STEP 5 Draft Report

The Lower John Day Basin Integrated Water Resource Plan

https://www.lowerjohndaypbp.com/ 12/10/21 *(Jeffrey Kee photo credit)*

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John Day scenery (Jeffrey Kee photo credit)

Executive Summary

The Lower John Day Placed-Based Partnership (Work Group) consists of 17 parties[1] working together over the last five years (2018-2022) to help plan for future instream and out-of-stream water needs in the Lower John Day Sub-Basin (Lower Basin). This Lower John Day Basin Integrated Water Resource Plan (Step 5 Report) as well as the previous three reports, which were used to assemble this final Plan, can be found on our website: https://www.lowerjohndaypbp.com/. The planning process examined existing conditions and expected future water needs in the Lower Basin, identified critical water resource issues in the Lower Basin, and developed integrated strategies to address those critical issues. Consistent with Place-Based planning guidance, the planning process was conducted within the framework of existing laws (statutes and rules) and did not consider changes to those laws.

The Lower Basin, like much of the western United States, faces unprecedented pressure on its natural and human systems. The region, like much of Oregon, is experiencing rising temperatures, increasing incidents and extent of drought, and increased fire frequency. These and other influences are preventing instream and out-of-stream water needs from being met. Multi-stakeholder and cross-agency coordination, and adequate funding, is critical to meet the challenges facing the Lower Basin.[2]

This Lower John Day Basin Integrated Water Resource Plan provides recommended strategies for addressing critical water resources issues identified by the Work Group, now and into the future, in cooperation and coordination with other Lower Basin planning efforts.

Key findings of the Work Group include:

- Municipal, industrial, and commercial out-of-stream water demand is not expected to see significant increases due to the projected low population growth and existing industrial and commercial enterprises.
- Water is not likely available for new surface water appropriations from July through October. Water may be available for appropriation from January through May.
- Few of the Lower Basin's tributary streams have instream water rights, and the instream water rights that do exist, for the mainstem and some tributaries, do not protect flows sufficient to meet all ecological needs.
- Available flows are insufficient to meet several Water Availability Basins' (WABs) monthly/biweekly water demands, most notably the months from July to October.
- High water temperature is the most significant water quality issue in the Lower Basin.
- The vast majority of the irrigation comes from surface waters of the main stem and its tributaries. Agriculture can play a major role in modifying local and regional hydrology.
- Additional climate change scenarios should be modeled and tracked. Changes in hydrograph curves due to loss of and/or earlier snowmelt and increasing summer temperatures are likely to increase lethal conditions for fish that depend on cold water.

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[1] The parties include government entities and agencies, Native American tribes, industry representatives, and non-governmental organizations. Some participants were initially active but became inactive over time, while others joined later in the process.

[2] Although the planning area was defined to include only the Lower Basin below the confluence of the North Fork John Day River, the Work Group recognizes that flows in the lower mainstem John Day River depend heavily on flows from the Upper Basin. For example, the Lower Basin produces only about 5.6 percent of the total annual surface water yield, despite covering 40 percent of the overall John Day Basin.

A Strategic Action Plan shown in Chapter 5 provides a roadmap of recommended strategies to address the 19 Critical Issues identified by the Work Group. Issues ranked by the group as top Critical Issues (top 5) were:

- Poor riparian habitat
- Elevated summer stream temperatures and low instream oxygen
- Insufficient instream flow
- Storage needs
- Degraded native plant communities

Top strategies, which were ranked within general categories and not collectively, included (one for each Critical Issue above):

- Protect, enhance, and/or restore native riparian vegetation
- Maintain and increase stream flows (to address elevated stream temperatures)
- Encourage improved irrigation efficiency projects and use of Conserved Water Act (to reduce out-of-stream demand through efficiency improvements and to protect a portion of water saved instream)
- Complete a feasibility study to assess potential off-channel water storage projects, including (a) potential locations for storage projects and (b) water availability, including consideration of all categories of instream flow needs (as recognized in the Step 3 Report).
- Restore upland function by improving plant communities with juniper removal and planting appropriate perennial bunchgrasses, shrubs, and forbs

The justification for the above findings and recommended actions as well as others found in this Plan are made from a multi-year, multi-stakeholder effort committed to seeking public input and engagement. Agricultural stakeholders, landowners, conservation groups and local districts, and state and federal agencies all participated in identifying the most Critical Issues facing the Lower John Day and participated in developing strategies or actions that will help improve conditions. Evidence was found from peer reviewed science documented throughout the plan, and support was provided from state and federal agency experts and scientists from regional conservation organizations. Collectively, the Work Group and the supporting community assembled and analyzed data found in the Work Group Reports from Steps 2 to 4 that support a list of findings and recommendations found in Chapter 5 of this Plan.

Prior to finalizing and approving the Lower John Day Basin Integrated Water Resource Plan, the Work Group will review and incorporate comments from the fall 2021 public comment period as well as the agency review period during winter 2021-22. The Work Group will then work through comments and edits and provide an updated draft to Oregon's Water Resources Commission in preparation for commission presentation in spring 2022.

John Day scenery (Jeffrey Kee photo credit)

Terms and Definitions

Unless the context requires otherwise, the following abbreviations and terms have the following meaning:

Acre-foot: The volume of water covering 1 acre to a depth of 1 foot.

Consumptive use: Water withdrawn from groundwater or a stream and not returned to the system (e.g., water consumed through evapotranspiration (ET) by irrigated crops lost to crop use [evapotranspiration] or transferred out of the watershed and not returned [municipal, agriculture, storage, and others]).

Cubic feet per second (cfs): Volumetric flow rate is equivalent to a volume of 1 cubic foot flowing every second.

Discharge: The volume of water moving down a stream or river per unit of time, commonly expressed in cfs or gallons per day. In general, river discharge is computed by multiplying the area of water in a channel cross section by the average velocity of the water in that cross section.

Evapotranspiration (ET): Water used by plants through a combination of evaporation (liquid water on a surface changing to water vapor) and transpiration (water lost through plant stomata).

Exceedance stream flow: The stream flow exceeded a given percent of the time.

Greenhouse gas emissions: Gases that trap heat in the atmosphere, often measured in carbon dioxide (CO_2) equivalents.

Instream water right: A water right held in trust by the Oregon Water Resources Department (OWRD) for the benefit of the people of the State of Oregon to maintain water in stream for public use.

"Instream water rights" can be created through conversion of minimum perennial stream flows established by administrative rule, applications by selected state agencies, and "transfers" (temporarily or permanently) of water rights for out-of-stream use. As with other water rights, all of these processes for creating instream water rights are subject to public comment and legal challenges.

Instream demand: The amount of instream flow necessary, at each time of year, to support all instream flow needs, including those of aquatic life and recreation.

Natural stream flow: The stream flow expressed in volume per unit of time (cfs or m^3/s), that would occur in a natural state, without storage or withdrawal.

Net irrigation water requirement (NIWR): Evapotranspiration minus effective precipitation.

Off-channel storage: According to Oregon Administrative Rule 690-300-0010(31), "off-channel" means outside a natural waterway of perceptible extent which, during average water years, seasonally or continuously contains moving water that flows off the property owned by the applicant and has a definite bed and banks which serve to confine the water. "Off-channel" may include the collection of stormwater runoff, snowmelt, or seepage which, during average water years, does not flow through a defined channel and does not flow off the property owned by the applicant.

Out-of-stream demand: The demand to use, outside of a stream, water that would normally flow in that stream.

Place-based integrated water resources planning (PBP): Voluntary, locally initiated and led effort in which a balanced representation of water interests in a basin, watershed, or groundwater area work in partnership with the state to build a collaborative and inclusive process, gather information to understand current water resources and identify knowledge gaps, examine current and future instream and out-of-stream water needs, identify and prioritize strategic integrated solutions to meet current and future water needs, and develop a place-based plan that serves as a roadmap for meeting water needs and informs future updates to the statewide Integrated Water Resources Strategy (IWRS).

Planning area: Geography that is the focus of the PBP effort.

Recharge (groundwater): The surface water that moves through the unsaturated zone and enters aquifers. Recharge to the water table can be diffuse (precipitation over the land surface) or localized (streams losing water to groundwater within reaches of the stream).

Voting members: Members of the Lower John Day Partnership who have signed the Declaration of Cooperation.

Watershed: The area of land that drains to a single outlet and is separated from other watersheds by a topographic or subsurface drainage divide.

Water availability basin (WAB): Sub-basins delineated by the OWRD for the purpose of computing available water.

OWRD has created and maintains a database of the amount of surface water available for allocation for most of the waters of the state. The database is used to evaluate applications for new uses of surface water. Water availability is OWRD's term for describing if, in its view, water is "available" for further appropriation. Available is defined as the amount of water that can be appropriated from a given point on a given stream for new out-of-stream consumptive uses. OWRD typically does this by subtracting existing in-stream water rights, storage, and out-of-stream consumptive uses from the natural stream flow. This methodology does not take into account instream flow needs beyond those reflected by instream water rights, which many waterways do not have and which do not include, in any event, instream flow needs such as those for habitat formation (peak and ecological flows), even though some contend OWRD should, and may be legally required, to take those instream flow needs into account.

Water Availability Reporting System (WARS): A system of computerized data maintained by the OWRD for the purpose of determining OWRD's estimating of "water availability" within a WAB. In general, the system estimates water availability by subtracting instream water rights, water storage, and estimated out-of-stream consumptive uses from estimated natural streamflow.

Water interests: Local governments, tribal governments, utilities, major industries or employers, agriculture and forestry groups, conservation groups, special districts, and state and federal agencies that are located within, serve, or whose members have interest in the planning area.

Water year: For hydrologic purposes, the water year runs from October of one year through September of the next, so winter storm flows are not split between years. (For example, water year 1990 extends from October 1, 1989, through September 30, 1990).

Wildland urban interface area: Populated area where people live in and around forests, grasslands, shrub lands, and other natural areas.

Work Group: Members of the Lower John Day Partnership involved in the planning process.

Introduction

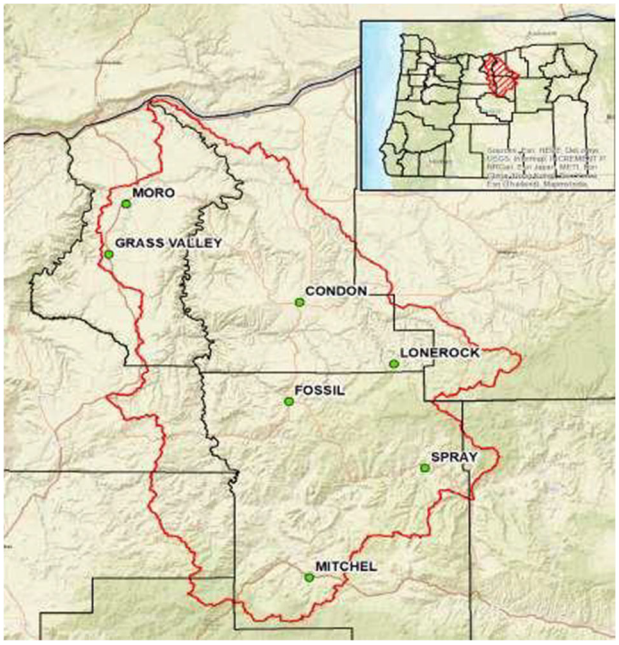
Place-Based integrated water resources planning (Place-Based water planning) is a voluntary, locally initiated and led effort. The purpose of the Place-Based planning effort is to set a process for a balanced representation of water interests to work in partnership with the state to analyze and understand and then develop a plan to meet the instream and out-of-stream water supply needs in the Lower John Day Basin (Lower Basin). In 2015, the Oregon Water Resources Department (OWRD) developed Draft Guidelines that provide a framework for planning. OWRD is a partner in the Work Group and also provides financial, technical, and planning assistance to the Work Group and its subsequent reports and this Lower John Day Basin Integrated Water Resource Plan.

The following planning principles are adapted from the draft Place-Based Planning Guidelines to fit the unique circumstances of the Lower Basin and our local planning process and were developed based on Work Group discussions.

- Maintain a locally initiated and led collaborative process.
- Employ a voluntary, non-regulatory approach in the planning process.
- Use an inclusive process that strives for a balanced representation of Basin water interests.
- Utilize an outside facilitator and facilitated processes.
- Conduct in close partnership with OWRD.
- Include the most current water resource data and scientific concepts.
- Address both instream and out-of-stream needs.
- Cover water quantity, quality, and ecosystem health.
- Build on and integrate existing studies and plans.
- Strive for consensus in decision-making.
- Utilize an open and transparent process that fosters public participation.
- Adhere to IWRS principles, Place-Based Planning Guidelines, and federal, state, and local laws.

Geographic Scope

The Lower Basin in north-central Oregon supports native aquatic fish species and habitat, small rural communities whose economies are centered on agriculture and energy development, and exceptional recreational, historical, and cultural riches. This section compiles and summarizes existing plans, assessments, and other available information to describe the Lower Basin setting. No new data were collected for this section.



Planning Area

The Lower Basin planning area encompasses all of the John Day River Basin downstream of the confluence of the Upper and North Fork John Day Rivers near Kimberly, Oregon. It drains an area of 3,149 square miles (over 2 million acres). The majority of the Lower John Day falls within Gilliam, Wheeler, and Sherman Counties, with smaller portions in Morrow, Wasco, Jefferson, Crook, and Grant Counties. The Lower Basin is situated in the interior plateau between the Blue

Mountains to the east and the Cascades Range to the west. The John Day River flow originates in the Strawberry Mountains (elevation 9,000 feet) and flows generally westward and then northward for approximately 284 miles, discharging into the Columbia River east of Rufus (elevation 200 feet).

The climate in the Lower Basin is semi-arid. This large area has highly variable precipitation, land cover, elevation, and evapotranspiration (ET). The area has a continental climate, characterized by low winter and high summer temperatures, low average annual precipitation, and dry summers. The low annual rainfall on the majority of the landscape is characteristic of the Intermountain Region, which receives most precipitation (70 to 80 percent) between November and March. Less than 10 percent of the annual precipitation falls as rain during July and August, usually from sporadic but violent thunderstorms (ODA, 2017).

John Day Fossil Bed formation along irrigated fields in Rowe Creek drainage. (Jeffrey Kee photo credit)

Most surface water is derived from the upper watersheds of the Lower Basin, primarily in the form of melting snow. The North and Middle Forks provide 60 percent of the flow to the main stem (NPCC, 2005). Major tributaries of the Lower John Day include Wallace Canyon, Bridge Creek, Thirtymile Creek, Butte Creek, Rock Creek, Grass Valley Canyon, Pine Hollow, Bear Creek, Dry Creek, Blalock Canyon, and Juniper Creek (ODA, 2017). There are 981 stream miles in the Lower Basin. Section 5 of the Step 2 report State of the Basin Report provides further detail on surface flows.

Plan Organization

The following Integrated Water Resource Plan (Step 5) is a summary of previously published reports starting with Step 1, which began in 2015, through Step 4, which was completed in 2021.

Chapter 1 of this Plan summarizes the Work Group, its members and contributors, governance procedures, and public engagement strategy. Chapter 2 characterizes the state of the water resources including water rights and the Lower Basin's water budget and highlights found data gaps in the planning area. Chapter 3 summarizes current uses and future water demands. Chapter 4 identifies 19 Critical Issues and a list of recommended actions and priority subwatersheds, which will be referred to throughout this report as WABs. WABs are essentially small watersheds OWRD uses to calculate if water is available for future allocation. There are 30 WABs in the Lower Basin. Their names usually correlate with tributary names. And finally, Chapter 5 summarizes implementation through a Strategic Action Plan.

Chapter 1: The Planning Process (Step 1)

Members of the Work Group break for lunch on a field tour examining fish passage barriers (Lee Rahr photo credit)

In Chapter 1, the Plan summarizes the Work Group, its members and contributors, governance procedures, and public engagement strategy.

Acknowledgments

The Lower John Day Basin Integrated Water Resource Plan represents the dedicated work of many individuals and organizations. In particular, we would like to thank the members of the Lower John Day Basin Work Group (Work Group) and all those who put in extra time and effort serving on a variety of subcommittees. Special thanks to Gilliam County Soil and Water Conservation District (SWCD), Mid John Day-Bridge Creek Watershed Council, and Sustainable Northwest for compiling the data and assembling the first draft of this report. We acknowledge the vital contribution of the authors of the existing plans, assessments, studies, data sets, and other materials that informed this document. Finally, we offer our deep appreciation to OWRD for funding this effort under a Place-Based integrated water resources planning grant and to those group members who offered match funding and countless in-kind hours.

"ODFW and the Warm Springs tribes were critical in better understanding our fisheries resource. We believe our action plan and our coordinated efforts with the JD Partnership puts the Lower John Day on solid footing for improving existing instream conditions."

– Herb Winters, Gilliam

Field trip to observe Beaver Dam Analogues on Bridge Creek, 2018 (Herb Winters photo credit)

Contributors

This Plan was developed by the Work Group and its subcommittees. Current members of the Work Group include:

- Gilliam County SWCD
- Gilliam-East John Day Watershed Council
- Mid John Day-Bridge Creek Watershed Council
- Natural Resources Conservation Service (NRCS)
- Oregon Natural Desert Association (ONDA)
- Sherman County Area Watershed Council
- Sherman County SWCD
- Gilliam County Cattlemen Association
- WaterWatch of Oregon
- Oregon Department of Agriculture
- OWRD
- Confederated Tribes of the Warm Springs
- Wheeler SWCD
- Sustainable Northwest
- The Conservation Angler

The following groups also participated in the planning process:

- The Freshwater Trust
- Oregon Department of Environmental Quality (DEQ)
- Port of Arlington
- Oregon Department of Fish and Wildlife (ODFW)

The following cities participated through field tours, meetings, surveys, and/or public comments processes:

- Arlington
- Condon
- Fossil
- Grass Valley
- Mitchell
- Moro
- Spray

The following groups and individuals provided comments (incorporated) on the Draft Step 5 Plan (9/1/2021):

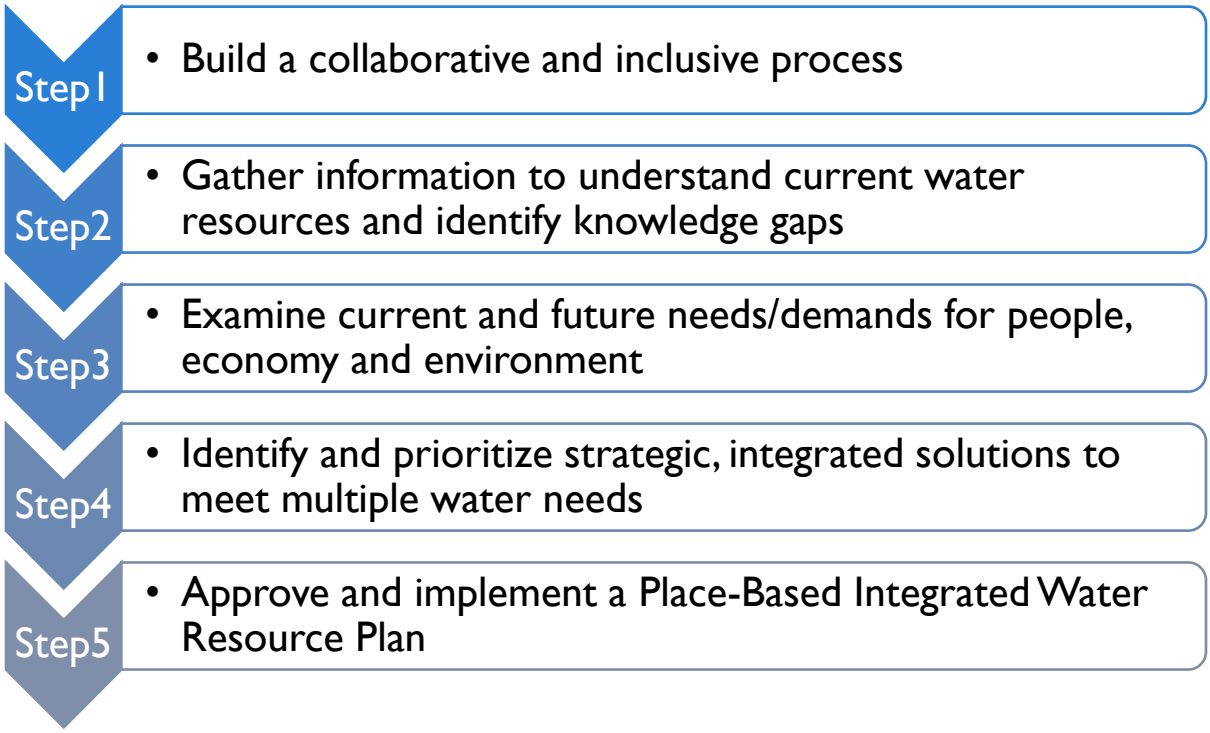
- WaterWatch
- ONDA
- Jeffrey Kee
- DEQ (Roxy Nayar and Smita Mehta)
- OWRD (Steve Parrett)
- The Conservation Angler (Craig Lacy)
- City of Condon
- ODFW
- Bill Marlett
- Native Fish Society

"Water is the most basic of our needs. Over the last five years, the Place Based Planning process has worked to develop a plan to meet that need for people and our environment. The Integrated Water Resource and Action Plan encompasses the work that began with a locally initiated and led effort with close coordination between local stakeholders, watershed councils, and soil and water conservation districts. That effort was quickly expanded and made stronger by the involvement of a balance of representation from regional and statewide interests."

– Debbie Bunch, Mid John Day-Bridge Creek Watershed Council Co-Convener

Governance and Organizational Structure

In December 2017, the Oregon Water Resources Commission adopted an updated IWRS, a framework for better understanding and meeting instream and out-of-stream water needs, including water quantity, water quality, and ecosystem needs. The IWRS recommended that OWRD help communities undertake a Place-Based approach to integrated water planning. Place-Based integrated water resources planning is a voluntary, locally initiated and led effort in which a balanced representation of water interests in a Basin, watershed, or groundwater area work in partnership with the state to:



OWRD developed Place-Based Planning Guidelines that lay out a five-step process for pursuing Place-Based planning efforts. In 2016, OWRD awarded grants to four communities to pilot the Place-Based process. The Work Group applied and was officially awarded funding on February 25, 2016.

The purpose of the integrated plans is to develop a shared understanding of the water quantity, water quality, ecological health, and other conditions in the planning area. This area experiences water supply shortages for instream and out-of-stream uses, which are expected to intensify in the future.

The vision of the Work Group is to help the Lower Basin create the condition for clean, cold water and healthy watersheds to provide for local ecosystems, economies, and communities. The mission of the Work Group is to restore and maintain the Lower Basin for the ecological, economic, social, and cultural well-being of the communities the river supports. Our partners and participants have brought a deep knowledge of the region, best available science, and cooperative planning and fundraising to more actions that establish healthy and resilient native habitats, balanced water use, and working landscapes for future generations. Lower John Day Place-Based Planning participants signed a Declaration of Cooperation and the Gilliam County SWCD has been the official convener and fiscal agent of the Work Group. The Mid John Day-Bridge Creek Watershed Council has been a co-convener since June 2016. A Declaration of Cooperation for the group was signed by 14 partners in April 2017 and three additional groups signed on later in the planning process. Signers of this declaration constitute the voting body and agreed to seek consensus for all decision-making processes. Decisions can be made at any properly noticed meeting by consensus of those in attendance with no quorum requirement. As outlined in the Declaration of Cooperation, each organization is allowed one vote, regardless of the number of representatives in attendance. Consensus minus 10 percent can carry an action.

This Plan helps to implement the State of Oregon's Integrated Water Resources Strategy and related policies. Under Oregon law, all water belongs to the public and is managed in accordance with many state and federal laws and policies. This planning effort will help understand and meet both the water needs of our communities, economy, and environment consistent with existing law and policy and will not jeopardize any existing rights to use water.

Local technical experts from SWCDs, the NRCS, and watershed councils have been working with public and private land managers for decades to improve rangelands and riparian areas and increase water availability (Jeffrey Kee photo credit).

Public Engagement

Initial outreach to form the Work Group was based on the suggested stakeholder list from the Place-Based Planning Guidelines. Initial meetings were well represented by the conservation community that work in the Lower Basin. As the Work Group continued to form, water users groups and interests were identified that were missing. The co-convenors looked at broader stakeholder groups for additional participation and identified possible representatives. Adding staff from three watershed councils and three SWCDs, many of whom are landowners, was a strategy used to ensure a more balanced representation of interests in the Work Group. That staff briefed the board members throughout the process and each provided feedback when necessary, including the identification of Critical Issues and strategies from the Step 3 process. In addition, the group has reached out to the public in multiple ways to ensure as many people are informed and involved as possible.

An outreach committee was formed, and an outreach plan was developed early in the process. It was recognized that many people may not be able to make the regularly scheduled meetings due to work or other responsibilities, so multiple avenues were used to reach people where they were. Work Group members presented information on the Place-Based Planning process and progress to county court and city council meetings, local agricultural group meetings, and SWCD and watershed council boards. A website was developed to serve as a central location to access meeting information and group documents, especially the Step Reports. Surveys were developed and circulated in a variety of ways to collect feedback and information from members of the public.

Cottonwood Canyon public outreach event and Place-Based Planning September 2019 meeting (Lee Rahr photo credit)

Balanced Participation

Balanced participation in the Place-Based planning was a priority for the Work Group. The co-conveners, facilitators, and other group members regularly assessed the participant group to ensure it was as balanced as possible. An email distribution list was composed consisting of formal work group members and all interested parties; the list was used to distribute monthly meeting notices, meeting notes, and all draft and final reports and to request public comment on draft reports. The following sectors and interest groups are represented in the distribution list serve:

- Local governments (cities and counties)
- Tribal governments
- Municipal water and wastewater utilities
- Major industries or employers
- Agriculture
- Forestry
- Self-supplied water users
- Conservation/environmental groups
- Power companies
- Small businesses
- Private landowners
- Special districts (e.g., irrigation, public utilities, flood control, parks/recreation, drainage, ports, etc.)
- State and federal agencies (natural resources and management, business development)

Step 1

The original planned convener for the Place-Based Planning process was the John Day Basin Partnership with coordination by the Lower John Day Work Group, a subgroup of the Partnership. Ultimately, the convenership was held by Gilliam SWCD with the Mid John Day-Bridge Creek Watershed Council added as a convener. The original members of the Lower John Day Work Group then began the initial outreach to additional stakeholders identified in the Place-Based Planning Guidelines. As outreach for Step 1 (June 2016 to April 2017) continued, the Work Group asked/identified which water users or interests were missing. The Work Group looked at broader stakeholder groups and then identified possible representatives of those groups and reached out to them.

Included in the Declaration of Cooperation are these statements:

Diverse Water Interests active in the Lower John Day planning area are invited to participate in the planning process as members of the Stakeholder Group by becoming a party to this Declaration. Stakeholders that sign the Declaration and fulfill membership requirements will be voting members of the Lower John Day water resource Work Group.

For the purposes of implementing this planning process "Basin Water Interests" will be interpreted to mean local governments, tribal governments, utilities, major industries or employers, agriculture and forestry groups, conservation groups, special districts, and state and federal agencies that are located within, serve, or whose members have interest in the planning area.

Step 2

The Work Group met monthly or every other month throughout the Step 2 process (April 2017 to January 2019). Meeting notices were sent to the distribution list and placed in local newspapers and on the Lower John Day Work Group Facebook page. The Draft Step 2 Report was shared with the public for a 30-day public comment period. During the public comment period, the Work Group held a meeting for the general public in Condon. Copies of the report were available at this meeting, and several Work Group members were selected to speak on a panel about the process. Thirty-seven people attended this meeting. After comments were incorporated into the final draft of the Step 2 State of the Basin Report, it was recirculated to the email list. Hard copies were available at the SWCD offices.

Step 3

Throughout the Step 3 process (January 2019 to July 2019), the Work Group met once per month in a standing meeting open to the public. Meeting notices were sent to the distribution list and to local newspapers and were posted on Facebook. In addition, the Technical Subcommittees usually met once per month and the Outreach Committee presented information about the planning process at numerous county commission meetings, city council meetings, agricultural outreach events, and agency annual dinners and events. Fieldtrips were also held during the Step 3 period, which included, but were not limited to, wastewater treatment plants, fish passage barriers, juniper management, and restoration and beaver dam analog installations.

The draft report was circulated to the public for a 30-day comment period. During this time, the Work Group hosted a public meeting in Mitchell to present the draft document. In addition to the Mitchell outreach meeting, which 10 local landowners attended, the Work Group presented at the annual SWCD meeting in Condon. In addition to the Work Group presentation, Nick Weber, a Fish Biologist with EcoLogical Research, LLC, also presented their contracted work on instream restoration through beaver dam analogs. More than 50 local residents, landowners, agencies, and Work Group members attended the dinner meeting. After comments were incorporated into the final draft of the Step 3 Report, a final Water Needs and Vulnerabilities of the Lower John Day Basin

report was circulated to the email list. , Hard copies were available at the SWCD and watershed council offices.

Step 4

Throughout the Step 4 process (July 2019 to May 2021), the Work Group met once per month in meetings open to the public at meeting spaces in the Lower Basin. Meetings in April 2020 through May 2021 were held online through the GoToMeeting web-based platform due to COVID-19 safety protocols. The GoToMeeting platform provides a call-in only option to allow those with no or limited internet service to attend. Meetings were publicized through the distribution list, newspaper advertisements, radio interviews, and on the Lower John Day Place-Based Planning website (https://www.lowerjohndaypbp.com) and Facebook. Project progress was presented at several meetings throughout the area.

The Step 4 Report outlines 19 Critical Issues and 46 strategies that were identified through analysis from Steps 2 and 3, as well as public outreach and input received from the landowner community and recreation and conservation stakeholders. The Work Group spent time during several meetings to collect and prioritize the Critical Issues. Final ranking was achieved through a "dot" voting exercise. Strategies to address the Critical Issues were brainstormed during group meetings and collected from other stakeholders and members of the public through several survey collections. Both paper and electronic surveys were distributed at NRCS and SWCD public meetings, and watershed council board meetings and through the website and email distribution. Feedback from public surveys was included in the internal process to identify 19 Critical Issues and 46 strategies summarized in Chapter 4.

The Step 4 report was made available for a 30-day public comment period (February 2021). Comments were incorporated into the final report. A separate in-person public meeting was not held to present this report due to COVID-19 risks and restrictions but can be found with other final documents on the Lower John Day Work Group website.

Step 5

Similar outreach as was completed in Steps 1 to 4 has continued for Step 5. Meetings have still been conducted virtually. Instead of in-person field tours, throughout the Step 4 and Step 5 process, we have hosted guest speakers on topics related to Critical Issues and on information related to the implementation phase of our work.

Overall Outreach and Diversity Considerations

The Work Group worked exceptionally hard to be inclusive to underrepresented communities. Special outreach and inclusivity actions taken over the course of the planning process included:

Multilingual material was considered. However, less than 5 percent of the population of Wheeler, Gilliam, and Sherman Counties is non-English speaking according to the U.S. Census, so this outreach method was rejected as difficult to implement, with low chance of impact.

Diversity of membership was considered when evaluating participation by those who are making decisions. It was determined that the group was adequately diverse and included women and tribal representatives. The Confederated Tribes of the Warm Springs directed participation to tribal staff who regularly participated. The Work Group strives to be inclusive but is aware of the lack of immigrant agricultural representation.

Diversity of input methods - Different methods were offered to promote meetings and public comment periods of reports including electronic email list serve, hard copy documents provided at agency offices, social media promotion, local newspaper advertisements, public message board flyers,

in-person meetings and, in 2020, phone and GoToMeeting online were made available as our main meeting platform.

Meeting landowners and the public at existing events was an outreach strategy used to gain a balance of feedback and ensure the local community was aware of the planning process. The Work Group attended and presented (prior to March 2020) on the planning process and progress at NRCS local workgroup meetings, SWCD monthly meetings and annual dinners, watershed council monthly and annual meetings, stockgrowers meetings, bull tour, and city council and county court meetings.

Meeting times - Meeting times were selected to help provide opportunities for all people to attend, including those with conflicting responsibilities (i.e., evening care of children). Remote meetings and Work Groups provided opportunities for participation. The majority of meetings began at 10 a.m. Daytime meetings did arise as a barrier for landowners. To mitigate this issue, Work Group members attended and provided updates at landowner and watershed council meetings noted above.

The Work Group met monthly through the entirety of the five-year (2018 to 2022) planning process. Additionally, the technical subcommittees often met monthly and the Outreach Committee presented updates and findings during public review for Steps 2 through 5. Prior to COVID-19, outreach was targeted to county commission meetings, city council meetings, agricultural outreach events, and agency annual dinners and events. Public outreach since COVID-19 has focused primarily on news outlets, public message boards, newspaper advertisements, social media forums, and on the Lower John Day Place-Based Planning website (https://www.lowerjohndaypbp.com).

As a result of COVID-19, the Work Group's usual in-person meetings held throughout the Lower Basin were held online through the GoToMeeting platform, meeting COVID-19 safety protocols. All meetings were publicized through newspaper advertisements and on the Lower John Day Place-Based Planning website (https://www.lowerjohndaypbp.com).

Gilliam County SWCD annual dinner, Place-Based Planning Step 3, and beaver dam analog presentations, 2019 (Lee Rahr photo credit)

Chapter 2: The Lower John Day's Water Resources (Step 2)

John Day scenery (Jeffrey Kee photo credit)

Chapter 2 summarizes the characteristics of the state of water resources in the Lower Basin as reported in The State of the Basin report. Major findings include:

- Most of the water, by unit area, is coming from the smaller southern basins (groundwater and surface water). Specific examples include Upper Rock Creek, Thirtymile Creek, Butte Creek, Bridge Creek, and Bear Creek.
- Nearly 60 percent of all mid-summer natural surface outflow comes from Rock Creek above Wallace Canyon, Bridge Creek above West Branch, Thirtymile Creek, Butte Creek, Rock Creek at the mouth, and Bear Creek. There is minimal surface water contribution from the Lower Basin between Service Creek and McDonald Ferry (100 to 200 cfs during high flow periods and during late summer).

- The Lower Basin produces only 5.6 percent of the total annual surface water yield, despite covering 40 percent of the overall basin.
- Of the total amount of water coming into the Lower Basin, 84 percent is lost to ET, 7 percent goes to surface water, and 9 percent goes to groundwater.
- More than 80 percent of surface water consumption comes from the mainstem, Rock Creek, Butte Creek, and Muddy Creek.
- The Grass Valley Canyon, Scott Canyon, and Lower Rock WABs have groundwater pumping rates significantly greater than estimated within-basin groundwater production.
- Approximately 24 percent of the total amount of existing water rights is being used. This is believed to be due to limited water availability and may also be due to other factors including on-farm management decisions.
- The static amount of instream rights (30 and 20 cfs year-round) is considerably below the Scenic Waterway flows and the estimated instream flow needs of fish. Instream water rights are much less frequently met where they exist on tributary streams. Six of 31 tributary WABs have instream established targets/rights.
- Water is not likely available for new surface water appropriations from July through October. Water may be available for appropriation from January through May.
- Instream low flows during key migration periods are a primary factor leading to serious steelhead and Spring chinook population declines. By 2070-2099, stream reaches with mean August temperatures less than or equal to 18˚C are primarily limited to lower-order higher-elevation subwatershed tributaries due to changing climate conditions. It is estimated that total steelhead-bearing stream miles with water temperature conditions less than or equal to 18˚C will reduce by 60 percent from the period 1993-2011 to the period 2070-2099. WABs with the greatest amount of suitable stream miles under future conditions include Upper Rock, Butte, Pine, and the Bridge Creek Basin. Other current important steelhead spawning grounds include Thirtymile, Service, and Mountain Creeks.

The major sections of the report are summarized below.

Basin Overview

The Lower Basin, defined as the entire Basin downstream from the North Fork John Day River confluence, supports native aquatic fish species and habitat, small rural communities whose economy is centered on agriculture and energy development, and exceptional recreational, historical, and cultural riches. It drains an area of 3,149 square miles, with the mainstem flowing generally westward and then northward to the Columbia River near Rufus. The majority of the Lower Basin is in Gilliam, Wheeler, and Sherman Counties. Smaller portions are in Morrow, Wasco, Jefferson, Crook, and Grant Counties. The Lower Basin has a plateau form, broken by the sinuous valley of the mainstem and its steep-walled tributaries.

The John Day Basin harbors the greatest assemblage of fossils from the Age of Mammals. This is the Clarno Unit West of Fossil, Oregon, which is a National Park Service managed area of the John Day Fossil Beds National Monument (Jeffrey Kee photo credit)

The low annual rainfall on the majority of the landscape is characteristic of the Intermountain Region, which receives most precipitation (70 to 80 percent) between November and March. Less than 10 percent of the annual precipitation falls as rain during July and August, usually from sporadic but violent thunderstorms. Annual rainfall in the Lower Basin as a whole varies from about 8 inches in the northeast to about 28 inches in the extreme southeast, higher elevation, forested areas. Most of the agricultural areas receive between 10 and 14 inches of precipitation per year.

Most surface water flow in the mainstem Lower John Day comes from the upper watersheds, primarily in the form of melting snow. The two largest WABs, Butte Creek and Upper Rock Creek, generate the largest total annual surface outflows. The John Day is primarily a free-flowing system (no large-scale dams), with highly variable discharge from peak to low flows. Discharge usually peaks from March through June, and seasonal low flows typically occur from August to October. Major

tributaries of the Lower Basin include Wallace Canyon, Bridge Creek, Thirtymile Creek, Butte Creek, Rock Creek, and Bear Creek. Major aquifers are found in alluvial deposits and in the Columbia River Basalt and Clarno/John Day geological units.

Historical descriptions indicate that the John Day River was once a relatively stable and healthy river with natural riverine processes and habitats. However, watershed conditions in the Lower Basin have changed significantly over the past 150 years. A myriad of water and land use practices, from mining to livestock grazing to riverine habitat degradation to invasive species, have contributed to these changes. These disturbances have impaired water quality in hundreds of stream miles, degraded riparian corridors and disconnected floodplains, reduced biodiversity and fish populations, and changed the structure and function of upland habitats.

In spite of past human disturbances, the Lower Basin continues to support wild runs of anadromous salmonids and a wide assemblage of resident wildlife. In addition, public and private landowners have increased awareness of the negative impacts of some land management practices. Current practices have been, and continue to be, improved to minimize these impacts while at the same time furthering the long-term interests of natural resource industries in the subbasin.

The John Day still supports the strongest wild runs of spring Chinook and summer steelhead in the Columbia River drainage, and fall Chinook salmon and anadromous Pacific lamprey are among other fish species present in the Lower Basin. Overall, it is estimated that there are 27 species of fish, including 17 native species, in the Lower Basin. Many fish populations in the Lower John Day River have declined significantly from historic levels.

…of the total amount of precipitation in the Lower Basin, 84 percent is lost to ET, 7 percent becomes part of the surface water flow of rivers and streams, and 9 percent goes to groundwater.

Private ownership is substantial in the Lower Basin. Land ownership in the Lower Basin is roughly 91 percent private and 9 percent federal (approximately 8 percent Bureau of Land Management [BLM] and 1 percent Forest Service). Private lands are mostly in agricultural use. There are approximately 327 farms and ranches in the Lower Basin. The primary agricultural products in the planning area are small grain, pasture and hay, and beef cattle production. While the region still relies on the production of food and forest products, the economy has diversified and is predominantly driven by agricultural, wind energy, and waste handling.

More recently, the Lower Basin has worked to become more of a recreation and tourist destination. Many small businesses cater to tourists. Hunting, fishing, boating, camping, wildlife observation, photography, hiking, swimming, fossil hunting, and scenic viewing on public and eased private lands are among the most common recreational activities.

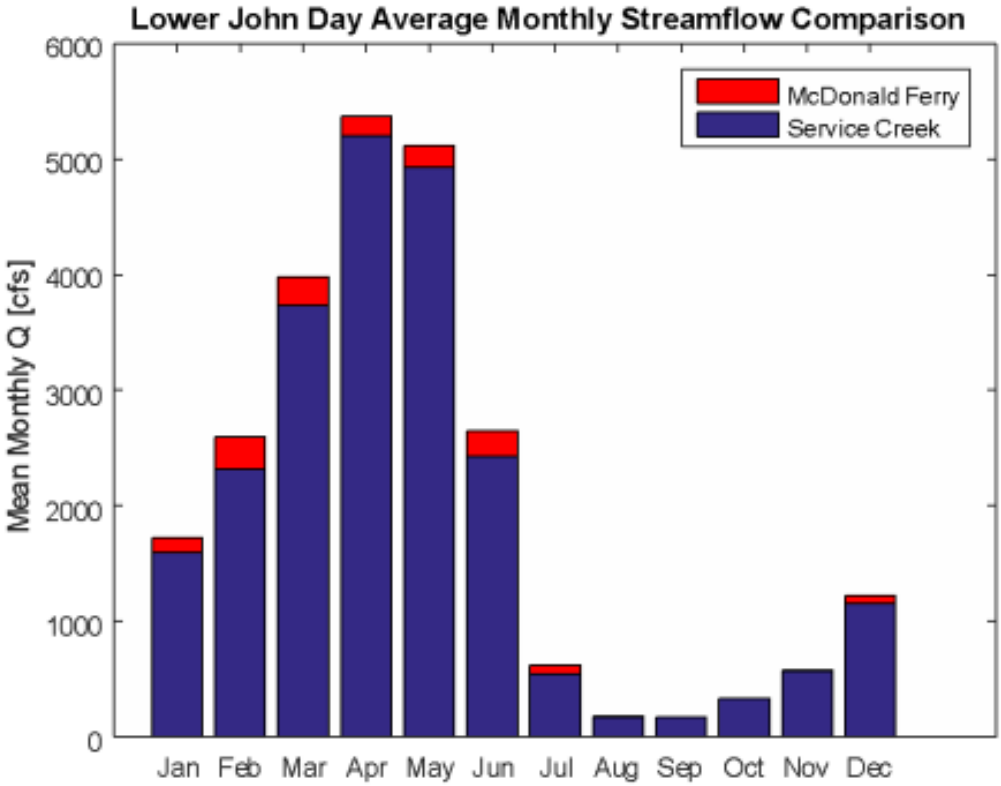
Water Budgets, Surface Water, and Groundwater

The Step 2 Report estimates that, of the total amount of precipitation in the Lower Basin, 84 percent is lost to ET, 7 percent becomes part of the surface water flow of rivers and streams, and 9 percent goes to groundwater. Most of the water, by unit area, is coming from the smaller, southern basins (groundwater and surface water). Specific examples include Upper Rock Creek, Thirtymile Creek, Butte Creek, Bridge Creek, and Bear Creek. Rock Creek above Wallace Canyon, Bridge Creek above West Branch, Thirtymile Creek, Butte Creek, Rock Creek at mouth, and Bear Creek account for nearly 60 percent of all mid-summer natural surface outflow. The Lower Basin produces

only an estimated 5.6 percent of the total annual surface water yield, despite covering 40 percent of the overall Lower Basin.

The figure below, "Lower John Day Average Monthly Streamflow Comparision," illustrates the inter-annual and intra-annual variability in streamflow in the Mainstem Lower John Day River. Mean monthly flows peak during periods of snowmelt in April and May at more than 5,000 cfs, while in late summer flows are typically under 200 cfs. Relative to incoming mainstem flows, there is minimal surface water contribution from the Lower Basin between Service Creek and McDonald Ferry (100 to 200 cfs during high flow periods and during late summer). The bulk of streamflow production in the entire basin (Lower, Upper, Main, North) occurs in months either outside the irrigation season (December through March) or during the early portion of the season when demand is not high (April and May).

The U.S. Geological Survey (USGS) gauge at McDonald Ferry (#14048000) regularly recorded instream flows under 20 cfs between the months of July and September. On September 3, 2018, a flow of 5.99 cfs was recorded at McDonald Ferry. In 2021, flow at McDonald Ferry fell below 20 cfs on August 5 and did not rise above that static threshold until September 19.



Pivot irrigation (Jeffrey Kee photo credit)

The Lower Basin has groundwater in three primary geological formations: the Columbia River Basalt Group, the Clarno/John Day Formation, and alluvial deposits. Average annual groundwater recharge rates over the Lower Basin were estimated at 0.4 to 0.6 inch/year.

There is a distinct, increasing spatial gradient from south to north in the number of, and ultimately the abstraction volume associated with, groundwater water rights within the Lower Basin. The vast majority of certificated groundwater rights is in the very northern reaches of the Lower Basin, where surface water production is typically relatively low.

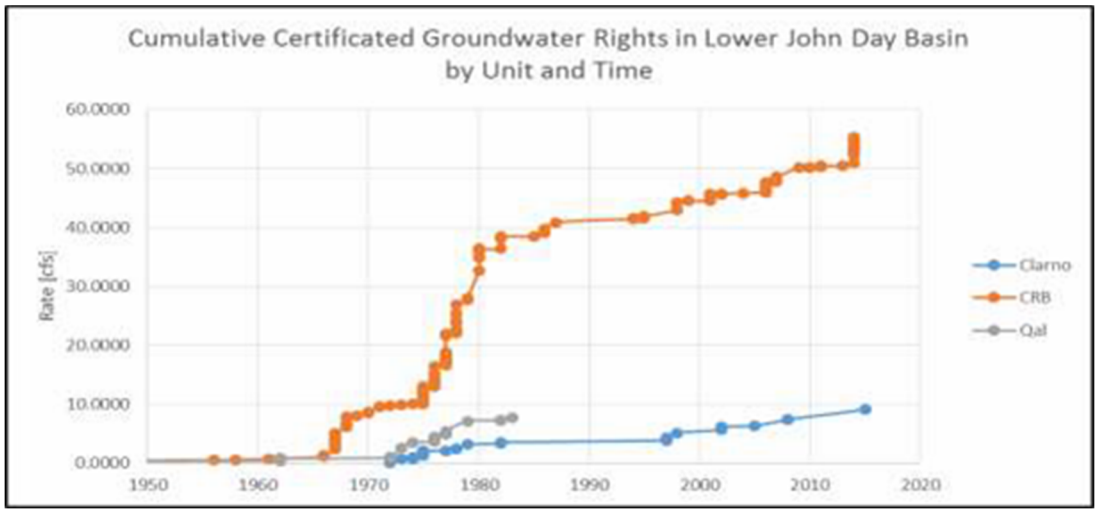
The Lower Basin is composed of five primary geologic units: Columbia River Basalt Group (CRBG), John Day/Clarno Group, Quaternary Alluvium (Qal), Mitchell Group, and The Dalles Group. CRBG dominates in terms of total coverage area. Similarly, the majority of certified wells in the Lower Basin draw from CRBG units (77 percent), followed by John Day/Clarno Group (12 percent) and Alluvium units (11 percent).

A John Day Basin-wide evaluation for groundwater resources in 1984 showed groundwater movement is generally northward toward the Columbia River; however, it is locally structurally controlled. Average annual groundwater recharge rates over the Lower Basin were estimated at 0.4 to 0.6 inch/year. The high horizontal transmissivity and relatively shallow static water levels in the CRBG make yields adequate for domestic and stock use in most areas. And although some small- scale irrigation use is assumed possible, the overall regional low recharge and significant depth of wells necessary to extract high volumes of water in the CRBG likely make large-scale groundwater irrigation development uneconomical or impractical. Low vertical transmissivity and precipitation input are primarily responsible for the low recharge in the CRBG group.

The alluvial deposits located in river and stream valleys are one of the most important aquifer units in the John Day Basin, second only to the CRBG. Significant Quaternary alluvial deposits are located in the vicinity of Spray, Twickenham, and Clarno and have high porosity, permeability, specific yields of up to 25 percent, and a high potential for recharge. Well yields can often be adequate for irrigation, but the shallow aquifers in alluvial deposits are typically directly connected to surface

waters. As such, removal of alluvial aquifer water can cause decreases in streamflow, and the management of the two resources must be considered together (Gannett, 1984).

The figure below shows that the cumulative certificated groundwater use in the Lower Basin has increased dramatically over the last 50 years. The period between 1965 and 1980 saw significant growth in the number of wells, particularly those targeting production from aquifers within the CRBG unit.

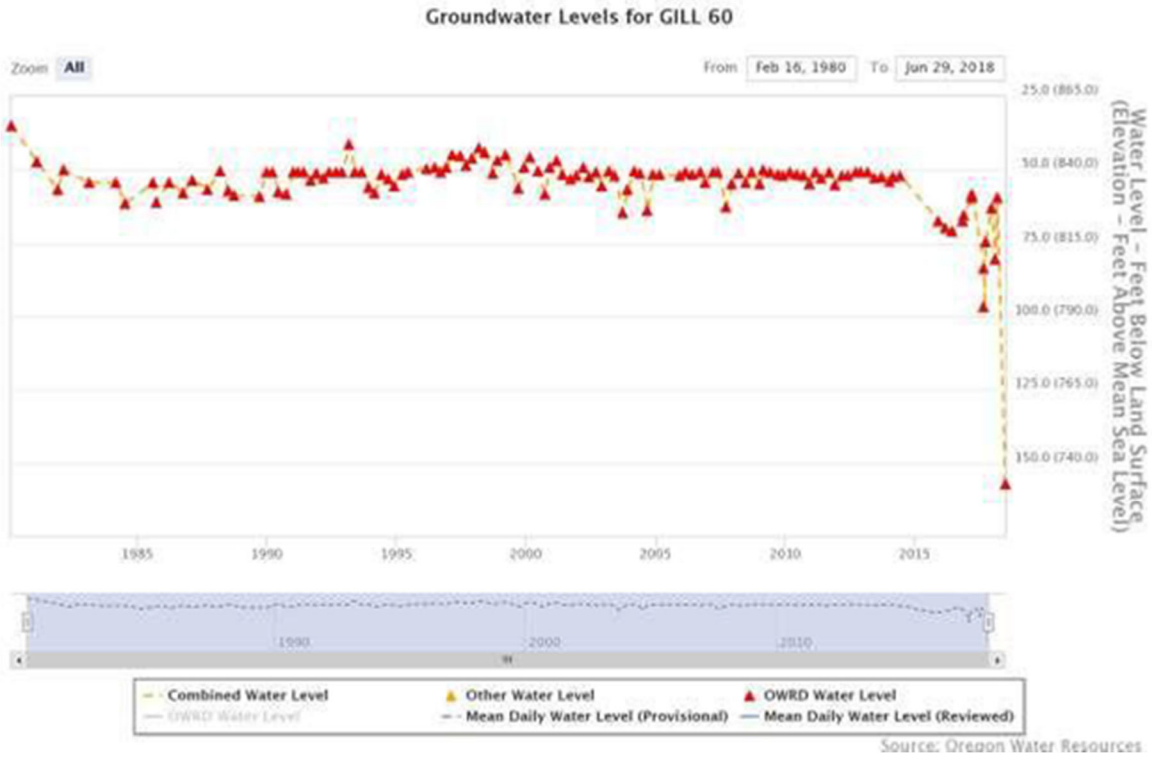


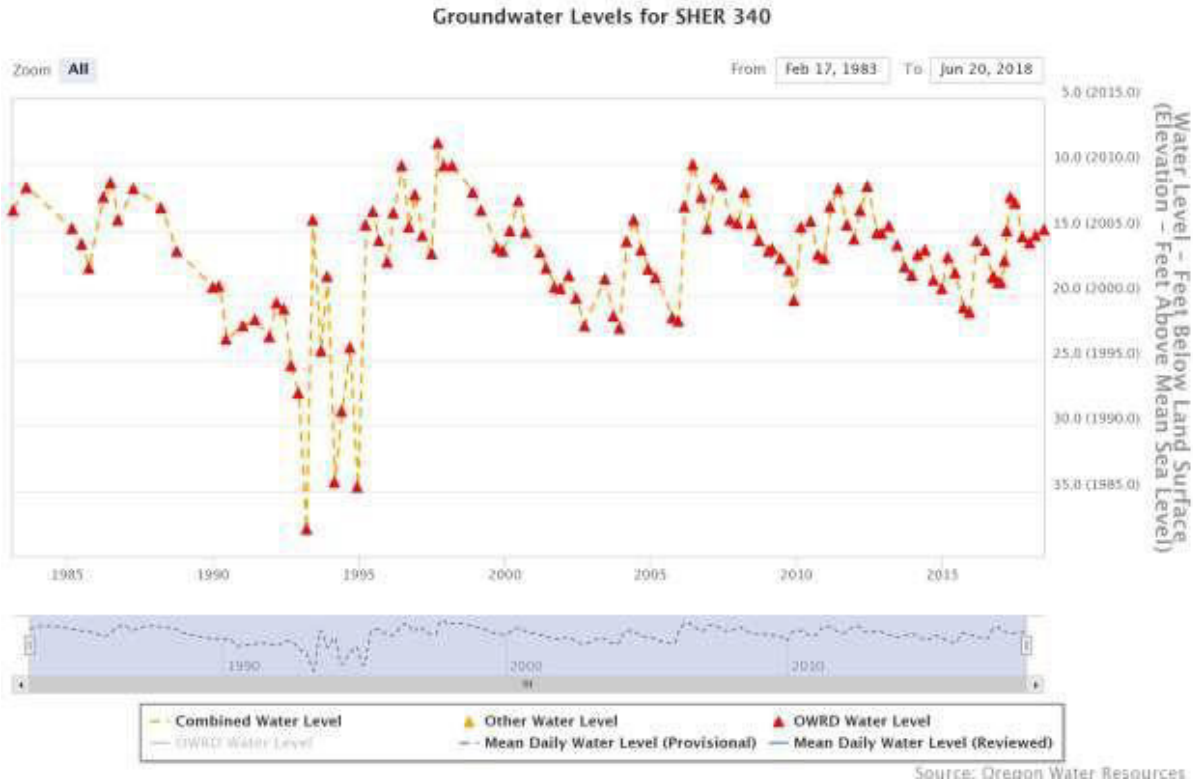
Trends in Groundwater Water Right Certificates in the Lower John Day by Aquifer (Clarno, CRBG, and Qal)

Relatively minimal increases in groundwater appropriations have occurred since the early 1980s.

Observation wells are used to track changes in water table elevations with time. Unfortunately, there are only two long-term and operational observation wells in the entire Lower John Day Basin. Both of these wells are completed into CRBG aquifers and display annual fluctuations and some short-term declines; however, they do not indicate any long-term water table declines. It is impossible to extrapolate the long-term water table trends in the greater basin based on such sparse data. Groundwater data from other nearby areas (Olex, Willow Creek, and Umatilla) do show sharp downward trends of groundwater head with time. There are no long-term water level records available for wells situated in alluvial aquifers in the Lower John Day Basin.

An analysis of groundwater pumping versus calculated recharge suggests that recharge may not meet long-term demand in areas of intense groundwater development, but that the vast majority of sub-basins have little development (Step 2 Report, pages 70-73). This analysis assumes that effects of groundwater pumping and recharge are isolated within each drainage basin, and at this time it is unknown to what extent groundwater moves between these basins, as shown on the two well logs below.


Groundwater Levels for GILL 60
Zoom All
From Feb 16, 1980
To Jun 29, 2018
25.0 (865.0)
50.0 (840.0)
75.0 (815.0)
100.0 (790.0)
125.0 (765.0)
150.0 (740.0)
Water Level - Feet Below Land Surface (Elevation - Feet Above Mean Sea Level)
1985
1990
1995
2000
2005
2010
2015
Combined Water Level
Other Water Level
OWRD Water Level
Mean Daily Water Level (Provisional)
Mean Daily Water Level (Reviewed)
Source: Oregon Water Resources


Groundwater Levels for SHER 340
Zoom All
From Feb 17, 1983
To Jun 20, 2018
5.0 (2015.0)
10.0 (2010.0)
15.0 (2005.0)
20.0 (2000.0)
25.0 (1995.0)
30.0 (1990.0)
35.0 (1985.0)
Water Level - Feet Below Land Surface (Elevation - Feet Above Mean Sea Level)
1985
1990
1995
2000
2005
2010
2015
Combined Water Level
Other Water Level
OWRD Water Level
Mean Daily Water Level (Provisional)
Mean Daily Water Level (Reviewed)
Source: Oregon Water Resources

The number of, and water use of, exempt wells in Oregon is largely unknown. Many wells drilled before the 1960s are not registered with the state (Jeffrey Kee photo credit)

Water Storage

The Step 2 analysis found that roughly one-quarter of all surface water diversions in the Lower Basin are for storage. Of these storage rights, the vast majority designate livestock or wildlife as the intended use. WABs with the greatest number include Upper Rock, Muddy, Lower Bridge, and Rowe Creek, accounting for more than 85 percent of all storage in the Lower Basin. The table below depicts Lower Basin storage categories as documented in the OWRD Water Rights Database.

Category	POU Count
LIVESTOCK	205
WILDLIFE	127
FIRE PROTECTION	42
IRRIGATION	36
MULTIPLE PURPOSE	22
RECREATION	19
STORAGE	18
SUPPLEMENTAL IRRIGATION	14
FISH CULTURE	11
DOMESTIC	5
MUNICIPAL USES	3
POND MAINTENANCE	3
DOMESTIC EXPANDED	2
AESTHETICS	1
AGRICULTURE USES	1
FOREST MANAGEMENT	1
INDUSTRIAL/MANUFACTURING USES	1

POU = point of use

Water Use

Water use in the Lower Basin includes withdrawals from surface water and groundwater for irrigation, stock watering, domestic and municipal uses, and instream use for fish, wildlife, recreation, and maintenance of water quality. More than 77 percent of all certificated groundwater wells are located in two subwatersheds, Grass Valley and Lower Rock. (This analysis excludes wells that are exempt from water-use permitting requirements, including wells for stock watering and limited domestic use.) Surface water consumption in the region is dominated by the large WAB encompassing the mainstem John Day River Valley, from Service Creek down to the Columbia River confluence.

The analysis conducted in Step 2 compared modeled natural streamflow from OWRD's Water Availability Reporting Systems with existing consumptive uses and found that from July to October, the period when water is generally in greatest demand, there is no available new surface water in the Lower Basin. Winter water may still be available for diversion and/or off-channel storage. WABs with the greatest amount of available water are Thirtymile, Parrish, Butte, Alder, Kahler, and Shoofly Creeks. This analysis does not include instream flow needs beyond those reflected in existing instream water rights.

On average, less than 24 percent of Basin surface water irrigation water rights are estimated to be used in mid- to late summer, suggesting that low flows make those rights "unreliable."

> …from July to October, the period when water is generally in greatest demand, there is no available new surface water in the Lower Basin.

The table below shows the mid-summer water reliability by WAB. The two exceptions are Lower Bridge Creek and the mainstem John Day above Heidtmann Canyon, which have 87 percent and 56 percent of water rights with reliable summer water, respectively. However, this may also be due in part to on-farm management decisions.

Average Mid-Summer Water Right Reliability by WAB

NAME	% of Water Right Area Irrigated in August
ALDER CR > JOHN DAY R - AT MOUTH	1%
BEAR CR > BRIDGE CR - AT MOUTH	12%
BOLOGNA CAN > JOHN DAY R - AT MOUTH	0%
BRIDGE CR > JOHN DAY R - AB W BR BRIDGE CR	16%
BRIDGE CR > JOHN DAY R - AT MOUTH	87%
BUTTE CR > JOHN DAY R - AT MOUTH	21%
CHERRY CR > JOHN DAY R - AT MOUTH	0%
ESAU CAN > JOHN DAY R - AT MOUTH	0%
FERRY CAN > JOHN DAY R - AT MOUTH	0%
GIRDS CR > JOHN DAY R - AT MOUTH	3%
GRASS VALLEY CAN > JOHN DAY R - AT MOUTH	0%
HAY CR > JOHN DAY R - AT MOUTH	0%
HAYSTACK CR > JOHN DAY R - AT MOUTH	15%
HORSESHOE CR > JOHN DAY R - AT MOUTH	0%
JOHN DAY R > COLUMBIA R - AB HEIDTMANN CAN	56%
JOHN DAY R > COLUMBIA R - AT MOUTH	33%
KAHLER CR > JOHN DAY R - AT MOUTH	0%
MUDDY CR > JOHN DAY R - AT MOUTH	15%
PARRISH CR > JOHN DAY R - AT MOUTH	23%
PINE CR > JOHN DAY R - AT MOUTH	0%
PINE HOL > JOHN DAY R - AT MOUTH	0%
RHODES CAN > JOHN DAY R - AT MOUTH	0%
ROCK CR > JOHN DAY R - AB WALLACE CAN	10%
ROCK CR > JOHN DAY R - AT MOUTH	13%
ROWE CR > JOHN DAY R - AT MOUTH	15%
SERVICE CR > JOHN DAY R - AT MOUTH	23%
SHOOFLY CR > JOHN DAY R - AT MOUTH	1%
SOREFOOT CR > JOHN DAY R - AT MOUTH	0%
THIRTYMILE CR > JOHN DAY R - AT MOUTH	3%
W BR BRIDGE CR > BRIDGE CR - AT MOUTH	21%

Permanent instream water rights currently exist for the lower mainstem river and a small subset of tributaries. The majority of the lower mainstem river is classified as a State Scenic Waterway and also has associated instream flow recommendations (500 cfs from July to January, 1,000 cfs in February, and 2,000 cfs from March to June). In general, the mainstem John Day instream rights are nearly always met. However, the static amount of those rights (30 and 20 cfs year-round) is considerably below the Scenic Waterway flows and the estimated instream flow needs of fish. Instream water rights are much less frequently met where they exist on tributary streams. The timing of low flows is a critical concern because low flows occur when Endangered Species Act-listed summer steelhead are beginning to migrate into the John Day system.

Altered hydrology is frequently identified as a primary limiting factor for steelhead recovery in the Lower Basin. The Lower Basin is characterized by hot, precipitation-free summers and cold, relatively dry winters. This natural combination of minimal annual precipitation input and long, warm, dry seasons naturally results in conditions that can be problematic for cold-water fish.

Coupled with surface water withdrawals, summertime conditions in Lower John Day tributary streams can easily become inhospitable.

Recreation is an integral part of the Lower Basin. Data from the BLM and other field guides suggest that over the last couple of years, minimum flows needed for canoes, drift boats, kayaks, and rafts are not met in the summer peak time (August to October).

Winter flows from the North Fork John Day meet the mainstem at Kimberly, Oregon (Jeffrey Kee photo credit)

Water Quality

Many streams in the Lower Basin are on the Clean Water Act 303(d) list, particularly for water temperature. Temperature, sedimentation, flow modification, and habitat modification are the leading causes of impairment. The WABs with impairments and Total Maximum Daily Loads are listed in the Step 2 Report. The NorWeST dataset provides measured and modeled water temperature data for the John Day River Basin and can be used to forecast the distribution of suitable future cold-water fish habitat based on climate change projections. It is estimated that total steelhead-bearing stream miles with water temperature conditions less than or equal to 18˚C will reduce by 60 percent from the period 1993-2011 to the period 2070-2099 (Step 2, Figures 64 through 66 extrapolated from NorWeST). WABs with the greatest amount of suitable stream miles under future conditions include Upper Rock, Butte, Pine, and the Bridge Creek basin.

There are concerns that smallmouth bass are having a negative effect on native fish species in the tributaries of the John Day River. If replacement is occurring, then removing/reducing bass does not help because the salmonids are not there due to temperature. If displacement is occurring, some type of active bass control (e.g., a bass exclusion weir like Thirtymile) could increase production of salmonids. However, this should be viewed as an intermediate step with the long-term goal of changing flow and temperature to favor salmonids over bass.

Steelhead and salmon in the Lower Basin need clean, cool water to thrive (Herb Winters photo credit)

Chapter 3: The Lower John Day's Current Uses and Future Water Demands (Step 3)

Cattle thrive in the Lower Basin when water requirements can be met (Gilliam SWCD photo credit)

Chapter 3 summarizes the Step 3 Integrated Water Resources Needs and Vulnerabilities Report. This report examined current and future water needs in three categories: (1) instream uses; (2) agricultural uses; and (3) municipal, domestic, industrial, and commercial uses. The report also includes a section on the expected impacts of climate change and discussions on infrastructure needs, natural hazards, and man-made obstructions to fish passage.

Major conclusions from the Step 3 analysis include:

- A percent-of-flow approach was used to determine instream flow needs for the 30 WABs in the planning area, and it was found that 50 percent of the WABs do not meet the current instream demand from July through October.
- Base and subsistence environmental flow values, which are a fraction of instream needs, are known for 10 out of 30 WABs.

- The mainstem river and many tributary streams have water quality impairments including high temperature (43 stream segments), sedimentation (31), flow modification (26), habitat modification (25), biological criteria (16), pH (10), and low oxygen concentrations (9).
- While the Lower Basin has no major dams, numerous smaller obstructions (dams, weirs, culverts, etc.) present barriers to fish passage.
- Irrigation certificated water rights in the Lower John Day Basin amount to 90,000 acre-feet per year (AFY). Based on water right acres, crop types, and irrigation inefficiencies, basin-wide annual irrigation demand is estimated to be as much as 101,000 AFY using AgriMet, which uses potential ET as defined as the amount of water required for the plant to be most productive. Alternatively, the Cuenca method (Cuenca, 1992) showed 67,000 AFY water used. Irrigation is used primarily for alfalfa, grass hay, and grass seed.
- The total water use by the livestock population in the planning area is estimated to be approximately 614.87 AFY.

Significant elements of this analysis are summarized as follows:

Instream Needs

A stream gauge on the South Fork John Day River (Jeffrey Kee photo credit)

Instream uses of water include recreation such as fishing, boating, and swimming, habitat for fish and wildlife, and maintaining water quality (by diluting pollutants and making streams more resilient to adverse warming, for example). Instream flows also help create habitat for fish and wildlife and maintain a healthy river ecosystem by moving materials such as gravel, sediment, and woody debris through the stream system, and by creating and maintaining habitat features such as gravel bars and side channels.

ODFW has identified five categories of instream flows necessary to fully support aquatic life: subsistence, base, pulse, bankfull, and overbank flows. Subsistence flows and base flows were estimated by ODFW in 1977 for the mainstem river and for approximately 25 percent of its tributary basins. In a few tributary basins, subsistence flow needs are protected by instream water rights, subject to prior rights. The mainstem Lower John Day River also has instream water rights, but the amounts are well below estimated instream flow needs. The Oregon Scenic Waterway Act protects a higher rate of flow against new applications for out-of-stream rights.

Instream flow needs have not been estimated by ODFW for all categories of environmental flows in the mainstem or any tributary basin. Moreover, some tributary basins have no ODFW estimates of instream flow needs.

For its Step 3 Report, the Work Group adopted the 1977 ODFW Basin Investigation Report as the best available estimates of subsistence and base flow needs for the mainstem river and the tributary streams for which the estimates were prepared. To estimate total instream flow needs for the mainstem river and each tributary stream for aquatic life, the group adopted a methodology from academic literature suggesting that, for a "moderate level of ecological projection," actual flows should not vary from estimated natural flows by more than 20 percent. As described in the literature, this is a "presumptive" standard to be used only when no better estimate of instream flow needs is available.[3]

> …close to 80 percent of the WABs have fish presence or are used for fish passage and habitat.

With the best available information (see Step 3, Section 2.5.2), instream flow demands for each WAB are estimated annually, in AFY and in a range of instantaneous flows in cfs, as shown in the table below titled *Instream Demand for WABs Annually,* assuming a moderate level of protection of instream flows at 20 percent of median flows. Even though the annual demand seems to be met at 50 percent exceedance flows, available flows are insufficient to meet monthly/biweekly water demands in several WABs, especially July to October. Insufficient flow in these months is a serious concern to anadromous fish population recovery and persistence. Low summer and fall flow also reduce the recreational use and potential economic input from the boating and recreational community.

Instream Demand for WABs Annually

WAB No.	Subwatershed Name	Surface Water Quantity (Natural Stream Flow) (from OWRD Portal) AFY (50th Percentile)	Instream Demand (AFY) (Presumptive Standard, Richter)	Instream Flows Min and Max in cfs Monthly (Presumptive Standard, Richter)
1	Alder Cr > John Day R - at Mouth	6584.15	5267.32	0.79-18.56
2	Bear Cr > Bridge Cr - at Mouth	6578.79	5263.03	1.44-16.32
3	Bologna Can > John Day R - at Mouth	1459.64	1165.33	0.06-5.05
4	Bridge Cr > John Day R - Ab W Br Bridge Cr	9207.69	7366.15	2.79-27.92
5	Bridge Cr > John Day R - at Mouth	19,833	9,245	3.28-37.04

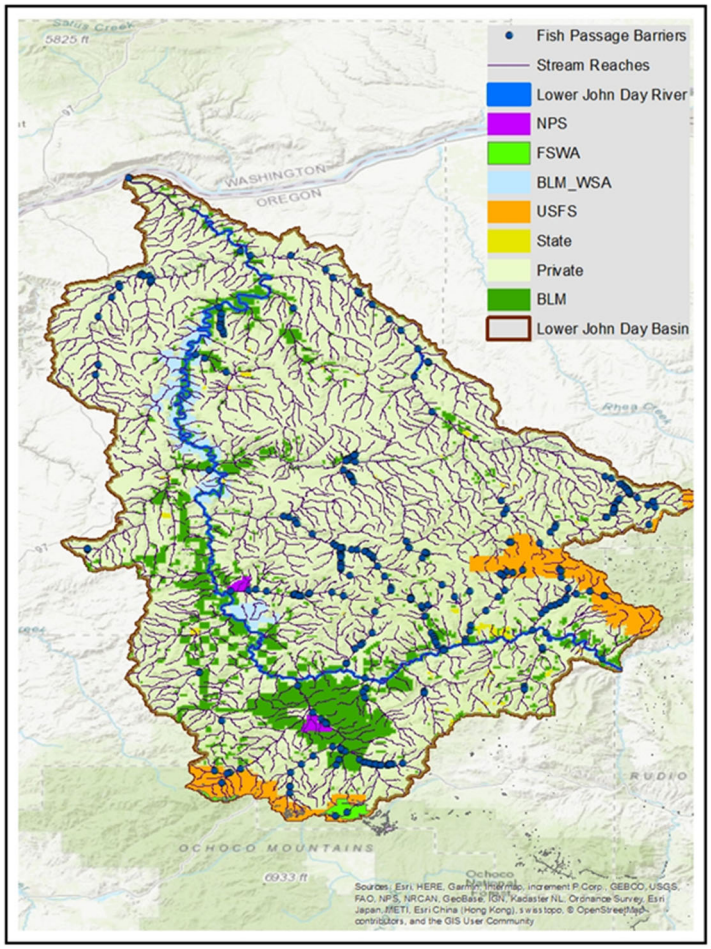
[3]*As noted in the Step 3 Report, these are estimates of total instream flow needs to be balanced against other needs, not proposed allocations of water.*

6	Butte Cr > John Day R - at Mouth	7,681	6,145	1.832-28.08
7	Cherry Cr > John Day R - at Mouth	3,081	2,465	0.712-10.48
8	Esau Can > John Day R - at Mouth	388.56	310.85	0.0-2.456
9	Ferry Can > John Day R - at Mouth	2101.10	1680.88	0.2-11.36
10	Girds Cr > John Day R - at Mouth	3360.62	2167.38	0.712-8.48
11	Grass Valley Can > John Day R - at Mouth	3300.11	2640.09	0.24-23.84
12	Hay Cr > John Day R - at Mouth	2649.13	2119.30	1.584-6.224
13	Haystack Cr > John Day R - at Mouth	550.41	440.33	0.008-2.288
14	Heidtmann Can > John Day R - at Mouth	718.22	574.57	0.048-2.888
15	Horseshoe Cr > John Day R - at Mouth	4223.61	3378.89	0.824-10.32
16	Jackknife Can > John Day R - at Mouth	921.72	737.38	0.048-5.264
17	Kahler Cr > John Day R - at Mouth	6496.08	5196.87	0.648-20.48
18	Muddy Cr > John Day R - at Mouth	3084.70	2467.76	0.456-13.2
19	Parrish Cr > John Day R - at Mouth	6959.62	5567.70	1.04-19.12
20	Pine Cr > John Day R - at Mouth	2819.91	2256.81	1.688-6.624
21	Pine Hol > John Day R - at Mouth	3162.06	2529.65	0.408-15.12
22	Rhodes Can > John Day R - at Mouth	458.18	366.55	0.048-2.176
23	Rock Cr > John Day R - Ab Wallace Can	19130.63	15304.50	0.96-73.2

24	Rock Cr > John Day R - at Mouth	23658.31	18856.44	1.792-98.4
25	Rowe Cr > John Day R - at Mouth	1929.72	1543.78	0.304-7.592
26	Scott Can > John Day R - at Mouth	683.70	546.96	0.0-5.064
27	Service Cr > John Day R - at Mouth	3522.06	2817.65	0.384-9.84
28	Shoofly Cr > John Day R - at Mouth	5772.51	4618.01	1.016-14.64
29	Thirtymile Cr > John Day R - at Mouth	10731.00	8584.80	2.88-41.2
30	John Day River > Mouth	1353008.43	1082406.74	216.0-4040.0
31	John Day River > H Canyon	1238641.19	990912.95	208.0-3816.0

ODFW is updating its instream needs guidance document (expected 2022) in order to provide a foundational assessment, particularly on streams with sensitive, threatened, or endangered species that currently lack instream targets. The new ODFW guidance builds on the Step 3 existing analysis and will provide a means to utilize additional data sources for estimating instream needs.

Based on the fish presence data shared by ODFW (ODFW, 2021), close to 80 percent of the WABs have fish presence or are used for fish passage and habitat. However, there is not enough information to estimate all categories of instream flow needs. The Lower Basin has a total of 230 fish passage barriers.

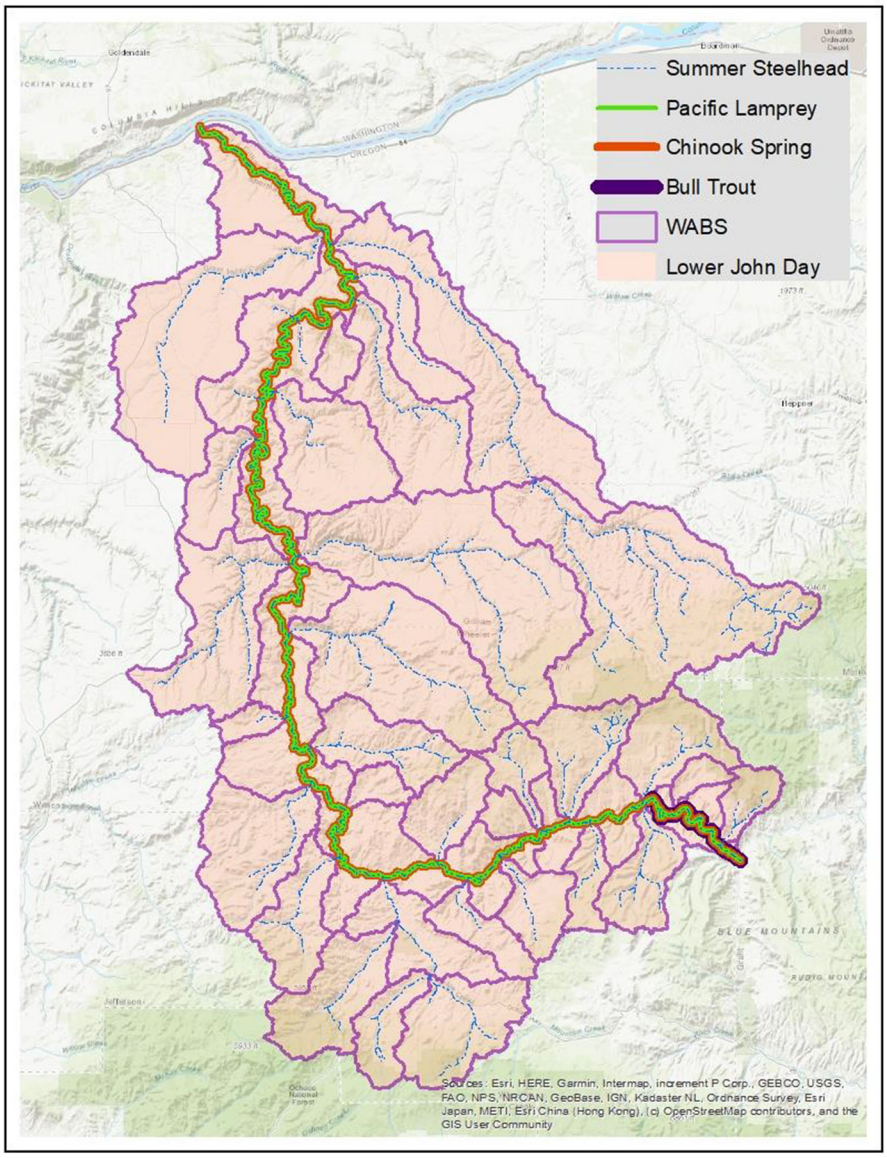


Fish passage barriers located in the Lower Basin

The Work Group noted that climate change, and resulting lowering instream flow conditions, are likely to exacerbate flow, temperature, and passage issues for fish and wildlife in the planning area.

The Lower John Day is home to numerous fish species, including some listed under the Endangered Species Act or listed as species of concern. The John Day hosts one of the few remaining wild fish runs in the Pacific Northwest; summer steelhead and spring Chinook salmon returning for spawning contribute to the largest entirely wild run in the mid- and upper Columbia River.

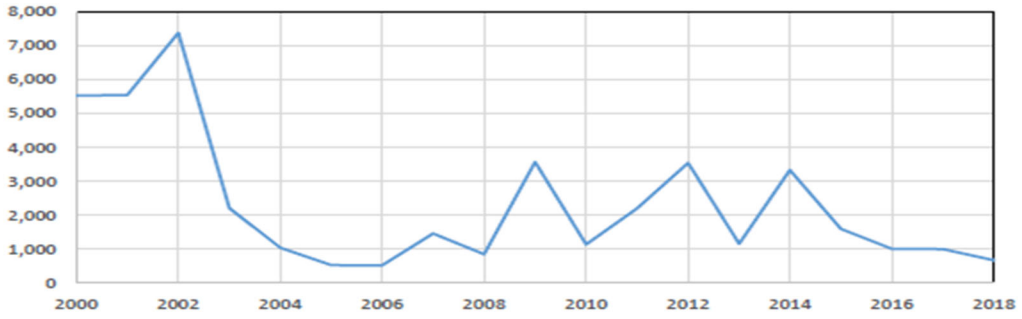
The return of summer steelhead to the Columbia in 2021 was the lowest since dam counts began at Bonneville Dam in 1939. The count of wild summer steelhead passing the John Day Dam from June 1 through November 12 was 17,718 wild or adipose-intact steelhead (some adipose-intact steelhead are unmarked hatchery-origin fish). The low return in 2021 follows several low run years for wild steelhead in the Columbia, resulting in several years of spawning escapement estimated to be well below recovery goals for the John Day River. Critically low abundance, poor marine survival, and low estimated hatchery origin stray rates for John Day-origin steelhead returning in 2021 led to an angling closure on the John Day River from September 1, 2021, through at least the end of 2021. It should be noted that this was part of a larger coast-wide phenomenon affecting multiple steelhead Distinct Population Segments.



Fish presence and use in the Lower Basin

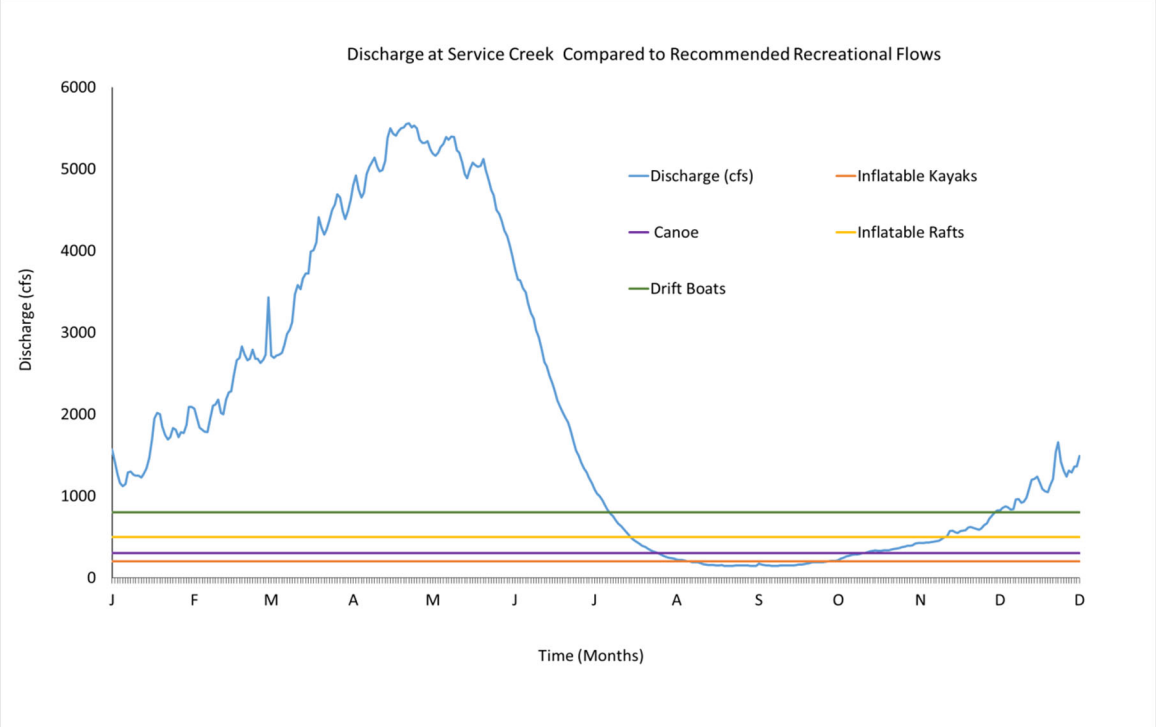
In addition to anadromous fisheries, this river section contains prime habitat for smallmouth bass. Also present are rainbow trout, Pacific lamprey, bridgelip sucker, and speckled and longnose dace.

Steelhead spawning surveys have been conducted since 1959 on highly abundant tributaries throughout the Lower Basin. The lower mainstem John Day steelhead population is at a moderate risk based on current abundance and productivity and is considered to be a maintained population with abundance above the minimum 500 (ODFW, 2010, 2019). The steelhead natural origin spawner abundance (NoSA) estimate for the Lower John Day below the South Fork John Day River from 2000 to 2018 is displayed below.



Lower mainstem John Day summer steelhead NoSA, 2000-2018 (ODFW recovery tracker)

In addition to the instream flow and passage needs of aquatic life, the Work Group looked at instream flow needs for floating the river, which is a popular recreational activity in the Lower Basin. Published information on necessary recreation flows for the Lower Basin are not available. However, based on interviews with staff at the Service Creek Station and guides, target flows for on-water recreation were estimated from the Step 2 Report. The figure below depicts the median daily discharge of the John Day River at Service Creek and the suggested minimum flows for various boat types.



Discharge versus recommended recreation flows, John Day River at Service Creek

Since 1998 there has been a steady increase in boater permits issued for the Lower John Day (roughly a 30 percent increase in the past 20 years). In 2017, the BLM recorded more than 28,000 boater-use-days between Kimberly and Tumwater Falls. According to the BLM, boater use correlates positively with instream flow levels.

Recreational use of the John Day River has increased significantly in the last decade. The BLM recently instituted a permit system to float the lower river (Jeffrey Kee photo credit)

Agriculture Needs

Irrigated agriculture in the Lower John Day watershed is used predominantly by commercial crops, hay, grass, orchards, and livestock watering. Agricultural products in the planning area include small grain, pasture and hay, and beef cattle production. Approximately 135,000 acres are in small grain crops, 12,000 acres are in pasture and hay, and 150,000 are fallow or idle cropland. The maximum allowable acreage (25 percent of total cropland) has been enrolled in the Conservation Reserve Program, removed from crop production, and planted to perennial grasses (USDA, 2005). In recent years, large tracts of private agricultural land have been purchased by absentee landowners with recreation being the primary use rather than agriculture. Roughly one-quarter of all surface water diversion in the region is used for storage water rights, the majority of which is for livestock or wildlife water use. In Step 2, irrigation water demand for the Lower John Day Basin was assessed per WAB by analyzing water rights, crop types, irrigation methods, and estimates of growing season ET under two scenarios: current use and using less than the full water right.

Agricultural water use was evaluated using two methods: 1) water rights from OWRD's Water Right Information Search database and 2) ET-based estimate for crop-water use. Comparing the two datasets, it was found that the net irrigation demand was 49,000 AFY using AgriMet data and 32,000 AFY using the Oregon Crop Water Use and Irrigation Requirements dataset (Cuenca, 1992) compared to 90,000 AFY irrigation water rights in the Lower Basin.

Irrigated pasture is an important part of livestock production in the Lower Basin (Jeffrey Kee photo credit)

Many streams in the planning area are on the Clean Water Act 303(d) list, primarily for water temperature. Temperature, sedimentation, flow modification, and habitat modification are the leading causes of impairment. Table 3-1 on page 90 of the Step 3 Integrated Water Resources Needs and Vulnerabilities Report provides the pollutants of concern in each WAB. Table 3-2 in the same report, shown on page 91, provides the number of impairments per pollutant. Insufficient agency field staff makes water quality monitoring difficult and oftentimes inadequate. Surface water and groundwater are used for irrigation in the Lower Basin.

Municipal, Domestic, Industrial, and Commercial Needs

Municipal, domestic, industrial, and commercial water users in the planning area include six public water systems, two self-supplied commercial and industrial users, and one quasi-municipal user. Some of the municipal water users, such as Lonerock, Mitchell, and Shaniko, have a relatively high maximum allowed water use per person compared to other cities, such as Condon, Moro, Grass Valley, and Fossil, which have lower gallon per minute (gpm)/person ratios. See Step 3, Appendix C, for a chart illustrating each municipal water need and demand for the Lower Basin.

In the Step 3 analysis, each city reported annual water use from 2008 to 2018 from wells, springs, and diversion points to calculate average to estimated use. Moro, Condon, and Grass Valley had the highest monthly water use in summer when irrigation requirements for landscape, parks, and ball fields are greatest. Gallons per capita day (gpcd) demand ranged from 44 gpcd in Shaniko up to 655 gpcd in Moro. The data also showed the ratio of maximum month use to lowest month use ranges widely from as low as 2:1 in Fossil to as much as 19:1 in Mitchell. Most domestic wells for single household use are exempt from the requirement to seek a water use permit from OWRD. Water use from wells is approximately 1,280,000 gallons per day. Annually that would be 467,200,000 gallons or 1,434 AF of rural exempt well water use. Domestic exempt well use makes up 78.5 percent of the combined domestic and municipal annual use, while municipal use within the

cities is only 21.5 percent. The greatest estimated annual volume of municipal and domestic demand is in the WAB near the mainstem above Heidtmann Canyon, at 1,057.85 AF annually.

Municipal, domestic, industrial, and commercial demands are relatively modest and not projected to grow significantly by 2050; however, population concentrations in towns can stress local drinking water supplies. Municipal water suppliers indicated a need for improvements to their water system infrastructure.

The Cities of Mitchell and Fossil have regularly instituted water use restrictions (Jeffrey Kee photo credit)

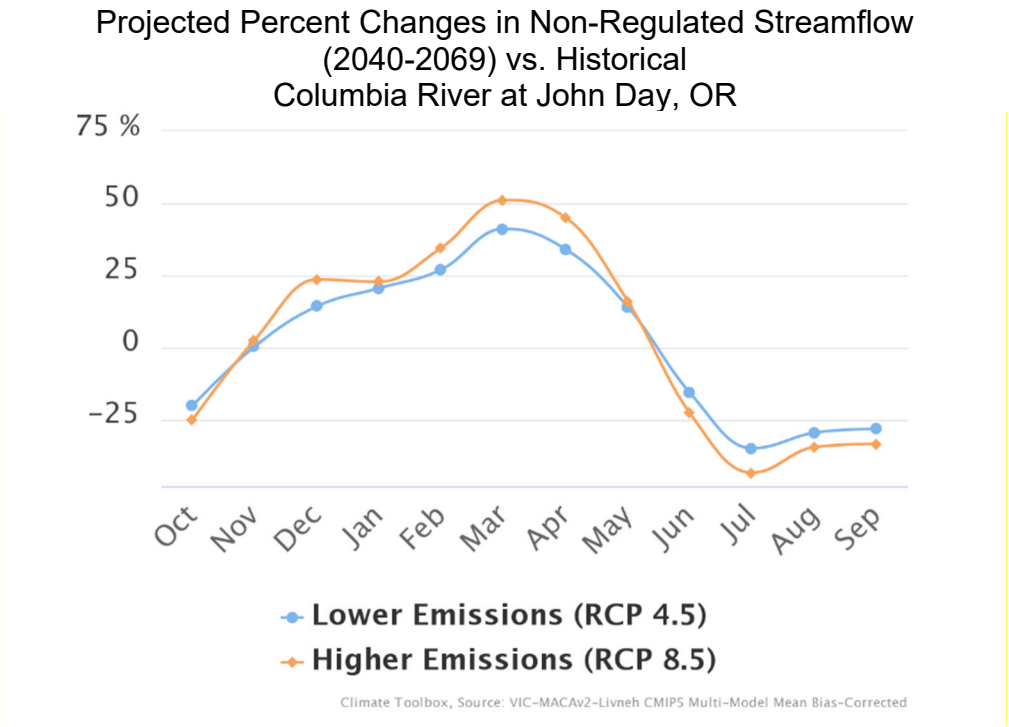
Natural Hazards and Climate Change

Drought, wildfire, windstorm, flood, and winter storms are all natural hazards that rank high for the planning area. Determining whether future demands for water in the Lower Basin can be met is dependent on many issues including the severity of climate change and whether conservation and restoration measures are implemented. A changing hydrograph is a leading area of concern.

Winter flows from the North Fork John Day River regularly produce significant ice (Jeffrey Kee photo credit)

The Lower Basin monthly hydrograph is characteristic of a snow-dominated basin with peak flows during the late spring snowmelt season. By the 2050s, the peak streamflow is projected to shift earlier in the spring as warmer temperatures cause the snowpack to melt earlier. In addition, winter streamflow is projected to increase due to increased winter precipitation and that precipitation falling more as rain than snow.

The greatest changes in peak streamflow magnitudes are projected to occur at intermediate elevations in the Cascade Range and the Blue Mountains (Safeeq et al., 2015). This represents a fundamental shift in hydrology, and declining snowpack will likely result in changes in the timing of water resources and greater water scarcity at times for multiple water uses, particularly for irrigation and instream flows for fish. Changing climate could have a detrimental impact on fish and wildlife in the planning area.



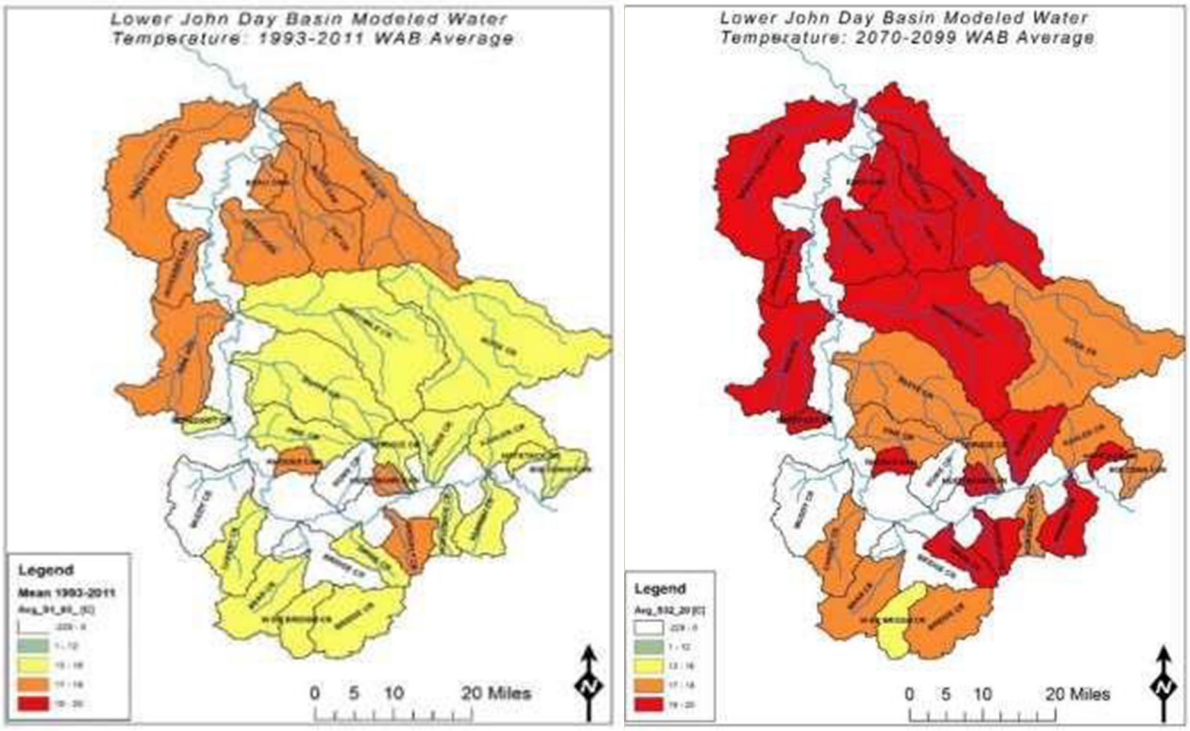
Projected percent changes in non-regulated streamflow (2040-2069) compared to historical levels from 1971 to 2000, Climate Toolbox, Hegewisch, K.C., Abatzoglou, J.T., and Chegwidden, O., 'Future Streamflows' web tool. NW Climate Toolbox (https://climatetoolbox.org/) accessed on 5.17.2019. RCP = representative climate pathway.

Drought conditions are represented by a low spring snowpack, low summer soil moisture, and low summer runoff (Oregon Department of Land Conservation and Development [DLCD], 2019). Climate change is expected to result in lower summer streamflow in historically snow-dominated basins across the Pacific Northwest as snowpack melts off earlier due to warmer temperatures and summer precipitation decreases (Dalton et al., 2017). As Oregon has experience in 2021, droughts have far-reaching environmental consequences that include increasing frequency and severity of forest insect/crop pest and pathogen outbreaks, expanding invasion of non-native weeds (University of Oregon's Institute for Policy Research and Engagement [UO], 2018), and worsening erosion and scouring leading to severe damages to fish habitat (UO, 2019). Drought also has a profound effect on these counties because of the counties' reliance on the local agricultural-based economies; drought impacts livestock health, damages crops, and results in reduced yields (UO, 2018). Droughts also increase the risk and impact of wildfire, as they leave the landscape dry and prone to ignition and low stream flows, which limit water availability for fire suppression. Widely reported by climate scientists, the probability of drought was listed as a high hazard probability by both Gilliam and Wheeler Counties as reported in the two counties' recent Multi-Jurisdictional Natural Hazards Mitigation Plans (UO, 2018; DLCD, 2019).

The climate and landscape in Gilliam and Sherman Counties are both conducive to wildfire, and these trends are increasing due to a reduction of moisture in vegetative fuels and soils. All communities in Gilliam County are within the Wildland Urban Interface area (ODF, 2006), and in Sherman County there are several areas within the interface area (UO, 2019). Both counties face increasing threats to human life as well as property including agricultural lands, crops, livestock, and livestock infrastructure.

Sherman County wind farms supply renewable electricity to Portland General Electric, Bonneville Power Administration, Eugene Water & Electric Board, and other power companies regionwide (Jeffrey Kee photo credit)

Over the last several decades, warmer and drier conditions recorded during summer months have contributed to an increase in dry fuels, which have enabled more frequent large fires, increased total acres burned, and prolonged fire season across the western United States (Dennison et al., 2014; Jolly et al., 2015; Westerling, 2016; Williams and Abatzoglou, 2016, in UO, 2018). The lengthening of the fire season is largely due to declining mountain snowpack and earlier spring snowmelt (Westerling, 2016, in UO, 2018). As shown below, climate change predictions show an increase in the frequency of "very high" fire danger days per year on average by nearly 15 days (with a range of -6 to +38 days) by the 2050s under the higher emissions scenario compared to the historical baseline for Gilliam County (UO, 2018) and by 14 days (with a range of -4 to +37 days) for Wheeler County (DLCD, 2019).



NorWeST dataset comparing August water temperatures for 1993-2011 and future forecast from year 2070- 2090

The likelihood of extreme heat and the number of hot days greater than or equal to 90°F are likely to increase by 29 days on average in Wheeler County and 33 days for Gilliam County with a range of approximately 11 to 39 days by the 2050s (Oregon Climate Change Research Institute [OCCRI], 2018a and 2018b). Extreme heat, lessening snowpack, and increased frequency and prolonged wildfire are all outcomes related to a changing climate. These very real vulnerabilities need to be considered in planning for current and future instream and out-of-stream water demands for the Lower Basin.

Warmer and drier conditions recorded during summer months have contributed to an increase in dry fuels, which have enabled more frequent large fires (Jeffrey Kee photo credit)

Data Gaps and Research Needs from Steps 2 and 3

Streamflow data

The Lower Basin has very few streamflow gauges, in part because several stream gauges have been discontinued. There is a need to include several additional stream gauges with efficient systems for collecting streamflow data.

Instream flow needs

Base and subsistence flow needs have not been determined for many tributary basins, and the mainstem and tributary basins all lack estimates, other than our percent-of-natural-flow estimates as discussed in Step 3, for the full range of flow needs (including pulse, bankfull, and overbank flows). Needs include instream flow specialists to conduct work necessary to better estimate all instream flow needs.

Groundwater levels and trends

The Lower Basin has only a few groundwater monitoring wells. Because the groundwater is held in multiple layers of multiple aquifers that may or may not be connected, these wells cannot provide a complete picture of groundwater conditions or trends in the Lower Basin. Needs include numerous additional groundwater monitoring wells, monitoring for different aquifers in different locations with efficient systems for collecting data on groundwater levels and trends in groundwater levels, and a volunteer network of exempt well owners to improve knowledge.

Water temperature data

Basin-wide stream temperature data are not fully available. Needs include additional temperature loggers to record stream temperatures in all tributary basins with efficient systems for collecting measurement data.

Updated evapotranspiration data for crops

The data used in computing ET crop and net irrigation demand are old, and the approach is based on an obsolete assumption that precipitation, temperature, and other weather/climate and hydrologic processes do not vary significantly over time or are stationary. Need to include updated ET estimates and/or models.

Agricultural water demands

Agricultural water demands do not include unpermitted use or excess use beyond authorized water rights.

Climate data

There are no AgriMet stations within the Lower Basin. Needs include an AgriMet weather station in the Lower Basin.

Rural exempt well water

Exempt well water use is approximately 1,434 AF (65 percent) and municipal city use is 764 AF (35 percent). Greater understanding of groundwater use and quantification of rural exempt well water use is needed.

Lack of metering

The lack of metering and use reporting on many irrigation water rights poses a challenge to estimating consumptive out-of-stream uses.

Surveying water right holders

Survey and outreach to water right holders about knowledge of water conservation opportunities would provide some important insights into water use, i.e., how many know that they can expand their irrigated lands utilizing the Allocation of Conserved Water Program?

Chapter 4: Critical Water Issues and Recommended Strategies for The Lower John Day (Step 4)

Maintenance and updating of irrigation systems in the Lower Basin will take significant outreach and investment (Jeffrey Kee photo credit)

Chapter 4 summarizes the Step 4 Integrated Water Strategies Report. In this report, the Work Group identified 19 Critical Issues facing the Lower Basin. For each Critical Issue, an accompanying problem statement, goal, and "strategies" for addressing the issue were compiled. The Work Group also ranked the issues using a "dot voting" exercise to prioritize issues in order of importance and significance.

Major conclusions from the Step 4 Report include:

- The highest priority issues of concern were poor riparian habitat, elevated summer stream temperatures, low instream oxygen, insufficient instream flow, storage needs, and degraded native plant communities. In addition, insufficient efficient irrigation infrastructure, inadequate gauge data, outdated and insufficient municipal water and wastewater infrastructure, lack of data on condition of groundwater aquifers and interactions between groundwater and surface water, and fish passage barriers were among the top identified issues both by the Work Group and through public outreach.

- The following strategies and related restoration actions were recommended due to their ability to address multiple basin water related challenges:
    - Protect riparian areas from livestock using fencing and off-stream stock watering systems;
    - Protect, enhance, and/or restore native riparian vegetation, reconnect floodplains (beaver dam analogs, beaver restoration, floodplain restoration, etc.); and
    - Restore upland function by improving plant communities with juniper removal and planting of appropriate perennial bunchgrasses, shrubs, and forbs.
- The highest priority basins for restoration include Bridge Creek (above West Branch), Bridge Creek (mouth), Butte Creek, Rock Creek (above Wallace Canyon), and Rock Creek (mouth).

Steelhead can still be caught on the John Day River, but only hatchery strays can be kept (Ian Tattam photo credit)

The 19 Critical Issues in order of ranking are shown below. Each issue has an icon next to it to indicate the four primary demand groups (instream, agricultural, municipal, and climate) that are most affected by this Critical Issue. This demonstrates our commitment to balance and integration of all strategies and Critical Issues.

Critical Water Issues and Ranking of Critical Issues

Key

Instream Demand	
Agricultural Demand	
Municipal Demand	
Climate Change/Natural Hazards	
All Benefit Equally*	

**All 19 strategies are intended to benefit all user groups and harm none. The purpose of this table is to illustrate the group likely to receive the largest benefit from the implementation of each strategy to show that our work was balanced and we considered the needs of all user groups.*

1. Poor riparian habitat
2. Elevated summer stream temperatures and low instream oxygen
3. Insufficient instream flow
4. Storage needs
5. Degraded native plant communities
6. Insufficient efficient irrigation infrastructure
7. Inadequate gauge data
8. Outdated and insufficient municipal water and wastewater infrastructure
9. Lack of data on condition of groundwater aquifers and interactions between groundwater and surface water
10. Fish passage barriers
11. Inadequate diversion data
12. Poor soil health in many of the WABs
13. Simplified stream morphology
14. Inadequate surface water for wildlife
15. Risk of intense or catastrophic wildfire that impacts water quality and quantity
16. Insufficient data on crops, climate, and datasets to support analysis
17. Degraded forest health
18. Erosion and sediment transport/control
19. Rural and domestic well data gaps

Strategies and Ranking of Strategies by Category

In addition to ranking Critical Issues and developing strategies to address each Critical Issue, the group also ranked strategies within seven general categories that described either the general focus of the strategy (e.g., riparian, instream and aquatic; upland management and restoration) or the nature of approach (e.g., outreach and education; data collection, monitoring, and feasibility). The list below summarizes the five top-ranked strategies, in order of priority, for each of the seven general categories. A full list of prioritized strategies is shown in the Step 4 Report. These 47 strategies (separated into seven categories) and their relations to the 19 Critical Issues are shown in Appendix A - Crosswalk Table. How strategies are integrated and anticipated to improve Critical Issues are shown in Appendix B - Strategy Impact Connection Table. It is important to note that not all strategies were included in all categories for ranking and that the Work Group did not rank all strategies together independent of the Critical Issues that the strategies are intended to address.

The characteristics of East Bologna Creek are common in the Lower Basin, where steelhead utilize spring flows for spawning and for rearing even when the majority of the water flows subsurface in the late summer and fall. Isolated pools continue to provide cool water that harbors life during the hot and dry seasons (Jeffrey Kee photo credit)

The Work Group also cross-referenced all 46 strategies with the 19 Critical Issues shown in a separate Strategy Impact Table in the Step 4 Report. The exercise illustrates which strategies are likely to address one or more Critical Issues facing instream and out-of-stream water demands.

Each strategy is integrated with the others to achieve multiple benefits as shown in the crosswalk table in Appendix A of the Step 4 Report. The following sections show the strategies prioritized by the Work Group within each subject area.

Riparian, Instream, and Aquatic Restoration

- Maintain and increase stream flows.
- Protect, enhance, and/or restore native riparian vegetation.
- Reconnect floodplains (beaver dam analogs, beaver restoration, floodplain restoration, etc.).
- Protect riparian areas from livestock using fencing and off-stream stock watering systems.
- Encourage improved irrigation efficiency projects and use of the Conserved Water Act (to reduce out-of-stream demand through efficiency improvements and to protect a portion of water saved instream).

Bridge Creek has received a lot of monitoring and restoration investment in the last decade. It is recognized as an Intensively Monitored system by the National Oceanic and Atmospheric Administration (Jeffrey Kee photo credit)

Upland Management and Restoration (including Irrigation)

- Restore upland function by improving plant communities with juniper removal and planting appropriate perennial bunchgrasses, shrubs, and forbs.
- Identify, protect, and restore seeps and springs supplying cool water.
- Promote best management practices (BMPs) for the capture and safe release of water (water and sediment control basins, etc.).
- Promote mulch tillage, ridge tillage, zone tillage, no till, chemical fallow, and Conservation Reserve Program as ways to improve soil health, etc.).
- Promote good vegetative cover/cover crops.

Uplands in the entire John Day Basin have been encroached upon by Western juniper. This invasive native robs the soil of moisture and degrades historically desired plant communities (Jeffrey Kee photo credit)

Off-channel Storage

- Complete a feasibility study to assess potential off-channel water storage projects, including (a) potential locations for storage projects and (b) water availability, including consideration of all categories of instream flow needs (as recognized in the Step 3 Report).
- Promote BMPs for the capture and safe release of water (water and sediment control basins, etc.).
- Develop off-channel storage projects as suggested by feasibility studies.

Municipal and Domestic Water

- Assist cities in creating and/or improving Water System Management Plans and/or Water Management and Conservation Plans that identify necessary system improvements. Assess whether these plans cover all needed improvements.

- Analyze existing groundwater data and conduct a groundwater study in the Lower Basin.
- Assist entities with public water and wastewater systems in funding and implementing infrastructure improvement projects.
- Support and advocate for increased communication for water conservation in public/ municipal water systems and infrastructure needs.
- Establish, support, and help fund additional groundwater monitoring wells and support community groundwater monitoring networks.

Data Collection, Monitoring, and Feasibility

- Support maintenance of existing gauges.
- Complete a feasibility study to assess potential off-channel water storage projects, including (a) potential locations for storage projects; (b) water availability, including consideration of all categories of instream flow needs (as recognized in the Step 3 Report) and changing hydrographs due in part to climate change; (c) instream and out-of-stream needs for water from storage; and (d) other costs and benefits.
- Analyze existing groundwater data and conduct a groundwater study in the Lower Basin.
- Support installation and maintenance of additional gauges at discontinued and recommended new sites.
- Conduct a process-based hydrologic study including how stream and groundwater flows change with land use and future climate change.

Outreach and Education

- Conduct outreach to irrigators about more efficient irrigation practices and systems and encourage adoption.
- Encourage improved irrigation efficiency projects and use of the Conserved Water Act (to reduce out-of-stream demand through efficiency improvements and to protect a portion of water saved instream).
- Promote utility, state, and federal incentive programs for improving irrigation efficiency.
- Promote BMPs for the capture and safe release of water (water and sediment control basins, etc.).
- Encourage voluntary leases, conservation easements, and permanent transfers of existing water rights to instream use.

Funding/Policy Options

- Reconnect floodplains (beaver dam analogs, beaver restoration, floodplain restoration, etc.).
- Protect, enhance, and/or restore native riparian vegetation.
- Maintain and increase stream flows.
- Protect riparian areas from livestock using fencing and off-stream stock watering systems.
- Restore upland function by improving plant communities with juniper removal and planting of appropriate perennial bunchgrasses, shrubs, and forbs.

Riparian habitat growth from restoration (Lee Rahr photo credit)

Priority WABs

The Critical Issues, goals, and strategies developed by the Work Group are generally applicable throughout the Lower Basin. However, limited resources may require future efforts to focus first on agreed-upon priority areas. Therefore, an evaluation to prioritize WABs for each Critical Issue was completed by a technical subcommittee and discussed in monthly meetings. A full list of strategies and accompanying priority WABs is provided in Section 3 of the Step 4 Report.

While prioritization of WABs may vary across Critical Issues and strategies, and while this work should be subject to adaptive management principles, the WAB priority analysis suggested the following WABs should be recognized as top priorities for restoration, further study, further analysis, and funding and investment:

1. Bridge Creek (above West Branch)

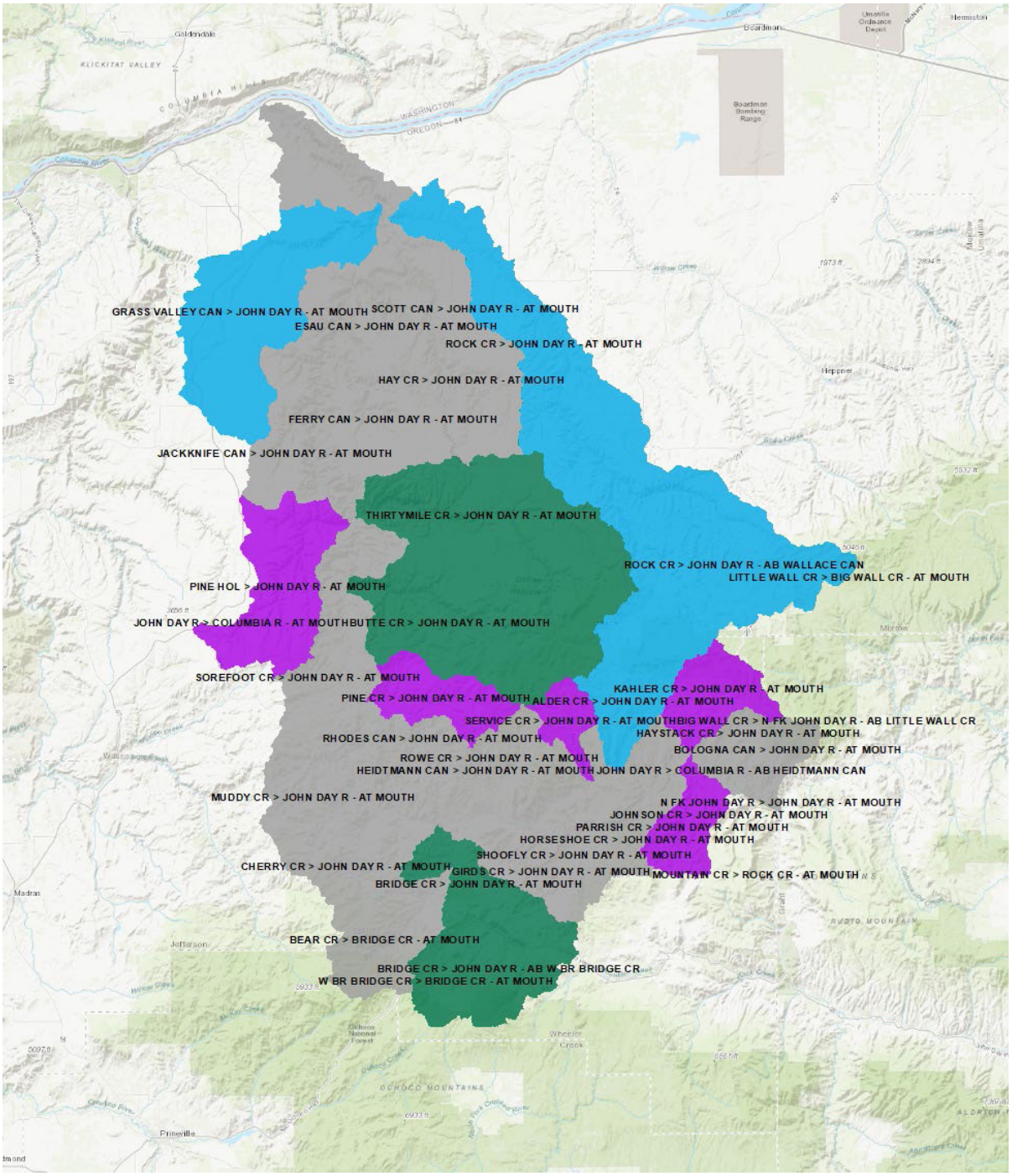
2. Bridge Creek (mouth)

3. Butte Creek

4. West Branch Bridge Creek

5. Thirtymile Creek

These WABs were identified as Tier 1. The next five WABs (6 through 10) were ranked as Tier 2, and the final five WABs (11 through 15) were ranked as Tier 3, as shown below and also on Map 4.1. Tier 1 WABs are green, Tier 2 are blue, and Tier 3 are purple.



The second group of prioritize WABs (Tier 2) includes:

- Bear Creek
- Rock Creek (above Wallace Canyon)
- Rock Creek (mouth)
- Grass Valley Canyon
- Alder Creek

The next group of priority WABs (Tier 3) includes:

- Parrish Creek
- Pine Hollow

- Pine Creek
- Kahler Creek
- Service Creek

The WABs that fall out of the top 15 are in no way precluded from restoration work. These areas are still important for prioritizing other Critical Issues depending on priorities set by the Work Group and funding available for implementation.

Chapter 5: The Lower John Day's Plan Implementation Strategy (Step 5)

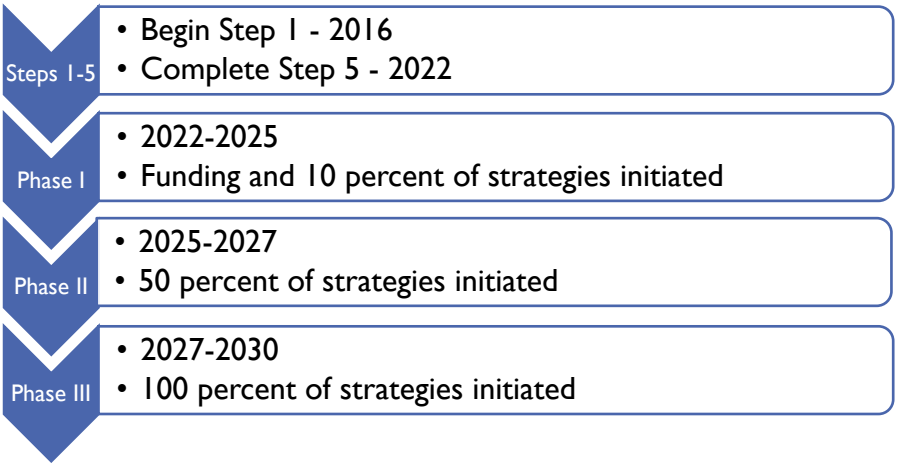
Hundreds of old irrigation diversion fish screens have been replaced in the Lower Basin (Jeffrey Kee photo credit)

Chapter 5 summarizes and outlines the process to create a Strategic Action Plan. The Work Group has finalized and approved three plans (Steps 2 through 4). The next step was to compile the analysis and findings to create an implementation plan. The Strategic Action Plan synthesizes all the Critical Issues, strategies, priority watersheds, partners, funding, metrics, and a timeline. The Integrated Water Resource Plan and this implementation guided by the Strategic Action Plan is an outcome of the State of Oregon Integrated Water Resource Plan, which lays out guidance and guidelines to help communities better understand and meet Oregon's consumptive and environmental water needs.

Implementation of the Strategic Action Plan is intended to take place over the next 8 years, 2022 to 2030. Although this Plan and Action Plan are living documents, Appendix C - Strategic Action Plan, represents the prioritization of the Critical Issues to be addressed, followed by the strategies or actions needed to be undertaken to address each Critical Issue of concern listed with the prioritized WABs. Implementation of the Action Plan and monitoring efforts will be coordinated with the John Day Basin Partnership. Many of the Critical Issues are connected to one another. For example,

streamflow (Critical Issue 3) affects water quality (Critical Issue 2) and riparian condition (Critical Issue 1). Effective implementation of the Action Plan in Appendix C will require that multiple strategies addressing multiple Critical Issues be pursued and implemented simultaneously.

The simplified timeline below shows the phasing of the Strategic Action Plan. This phasing represents areas of focus for the Work Group; however, strategies in later phases may be addressed opportunistically and thus occur sooner if funding or individual stakeholder priorities warrant this approach.



The Strategic Action Plan also lists funding sources and resource needs for each of the implementing strategies or actions. Funding sources range from federal grant programs such as BLM WaterSMART, NRCS programs, and USGS to Oregon Department of Geology and Mineral Industries, OWRD, and Oregon Watershed Enhancement Board grants, and then to more local utility and county programs and private foundations. The Oregon legislature in 2021 passed extensive funding to expand OWRD staff, Place-Based planning and more than $30 million to provide water project grants and loans to evaluate, plan, and develop instream and out-of-stream water projects. Despite alarming drought conditions facing most of the state, the Work Group believes there are federal and state resources more readily available to address much of the implementation strategies outlined in this Plan.

The Work Group will continue to meet monthly until this Plan integrates public comments and recommendations made by the Oregon Water Resources Commission. After this Integrated Water Resource Plan is approved in 2022, the Work Group will meet quarterly, shift focus from planning to implementation and more closely coordinate implementation funding as a subgroup of the John Day Partnership, work in coordination with the Partnership to implement the Strategic Action Plan, and coordinate the reporting and monitoring metrics with the Partnership's existing protocol.

Strategic Action Plan

The Strategic Action Plan includes the following sections for each Critical Issue:

- Priority WABs
- Strategies
- Funding
- Team Lead
- Timeline Phase I, II, III
- Status
- Implementation Metric: What was done, how much was completed?

- Effectiveness Monitoring Metric: Did it have primary and secondary impacts in the short and then long term?
- Monitoring/Reporting: Have the actions created healthier or better conditions?
- Notes on how to implement, measure, monitor, and report

See Appendix C for the full Strategic Action Plan. Implementation designs, metrics, and reporting requirements will be refined as distinct projects are developed.

Following is a summary of the 2021-22 Lower John Day Basin Integrated Water Resource Plan adoption process and proposed timeline:

- Public comment of Draft Step 5 (October 2021)
- Incorporate internal and public comments
- Agency review of Draft Step 5 (December 2021)
- Incorporate agency comments
- Work Group reviews Final Draft for adoption, formal vote of adoption
- Send Step 5 to OWRD
- Agency Review Team reviews for Final Draft and provides a recommendation to the Oregon Water Resources Commission (February 2022)
- Present to Oregon Water Resources Commission (March 2022)
- Incorporate Oregon Water Resources Commission comments and finalize all internal and external comments
- Update, finalize, and distribute Step 5: Lower John Day Integrated Water Resource Plan
- Publish biennial (2024, 2026, 2028, and 2030) short report of implementation progress, metrics reporting, funds invested, and case studies to be shared with distribution list.

John Day Basin scenery (Jeffrey Kee photo credit)

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Chapter 7: Appendices

Appendix A - Crosswalk Table

	Strategies	Riparian, Instream and Aquatic Restoration	Upland Management and Restoration (including Irrigation)	Off-channel Storage	Municipal and Domestic Water	Data Collection Monitoring and Feasibility	Outreach and Education	Funding/ Policy Options	Number of Categories	Possible funding sources
Critical Issue 1: Poor Riparian Habitat										
Critical Issue #1 Solutions/Strategies	Protect riparian areas from livestock using fencing and off-stream stock watering systems	1						1	1	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG
	Protect, enhance, and/or restore native riparian vegetation	1						1	1	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG
	Reconnect floodplains (beaver dam analogs, beaver restoration, floodplain restoration, etc.)	1	1					1	2	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG
Critical Issue 2 : Elevated Summer Stream Temperatures and Low Instream Oxygen										
	Identify, protect, and restore seeps and springs supplying cool water	1	1					1	2	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG
	Maintain and increase streamflows	1						1	1	
	Conduct additional monitoring for temperature and dissolved oxygen	1				1		1	2	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS
	Implement strategies for Critical Issues 1 (Riparian) and 3 (Streamflow)									
Critical Issue 3: Insufficient Instream Flow										
Critical Issue #3 Solutions/Strategies	Encourage and assist state agencies in creating additional instream water rights	1						1	1	
	Encourage voluntary leases and transfers of existing water rights to instream use	1					1	1	2	
	Encourage improved irrigation efficiency projects and use of Conserved Water Act (to reduce out-of-stream demand through efficiency improvements and to protect portion of water saved instream)	1					1	1	2	
	Implement strategies for Critical Issue 11 (Diversion Data)									
	Implement strategies for Critical Issue 1 (Riparian)									
	Implement strategies for Critical Issue 4 (Storage)									
Critical Issue 4: Storage Needs										
Critical Issue #4 Solutions/Strategies	Complete a feasibility study to assess potential off-channel water-storage projects, including: (a) potential locations for storage projects; (b) water availability, including consideration of all categories of in-stream flow needs (as recognized in the Step 3 Report) and changing hydrographs due in part to climate change; (c) in-stream and out-of-stream needs for water from storage; and (d) other costs and benefits	1	1	1		1		1	.5	OWRD
	Develop off-channel storage projects as suggested by feasibility studies	1	1	1		1		1	.5	OWRD
Critical Issue 5: Degraded Native Plant Communities										
Critical Issue #5 Solutions/Strategies	Control noxious weeds		1					1	1	OSWB, OWEB-OS, OWEB-FIP (Butte/Thirtymile)
	Restore upland function by improving plant communities with juniper removal, and planting of appropriate perennial bunchgrasses, shrubs, and forbs.		1					1	1	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG
	Implement strategies for Critical Issue 1 (Riparian)									
Critical Issue 6: Insufficient Efficient Irrigation Infrastructure										
Critical Issue #6 Solutions/Strategies	Conduct outreach to irrigators about more efficient irrigation practices and systems and encourage adoption	1	1				1	1	.3	
	Promote utility, state and federal incentive programs for improving irrigation efficiency	1	1				1	1	.3	
	Replace inefficient and failing diversions and/or screens such as push up dams with new structures that maintain or improve native fish passage	1	1					1	2	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG
	Pipe open ditches	1	1					1	2	OWEB-OS, OWEB-SG
	Replace inefficient irrigation systems with more efficient systems (e.g., replace flood irrigation with sprinklers)	1	1					1	2	OWEB-OS, OWEB-SG
Critical Issue 7: Inadequate Gauge Data										
	Support maintenance of existing gauges	1	1			1		1	.3	
	Support installation and maintenance of additional gauges at discontinued and recommended new sites	1	1			1	1	1	.5	
Critical Issue 8: Outdated and insufficient municipal water and wastewater infrastructure										
Critical Issue #8 Solutions/Strategies	Assist cities in creating and/or improving Water System Management Plan and/or Water Management and Conservation Plan that identify necessary system improvements. Assess whether these plans cover all needed improvements.				1			1	1	
	Assist entities with public water and wastewater systems in funding and implementing infrastructure improvement projects				1			1	1	
	Support and advocate for increased communication for water conservation in public / municipal water systems and infrastructure needs				1		1	1	2	
Critical Issue 9: Lack of data on *condition of groundwater* aquifers and interactions *between groundwater and surface water*										
Critical Issue #9 Solutions/Strategies	Conduct process based hydrologic study including how stream and groundwater flows change with land use and future climate change.	1	1			1		1	.3	
	Analyze existing groundwater data, and conduct a groundwater study in the basin	1	1		1	1		1	.5	
	Establish, support and help fund additional groundwater monitoring wells and support community groundwater monitoring networks	1	1		1	1	1	1	6	
Critical Issue 10: Fish passage barriers										

Critical Issue #10 Solutions/Strategies	Provide full fish passage (removal, repair and/or replacement) at priority artificial obstructions including culverts and dams.	1						1	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG
	Assist ODFW with updating list of priority fish-passage barriers if necessary	1				1		1	
Critical Issue 11: Inadequate diversion data									
Critical Issue #11 Solutions/Strategies	Support additional personnel for flow and diversion monitoring and management	1	1			1		1	
	Advocate for irrigator incentives for measurement of diversions, including installing measurement devices	1	1			1	1	1	
	Promote existing incentives for measurement of diversions	1	1			1	1	1	
Critical Issue 12: Poor soil health in many of the Water Availability Basins									
Critical Issue #12 Solutions/Strategies	Promote good vegetative cover/cover crops.		1				1	1	OWEB-OS, OWEB-SG, NRCS-RCPP/EQIP
	Promote mulch tillage, ridge tillage, zone tillage, no till, chem fallow, and CRP as ways to improve soil health, etc.)		1				1	1	OWEB-OS, OWEB-SG, NRCS-RCPP/EQIP
	Support payment programs for landowners adopting soil carbon improvement practices and management that mitigate for greenhouse gas emissions		1				1	1	
Critical Issue 13: Simplified Stream Morphology									
Critical Issue #13 Solutions/Strategies	Implement strategies for Critical Issues 1 (Riparian) and 3 (Streamflow)								
Critical Issue 14: Adequate surface water for wildlife									
Critical Issue #14 Solutions/Strategies	Conduct study regarding changes in prevalence and function of springs and causes of changes					1		1	
	Implement strategies for Critical Issues 1 (Riparian) and 5 (Native Plants)								
Critical Issue 15: Risk of intense or catastrophic wildfire that impacts water quantity and quality									
Critical Issue #15 Solutions/Strategies	Create and promote wildland urban interface buffers, and defensible space around rural homes and buildings.		1				1	1	ODF?
	Increase pace and scale of forest restoration, including prescribed burning and thinning		1					1	ODF?
	Support community wildfire response plans		1				1	1	
Critical Issue 16: Insufficient data on crops, climate, and datasets to support analysis.									
Critical Issue #16 Solutions/Strategies	Support Agri Met station in Basin		1			1		1	
	Support collection of additional Lidar data		1			1		1	
	Analyze existing data on crop and climate		1			1		1	
Critical Issue 17: Degraded Forest Health									
Critical Issue #17 Solutions/Strategies	Implement strategies for Critical Issue 5 (Native Plants)								
	Implement prescribed burn and thinning for forest management		1					1	OWEB-OS, OWEB-SG, NRCS-RCPP/EQIP, ODF?, Cooperative agreements with USFS
Critical Issue 18: Erosion and Sediment Transport/Control									
Critical Issue #18 Solutions/Strategies	Implement strategies for Critical Issue 12								
	Promote best management practices for the capture and safe release of water (Water and sediment control basins, etc.)		1	1			1	1	OWEB-OS, OWEB-SG, NRCS-RCPP/EQIP
Critical Issue 19: Rural and domestic well data gaps									
Critical Issue #20 Solutions/Strategies	Conduct voluntary survey for non-municipal well users to capture issues associated with domestic water availability and quality				1	1	1	1	
	Provide assistance or technical expertise through OWRD support on installing well level monitors.				1	1	1	1	
	Provide information on where to get well water testing kits and technical support for water quality issues				1	1	1	1	
		26	30	3	8	19	18	46	

OWEB-OS	Oregon Watershed Enhancement Board Open Solicitation
OWEB-SG	Oregon Watershed Enhancement Board Small Grants
OWEB-FIP	Oregon Watershed Enhancement Board Focused Investment Partnership
NRCS RCPP/EQIP	Natural Resources Conservation Service Regional Conservation Partnership Program/Environmental Quality Incentive Program
ODF	Oregon Department of Forestry
OWRD	Oregon Water Resources Department
BPA	Bonneville Power Administration-Columbia Basin Water Transaction Program
CTWS	Confederated Tribes of the Warm Springs
USDA RDI	United States Department of Agriculture-Rural Development Initiative
BOR	Bureau of Reclamation
	Federal Appropriations
NWPPC	Northwest Power Planning Council

Appendix B - Strategy Impact Connection Table

	Strategies	1. Poor riparian habitat	2. Elevated summer stream temp/low instream oxygen	3. Insufficient instream flow	4. Storage needs	5. Degraded native plant communities	6. Insufficient efficient irrigation infrastructure	7. Inadequate gauge data	8. Outdated and insufficient municipal water and wastewater infrastructure	9. Lack of data on condition of groundwater aquifers and interactions between groundwater and surfacewater	10. Fish passage barriers	11. Inadequate diversion data	12. Poor soil health in many of the Water Availability Basins	13. Simplified stream morphology	14.Adequate Surface water for wildlife	15. Risk of intense or catastrophic wildfire that impacts water quanity and quality	16. Insufficient data on crops, climate, and datasets to support analysis	17. Degraded forest health	18. Erosion and sediment transport/control	19. Rural and domestic well data gaps	Total
1	Protect riparian areas from livestock using fencing and off-stream stock watering systems	1	1	1	x	1					x		x	1	1	x		x	x		6
1	Protect, enhance, and/or restore native riparian vegetation	1	1	1	x	1					x		x	1	1	x		x	x		6
1	Reconnect floodplains (beaver dam analogs, beaver restoration, floodplain restoration, etc.)	1	1	1	x	1					1		x	1	1	x		x	x		7
2	Identify, protect, and restore seeps and springs supplying cool water	x	1	x	x	x					x		x	x	x	x		x	x		1
2	Maintain and increase streamflows	x	1	x	x	x					1		x	x	x	x		x	x		2
2	Conduct additional monitoring for temperature and dissolved oxygen	x	1	x	x	x					x			x	x	x	x				1
3	Encourage and assist state agencies in creating additional instream water rights	x	1	1	x	x					x		x	1	x	x		x	x		4
3	Encourage voluntary leases and transfers of existing water rights to instream use	x	1	1	x	x					x		x	1	x	x		x	x		4
3	Encourage improved irrigation efficiency projects and use of Conserved Water Act (to reduce out-of-stream demand through efficiency improvements and to protect portion of water saved instream)	x	1	1	x	x	1				x		x	1	x	x		x	x	x	5
4	Complete a feasibility study to assess potential off-channel water-storage projects, including: (a) potential locations for storage projects; (b) water availability, including consideration of all categories of in-stream flow needs (as recognized in the Step 3 Report) and changing hydrographs due in part to climate change; (c) in-stream and out-of-stream needs for water from storage; and (d) other costs and benefits	x	x	1	1						x		x	x	x	x		x	x		3
4	Develop off-channel storage projects as suggested by feasibility studies	x	1	1	1						x		x	x	x	x		x	1		5
4	Control noxious weeds	x	x	x		1							x		1	x		1	x		3
5	Restore upland function by improving plant communities with juniper removal, and planting of appropriate perennial bunchgrasses, shrubs, and forbs	x	x	x		1					x		x	x	1	x		1	x		3
6	Conduct outreach to irrigators about more efficient irrigation practices and systems and encourage adoption	x	x	x	x	x	1				x	x	x	x	x	x		x	x	x	2
6	Promote utility, state and federal incentive programs for improving irrigation efficiency	x	x	x	x	x	1				x	x	x	x	x	x	x	x	x	x	2
6	Replace inefficient and failing diversions and/or screens such as push up dams with new structures that maintain or improve native fish passage	x	x	x			1				x	x		x	x	x			x		2
6	Pipe open ditches	x	x	x	x	x	1			x	x	x		x	x	x			x	x	2
6	Replace inefficient irrigation systems with more efficient systems (e.g., replace flood irrigation with sprinklers)	x	x	x	x	x	1			x	x	x	x	x	x	x	x	x	x	x	2
7	Support maintenance of existing gauges	x	x	x	x	x	x	1		x	x	x	x	x	x	x	x	x	x		2
7	Support installation and maintenance of additional gauges at discontinued and recommended new sites	x	x	x	x	x	x	1		1	x	x	x	x	x	x	x	x	x		3
8	Assist cities in creating and/or improving Water System Management Plan and/or Water Management and Conservation Plan that identify necessary system improvements. Assess whether these plans cover all needed improvements.		x		x				1	x		x				x					1
8	Assist entities with public water and wastewater systems in funding and implementing infrastructure improvement projects		x						1												1
8	Support and advocate for increased communication for water conservation in public / municipal water systems and infrastructure needs		x		x				1												1
9	Conduct process based hydrologic study including how stream and groundwater flows change with land use and future climate change	x	x	x	x	x				1	x		x	x	x	x	x	x		x	1
9	Analyze existing groundwater data, and conduct a groundwater study in the basin	x	x	x	x					1	x			x	x	x	x	x		x	1

9 Establish, support and help fund additional groundwater monitoring wells and support community groundwater monitoring networks	x	x	x	x					1	x			x	x	x	x	x		1	*2*
10 Provide full fish passage (removal, repair and/or replacement) at priority artificial obstructions including culverts and dams	x	x	x							1			x							*1*
10 Assist ODFW with updating list of priority fish-passage barriers if necessary	x	x	x							1			x							*1*
11 Support additional personnel for flow and diversion monitoring and management	x	x	1	x	x	x	x		x	x	1	x	x	x	x	x		x		*3*
11 Advocate for irrigator incentives for measurement of diversions, including installing measurement devices	x	x	1	x	x	x	x		x	x	1	x	x	x	x	x		x		*3*
11 Promote existing incentives for measurement of diversions	x	x	1	x	x	x	x		x	x	1	x	x	x	x	x		x		*3*
12 Promote good vegetative cover/cover crops	x	x	x		x					x		1	x	x	x	x		1		*2*
12 **Promote mulch tillage, ridge tillage, zone tillage, no till, chem fallow, and CRP as ways to improve soil health, etc.)**	x	x										1	x					1		*2*
12 Support payment programs for landowners adopting soil carbon improvement practices and management that mitigate for greenhouse gas emissions	x	x										1	x					1		*2*
14 Conduct study regarding changes in prevalence and function of springs and causes of changes	x	x	x	x	x				x		x	x	x	1	x	x	x	x		*2*
15 Create and promote wildland urban interface buffers, and defensible space around rural homes and buildings	x	x		x	x							x			1		x	x		*1*
15 Increase pace and scale of forest restoration, including prescribed burning and thinning					x										1		1			*2*
15 Support community wildfire response plans															1					*1*
16 Support Agri Met station in Basin				x												1				*1*
16 Support collection of additional Lidar data	x	x	x	x	x	x	x		x		x	x				1				*1*
16 Analyze existing data on crop and climate	x	x	x	x	x	x	x		x	x	x	x	x	x	x	1	x	x	x	*1*
17 Implement prescribed burn and thinning for forest management	x	x	x		x							x			x		1			*1*
18 Promote best management practices for the capture and safe release of water (Water and sediment control basins, etc.)	x	x	x	x	x					x		x	x	x			x	1		*1*
20 Conduct voluntary survey for non-municipal well users to capture issues associated with domestic water availability and quality		x	x	x					x		x		x			x			1	*1*
20 Provide assistance or technical expertise through OWRD support on installing well level monitors		x	x	x					x		x		x			x			1	*1*
20 Provide information on where to get well water testing kits and technical support for water quality issues								x	x		x					x			1	*1*

Appendix C - Strategic Action Plan

LOWER JOHN DAY INTEGRATED WATER RESOURCE PLAN: STRATEGIC ACTION PLAN

Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
PHASE I 2022- 2025										
Critical Issue 1: Poor riparian habitat	Bridge Creek (above West Branch) Bridge Creek (mouth) Bear Creek West Branch Bridge Creek Butte Creek	Protect riparian areas from livestock using fencing and off-stream stock watering systems	NRCS-CREP, CTWS,OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG, DEQ 319 grant, BLM, private foundations/organizations (Rocky Mountain Elk Foundation, Blue Mountain Land Trust, ONDA, Ruffed Grouse Society),ODA	SWCD's, WC, ONDA	2022-2025	In Progress	Linear feet of fencing; number of troughs installed.	Increase in area of healthy riparian vegetation at project sites.	yes/no	Conduct suneye measurements or obtain solar input imagery through drone imagery, measure % shade, measuree % of active erosion, measure change in stream temp; Quantify change in solar input per unit area; Quantify # of Acres treated, Linear Ft fenced, number of off stream troughs installed
		Protect, enhance, and/or restore native riparian vegetation	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWED-SG,DEQ 319 grant,ODA	SWCD's, WC, ONDA	2022-2025	In progress	Number of protection/restoration projects completed; number of stream miles treated with projects.	Increase in areas of healthy riparian vegetation at project sites.	yes/no	Number of Acres treated; Quantify change in: shannon's diversity index; volume, depth and width of pool/riffle habitat; pool to riffle ratio. Reduction in stream temp., increase in groundwater levels, reduce channel incision,% shade,%active erosion, increase stream sinuouscity, Total suspended solid in m3, no. of fish count, ,, increase in linear ft of floodplain, Conduct vegetation surveys to document change in vegetation. Quantify Linear Ft installs, acres of planted natives, acres of invasive species treated, how many species and individual plants planted, Survival rate of plantings,% shade change, % active erosion, Reduction in stream temp, Quantify % change in ground cover, understory, and canopy cover.
		Reconnect floodplains (beaver dam analogs, beaver restoration, floodplain restoration, etc.)	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG, OWRD grants and loans?	SWCD's, WC, ONDA	2022-2030	In progress	Number of projects completed; stream miles treated.	Increase in streamflows, reductions in stream temperatures, increased, increase in groundwater levels, increase in channel sinuousity, increase in beaver habitation, and increase in area of healthy riparian vegetation (all as measured in project areas).	yes/no	Install and monitor pressure logger pre and post treatment upstream and downstream of restored reach; Conduct habitat surveys (i.e. CHaMP lite), Monitor beaver activity, document presence and count of dams, volume and surface area of ponds created by dams vs volume and surface area of water before dams;Quantify the change in the number of dams. Quantify the volume and surface area of beaver ponds. Use remote sensing to map heterogeneity in thermal patterns near BDA's and in control areas

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 2: Elevated Summer Stream Temperatures and Low Instream Oxygen	Bridge Creek (above West Branch) Bridge Creek (mouth) West Branch Bridge Creek Butte Creek Bear Creek	Identify, protect, and restore seeps and springs supplying cool water	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG,DEQ 319 grant, The Freshwater Trust, Trout Unlimited, Mid- Johnd Day/Bridge Creek Watershed Council, Bullet Foundation, Ford Family Foundation, Oregon Community Foundation	CA, ONDA	2022-2025		Number of springs identified, then number protected and restored. Number of spring source fenced off	Reduction in stream temp., Increase in Dissolved Oxygen levels; increase in flows from springs,	yes/no	Quantify change in volume of cool water avaiable to salmonids (volume of water <18°C 7DAM) pre and post treatment
		Maintain and increase streamflows	OWRD, Columbia Basin Transcation Program (NWIF), Freshwater Trust	OWRD, WW, CA, ONDA			Number of water right applications, Number of conserved water projects,Number of irrigation efficiency projects~~, etc. - to maintain and increase streamflows.~~	Increase in streamflows.	yes/no	Quantify reduction in stream temp., Quantify icrease in Dissolved Oxygen levels; Quantify change of increase in streamflows. Install and monitor pressure logger pre and post treatment upstream and downstream of restored reach
		Conduct additional monitoring for temperature and dissolved oxygen	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS	CA	2022-2025		Number of additional devices installed to measure/monitor temperature and dissolved oxygen.	Increase in available data on temperature and dissolved oxygen.	yes/no	Install and monitor temperature loggers pre and post treatment, install monitoring devices dissolved oxygen. Measure change in 7DAM temperature.
		Implement strategies for Critical Issues 1 (Riparian) and 3 (Streamflow)			2022-2025					

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 3: Insufficient Instream Flow	Bridge Creek (above West Branch) Bridge Creek (mouth) Rock Creek (mouth) West Branch Bridge Creek Bear Creek Butte Creek	Encourage improved irrigation efficiency projects and use of Conserved Water Act (to reduce out-of-stream demand through efficiency improvements and to protect portion of water saved instream)	CBWTP, BPA, NWPPC, SWCDS NRCS, TU	SWCD, WC	2022-2025		Number of irrigation efficiency projects installed/upgraded; quantity of water projected instream using Conserved Water Act. Number of irrigators educated on efficiency opportunities.	Increase in streamflow resulting from projects completed.	yes/no	Quantify irrigation projects installed or upgraded - VFD pumps, sprinkler nozzles, irrigation converted from gun to wheel, or wheel to pivot. Number of new monitoring stations installed;quantify the volume of water saved and estimate distance held as instream flow (volume x distance from improved POD to next downstream POD where water is removed, include water temperature of diverted water saved
		Encourage voluntary leases and transfers of existing water rights to instream use	OWRD, CBWTP, Ag groups, Columbia Basin Transaction Program (NWIF)	SWCD, WC, WW	2022-2025		Number of leases identified and then transferred. Amount of water protected instream through leases and permanent transfers of existing water rights to instream water rights.	Increase in streamflow resulting from leases and tranfers.	yes/no	Install and monitor pressure logger pre and post treatment upstream and downstream of restored reach Quantify the number of leases, and cfs recruited.
		Encourage and assist state agencies in creating additional instream water rights	ODFW, OWRD	OWRD, WW	2022-2025		Number of actions taken to encourage agencies to seek additional instream water rights.	Number of additional instream water rights applied for; number approved; increase in streamflows resulting from additional instream water rights.		Percent increase in streamflows (cfs) measured at priority WAB gages, number of agency personnel trained or hired for instream flow work.
		Implement strategies for Critical Issue 11 (Diversion Date)			2022-2025					
		Implement strategies for Critical Issue 1 (Riparian)			2022-2025					
		Implement strategies for Critical Issue 4 (Storage)			2022-2025					

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 4: Storage Needs	West Branch Bridge Creek Thirty mile Sorefoot creek Pine Hollow Bridge creek (above West Branch)	Complete a feasibility study to assess potential off-channel water-storage projects, including: (a) potential locations for storage projects; (b) water availability, including consideration of all categories of in-stream flow needs (as recognized in the Step 3 Report) and changing hydrographs due in part to climate change; (c) in-stream and out-of-stream needs for water from storage; and (d) other costs and benefits	OWRD, Oregon Cattlemens Association, Oregon Farm Bureau, Oregon Department of Agriculture, DEQ 319, USDA Rural Initiative	OWRD, SNW, WW	2022-2025		Number of applications submitted for funding feasibility study.	Study findings presented to LJDWG, JDP and community.	yes/no	Study findings presented to LJDWG, JDP and community. Number of AcreFeet of storage proposed or not proposed from study, off chanel storage sites recommended or not recommended.
		Develop off-channel storage projects as suggested by feasibility studies	OWRD, NRCS, SWCD, Watershed Councils, OCA, OFB	TBD	2022-2025		Number of projects consistent with studies implemented (if any).	Increase in water available for instream and out-of-stream needs during dry months; maintenance instream flow needs throughout the year.	yes/no	TBD based on feasibility study outcomes

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 5: Degraded Native Plant Communities	Bear Creek Bridge Creek (above west branch) Butte creek Rock creek (above Wallace Canyon), Rock creek (mouth)	Control noxious weeds	OSWB, OWEB-OS, OWEB-FIP (Butte/Thirtymile), SWCD, Oregon Cattlemans Association, Oregon Farm Bureau, ODA, National Parks (JD Fossil Beds National Monuement) ONDA, BlueMountain Land Trust, RMEF	SWCD, NRCS	2022-2025		Number of projects and acres treated to control noxious weeds.	Decrease in noxious weeds.	yes/no	Quantifiy acres treated, projects completed. Document conditions pre and post treatment by estimating density of invasive plants, note methods used
		Restore upland function by improving plant communities with juniper removal, and planting of appropriate perennial bunchgrasses, shrubs, and forbs.	OWEB-OS, OWEB-FIP for Butte and Thirtymile WS, OWEB-SG	SWCD, NRCS	2022-2025		Number of projects completed; area covered by projects.	Number of acres treated, land owners/managers participating Increase in area of healthy native plant communities.	yes/no	Identify areas to be thinned, Monitor plant density, vigor, and compostion pre and post treatment. Include 2yr survival post planting
		Implement strategies for Critical Issue 1 (Riparian)			2022-2025					

LOWER JOHN DAY INTEGRATED WATER RESOURCE PLAN: STRATEGIC ACTION PLAN

Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
PHASE II 2025-2027										
Critical Issue 6: Insufficient Efficient Irrigation Infrastructure	Alder Creek, Kahler Creek, Rock Creek (mouth), West Branch Bridge Creek, Rock creek (mouth), John Day mainstem-Heidtmann Canyon to N.Fork, Mouth to Heidtmann Canyon	Conduct outreach to irrigators about more efficient irrigation practices and systems and encourage adoption	Oregon Farm Bureau, Oregon Cattlemens Association, DEQ 319, ODA, Columbia Basin Water Transaction Program, OWEB, CWDS, NRCS, TU, National Parks (JDFBNM)	SWCD, WC	2025-2027		Workshop delivered, # Field tours	Number of irrigators educated, presence of BPA irrigation specialists providing services, Number of projects upgraded or converted.	yes/no	
		Promote utility, state and federal incentive programs for improving irrigation efficiency	Oregon Farm Bureau, Oregon Cattlemens Association, DEQ 319, ODA, Columbia Basin Water Transaction Program, OWEB, CWDS, NRCS, TU, National Parks (JDFBNM)		2025-2027		Workshop delivered, # Field tours	Presence of utility services provided through BPA .Irrigation efficiency projects implemented as a result of promotion.	yes/no	
		Replace inefficient and failing diversions and/or screens such as push up dams with new structures that maintain or improve native fish passage	ODFW, OWEB, Private Foundations		2025-2027		number of failing diversions, push up dams fixed and removed Number of diversions replaced and/or screened to improve fish passage.	Improved fish passage; fewer fish pulled into diversion works Increase (or reduced decline) in native migratory fish populations due to fish passage improvements at projects.	yes/no	
		Pipe open ditches	BOR (WaterSmart), OWRD (Water projects grants and loans), Local SWCD, EQIP NRCS		2025-2027		Linear feet piped	Amount of water conserved	yes/no	
		Replace inefficient irrigation systems with more efficient systems (e.g., replace flood irrigation with sprinklers)	OWEB, NRCS, CBWTP, BPA, Tribes		2025-2027		# projects upgraded; Number of irrigation systems replaced with more efficient systems.	Amount of water conserved for in and out of stream needs from efficiency projects; Amount of water conserved as a result of efficiency projects.	yes/no	

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 7: Inadequate Gauge Data	Bear Creek, Bridge Creek(above West Branch), Bridge Creek (mouth), Butte Creek,Thirty mile	Support maintenance of existing gauges	OWRD, USGS, ODA, Columbia basin water transaction program, Oregon Cattlemens Association, Oregon Farm Bureau		2025-2027		OWRD capacity increase and prioritization Actions taken to support maintenance of existing gauges.	Number stream gages maintained	yes/no	
		Support installation and maintenance of additional gauges at discontinued and recommended new sites	OWRD, USGS, TU, ODA		2025-2027		OWRD capacity increase and prioritization Actions taken to support installation and maintenance of additional gauges.	Number of stream new and/or restored gages installed	yes/no	

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 8: Outdated and insufficient municipal water and wastewater infrastructure	Butte Creek, Grass Valley Canyon,John Day Mainstem,Mouth to Heidtmann Canyon,Bridge Creek (above West Branch),Thirtymile Creek	Assist cities in creating and/or improving Water System Management Plan and/or Water Management and Conservation Plan that identify necessary system improvements. Assess whether these plans cover all needed improvements.	USDA Rural Intiative, local cities, local counties, State of Oregon, Oregon Community Foundation, Collins Foundation, create Local Improvement Districts, WaterSmart (BOR)		2025-2027		# of cities and municipal systems assisted	Number of plans developed	yes/no	
		Assist entities with public water and wastewater systems in funding and implementing infrastructure improvement projects	same		2025-2027		Number of cities and municipal systems assisted	Number of projects developed, wastewater treatment upgrades, gallons of water treated	yes/no	
		Support and advocate for increased communication for water conservation in public / municipal water systems and infrastructure needs	OWRD, State of Oregon Legislature, Capacity grants (OWEB), Association of Oregon counties?		2025-2027		Number of newsletters and communication material distributed by water utilities, SWCD, Watershed Councils and other related and earned media news outlets	Increase in water conservation attributable to outreach; increase in support for necessary infrastructure projects	yes/no	Number of wastewater systems funded and improved

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 9: Lack of data on condition of groundwater aquifers and interactions between groundwater and surface water	Grass Valley Canyon,Jackknife Canyon,Rock Creek (above Wallace Canyon),Rock Creek (mouth),	Conduct process based hydrologic study including how stream and groundwater flows change with land use and future climate change.	OWRD, USDA rural intittives, O Department of Geology and Mineral INdustries, Oregon Groundwater Association, Oregon Community Foundation, Ford Family Foundation, Association of Oregon Counties		2025-2027		Whether study was completed. Number of watersheds analyzed	Increase in knowledge regarding issues addressed.	yes/no	LJDWG/JDP outreach to community to share study results.
		Analyze existing groundwater data, and conduct a groundwater study in the basin	OWRD, OWEB, Gilliam, Sherman, Wheeler, Grant Counties, OCA, OFB, BOR,USGS		2025-2027		Number of groundwater studies conducted, Analysis of existing groundwater data;	Increase in knowledge re condition of groundwater aquifers and interactions between groundwater and surface water	yes/no	LJDWG/JDP outreach to community to share groundwater data,
		Establish, support and help fund additional groundwater monitoring wells and support community groundwater monitoring networks	Association of Oregon Counties, OCA, OFB				Number of additional groundwater monitoring wells installed; number of participants in community groundwater monitoring network.	Increase in knowledge re condition of groundwater aquifers and interactions between groundwater and surface water. Percent change in groundwater levels.	yes/no	Quantify % Change in aquifer levels.

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 10: Fish passage barriers	Alder Creek, Bear Creek, Bridge Creek (above West Branch), Bridge Creek (mouth), Butte Creek	Provide full fish passage (removal, repair and/or replacement) at priority artificial obstructions including culverts and dams.	USFS, BLM, OWEB, ODFW, CT of the Warm Springs and the Umatilla, SWCDS, Watershed Councils, TU, Bullit Foundation, RMEF		2025-2027		Number of priority obstructions at which full fish passage provided.	Increase (or reduced decline) in native migratory fish populations due to fish passage improvements at projects.	yes/no	Monitor, quantify fish distribution as a result of fish barrier improvements. Number of barriers improved/ removed, quantify fish presence, estimate length of stream occupied pre and post restoration; Quantify change in % survival via PIT tagging and passive redetection.
		Assist ODFW with updating list of priority fish-passage barriers if necessary	BLM, USFS, Councils, SWCD, TU		2025-2027		Number of inputs to ODFW regarding identification of priority fish passage barriers (if necessary)	Accuracy of list of priority fish-passage barriers.	yes/no	Monitor, quantify fish distribution as a result of fish barrier improvements. Number of barriers improved/ removed, quantify fish presence, estimate length of stream occupied pre and post restoration; Quantify change in % survival via PIT tagging and passive redetection.

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
PHASE III 2027-2030										
Critical Issue 11: Inadequate diversion data	Bridge Creek (above West Branch), Bear Creek, West Branch Bridge Creek,Rock Creek (mouth),Thirtymile Creek ,Butte Creek, BLM, USFS	Support additional personnel for flow and diversion monitoring and management	OWRD, ODA, NW Power Planning Council, Bonneville Power Administration, Tribes, BLM USFS, USGS, NOAA		2027-2030		Number of actions taken to support increase in personnel for flow and diversion monitoring and management.	Number of additional personnel for flow and diversion monitoring and management.	yes/no	
		Advocate for irrigator incentives for measurement of diversions, including installing measurement devices	OWRD, OCA, OFB, Association of Oregon Counties		2027-2030		Actions taken to advocate for incentives.	Number of measuring devices installed as a result of incentives obtained.	yes/no	
		Promote existing incentives for measurement of diversions	OFB, OCA, OWEB, NRCS, SWCD's		2027-2030		number of entities adopting new rules ie, all SWCD's require Actions taken to promote incentives.	Number of measuring devices installed as a result of incentives obtained.	yes/no	

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 12: Poor soil health in many of the Water Availability Basins	Grass Valley Canyon,Esau Canyon,John Day River - Heidtmann Canyon to N Fork. Rock Creek (above Wallace Canyon), Rock Creek (mouth)	Promote good vegetative cover/cover crops.	ODA< Cattlmen, Farm Bureau, SWCD, USDA NRCS		2027-2030		Actions taken, acres covered, number of actions/proejects taken to promote veg cover.	Increase in acreage/area with good vegetative cover/cover crop as a result of promotion.	yes/no	Quantify downstream habitat protected, measure sediment storage post treatment
		Promote mulch tillage, ridge tillage, zone tillage, no till, chem fallow, and CRP as ways to improve soil health, etc.)	SWCD, NRCS, ODA		2027-2030		Actions taken to promote impoved soil condition, number of acres under changed tillage practices	Increase in promoted practices resulting from promotion.	yes/no	Measure carbon uptake in soils through NRCS/SNW pilot. Quantify downstream habitat protected, measure sediment storage post treatment
		Support payment programs for landowners adopting soil carbon improvement practices and management that mitigates for greenhouse gas emissions	Ecotrust, private companies, Oregon Tilth, Climate Trust,		2027-2030		Number of projects and action taken to promote carbon sequestering	Number of projects completed as a result of payment programs promoted.	yes/no	Number of landonwers, numbers of projects, number of soil samples, carbon increased

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 13: Simplified Stream Morphology	Bear Creek, Bridge Creek (above West Branch), Bridge Creek (mouth), Butte Creek, Thirtymile Creek	Implement strategies for Critical Issues 1 (Riparian) and 3 (Streamflow)	OWEB, Councils, Tribes, Private Foundations, BPA, NWPPC, TU		2027-2030				yes/no	

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 14: Adequate surface water for wildlife	Bear Creek, Bridge Creek (above West Branch), Butte Creek, Thirtymile Creek, West Branch Bridge Creek	Conduct study regarding changes in prevalence and function of springs and causes of changes	RMEF, TU, Ruffed Grouse Society, Oregon Wildlife Society, Tribes		2027-2030		number of studies	Increase in knowledge resulting from study.	yes/no	Track spring protection and restoration.
		Implement strategies for Critical Issues 1 (Riparian) and 5 (Native Plants)			2027-2030				yes/no	

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 15: Risk of intense or catastrophic wildfire that impacts water quantity and quality	Butte Creek, Rock Creek (mouth), Thirtymile Creek, West Branch Bridge Creek, Pine Creek, Pine Hollow	Create and promote wildland urban interface buffers, and defensible space around rural homes and buildings.	Oregon Department of Forestry, USDA, OWEB, Private Foundations, Tribes, OR cattlemens assocition Oregon Farm Bureau, SWCD's BLM, USFS		2027-2030		number of acres treated, number of structure protected	Reductions (or reduced increases) in damage from wildfire as a result of projects.	yes/no	
		Increase pace and scale of forest restoration, including prescribed burning and thinning	ODF, USFS, BLM		2027-2030		Acres treated	Reductions (or reduced increases) in damage from wildfire as a result of projects.	yes/no	
		Support community wildfire response plans	ODF, USFS, FEMA, Local WC's and cities		2027-2030		Actions taken to support plans.	Reductions (or reduced increases) in damage from wildfire as a result of projects.	yes/no	Track identified actions

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 16: Insufficient data on crops, climate, and datasets to support analysis.	Bridge Creek (mouth),West Branch Bridge Creek,Parrish Creek, John Day River - Heidtmann Canyon to N Fork, John Day River - Mouth to Heidtmann Canyon	Support Agri Met station in Basin	ODA, Cattlemen, Farm Bureau, SWCD*s NRCS		2027-2030		Actions taken to support station.	Number of stations added.	yes/no	
		Support collection of additional Lidar data	NRCS, DOGAMI (State Dept. of Geology and Industries)		2027-2030		Actions taken to support collection of additional data.	Amount of additional data collected.	yes/no	
		Analyze existing data on crop and climate	AgWest (DCR), ODA, OSU (OCCI),ARS, National Agriculture Statistics Census USDA		2027-2030		Actions taken to analyze data.	Increase in knowledge resulting from analysis.	yes/no	

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 17: Degraded Forest Health	Bear Creek,Bridge Creek (above West Branch), Bridge Creek (mouth), Kahler Creek, Parrish Creek	Implement strategies for Critical Issue 5 (Native Plants)	USFS BLM SWCDS, Or Cattlemen, Oregon Farm Burea ODF		2027-2030				yes/no	
		Implement prescribed burn and thinning for forest management	ODF,USFS,FEMA, Local WC's and cities, NRCS,OWEB		2027-2030		Number of projects and acres treated.	Acres thinned/treated, projects completed. Increase in area of healthy forest resulting from projects.	yes/no	Quantify acres thinned and transpirition loss due to vegitation pre and post treatment. Record forest stand compostion pre and post treatment

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 18: Erosion and Sediment Transport/Control	Butte Creek Thirtymile Creek Bridge Creek (above West Branch) Bridge Creek (mouth) Bear Creek	Implement strategies for Critical Issue 12	NRCS, SWCD's, AG groups, ODA		2027-2030				yes/no	
		Promote best management practices for the capture and safe release of water (Water and sediment control basins, etc.)	OWRD,DEQ-319,NRCS,SWCD's		2027-2030		Actions taken to promote.	Number of projects undertaken as a result of promotion; improvements in water quality as a result of projects.	yes/no	Quantify downstream habitat protected, measure sediment storage post treatment

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Critical Issue	Priority WABS	Strategies	Funding	Team Lead	Timeline (Phase I, II, III)	Status	Implementation Metric	Effectiveness Monitoring Metric	Monitoring/Reporting (have the actions created healthier or better conditions?)	Notes on how to implement, measure, monitor and report:
Critical Issue 19: Rural and domestic well data gaps	Grass Valley Canyon Rhodes Canyon Rock Creek (above Wallace Canyon) Butte Creek Hay Creek	Conduct voluntary survey for non-municipal well users to capture issues associated with domestic water availability and quality	OWRD,OWEB?, Private foundations, USDA		2027-2030		Whether survey conducted.	Increase in knowledge regarding issues associated with domestic water availability and quality.	yes/no	
		Provide assistance or technical expertise through OWRD support on installing well level monitors.	OWRD,USGS,BOR		2027-2030		Number of people assisted	Number of monitors installed; increase in knowledge regarding groundwater as a result of increased number of monitors.	yes/no	
		Provide information on where to get well water testing kits and technical support for water quality issues	OWRD,OHA		2027-2030		Actions taken to provide information from local water district or agency or county or municipal services agency	Number of people assisted; number of tests conducted; improvements to water quality from rural and domestic wells.	yes/no	