
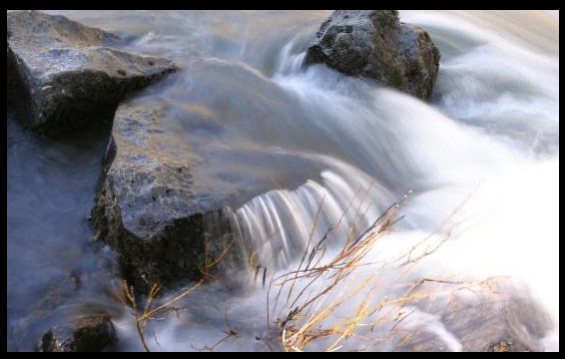



OREGON'S

INTEGRATED WATER RESOURCES STRATEGY

EXECUTIVE SUMMARY





State of Oregon
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Cover Photos: Bob Wood, OWRD; Kyle Gorman, OWRD; Gary Halvorson, Oregon State Archives; and Rick Swart, ODFW

There is no substitute for clean and abundant water. Every living thing depends upon clean and abundant water to meet basic needs. Oregon's economic vitality, environmental integrity, and cultural identity depend upon it. Water is Oregon's most precious natural resource.

In its deliberations over House Bill 3369 in 2009, Oregon's Legislature posed two questions essential to Oregon's future: what is the current state of Oregon's water supply relative to its needs, and what must Oregon do to ensure that sustainable supplies of clean and abundant water are available to meet future instream and out-of-stream needs? Oregon's Legislature passed HB 3369, and in doing so, directed the Water Resources Department to lead a statewide effort to provide answers to these questions in the development of Oregon's first Integrated Water Resources Strategy.

"This document reflects Oregon's diverse opinions and interests, while providing a blueprint for opportunities both in-stream and out—from our agricultural sector to our municipal water supply to healthy fish and other aquatic life."

– Governor John A. Kitzhaber (2012)

Building a Water Strategy for Oregon

With leadership, support, and direction from the Oregon Legislature and the Water Resources Commission, Oregon's natural resource agencies set out to develop the statewide, Integrated Water Resources Strategy to meet current and future water needs. The Oregon Water Resources Department, the state agency responsible for water quantity, took the lead to develop this Strategy. The Department worked closely with the Oregon Department of Environmental Quality and the Department of Fish and Wildlife to ensure that water quality needs and ecological needs were directly addressed. The Oregon Department of Agriculture, which oversees the safety and promotion of Oregon's agricultural industries, also played an important role in the development of the Integrated Water Resources Strategy.

Unlike traditional water supply plans, this Strategy considers instream needs (where water remains in the environment) along with out-of-stream needs (where water is diverted for use), including water quality, water quantity, and ecosystem needs.

A Bottom-Up Approach

The state's first Integrated Water Resources Strategy, although led by state agencies, was built from the ground up. Early on, the four state agencies actively sought out input from the public, hosting discussions in eleven Oregon communities all across the state. Stakeholders and several water-related organizations also participated in individual workshop discussions.

The public input gathered from these discussions resulted in an extensive list of water-related challenges

offered up a variety of solutions and ways the state could move forward to improve water resources

Conversations continued with formal advisory groups that offered advice on the most critical issues to address and the most promising solutions. More than fifteen natural resource and economic development state agencies, along with ten federal agencies with diverse responsibilities in the areas of water supply,

water quality, land management, and fish and wildlife management in Oregon, provided assistance and feedback in developing the Strategy. These agencies were instrumental in helping to identify the successful tools, plans, and programs already in place today that can be built upon, further integrated, and improved under the umbrella of the Integrated Water Resources Strategy.

In any public outreach effort, it is almost impossible to reach every citizen of the state. An 18-member advisory group of citizens and stakeholders from across the state provided a diverse range of perspectives and interests. Like the state and federal agencies, their feedback and recommendations were invaluable to developing the structure and content of the Strategy.

The comments, feedback and input received throughout the development of the Strategy were shared regularly with the Water Resources Commission, other boards and commissions, the Oregon State Legislature, and the Governor's Office.

After more than three years of engagement with Oregon's citizens, the Water Resources Commission formally adopted Oregon's first Integrated Water Resources Strategy on the second day of August, 2012.

Key Findings: The Status of Water Use in Oregon

In an average year, Oregon can expect to see an estimated 100 million acre feet of water fill our lakes and streams and recharge our groundwater aquifers. This amount does not include water that evaporates

Out-of-Stream Needs

Water users in Oregon divert about nine million acre-feet of water each year for out-of-stream uses, serving four primary types of user groups: agriculture, municipalities, self-supplied industry, and self-supplied domestic water users.

These diversions represent approximately eight percent of the estimated yield in an average year.

Agricultural water use accounts for an estimated 85 percent of all water diverted in Oregon, according to 2008 water demand forecasting figures. Irrigated farms produce 77 percent of the total value of Oregon's harvested crops, which is equivalent to approximately $3.38 billion in agricultural production values for 2010. Water can increase yields 200 to 600 percent, providing growers with the ability to produce a wider variety of crops, which can make land more valuable and create economic hubs.

Water is the lifeblood of Oregon's cities as well, with municipal drinking water systems delivering water to about 88 percent of the state's population, about 3.3 million people. Municipal water systems, representing an estimated six percent of out-of-stream demands, also support economic development needs, providing clean and reliable water supplies for Oregon communities and businesses.

Self-supplied industrial water use in Oregon represents about six percent of all the water diverted in Oregon. Such water use takes place in industrial and commercial facilities and typically involves water as a key production input. Water is also used to construct, operate, cool, and maintain facilities.

Domestic water use represents the 707,000 Oregon residents whose water needs are supplied by privately-owned groundwater wells. This use accounts for about one-percent of all out-of-stream water demands in Oregon. Water is used to meet basic drinking water needs, household activities, and for smaller outdoor watering purposes.

Population growth, changes in land use, climate change, and improved technologies will shift water demands over the next 50 years, with some factors creating a greater demand for water and some factors lowering demand for water. Oregon will need to conduct regular, long-term water demand forecasts in order to accurately anticipate and meet these demands.

Instream Needs

Just as water is needed to support out-of-stream needs, water is needed within the environment to ensure overall ecosystem health. Water that remains in the stream system and within groundwater aquifers is needed to sustain Oregon's diverse aquatic species and ecosystems, a recognized beneficial use of water. Instream flows also support the needs of Oregon's industries, such as recreational and commercial fisheries and associated businesses, water-related tourism and destination spots, energy production, and navigational transportation.

Nineteen million acre feet of the surface water that is not diverted in Oregon is formally protected by more than 1,400 instream water rights. Instream protections are also contained within federal biological opinions and other prescribed minimum flow requirements.

Oregon has conducted some quantitative work to determine the base flow needs of some species, and has protected some of these flows with instream water rights. However, much work remains to incorporate the needs of other species into these calculations as well. In addition, very little data exists regarding the elevated streamflows required to keep ecosystems healthy, or the groundwater quantity and quality

Key Findings: The Status of Physical Water Supplies

The remainder of the water not formally allocated for instream or out-of-stream uses presents a question worthy of discussion. If Oregon is viewed as a "wet" state, why is it that meeting instream and out-of-stream needs for water is a challenge today? Many of our water

and the form of precipitation, water quality, and access to water.

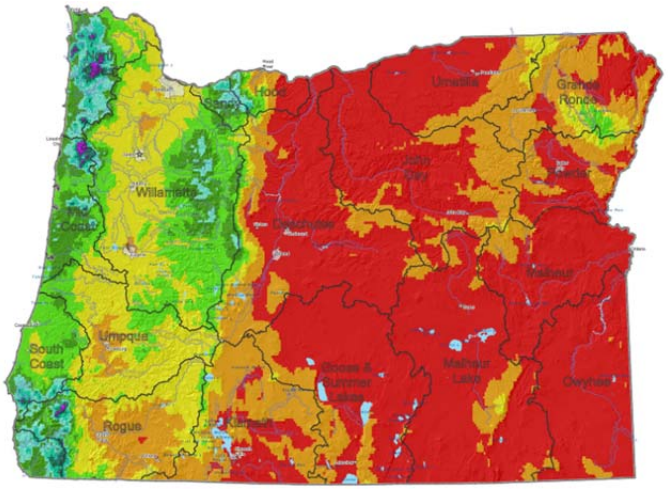
Location

Oregon's average annual precipitation is about 30 inches and unevenly distributed across the state. In fact, it varies widely, from as much as 200 inches at points along the coastal mountains, to less than eight inches in areas of drier eastern Oregon.

This disparity means that some Oregon communities often experience flooding conditions while others experience drought.

The locational differences of groundwater also pose a challenge to some Oregon communities, with geologic conditions varying extensively

"…If Oregon is viewed as a wet state, why are we facing water challenges?"



Average Annual Precipitation in Oregon

throughout the state. In some areas, groundwater is a major contributing source of water for springs, lakes, and wetlands. It feeds streams and rivers gradually throughout the year and augments streamflow in late summer months.

Although groundwater occurs almost everywhere in Oregon, the availability of groundwater for large-scale use and development is dependent on geologic conditions and climate, how it interacts with surface water, and the extent of previous development pressures on the resource. During the past 60 years, groundwater development has occurred primarily in areas where the geologic conditions are favorable and surface water has not been easily accessible. In several areas throughout the state, groundwater aquifers are not capable of sustaining additional development. In the Willamette Valley alone, twelve areas have been completely withdrawn from future uses or limited to smaller uses, allowing only minimal irrigation or essential public safety needs, such as fire protection.

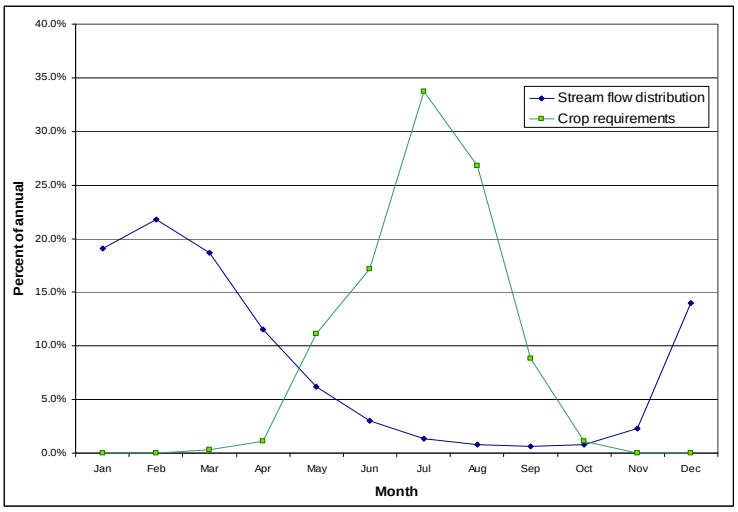
The limits of groundwater extend beyond quantity; some aquifers contain saline water, others contain area-wide nitrate contamination. Groundwater contamination is a serious issue in some locations throughout Oregon, affecting portions of Linn, Lane, and Benton Counties, the Lower Umatilla Basin, and portions of northern Malheur County.

The Integrated Water Resources Strategy calls for a significant investment in groundwater and surface water data, both quantity and quality. The State needs a more robust network of stream gages and observation wells in place to track the health of Oregon's water in each basin— to monitor groundwater levels, streamflows, and water quality. Further, professional personnel that are able to collect data, provide quality control, and process and share the results, are a critical part of Oregon's data needs.

Timing

Although the volume of water seems enormous in some areas of the state, it does not always arrive when we need it most. The arrival of precipitation in Oregon, whether by rain or snow, typically occurs from October through May. This stands in stark contrast to the months in which water demands are at their highest, or peak, for most uses.

The accompanying graph demonstrates this mismatch in timing. The highest water demand for crops (green line) occurs during the months of June, July, and August. The blue line, representing typical stream



Typical Timing of Streamflow vs. Demand in Oregon

Historically, agricultural water users and municipal water providers have tried to meet summertime demands through storage—using a combination of above or below-ground options and relying upon natural storage (i.e., snowpack, floodplains) to replenish and filter water supplies.

Instream needs are more difficult to place on a graph, as different species need sufficient water at different times of the year for different biological purposes. Generally, in terms of timing, low streamflows during the summer months represent the greatest concern for the survival of aquatic species.

Oregon is fortunate to have already made a solid start on developing the tools it needs to address the challenge of timing. The Integrated Water Resources Strategy calls for increased support for tools such as: built storage, natural storage, water conservation and re-use, water right transfers and other water management and development tools. The Strategy also calls for the development of new tools, such as a water supply development program, to strengthen the State's role as a direct partner in water supply development.

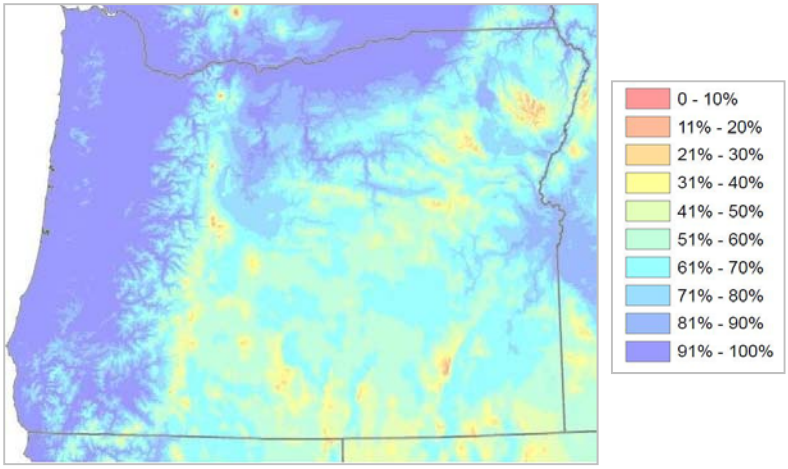
Form of Precipitation

Water users in Oregon and throughout the Pacific Northwest are highly dependent on temperature-sensitive springtime snowpack to meet growing and often competing water demands.

Approximately fifty percent of Oregon water users are located in areas of the state that are "snowpack dependent." This means that water users, both instream and out-of-stream, significantly rely on snowmelt to replenish Oregon's rivers, streams, and aquifers throughout the late spring and early summer months.

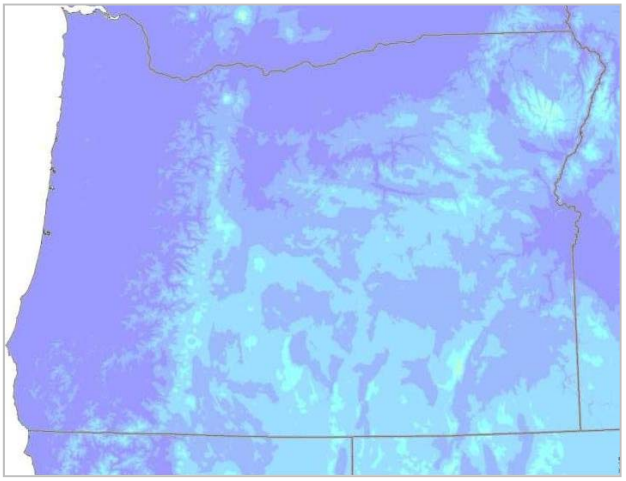
Climate change researchers are projecting an increase of mean annual temperature in Oregon between 0.1 and 0.6 degree Celsius each decade, through the 2050s. The maps below show the effect warmer temperatures could have on mid-level snowpack in Oregon. With an increase of just 3°C, precipitation that typically arrives in the form of snow could arrive more often in the form of rain.

Current Precipitation Conditions



Red, yellow, and orange hues represent areas where a large percentage of precipitation falls as snow.

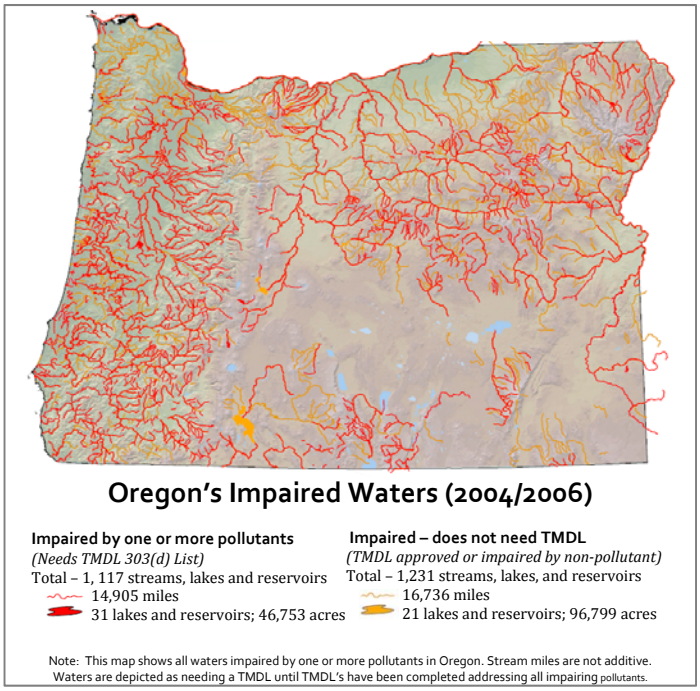
Future Scenario (3.0°C Temp Increase)



Snow-dominant areas largely disappear with a rise in air temperature.

A shift in the form of precipitation presents a number of water-related challenges, from flashier flood-prone systems to decreased summertime run-off to surface water, resulting in possible water shortages. Less snow also has an effect on groundwater resources as well, decreasing the opportunity for groundwater recharge. Those users who are dependent on snowpack to meet either instream or out-of-stream needs during the summer could see significant decreases in water when they need it most.

Oregon is an international leader in climate change research with the Oregon Climate Change Research Institute named as the anchor institution for two federally funded regional climate science centers. Climate change scientists are working on translating information into a format that local communities can use to anticipate and adapt to climate change. State agencies can help these communities by serving as a



Water Quality and Ecosystems

Water quality is impaired in many of Oregon's surface water bodies. Poor water quality often equates to higher costs for water treatment to meet municipal and industrial needs, and it also limits the accessibility to clean water for fish, wildlife, domestic uses, agricultural, and recreational uses.

More than 1,861 water bodies are impaired and not meeting water quality standards, including more than 30 lakes and reservoirs, and about 22,000 stream miles. Temperature, sedimentation, and nutrients are the leading pollutants that impair Oregon's rivers and streams.

Water temperature, which can increase as a result of low streamflow, loss of riparian vegetation, channel modification, or warm discharge, is a critical water quality parameter because it directly effects the survival of sensitive species such as salmon and trout. For lakes, ponds, and reservoirs, dissolved oxygen and habitat alteration are the two most common water quality issues.

What's the effect? Impaired water quality poses human health risks, as well as higher costs to monitor and treat. In addition, impaired water quality can be lethal to fish and wildlife, or can result in reduced fish egg production, nest and brood abandonment, lower disease resistance, reduced adult survival and lower population abundance. For agriculture or other industries, poor water quality may jeopardize crop production and limit potential economic opportunities.

Since 1991, the National Oceanic and Atmospheric Administration's (NOAA) Fisheries' Office of Protected Resources has listed 27 Pacific salmonid species under the Endangered Species Act (ESA), and has delisted zero species, due in part to water quality problems.

Oregon has a number of programs in place today designed to restore impaired water as well as to prevent further deterioration. Many of these programs are entering an implementation phase. However, a statewide groundwater quality monitoring program does not exist today. Oregon needs to establish and maintain a statewide program, particularly related to nitrates, a known groundwater quality problem throughout Oregon.

Lack of Access

The lack of access to water can manifest itself in many different ways. Three examples mentioned repeatedly throughout this project are cost, environmental justice/process difficulties, and barriers to fish habitat.

Cost: The cost to access water can be enormous. For municipal drinking water systems in Oregon, the U.S. Environmental Protection Agency estimates a total need of approximately $3 billion. For municipal and agricultural users, costs can include capital construction and maintenance, securing a water source, transmission, storage, treatment, and distribution. These costs involve routine construction and

preparedness efforts that Oregon needs to undertake over the next 20 years. The cost of ongoing

Environmental Justice/Process Difficulties: Difficulty in gaining access to decision-making processes in the natural resources arena can pose a problem for those without access to digital news media, or without time, resources, or information to participate. In 2007, the Oregon Legislature called for environmental justice in Oregon, ensuring that all persons participate in decisions that affect their environment. Members of minority and low-income communities, tribal communities, and other communities have been traditionally under-represented in public processes and disproportionately affected by cumulative environmental impacts.

Fish Passage Barriers: Our water challenges are not just limited to a lack of access to water for humans. Oregon's fish and wildlife species lack adequate access to miles of waterways due to diversions or facilities that lack proper screening or passage, which can increase fish mortality and injury as fish enter diversions and other structures. In December 2011, the Oregon Department of Fish and Wildlife published a Fish Passage Barriers dataset, showing barriers to native migratory fish. Some of the barriers identified are passable barriers, others are partially blocking or completely blocking passage, and for a

The Integrated Water Resources Strategy contains a number of recommended actions designed to improve access to water. The Strategy advocates for funding to benefit local communities—to participate in place-based planning; to finance water and wastewater infrastructure; to improve fish passage, screening, and other ecological restoration efforts; and to develop water resources projects.

What Oregon Needs to Do to Meet Its Water Needs

Oregon has a solid legal and scientific history in place, providing a strong foundation for economic development, public health, and environmental protections in the water arena. Oregon has often set the standard among states in water policy and implementation. Since 1909, Oregon's Water Code has not only created a rational system of water allocation and distribution through the state, but it has continued to evolve, to accommodate advancements in science and society. For instance, Oregon water law now recognizes the close connection between groundwater and surface water. It also recognizes that instream needs are beneficial uses. It provides tools for water right transfers. And, it provides tools to encourage water conservation.

Oregon's leadership encompasses other water issues as well, such as the Beach Bill in the 1960s; the Scenic Waterways Act, Forest Practices Act, and land-use planning system in the 1970s; the Groundwater Quality Protection Act and Wetlands Policy in the 1980s; and the Agricultural Water Quality Management Act and Oregon Plan for Salmon and Watersheds in the 1990s. During the past decade, Oregon has adopted a number of water-related strategies and policies in order to better position the state in the areas of fish and wildlife conservation, energy development, and economic development.

The Integrated Water Resources Strategy recognizes the importance of Oregon's legal and scientific foundation and commits to continuing and strengthening it.

Despite these successes, all of the challenges mentioned above—location, timing, form, quality, and lack of

Oregon's Water Strategy for the Future

The Integrated Water Resources Strategy is a blueprint to help the State of Oregon better understand and meet its instream and out-of-stream water needs, taking into account water quantity, water quality, and ecosystem needs. The Strategy has four primary objectives. Each is followed by a set of recommended actions designed to meet these objectives.

OBJECTIVE 1: UNDERSTAND WATER RESOURCES TODAY

Oregon needs to fill the knowledge gap—gathering, processing, and sharing water resources information, so that the State can better characterize its water resources to sustain Oregon's jobs and the economy, as well as a healthy environment.

Critical Issues: Further Understand Limited Water Supplies & Systems; Water Quality/Quantity Information; Water Management Institutions

Recommended Actions:

1A. Conduct additional groundwater investigations
1B. Improve water resource data collection and monitoring
1C. Coordinate inter-agency data collection, processing, and use in decision-making

OBJECTIVE 2: UNDERSTAND INSTREAM AND OUT-OF-STREAM NEEDS

Oregon needs a better grasp of current and future needs—both instream and out-of-stream. Without a better characterization of current water use and future water quantity, water quality, and ecosystem needs, the State cannot adequately plan to meet these needs into the future.

Critical Issue: Understanding Oregon's Out-of-Stream Needs/Demands

Recommended Actions:

2A. Update long-term water demand forecasts
2B. Improve water-use measurement and reporting
2C. Determine pre-1909 water right claims
2D. Update water right records with contact information
2E. Update Oregon's water-related permitting guide

Critical Issue: Understanding Oregon's Instream Needs/Demands

Recommended Actions:

3A. Determine flows needed (quality and quantity) to support instream needs
3B. Determine needs of groundwater dependent ecosystems

OBJECTIVE 3: UNDERSTAND THE COMING PRESSURES THAT AFFECT OUR NEEDS AND SUPPLIES

Oregon must anticipate and model some of the most powerful changes that may affect both water resources and water needs into the future. Such changes include climate change, population growth and shifts, economic development, changes in land use, infrastructure needs, the water-energy nexus, and the need for water-related education.

Critical Issue: The Water-Energy Nexus

Recommended Actions:

4A. Analyze the effects on water from energy development projects and policies
4B. Take advantage of existing infrastructure to develop hydroelectric power
4C. Promote strategies that increase/integrate energy & water savings

Critical Issue: Climate Change

Recommended Actions:

5A. Support continued basin-scale climate change research efforts
5B. Assist with climate change adaptation and resiliency strategies

Critical Issue: The Water and Land Use Nexus

Recommended Actions:

6A. Improve integration of water information into land use planning (& vice versa)
6B. Update state agency coordination plans
6C. Encourage low-impact development practices

Critical Issue: Water-Related Infrastructure

Recommended Actions:

7A. Develop and upgrade water and wastewater infrastructure
7B. Encourage regional (sub-basin) approaches to water and wastewater systems

Critical Issue: Education and Outreach

Recommended Actions:

8A. Support implementation of Oregon's K-12 Environmental Literacy Plan
8B. Provide education and training for Oregon's next generation of water experts
8C. Promote community education and training opportunities
8D. Identify ongoing water-related research needs

OBJECTIVE 4: MEET OREGON'S INSTREAM AND OUT-OF-STREAM NEEDS

Oregon needs to integrate and coordinate both the long-term planning and day-to-day management of Oregon's water resources among local, state, federal, and tribal governments, as well as with other state partners. Key actions here include state-level and place-based planning, water management and development, protection of public health and ecological health, and stable funding.

Critical Issue: Place-Based Efforts

Recommended Actions:

9A. Undertake place-based integrated, water resources planning
9B. Coordinate implementation of existing natural resource plans
9C. Partner with federal agencies, tribes, & neighboring states in long-term water resources management

Critical Issue: Water Management and Development

Recommended Actions:

10A. Improve water-use efficiency and water conservation
10B. Improve access to built storage
10C. Encourage additional water reuse projects
10D. Reach environmental outcomes with non-regulatory alternatives
10E. Authorize and fund a water supply development program

Critical Issue: Healthy Ecosystems

Recommended Actions:

11A. Improve watershed health, resiliency, and capacity for natural storage
11B. Develop additional instream protections
11C. Prevent and eradicate invasive species
11D. Protect and restore instream habitat and habitat access for fish and wildlife

Critical Issue: Public Health
Recommended Actions:
12A. Ensure the safety of Oregon's drinking water
12B. Reduce the use of and exposure to toxics and other pollutants
12C. Implement water quality pollution control plans

Critical Issue: Funding
Recommended Actions:
13A. Fund development and implementation of Oregon's IWRS
13B. Fund water resources management at the state level
13C. Fund communities needing feasibility studies for water conservation, storage & reuse projects

Measure of Success

Fifty years from now, our vision is to see, "Everywhere in our State, …healthy waters, able to sustain a healthy economy, environment, and cultures & communities." This vision, developed by the IWRS Policy Advisory Group, has shaped the recommended actions in the Integrated Water Resources Strategy.

If, during 2012-17, the Oregon Legislature supports the policy and funding recommendations laid out in

towards this vision.

First, a better understanding of Oregon's physical water resources
This includes completion of additional groundwater basin studies that help us understand where

sustainable yield. It also includes improved monitoring of groundwater, surface water, and habitat

Second, an improved understanding of Oregon's need for water
Recommended actions begin to close some fundamental gaps in our water rights system, such as

Third, a better understanding of the coming pressures that affect our needs and supplies
Recommendations in this area place heavy emphasis on providing critical groundwater and climate change information to local communities and planners, so that they can understand how groundwater

Fourth, an improved ability to meet Oregon's current and future water resources needs
This includes developing tools so the State can partner with local communities to conduct place-based

Conclusion

The Legislature has directed the Water Resources Commission to review and to update the Integrated

out-of-stream water needs.