many have not which means the condition and ownership status is unknown. Based on information from the Corps of Engineers, there could be nearly 2000 levees that are not in their inventory.

The Department of Geology and Mineral Industries has compiled a dataset of levee like features throughout parts of the Willamette Valley and the Oregon Coast. The dataset is a starting point for developing a geospatial inventory of levees. However, the inventory only identifies levee like features. As a result, there are many structures in the inventory that are not levees and the inventory needs to be vetted. A geospatial inventory of levees is an important resource for assessing flood risk, flood mitigation planning and for emergency response during flood events. It also benefits ecological restoration efforts by helping locate levees to remove or breach in order to expand habitat for aquatic species. The 2021-2023 legislative session authorized \$10 million to Business Oregon for levee grant funding available to provide financial assistance for levee projects that result in improvement, expansion, or repair of levees, flood control facilities, or flood control embankments.

**New Standards for Levee Certification** – Levees must be accredited to be recognized in the Federal Emergency Management Agency's flood insurance program. An accredited designation means that a levee is built and maintained to protect against a one-percent-annual-chance flood event, commonly known as the 100-year flood. To achieve accreditation, a professional engineer must certify the levee. Levee failures resulting from Hurricane Katrina spurred the U.S. Army Corps of Engineers to re-evaluate their levee inspection and certification program. New evaluation standards were established in 2012 for all levee certifications, including those that were previously completed.

Given the large number of un-accredited levees and public safety risk, the State should establish a levee safety program (similar to its Dam Safety Program) See Action 13C.

## **Wildfire Damage & Public Health Risk**

Drinking water and wastewater infrastructure can be damaged during a fire in unexpected ways. Intense heat from wildfires can release toxic chemicals into a public drinking water system, interruption of electrical power can cause a loss of pressure in the system and risk of contamination, and systems served by surface water can experience a spike in sediment, minerals, and nutrients. Septic systems that sustained only partial damage during a fire may still

need to be replaced. The Department of Environmental Quality maintains a [website](#) with several resources for addressing infrastructure issues following a fire.

## Encourage Regional Systems

Many Oregon communities, particularly smaller ones, struggle to adequately fund water and wastewater-related infrastructure. The high capital costs of infrastructure, construction, operation, and maintenance cost of facilities, and the salary and training costs of retaining qualified personnel can be prohibitively expensive to communities with a small ratepayer base. In Oregon these tend to be rural, coastal, and/or small urban communities.

**Action 13B**  
Encourage Regional (Sub-basin) Approaches to Water and Wastewater Systems

Developing a regional water and wastewater system makes sense, if it is cost-effective. A regional system could include physical consolidation, system redundancy, or shared contracts, services, purchases, mutual assistance agreements, interties, and back-up supplies. State and federal agencies often provide incentives such as funding and technical assistance to encourage a regional approach to meeting water needs.

Oregon should encourage regional approaches to water and wastewater services, particularly if these approaches create efficiencies for smaller communities and support resilience to natural hazards and climate change. Business Oregon has recently completed a rulemaking allowing them to provide funding for regionalization projects. Organizations such as the Oregon Association of Clean Water Agencies (ORACWA) can play a key role in making connections and encouraging regional approaches among water and wastewater systems.

## Support Dam & Levee Safety

Dam safety represents a significant area in which the state has responsibility for the communities located downstream from important but aging water impoundments.

**Action 13C**  
Support Dam & Levee Safety

A “dam” is a hydraulic structure built above the ground surface that is used to impound water. Dams include all related structures, and together are sometimes referred to as “the works.” Dams can include wastewater lagoons and other hydraulic structures that store water, attenuate floods, and divert water into canals. Many traditional dams are constructed on stream channels to form reservoirs. Dam owners include homeowners, farmers, irrigation districts, private industry, municipalities, associations, and public agencies.

As mentioned in Chapter 2 Action 6B, dam safety and flood events are included in the state’s Natural Hazard Mitigation Plan, being updated in 2025.

### Establish a Levee Safety Program

Levees, described under Action 13A, have received less recognition than dams regarding their potential for failure and ability to cause life and property loss. The US Army Corps of Engineers estimates that there are as many as 2,000 levees in Oregon. However, the Water Resources Department is only aware of about 260 levees. Oregon needs to establish a Levee Safety Program, in concert with the Dam Safety Program, to protect public safety and increase resilience to climate change and natural hazards (e.g., floods, earthquakes).

### Managing Oregon’s Dam Safety Program

Oregon strives to maintain a good dam safety record to ensure public safety. The Association of State Dam Safety Officials notes that, while *“dams bring water, power, flood control, recreation, economic possibilities and many other advantages to people...people must understand that safe operation and maintenance is key to sustaining these advantages and avoiding potential disaster.”*

The original focus of Oregon’s dam safety program was the review and approval of designs for new dams. A majority of Oregon’s dams were constructed decades ago, with some more than 100 years old. As a result, the dam safety program now focuses on evaluating the condition of existing dams through regular inspections and providing feedback to owners regarding needed safety improvements.

Oregon Revised Statutes authorize and direct the Water Resources Department to take specific actions related to the design, construction, inspection, and safety of dams. The State Engineer for Water Resources oversees the Dam Safety Program and inspects all of the state-regulated high hazard dams. Among their many duties, Oregon’s watermasters conduct inspections of low hazard dams.

**Those Subject to the Dam Safety Program** – Approximately 1,200 dams in Oregon are at least 10 feet high and store 3 million gallons or more (9.2 acre-feet of water), making them subject to Oregon’s dam safety program. The largest dams, however, are regulated by federal agencies. The Water Resources Department is the lead public authority responsible for 941 non-federal dams.

The Department works with owners to bring these dams up to current safety standards. Many of Oregon’s dams are old and could fail, greatly increasing the severity and consequences during major flooding. Additional resources are needed to determine if dams have safety deficiencies.

**Hazard Ratings** – Like most states, Oregon rates dams by hazard classification—high, significant, or low (Figure 4-6). A dam’s hazard rating is based on what could happen if the dam fails, not on the condition of a dam. A high hazard dam, for example, means that failure would likely cause fatalities. There are currently 76 non-federal dams rated as high hazard. These dams are inspected annually.

The condition of High hazard dams is evaluated using four categories: satisfactory, fair, poor, and unsatisfactory. The condition analysis of each high hazard dam is updated after its formal inspection.

**Monitoring High Hazard Dams** – Remote monitoring can detect a potential problem before there is harm to people and property. The most important information includes the current water level in the reservoir and any change in seepage flow through the dam. The Water Resources Department is now authorized to require remote monitoring on deficient, high hazard dams.

**Emergency Authorities** – In Oregon, if a dam is imminently unsafe, the Department will notify the owner and schedule a hearing to see if a water level restriction or other action is deemed warranted by an administrative law judge in accordance with the dam safety statutes and Oregon administrative law. The process takes several months unless the owner voluntarily signs a consent agreement.

**Legal Responsibilities for Dam Safety** – The Association of State Dam Safety Officials notes that dams are a unique type of infrastructure, because while public entities tend to own roads, bridges, and sewer systems, this is not the case with dams. Most dams in the United States are privately owned. Dam owner responsibility and liability is outlined in statute (ORS 540.459 and 491). Owners should know what their responsibilities are, including keeping the dam safe and taking immediate action if the dam begins to fail and threaten people or property.

**Figure 4-6: Hazard Classifications for Dams**

<b>76</b>	<b>High Hazard Dams</b> Failure will likely cause fatalities. These dams are inspected annually.
<b>154</b>	<b>Significant Hazard Dams</b> Failure will damage property but loss of life is unlikely. These dams are inspected every 2 to 3 years.
<b>711</b>	<b>Low Hazard Dams</b> Failure is unlikely to cause major property damage or loss of life. These dams are inspected every 5 to 6 years.
<b>941</b>	<b>Total Dams in the Program</b>

Source: OWRD, February 2024

**Emergency Action Plans** – An Emergency Action Plan (EAP) helps identify situations where a dam failure might occur and spells out actions that could save the dam and hasten evacuations. The 2017 Legislature passed a bill requiring owners or operators of high-hazard dams to develop an emergency action plan and file it with the Water Resources Department, Office of Emergency Management, and the local county emergency agency no later than January 1, 2019. Dam owners are required by statute to update and exercise their EAPs periodically. However, current statute and rule lack clarity on enforcement mechanisms to ensure dam owners follow through with EAP exercises and updates.

**Emergency Inspection after Extreme Events** – Oregon has no interagency agreements in place to inspect multiple dams damaged by an earthquake or widespread flood. After extreme floods and multiple dam failures in 2013 and 2015, Colorado and South Carolina had to improvise, but fortunately, both states had federal and local dam safety engineers available to make inspections quickly. In Oregon, this will be difficult after a Cascadia Earthquake or flood if access via roads is no longer possible. Emergency access and dam inspections are essential to avoid dam failures in the aftermath of a Cascadia Earthquake or significant flood. Additional arrangements are needed for effective and coordinated response during extreme events so that the public can be reassured that dams are safe, or can be evacuated, if necessary.

**Grant and Loan Programs** – Most conventional loan programs cannot be applied to dam repair or maintenance, and since many dams are privately owned, many owners do not have the financial resources necessary to rehabilitate their dams. This is especially true for dams that generate no income. It is essential to inspect, monitor and analyze those dams with known deficiencies. With older dams, there are often a great number of unknowns, uncertainties, and defects, including the reliability or existence of design information.

Recently, the dam safety program and other grant programs provided some funds to dam owners to conduct engineering analysis of high hazard dams. Although Oregon has efficiently leveraged limited resources to improve the overall safety of state-regulated dams, many important activities have been deferred, some indefinitely. Establishing formal grant and loan programs would allow owners to make seismic and flood related upgrades, rehabilitate unsafe dams that still have value, or to provide funds for removal of dams that no longer provide benefits.

Federal sources of funding include the Federal Emergency Management Agency's (FEMA) High Hazard Potential Dam Grant and National Dam Safety Program Grant programs.



### Lead Agencies

ODEQ, OHA, OWRD

### Supporting Agencies

BIZOR, DLCD, DOGAMI, ODFW, ODOE, USACE, USEPA, USFWS

### Partners

Tribes, Local governments, utilities

## Background

Ensuring that Oregon's water-related built and natural infrastructure is maintained and properly functioning is important for a variety of environmental, public health, and safety reasons, but also for meeting our state's economic needs. It takes an extensive system of pumps, pipes, treatment, and storage facilities to deliver water to our homes, businesses, and fields every day. A network of built and natural infrastructure is necessary for conveying and treating stormwater and wastewater produced by residences, businesses, and industry. Updating aging infrastructure improves resilience, water security, and may also result in water and energy conservation. In some cases, decommissioning or removing infrastructure may be a more cost-effective and environmentally beneficial alternative. Protection and restoration of natural infrastructure (also see Action 10A) is also critical for maintaining infrastructure benefits such as flood control, stormwater management, water quality improvement, and storage.

Safety improvements and decommissioning of dams and levees is covered under this action and Action 13C.

## Example Actions

- ~~Use an "asset management" approach to identify and plan for rehabilitation, upgrade, or replacement of infrastructure~~
- Provide timely inspection of well construction, review of well logs, and educate drillers and pump installers to ensure construction standards are met
- Inventory, inspect, and make safety improvements to levees, **accounting for future conditions associated with climate change**
- Properly decommission infrastructure, such as a well, culvert, levee, or dam, at the end of its useful life
- **Upgrade infrastructure to improve water and energy efficiency and conservation (e.g., pipe irrigation canals, leak detection and repair in municipal water distribution systems)**
- **Provide funding for planning, design, and construction of point source and nonpoint source water pollution control projects to upgrade infrastructure systems, protect, restore, and improve water quality**
- **Incorporate equity and community vulnerability assessments into infrastructure planning to inform strategies for repair, replacement, and funding infrastructure improvements**
- **Assess additional locations where levee accreditation could help lower floodplain insurance costs for low-income households and improve flood protection for vulnerable communities**
- **Continue to support the OWRD Well Abandonment, Repair, and Replacement Fund to provide financial assistance to low to moderate income individual households or members of federally recognized tribes in Oregon**
- **Incorporate environmental justice considerations in targeting funding and resources for water infrastructure improvements in underserved communities**
- **Support water and wastewater infrastructure investments that prioritize (efficient) infill development, provision of affordable housing, and jobs within walkable service areas**

## Resources

### *Agency Programs*

ODFW Fish Passage Program, OWRD Well Construction Program and Dam Safety Programs

### *Funding*

BIZOR grant and loan programs, including Community Development Block Grants, [Safe Drinking Water Revolving Loan Fund](#), Special Public Works Fund, Sustainable Infrastructure Planning Projects Forgivable Loan Program, Tidegate Fund, Water/Wastewater Fund, ODEQ Clean Water State Revolving Fund Program, [OHA Drinking Water State Revolving Fund Program](#), OWRD [Water Well Abandonment, Repair, and Replacement Fund](#) and [Water Projects Grants and Loans](#)

### Lead Agencies

ODEQ, OWRD, BIZOR, OHA

### Supporting Agencies

DLCD, ODFW, ODOE

### Partners

Tribes, local governments, utilities,  
Oregon Association of Clean Water  
Agencies

## Background

Many Oregon communities, particularly less populated ones, struggle to adequately fund water and wastewater related infrastructure. The high capital costs related to infrastructure, the construction, operation, and maintenance cost of facilities, and the salary and training costs of retaining qualified personnel may be prohibitively expensive to communities with a small ratepayer base. In Oregon, these tend to be rural, coastal, and/or small urban communities.

Developing a regional water and/or wastewater system may be more cost-effective and provide co-benefits such as improved water quality. A regional system could include physical consolidation, system redundancy, or shared contracts, services, purchases, mutual assistance agreements, interties, and back-up supplies. State and federal agencies often provide incentives such as funding and technical assistance to encourage a regional approach to meeting water needs.

## Example Actions

- Make use of shared contracts, services, and purchases
- Develop mutual assistance agreements **between neighboring communities and water/wastewater systems**
- Establish inter-ties and back-up supplies **for water supplies**
- Provide incentives to encourage regional approaches **to water distribution, efficiency, and wastewater treatment**
- **Incorporate equity and community vulnerability assessments into asset management planning to inform strategies for repair, replacement, and funding infrastructure improvements**
- **Identify transition strategy for providing water and wastewater to urbanizable areas (UGB) consistent with comprehensive land use planning.**

## Resources

### *Agency Programs*

BIZOR grant and loan programs, including Community Development Block Grant, Safe Drinking Water Fund, Special Public Works Fund, Water/Wastewater Fund

### *Funding*

ODEQ Clean Water State Revolving Fund and Overflow Sewer and Stormwater Municipal Grant Program, OHA's Safe Drinking Water State Revolving Fund ,, OWRD's Water Projects Grants & Loans

OWRD's Place-Based Planning Fund

OHA's [Drinking Water State Revolving Fund](#)

### Lead Agencies

ODA, OEM, OWRD

### Supporting Agencies

BPA, ODEQ, ODFW, USACE

### Partners

Homeowners, farmers, irrigation districts, private industry, municipalities

## Background

Approximately 1,200 dams in Oregon are at least 10 feet high and store at least 3 million gallons of water (9.2 acre-feet of water), making them subject to Oregon's Dam Safety Program. The largest dams, such as the Bonneville Dam on the Columbia River, are regulated by federal agencies like the Bonneville Power Administration and the United States Army Corps of Engineers. The Water Resources Department is the lead public authority responsible for 950 non-federal dams.

The original focus of Oregon's Dam Safety Program was the review and approval of designs for new dams. Many of Oregon's dams were constructed decades ago, with some more than 100 years old. As a result, the Dam Safety Program now focuses on evaluating the condition of existing dams through regular inspection feedback to owners regarding needed safety improvements. Oregon also needs to establish a Levee Safety Program

Safety improvements and decommissioning of dams and levees is also covered under Action 13A.

## Example Actions

- ~~Modernize state laws to improve the safety and resiliency of Oregon dams (completed)~~
- Authorize resources to determine if dams have safety deficiencies; evaluate and retrofit dams to meet new seismic **and hydrologic** standards
- ~~Authorize emergency actions and encourage cooperative~~ **Implement** actions to improve the safety of dams
- Properly decommission dams **and levees** at the end of their useful life
- Coordinate interagency emergency response regarding dam inspection, communication, and evacuation
- Define the legal responsibilities of dam owners
- ~~Authorize a requirement for remote monitoring on deficient, high hazard, dams (completed)~~
- ~~Dam owners should prepare and implement an Emergency Action Plan for all existing dams rated as High Hazard (completed)~~
- ~~Authorize a fee for review of plans and specifications (completed)~~
- Dedicate grant and loan resources for rehabilitation of deficient dams
- **Improve clarity of statute and rule regarding enforcement mechanisms to ensure dam owners follow through with Emergency Action Plan exercises and updates**
- **Map potential impacts to critical infrastructure (e.g. schools, hospitals, water treatment facilities) and demographics of who will be impacted by dam failures**

## Resources

### *Agency Programs*

OWRD's Dam Safety Program

### *Workgroups*

Association of State Dam Safety Officials

### *Funding*

FEMA High Hazard Potential Dam Grant, FEMA National Dam Safety Program Grant

The use of water and energy are highly interdependent. Water is critical for energy production, and energy is used to pump, treat, and convey water through pipes for residential, commercial, industrial, and irrigation purposes. Water conservation also conserves energy, and energy conservation reduces the amount of water used in energy production. Across various locations and times of the year, climate change presents the challenge of having reduced availability of both water and energy. Actions and policies to reduce greenhouse gas emissions and diversify Oregon's energy portfolio will change the ways in which we use water in energy production. Severe weather events threaten energy and water infrastructure and climbing temperatures also increase the demand for water for many types of cooling processes.

Since 2018, the Oregon Department of Energy has delivered Biennial Energy Reports to inform local, state, regional, and federal energy policy, planning, and investments. The most recent report from 2022 provides information on key energy resources, policies, trends, and forecasts, and what they mean for Oregon. The document serves as a helpful education tool, including a section called 'Energy 101' that provides the reader with foundational knowledge about energy planning and management in Oregon. The report concludes with calling for the development of a state [energy strategy](#). The Oregon Department of Energy will be leading the development of a state energy strategy due November 1, 2025.

### Energy-Water Interdependence

Water is critical for electricity production. The U.S. Department of Energy estimates that nearly half of all fresh surface water withdrawals in the United States are used at thermoelectric power plants.<sup>39</sup> Oregon has relatively minimal water withdrawals for thermoelectric power plant cooling and the largest water withdrawals are for irrigation. The 2020 Biennial Energy Report, [Agriculture Sector Profile](#), shows that irrigation is also one of the largest uses of electric energy in agriculture. In Oregon, the electricity we use comes from energy production plants throughout the West, including hydroelectric, coal, natural gas, wind, solar, and other sources (see Figure 4-7). About 40 percent of the electricity used in Oregon is generated by hydroelectric facilities. The Oregon Department of Energy's website offers interactive features to see how Oregon's [electricity mix](#) has changed over time.

### Oregon's Renewable Portfolio Standard (RPS)

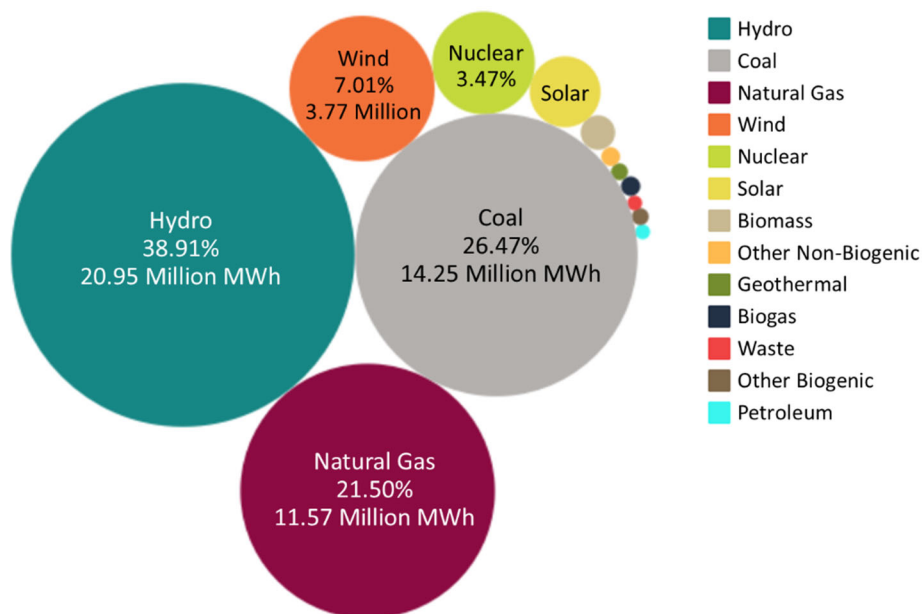
Oregon's 2016 Renewable Portfolio Standard (RPS) update requires that 50 percent of the electricity sold by Oregon's large utilities comes from eligible renewable resources by 2040. Oregon's 100 percent clean energy target established by House Bill 2021 in 2021 also requires the state's large investor-owned electric utilities to achieve a 100 percent reduction in the greenhouse gas emissions associated with their electricity mixes by 2040. HB 2021 established an emission-based clean energy requirement, and therefore wouldn't necessarily require new renewable energy resources. Existing dams are eligible for the Oregon RPS if they are modified to be more efficient and produce more power, without increasing water flow through the dams. Existing hydropower facilities are also eligible for the Oregon RPS if they are certified as "low-impact hydro" by the [Low-Impact Hydropower Institute](#). Certified low-impact hydropower facilities are facilities that meet science-based criteria for flow, water quality, fish passage, aquatic and riparian habitat, and cultural resource protection.

As the state considers additional renewable energy projects, we will need a better understanding of how such projects will affect water resources (see Action 8A). Wind and solar generation facilities have minimal water needs, but new thermoelectric generation may be added to supply electricity when wind and solar are not meeting demands. Energy storage advancements could reduce the need for new thermoelectric generation. Potential low carbon alternative fuels such as hydrogen and biofuels may grow in demand and production to meet decarbonization targets. Production of these fuels requires the use of water and may lead to greater water demand from the energy sector.

### Figure 4-7 Resources Used to Generate Oregon’s Electricity

Source: Oregon Department of Energy 2022 Biennial Energy Report

Based on 2020 data, this chart shows the energy resources used to generate the electricity that is sold to Oregon’s utility customers.



## Develop Non-Traditional Hydroelectric Power

There are several ways that existing infrastructure can support additional power generation. Existing hydroelectric dams can be modified to produce more energy, non-hydroelectric dams can be modified to produce power, and piped water distribution systems can be modified to include in-conduit energy production. Pumped storage systems are less frequently considered for existing infrastructure (e.g., occupying a brownfield site rather than developing a greenfield).

**Action 14A**  
Develop Non-Traditional Hydroelectric Power

### Modify Existing Hydroelectric Dams

Existing hydroelectric dams can be modified to increase power production without increasing the water flow through the facility. This option takes advantage of existing infrastructure and advances in power generation technology.

**Certified Low-Impact Hydropower Facilities** – Low Impact Certification of a hydropower facility indicates it has met or exceeded eight criteria that address environmental, cultural, and recreational considerations. This voluntary nation-wide program incentivizes hydropower facilities to minimize their impacts.

### Modify Existing Dams to Add Power Production

The Northwest Power and Conservation Council’s [Columbia River Basin Fish and Wildlife Program](#) has designated certain river reaches as “protected areas,” finding that new hydropower development in those areas would have unacceptable risks of loss to fish and wildlife.<sup>40</sup> Exemptions to this policy include adding hydroelectric facilities to already-existing non-hydroelectric dams or diversion structures. These projects must be designed to avoid and minimize potential impacts to fish, wildlife, and water quantity and quality.

## In-Conduit Hydroelectric Development

**Irrigation Distribution System** - Oregon has an expedited review process for proposed hydroelectric projects at existing artificial delivery systems, such as within an irrigation district distribution systems. The amount and timing of water diverted for an existing water use must remain unchanged (Oregon Revised Statutes 543.765). Holders of water right certificates under these provisions can secure approval to install hydroelectric generation inside or at the end of existing transmission pipelines or conduits. The resulting hydroelectric water rights certificate will include requirements for fish screens, by-pass devices, and fish passage, with some exceptions.

In 2013, the Oregon Legislature passed [Senate Bill 837](#), giving in-conduit hydro developers a choice: install fish passage as required by the Oregon Department of Fish and Wildlife or pay into a statewide fish passage restoration account that will fund fish passage at priority locations identified by Fish and Wildlife.<sup>41</sup> The Department of Fish and Wildlife is required to report on the deposits and expenditures from this restoration account. As of December 31, 2021, the account had a balance of \$1,900.35. This was the entire revenue generated by the program at that time, an amount far less than originally anticipated. The Department of Fish and Wildlife has not expended any funds from the account and may consider revisions to this program due to the small generation of funds.

**Aquifer Storage and Recovery Wells** - There are other in-conduit projects generating electricity as water is injected into aquifer storage and recovery wells. Aquifer storage and recovery projects at Madison Farms of Echo and the City of Pendleton also represent a non-traditional use of hydroelectric power.

## Pumped Storage Systems

A pumped storage system consists of two reservoirs, one at a higher elevation than the other, where water moves from the upper reservoir to the lower reservoir to generate power when demand is high. Water is then pumped back up to the higher reservoir, using electricity, when pricing and demand is low, usually at night. Pumped storage systems can be considered both a power management tool and an energy storage device, but notably consume more energy than they produce. These systems must be designed to avoid and minimize potential impacts to fish, wildlife, and water quantity and quality. Currently, there is one pumped storage project that has been licensed by the Federal Energy Regulatory Commission in Oregon, and a number of pumped storage projects are currently being proposed. Utilizing a brownfield, or land that was once developed, would reduce the ecological footprint associated with this power generation technique.

## Promote Water and Energy Savings

There are many options when selecting energy-efficiency and water efficiency techniques. Significant efficiencies could be realized from coordinating energy conservation and water conservation efforts. Also see Action 12B for water efficiency and conservation resources.

**Action 14B**  
Promote Strategies that  
Increase/Integrate Energy  
and Water Savings

## Saving Water and Energy in Agriculture

Pumping and moving water, especially groundwater, can require significant energy for agriculture and businesses.

Many of Oregon's farmers and ranchers have implemented energy efficiency projects, and a few have implemented renewable energy projects. Some of the most attractive projects are those that provide significant co-benefits, such as labor savings, water savings, and improved soil productivity. Irrigation efficiency and reduced or no-till cropping systems are some of the most popular types of multi-benefit projects. Farms often employ the use of efficient water application equipment, energy-saving pumps and motors, soil moisture monitoring programs, and precision fertilizer applications. Reducing the amount of groundwater used for irrigation can save significant energy – the deeper the well, the more power and energy is required.

Achieving greater efficiencies in water application—for example, moving from gravity-powered systems to pumped systems—increases the demand for energy, driving up energy costs though this can be mitigated by using efficient water and energy efficient delivery, e.g., LEPA, LESA and using VFDs to control pumps. This increased energy cost may outweigh the water-use efficiency benefits, and should be considered during the design of a project. Grants and incentives are offered by the U.S. Department of Agriculture and Energy Trust of Oregon to encourage installation of more energy efficient irrigation and renewables. A variety of measures are supported by public utilities, including the installation of freeze-resistant stock watering tanks and low-energy precision irrigation equipment.

**Agrivoltaics** – Agrivoltaic projects combine growing crops and energy production using solar voltaic panels. The Oregon State Extension Service has constructed a research study area at the North Willamette Research and Extension Center in Aurora, Oregon. According to Oregon State University's [Sustainable Farm Agrivoltaic website](#), this approach may reduce the water demand by plants, providing solar panels shading them enough to limit evapotranspiration. The plants also provide a benefit to the solar panel efficiency by keeping them cooler, and thus more productive.

### **Saving Water and Energy at Wastewater Treatment Plants**

Energy is needed to pump, treat, and deliver water to homes and businesses. For a municipality, the energy costs for managing water and wastewater can represent one-third of electricity costs. The [Oregon Association of Clean Water Agencies](#) has actively partnered with its member agencies, providing training and best practices to drive down the use and cost of electricity in Oregon's wastewater treatment plants.<sup>42</sup> The association named the City of Gresham its outstanding member agency in 2015 for becoming a "net-zero energy" wastewater treatment plant. Gresham's activated sludge treatment plant generates all the power it needs to drive the wastewater plant through best-in-class energy conservation, a ground-mounted solar photovoltaic array, and co-generation engines driven in part by fats, oil, and grease collection. The City saves \$500,000 annually on power bills, while generating \$250,000 annually from fats, oil, and grease hauler tipping fees. Gresham is the first wastewater utility in the Pacific Northwest to reach net-zero energy status and one of only a handful in the United States.

### **Saving Water and Energy through Building Codes and Standards**

Building codes and standards provide a basic starting point for water and energy savings in both residential and commercial buildings. Oregon has mandatory [building codes](#) in 11 different specialty areas, including plumbing (e.g., faucets, showerheads, urinals, and toilets) and residential energy efficiency.<sup>43</sup> To provide guidance to local jurisdictions on water conservation, the State of Oregon Building Codes Division approved [Statewide Alternative Methods](#) in 2008 for rainwater harvesting (applicable to both commercial and residential construction as well as potable and non-potable uses) and for the use of graywater for toilet flushing.<sup>44</sup> The Building Codes Division updated these Statewide Alternate Methods in 2017 and is also directed by Executive Order 17-20<sup>45</sup> to amend the code by October 1, 2025 to require water efficiency improvements in all newly constructed commercial buildings through standards for capture and safe reuse of water for irrigation purposes.

The Building Codes Division has also published a series of [Oregon Smart Guides](#) for consumers; two of those guides focus on rainwater harvesting and water conservation systems.<sup>46</sup>

The Oregon Department of Energy sets efficiency standards for certain products that must be met in order for those products to be sold or installed in Oregon. In 2021, ODOE in coordination with the Building Codes Division completed rulemaking and subsequent legislation to establish efficiency standards for showerheads and faucets to require high-efficiency fixtures that align with the most efficient standards in the country and exceed WaterSense<sup>®</sup> fixture efficiencies.<sup>47</sup> The Building Codes Division's 2023 Oregon Specialty Plumbing Code adoption included updates to align with these standards.<sup>48</sup> Also, in 2022 the Department of Energy updated rules for demand-response capable water heaters and completed rulemaking to establish minimum standards for spray sprinkler bodies (residential irrigation sprinklers).

## **Saving Water and Energy in the Home**

ENERGY STAR, a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy, rates energy efficient products and practices to help consumers and businesses save money and energy on new purchases. Many qualifying appliances also reduce water use. Some utilities in Oregon offer incentives for installing ENERGY STAR appliances, some even offer incentives for premium water-heating technologies, such as tankless and heat pump water heaters, that help reduce the energy needed to heat water in the home.

## **Cross-Sector Coordination**

Addressing the water-energy nexus cannot occur in isolation; the state must focus on cross-sector and cross-agency collaboration to develop solutions. Oregon's state agencies, working with their civic and industrial partners, should focus efforts on maximizing the efficient use of our water resources, particularly with respect to the generation of low-carbon electricity. Developing new partnerships between the water and energy sectors to better understand how energy is used in water services and how water is used in energy production is critically important.



### **Lead Agencies**

ODEQ, ODFW, ODOE, OWRD

### **Supporting Agencies**

BIZOR, BPA, DLCD, ODA, ODOT, DSL, OEM, NRCS, USEPA

### **Partners**

Tribes, Local gov'ts, Energy Trust, Farmers Conservation Alliance, Oregon Climate Action Commission, Oregon Public Utility Commission, irrigation districts, water utilities

## **Background**

Oregon's 2016 Renewable Portfolio Standard (RPS) update requires that 50 percent of the electricity sold by Oregon's large utilities comes from eligible renewable resources by 2040. Oregon's 100 percent clean energy target established by House Bill 2021 (2021) also requires the state's large investor-owned electric utilities to achieve a 100 percent reduction in the greenhouse gas emissions associated with their electricity mixes by 2040. Non-traditional hydroelectric projects can help meet Oregon's RPS.

Non-traditional hydroelectric power projects include certified low-impact hydropower facilities, pumped storage systems, in-conduit (within-a pipe) hydropower systems, modifications to increase the efficiency of existing hydropower turbines (i.e., increase the amount of electricity produced by the same amount of flow), and modifications to existing dams that don't currently generate power.

## **Example Actions**

- Utilize the state's expedited application process to develop hydroelectric projects at existing infrastructure
- **Invest in alternative energy projects**
- **Promote modifications to increase the efficiency of existing hydropower turbines (i.e., increase the amount of electricity produced by the same amount of flow – eligible per Renewable Portfolio Standard)**
- **Offer incentives for low-impact hydropower projects that provide local co-benefits, such as in-conduit micro-turbines installed in irrigation pipes**
- **Add hydroelectric to non-powered dams using newer fish-friendly hydroelectric turbine designs (will require capital intensive fish screening at intake and/or fish passage fish)**

## **Resources**

### *Agency Programs*

ODEQ Section 401 Hydropower Program, ODFW Hydropower Program, OWRD Hydroelectric Program

### *Workgroups*

Hydroelectric Application Review Team (ODEQ, ODFW, OWRD), River Management Joint Operating Committee (BPA, USACE, USBR)

### *Documents/Websites*

[2022 ODOE Biennial Energy Report](#)

[Pumped Storage Hydropower | Department of Energy](#)

[Low Impact Hydro Certification](#)

[BPA/USACE/USBR 2018 Hydroclimate Projections and Analyses](#)

### *Funding*

[Energy Trust Irrigation Modernization](#), [Farmers Conservation Alliance](#), [NRCS Environmental Quality Incentives Program](#)

### Lead Agencies

ODA, ODOE, OWRD

### Supporting Agencies

BCBS, BIZOR, BPA, DLCD, ODA,  
USDA, USEPA

### Partners

Tribes, Local gov't's, Energy Trust, Farmers  
Conservation Alliance, irrigation districts, Oregon  
Association of Clean Water Agencies, Oregon Climate  
Action Commission, Oregon Public Utility  
Commission, OSU Extension Service, water utilities

## Background

Water is critical for energy production, and energy is used to pump, treat, and convey water through pipes for residential, commercial, industrial, and irrigation purposes. Water conservation also conserves energy, and energy conservation reduces the amount of water used in energy production. Across various locations and times of the year, climate change presents the challenge of having reduced availability of both water and energy. In order to increase water/energy efficiency and conservation, there is a need to increase the sharing of information about efficiency and conservation strategies, along with financial incentives to implement the strategies.

## Example Actions

- Move toward energy independence **and resiliency** for publicly operated treatment works (wastewater treatment)
- Continue to implement and evaluate building codes that encourage water and energy efficiencies
- Encourage individuals, communities, industries, and businesses, including agriculture, to look for and integrate ways to conserve both energy and water
- Encourage cross-sector and cross-agency collaboration to achieve energy and water savings
- Strive to capture and publicly report energy and water savings data
- **Promote resources that expand irrigation water and energy efficiency and conservation**
- **Promote regenerative agriculture and permaculture practices**
- **Improve availability of cost savings associated with ENERGY STAR and similar programs to low-income or disadvantaged households and businesses**
- **Explore new or innovative technologies to accomplish energy and water savings**
- **Consider developing an energy/water nexus efficiency programs that could support industrial water and energy intensive uses (e.g., data centers, paper mills)**
- **Increase interagency and energy/water sector collaboration, to identify co-benefits and opportunities for water efficiency (See Action 12B)**

## Resources

### *Agency Programs*

ODOE Community Renewable Energy Grant Program, ODOE Energy Planning & Innovation, ODOE Energy Development Services, ODEQ Climate Protection Program, BCBS Building Codes Division Energy Code

### *Workgroups*

Northwest Power and Conservation Council

Oregon Climate Action Commission (formerly Oregon Global Warming Commission before 2023)

Energy Facility Siting Council

Energy Advisory Work Group

### *Documents*

Oregon Global Warming Commission [2023 Oregon Climate Action Roadmap to 2030](#)

Oregon Global Warming Commission [2021 Natural & Working Lands Proposal](#)

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# CONCLUSION

## Implementation and Looking Forward

Water is a finite resource with growing demands; water scarcity is a reality in Oregon. Water-related decisions should rest on a thorough analysis of supply, the demand / need for water, the potential for increasing efficiencies and conservation, and alternative ways to meet these demands.”

- Policy Advisory Group (2016)

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## Remaining Resource Gaps

In spite of the resources for addressing water challenges recently made available by the 2021 and 2023 Legislature, some gaps in funding or support remain. The following list outlines major gaps by Strategy chapter.

### Funding

- Action 1B - Adequately fund staff capacity for carrying out water management duties including monitoring, permitting, regulation, and enforcement to protect water quantity and water quality
- Action 1C - Continue to make funds available for communities to plan and implement water projects that contribute to water conservation, increased water remaining instream, upgrade infrastructure, and improve ecological resilience

### Partnerships & Planning

- Actions 7A-7D - Data and technical assistance to support place-based and other local/regional planning efforts
- Action 5A - Enhanced coordination with local governments to provide them with their water data needs
- Action 5A - Support for local governments to protect their water resources (support updated Goal 5 inventories)
- Actions 5A and 6A-6C - Support for local governments for natural hazard planning (Goal 7) to avoid future damages

### Data & Analysis

- Action 7A – Support for observation well monitoring
- Action 7A - Support for groundwater quality monitoring

### Stewardship

- Actions 10A-10E and 13A - Protection and enhancement of natural infrastructure
- Action 10E – Increased protections for groundwater and allow for sustainable groundwater management
- Action 12B – Increased incentives for water conservation, specifically in the agricultural sector
- Action 12E – Need for additional market-based approaches to support environmental outcomes
- Action 11A - Increased support for vulnerable drinking water systems
- Action 11C - Development of additional TMDLs and water quality protections

## Strategy Workplan and Implementation

The statute guiding the development and implementation of the Strategy was updated in 2023 to require a biennial workplan. Following the adoption of the 2024 Strategy by the Water Resources Commission, the Water Resources Department will solicit input from the Commission, agencies, and partners about how best to develop the workplan. Developing a workplan provides the opportunity to coordinate work across many agencies and partners and must be done in a way that protects the public interest and balances instream and out-of-stream needs.

Consistent with previous Strategies, actions are not given a prioritization. However, this can be addressed in partnership with the Governor's Office and interested parties as part of the Legislative process.

## Closing Thoughts

Since 2012, the Strategy has provided Oregon with a roadmap to improving our understanding of our water resources and working towards meeting our instream and out-of-stream needs. Most years, steady progress has been made on the Strategy actions, with the last three years providing the most significant increase in activity. Private landowners, communities, non-profits, businesses, local governments, utilities, tribes, and state and federal agencies have come together to discuss difficult topics, develop creative solutions, find funding, and implement projects on the ground.

Projects that seemed impossible just ten years ago have now become a reality. Four dams on the Klamath River will be removed this year, restoring over 400 miles of habitat for endangered species, making it one of the biggest dam removal projects ever undertaken.

During public engagement for the 2024 Strategy, differences in opinion were shared about how to address our water challenges. But commonalities were also shared, across different communities throughout the state. Participants also shared a message of hope:

- Encouragement about the development of new devices and technology for both addressing water quantity (such as more efficient tools for agriculture or for households) and water quality
- Empathy and care for what people in other parts of the state might be facing with water in their communities (or as one Marion County resident put it, “There are so many of us who care deeply about water, and there are not many ways to show that or ways to find each other if we are not already involved in water management as large-scale customers, professional experts, or administrators.”)
- A desire to learn more
- Hope in future generations as water and land stewards
- Appreciation for opportunities to be part of the statewide conversation on water

More work is yet to be done. Let the Strategy be the springboard for conversations about water, water problems, and water solutions. We can’t live without water and we can make choices now that make future conversations easier rather than harder. To quote many Strategy engagement participants, “water is life.”

The next edition of the Strategy is due no later than 2032.



# ACRONYMS

Ag	Agriculture
AgriMet	Agricultural Meteorology
AIS	Aquatic Invasive Species
ACFFOD	Amended and Corrected Findings of Fact and Order of Determination
AR	Artificial Recharge
ASR	Aquifer Storage and Recovery
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
BiOp	Biological Opinion
BIZOR	Oregon Business Development Department
CFS	Cubic Feet per Second
DCBS	Department of Consumer and Business Services
DEQ, ODEQ	Oregon Department of Environmental Quality
DLCD	Department of Land Conservation and Development
DOGAMI	Oregon Department of Geology and Mineral Industries
DSL	Department of State Lands
EAP	Emergency Action Plan
ESA	Endangered Species Act
ET	Evapotranspiration
FEMA	Federal Emergency Management Agency
FTP	File Transfer Protocol
GDE	Groundwater Dependent Ecosystem
GNRO	Governor's Natural Resources Office
GPS	Global Positioning System
GWMA	Groundwater Management Area (DEQ designation)
IPCC	Intergovernmental Panel on Climate Change
Lidar	Airborne Light Detection and Ranging
MS4	Municipal Separate Storm Sewer System
MW	Megawatt
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source of Pollution
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
OAR	Oregon Administrative Rule
OCAR	Oregon Climate Assessment Report
OCCRI	Oregon Climate Change Research Institute
ODA	Oregon Department of Agriculture

ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
ODOE	Oregon Department of Energy
ODOT	Oregon Department of Transportation
OHA	Oregon Health Authority
OLCC	Oregon Liquor and Cannabis Commission
OPRD	Oregon Parks and Recreation Department
ORS	Oregon Revised Statutes
OSMB	Oregon State Marine Board
OSU	Oregon State University
OWEB	Oregon Watershed Enhancement Board
OWRD	Oregon Water Resources Department
PSP	Pesticide Stewardship Partnership
RISA	Regional Integrated Science and Assessments
TMDL	Total Maximum Daily Load
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
UICs	Underground Injection Control Systems
USDA	U.S. Department of Agriculture
WMCP	Water Management and Conservation Plan

# ACKNOWLEDGEMENTS

Documents of this scope and depth are the product of a talented team and a public who cares deeply about the future of water in Oregon. With gratitude for their time, expertise, and patience, we would like to thank:

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# Oregon's 2024 Integrated Water Resources Strategy - Draft 1, March 2024

## Water Challenges Across Oregon

Oregon faces a number of water challenges that impact the quality and quantity of water for instream and out-of-stream needs, including:

- Too much demand for too little water for in-stream and out-of-stream uses;
- A half century of underinvestment in our water resources and infrastructure;
- Our changing population and associated development – growing in some areas, shrinking in others; and
- Climate change and associated increases in temperature, wildfire, drought, damaging floods, and harmful algal blooms.

## Vision

To address changes in climate and population dynamics, Oregonians will take care of our surface water, groundwater, and built and natural infrastructure to ensure we have enough clean water for our people, our economy, and our environment now and for future generations. Oregonians will invest strategically in partnerships and planning, data and analysis, and water stewardship for instream and out-of-stream needs across all regions to support resilient communities, vibrant local economies, and a healthy environment for all who live here.

## Call to Action

We must both act now and plan for the long term, otherwise we will place the safety of our communities, the health of our people and environment, and Oregon's economic future at risk. How we choose to care for our surface and groundwater and our built and natural infrastructure, will determine if we pass a legacy of clean and sustainable water to future generations. A coordinated effort of immediate actions and thoughtful planning for the future are needed. The Strategy outlines the inter-agency actions and public-private partnerships needed to understand and meet Oregon's instream and out-of-stream water needs, to create a foundation for coordinated action and funding.

The 2024 Integrated Water Resources Strategy proposes actions for improving our understanding of Oregon's water resources and meeting our instream and out-of-stream needs, including water quantity, water quality, and ecosystem needs, in the following categories:

### Funding

*Oregon must invest now to secure our water future*

- **Funding**

### Partnerships and Planning

*All Oregonians must work together and plan for our water future*

- **Education & Outreach**
- **Land Use Planning**
- **Coordination & Collaboration**
- **Natural Hazard Mitigation**
- **Water Planning**
- **Planning & Extreme Events**

### Data and Analysis

*Oregon needs foundational information to make wise decisions and pursue innovation*

- **Water Resource/Supply Information**
- **Out-of-Stream Water Needs**
- **Instream & Ecosystem Water Needs**

### Stewardship

*Oregon must secure its water future through active management and stewardship of its resources*

- **Healthy Ecosystems**
- **Water Infrastructure**
- **Clean Water**
- **Water & Energy**
- **Water Use & Management**



# Oregon's 2024 Integrated Water Resources Strategy Framework and Actions - Draft 1, March 2024

Focusing on: Climate change, population growth, land use change, economic impacts, and energy demand

## Goal 1: Improve Understanding of Oregon's Water Resources

- Objective 1: Understand Water Resources
- Objective 2: Understand Instream and Out-of-Stream Needs
- Objective 3: Understand the Pressures that Affect Our Needs and Supplies

## Goal 2: Meet Oregon's Water Resources Needs

- Objective 4: Meet Oregon's Instream and Out-of-Stream Needs

## Chapter 1: Funding

### Funding

- 1A [13A] – Fund Development and Implementation of Oregon's Integrated Water Resources Strategy
- 1B [13B] – Fund Water Resources Management Activities at State Agencies
- 1C [13C-13E] – Invest in Planning, Feasibility Studies, and Water Resource Project Implementation

## Chapter 2: Partnerships and Planning

### Education & Outreach

- 2A [8C] – Promote Community Education and Outreach
- 2B [8A] – Support Implementation of K-12 Environmental Literacy Plan
- 2C [8B] – Provide Career Training for the Next Generation of Water Professionals
- 2D [8D] – Identify Water Research Needs & Partnerships

### Coordination & Collaboration [new]

- 3A [9C] – Partner with Tribes, Federal Agencies, and Neighboring States in Long-Term Water Resources Management
- 3B [6B] – Improve State Interagency Coordination
- 3C [new] – Lead Meaningful Community Engagement

### Water Planning

- 4A [9A] – Support Integrated Place-Based Planning and Other Water Planning Efforts
- 4B [9B] – Coordinate State and Local Natural Resource Plans

### Land Use Planning

- 5A [6A] – Improve Integration of Water Information and Land Use Planning
- 5B [6C] – Encourage Low Impact Development Practices and Green Infrastructure

### Natural Hazard Mitigation Planning & Extreme Events

- 6A [5.5A] – Plan and Prepare for Drought & Wildfire Resiliency
- 6B [5.5B] – Plan and Prepare for Flood Events
- 6C [5.5C] – Plan and Prepare for a Cascadia Earthquake & Tsunami Event

## Chapter 3: Data and Analysis

### Water Resource/Supply Information

- 7A [1B] – Improve Water Resource Data Collection and Monitoring
- 7B [1A] – Conduct Additional Groundwater Basin Studies
- 7C [1C] – Enhance Interagency Data Coordination
- 7D [5A] – Support Basin-Scale Climate Change Research

### Instream & Ecosystem Water Needs

- 8A [4A] – Analyze the Effects on Water from Energy Development Projects and Policies
- 8B [3A] – Determine Instream Flow Needs (Quality and Quantity)
- 8C [3B] – Determine Needs of Groundwater-Dependent Ecosystems
- 8D [new] – Develop Instream & Ecosystem Water Demand Forecasts

### Out-of-Stream Water Needs

- 9A [2B] – Improve Water-Use Measurement and Reporting
- 9B [2A] – Regularly Update Out-of-Stream Water Demand Forecasts

## Chapter 4: Stewardship

### Healthy Ecosystems

- 10A [11A] – Improve Watershed Health, Resiliency, and Capacity for Natural Storage
- 10B [11D] – Protect and Restore Instream Habitat and Fish Passage/Screening
- 10C [11B] – Develop Additional Instream Protections
- 10D [11C] – Prevent and Eradicate Invasive Species
- 10E [11E] – Develop Additional Groundwater Protections

### Clean Water

- 11A [12A] – Ensure the Safety of Oregon's Drinking Water
- 11B [12B] – Reduce the Use of and Exposure to Toxics and Other Pollutants
- 11C [12C] – Implement Water Quality Pollution Controls

### Water Use & Management

- 12A [2C] – Determine Unadjudicated Water Right Claims
- 12B [10A] – Improve Water-Use Efficiency and Water Conservation
- 12C [10C] – Encourage Water Reuse Projects
- 12D [10B] – Improve Access to Storage
- 12E [10D] – Reach Environmental Outcomes with Non-Regulatory Alternatives
- 12F [10F] – Provide an Adequate Field Presence
- 12G [10G] – Strengthen Water Quantity and Water Quality Permitting Programs

### Water Infrastructure

- 13A [7A] – Maintain, Upgrade, Decommission Water and Wastewater Infrastructure
- 13B [7B] – Encourage Regional (Sub-Basin) Water and Wastewater Systems
- 13C [7C] – Support Dam and Levee Safety

### Water & Energy

- 14A [4B] – Develop Non-Traditional Hydroelectric Power
- 14B [4C] – Promote Strategies that Increase/Integrate Energy and Water Savings

Note: 2017 IWRS numbering is shown in [brackets].

# Appendix A

## Cross-walk of 2017 Strategy and 2024 Draft 1 Strategy Actions

2017 Strategy Action	Proposed 2024 Strategy Action
1A	7B
1B	7A
1C	7C
2A	9B
2B	9A
2C	12A
2D	Moved to example action 12G
2E	Moved to example action 12G
3A	8B
3B	8C
4A	8A
4B	14A
4C	14B
5A	7D
5B	Distributed throughout
5.5A	6A
5.5B	6B
5.5C	6C
6A	5A
6B	3B
6C	5B
7A	13A
7B	13B
7C	13C
8A	2B
8B	2C
8C	2A
8D	2D
9A	4A
9B	4B
9C	3A

2017 Strategy Action	Proposed 2024 Strategy Action
10A	12B
10B	12D
10C	12C
10D	12E
10E	Moved to example action under 1C
10F	12F
10G	12G
11A	10A
11B	10C
11C	10D
11D	10B
11E	10E
12A	11A
12B	11B
12C	11C
13A	1A
13B	1B
13C	Combined into 1C
13D	Combined into 1C
13E	Combined into 1C