4.4 Other Options

Expanding monitoring efforts to better understand water quantity, water quality, ecological issues, and program effectiveness is a key recommendation of the State's draft 2024 IWRS (Oregon Water Resources Department 2024). Planning groups may need to install measurement devices or include monitoring as part of plan development, or the group may recommend increasing monitoring efforts as a management tool. Place-based planning efforts could help identify additional data needs, which can include monitoring and evaluating streamflow (e.g. adding real-time capabilities), groundwater levels, water use, water quality, habitat conditions, and watershed functions. Per the place-based planning guidelines, this Plan should include a description of any current or proposed monitoring activities occurring in the watershed (Oregon Water Resources Department 2015). The Basin Study also evaluated tools involving adding snow telemetry stations to improve runoff forecasts, expanding gaging of diversions, and improving drought and hydrologic forecasting methods (Bureau of Reclamation and Oregon Water Resources Department 2019).

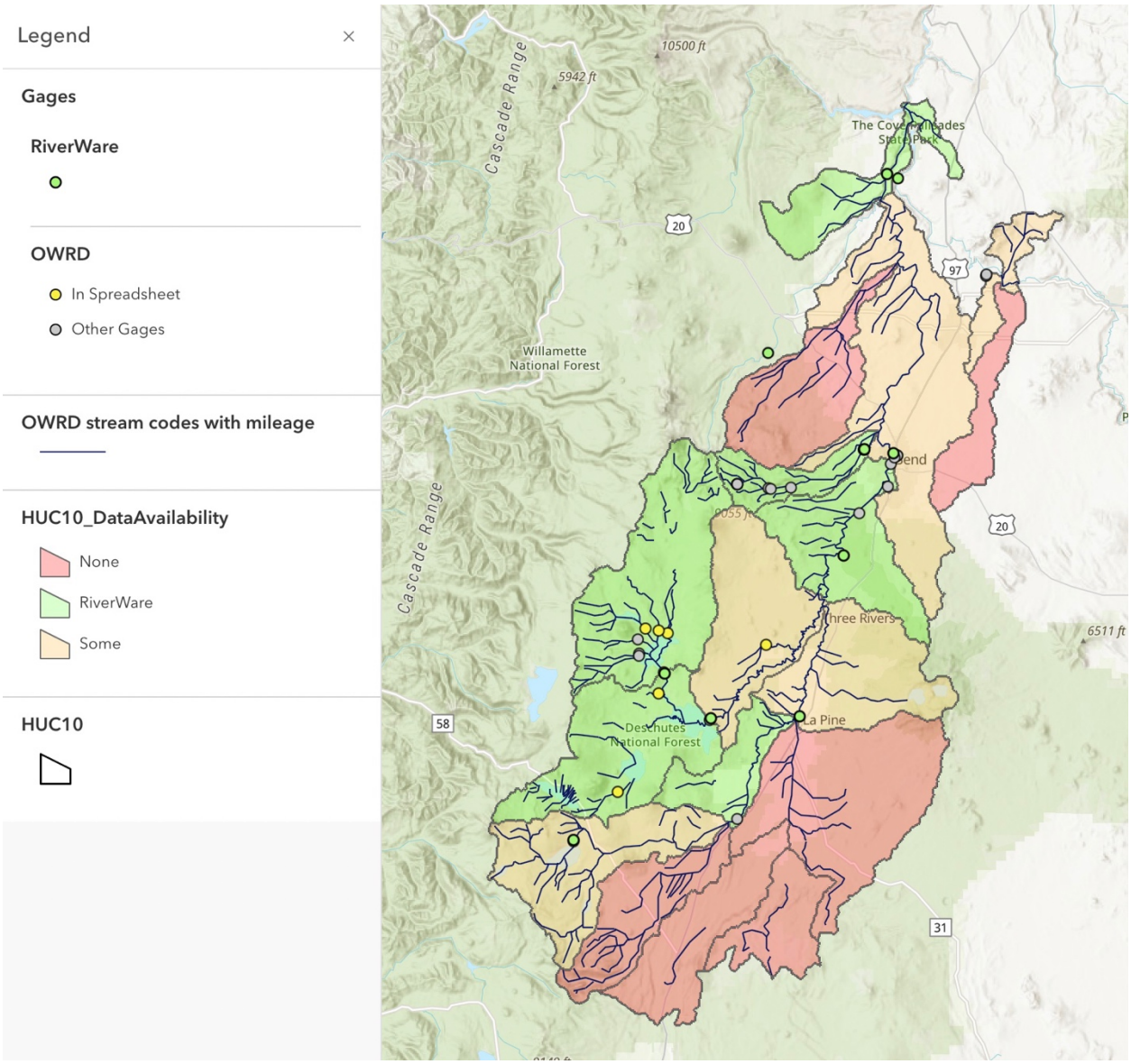
4.4.1 Measurement (streamflows/water use)

Installing measurement devices for both streamflow and out-of-stream water use allows resource managers in the Basin to track changes in surface water availability to meet in- and out-of-stream water needs in a changing climate (Oregon Water Resources Department 2024). Streamflow is measured by stream gages operated by OWRD and other entities. In reaches where no gages are present, streamflow is modeled using Riverware (described in Section 3.1.1). The coverage of stream gage and Riverware data throughout the Upper Deschutes Basin has been mapped as part of ODFW's spatial tool (**Figure 1**). In the Deschutes Basin, expansion of stream gages and/or Riverware data points should be prioritized in the HUC10 subwatersheds for which there are no data (in red in **Figure 1**). [Further analysis [can/should/will] be done to identify specific reaches, which provide habitat for critical species but for which there is no available streamflow data.]

[**Question for PT/ODFW** – should we include an analysis of where to prioritize expansion of flow data? Could agency offer assistance with this?] [Best I can do is cross-reference HUC10 data availability vs fish priority layers on spatial tool to identify overlap —> only Deep Canyon sub watershed (northwest red one) is listed as a fish priority, and even then it's priority level 3 (redound & historical use). Is this sufficient analysis for this Plan?]

OWRD's stated objective in the Draft 2024 IWRS is to continue expanding and maintaining its network of stream gages across the state to improve water resource data collection and monitoring (Oregon Water Resources Department 2024).

Figure 1. Location of stream gages, Riverware data points, and HUC10 streamflow data availability for the Upper Deschutes Basin (from ODFW spatial tool).



Improving data collection of out-of-stream water use, particularly for agricultural use as the primary user of surface water in the basin, has been identified as a priority enabling action to better meet the challenges of piping district and private conveyance systems and enabling market-based tools. Irrigation districts already measure how much water is diverted at the intake of each of their canals, but measurement can be expanded to track "beyond the POD" water use at the patron level. Measurement devices located on private laterals and farms can track water deliveries and application efficiency, respectively, and will allow any water conserved by patron activities to be accounted for water to meet both instream and irrigation uses. This is a key enabling condition to ensure that water marketing activities, which conserve water achieve their intended benefit for the river and for junior irrigation districts. Ongoing piping of district and private conveyance systems provides an opportunity to install measurement devices at those

locations. Current private lateral piping projects funded by RCPP include funding for the installation of a measurement device on XXX. Through engagement with the DBWC, the irrigation districts have an opportunity to develop, fund, and install measurement devices to better meet the water management challenges resulting from piping conveyance systems and the use of market-based tools. These efforts are best pursued initially on a demonstration basis in specific service areas and built out and improved as experience is gained and lessons are learned.

4.4.2 Plan Effectiveness

[**Question to Planning Team** – what to include here, if anything? How much time/effort to dedicate to this section?]

4.4.3 Quality assurance

[**Question to Planning Team** – what to include here, if anything? How much time/effort to dedicate to this section?]

4.4.4 Shared information

-Need information on domestic water needs
-OWRD working on updating its storage tracking reports?

[**Question to Planning Team** – what to include here, if anything? How much time/effort to dedicate to this section?]

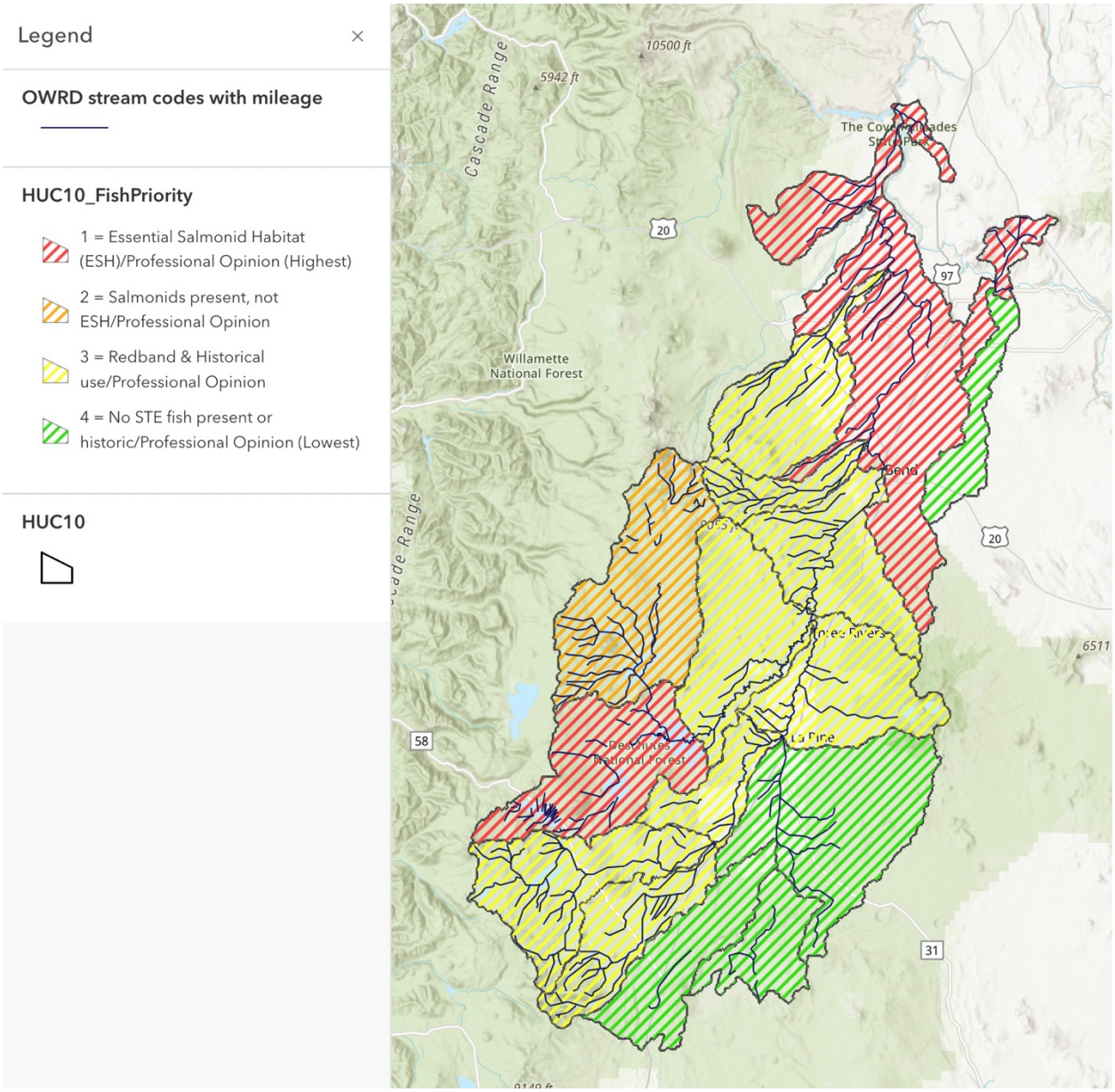
4.5 Watershed & Habitat Restoration

As discussed in Chapter 3, meeting ecological demands for water in the Upper Deschutes Basin often requires the implementation of aquatic habitat restoration activities to complement flow restoration. This includes channel modification to create instream habitat or reconnect floodplains and wetlands, reestablishment of native riparian vegetation, removal of fish passage barriers, and other strategies. Habitat restoration ties in more broadly with watershed restoration, which involves restoring natural hydrologic function of all aspects of a watershed, including forests, floodplains, wetlands, and mountain meadows in addition to aquatic restoration. As discussed in Section **Error! Reference source not found.**, watershed restoration activities can enhance the natural storage capabilities of the Upper Deschutes Basin to benefit surface and groundwater supplies, ecological health, and flood risk reduction.

4.5.1 Improve/maintain ecological health

As part of this Plan, the DBWC will work with instream/ecological representatives and agencies to identify priority areas where habitat restoration can make the greatest impact on improving or maintaining ecological health. Section 3.5 discussed the relationship between habitat restoration and flow restoration efforts, the latter of which is benefitted by the pathways described in Sections 4.1 and 4.2. At the HUC10 subwatershed scale, restoration activities should be prioritized in the subwatersheds identified by ODFW as being the top priority for salmonid habitat (**Figure 2**). This includes the Browns Creek-Deschutes River subwatershed in the upper portion of the Basin, which provides critical bull trout habitat, and the McKenzie Canyon-Deschutes River subwatershed in the downstream portion of the Basin, which provides essential habitat for summer steelhead and spring chinook spawning, and redband and bull trout migration.

Figure 2. Fish habitat priority by HUC10 subwatershed in the Upper Deschutes Basin (from ODFW spatial tool).



[A reach-by-reach analysis of priority habitat restoration activities will be conducted with assistance from ODFW, USFWS, and other members of the DBWC Ecological Needs Committee.]

[**Question to PT/ODFW for fish habitat priority** – is this level of analysis for fish necessary for this Plan? Could agency offer assistance with this, if needed? Don't think DBWC staff have the capacity to do this]

For OSF habitat, USFWS will be publishing the Final OSF Recovery Plan in May or June of 2024, which will include mapping of channel restoration and OSF habitat improvement work as part of its Recovery Implementation Strategy [this will be added once completed].

4.5.2 Utilize existing plans/efforts (e.g., Oregon Plan)

In response to the listings of salmon species under the federal Endangered Species Act, Oregon lawmakers joined landowners in 1997 to create the Oregon Plan for Salmon and Watersheds. The Oregon Plan seeks to restore salmon runs, improve water quality, and achieve healthy watersheds through the joint efforts of government, landowners, and citizen volunteers. In 1998, Oregonians passed a ballot measure to direct a portion of lottery funding for parks, watersheds, and salmon. This support was made permanent through a ballot measure passed in 2010. During the 2021-2023 biennium, the Oregon Watershed Enhancement Board (OWEB) awarded $112,186,346 for watershed enhancement projects in Oregon, $8,434,679 of which was invested in the Deschutes Basin (Oregon Watershed Enhancement Board 2023). This funding can continue to be leveraged by partners in the Upper Deschutes Basin to support watershed and habitat restoration priorities identified by this Plan.

4.5.3 Fish passage barriers/screening

Removal of fish passage barriers improves migratory salmonid species' ability to access historic spawning and rearing habitat in the rivers and creeks of the Upper Deschutes Basin. Fish passage into the Upper Deschutes Basin was cut off in the 1960s by the construction of the Pelton-Round Butte (PRB) Dam which forms Lake Billy Chinook at the downstream end of the planning area (source). Hundreds of millions of dollars have been invested in the reintroduction of anadromous fish (steelhead and salmon) above Lake Billy Chinook by providing fish passage around the PRB dam complex (source). For the first time since the 1960s, adult salmon and steelhead returned to the Upper Deschutes basin in late 2011 (source). However, returning fish numbers have been considered by many to be disappointing, highlighting the continued need for habitat restoration, protection, and additional fish passage through removal of upstream barriers.

ODFW has identified priority fish passage barriers for removal in the Upper Deschutes Basin, in addition to barriers through which fish passage has been restored or improved (**Figure 3**). The major priority barriers include the dams at Wickiup Reservoir, Crane Prairie Reservoir, and Crescent Lake, as well as two spillway dams in the City of Bend. There are also many other, smaller-scale fish passage barriers in the Basin as well (**Figure 4**). Passage barriers can include culverts, dams, bridges, road stream crossings, weirs, and natural waterfalls or gradient. There have been two culverts removed or replaced to restore fish passage along Odell Creek, but additional work will be needed to improve passage basin-wide. Fish passage barrier removal projects are funded in Oregon through OWEB Restoration Grants (which also fund other types of habitat restoration) and ODFW Fish Screening and Passage Program. At the federal level, NOAA Fisheries offers a Restoring Fish Passage through Barrier Removal Grants program as well.

Figure 3. Priority fish passage barriers in the Upper Deschutes Basin (from ODFW spatial tool).

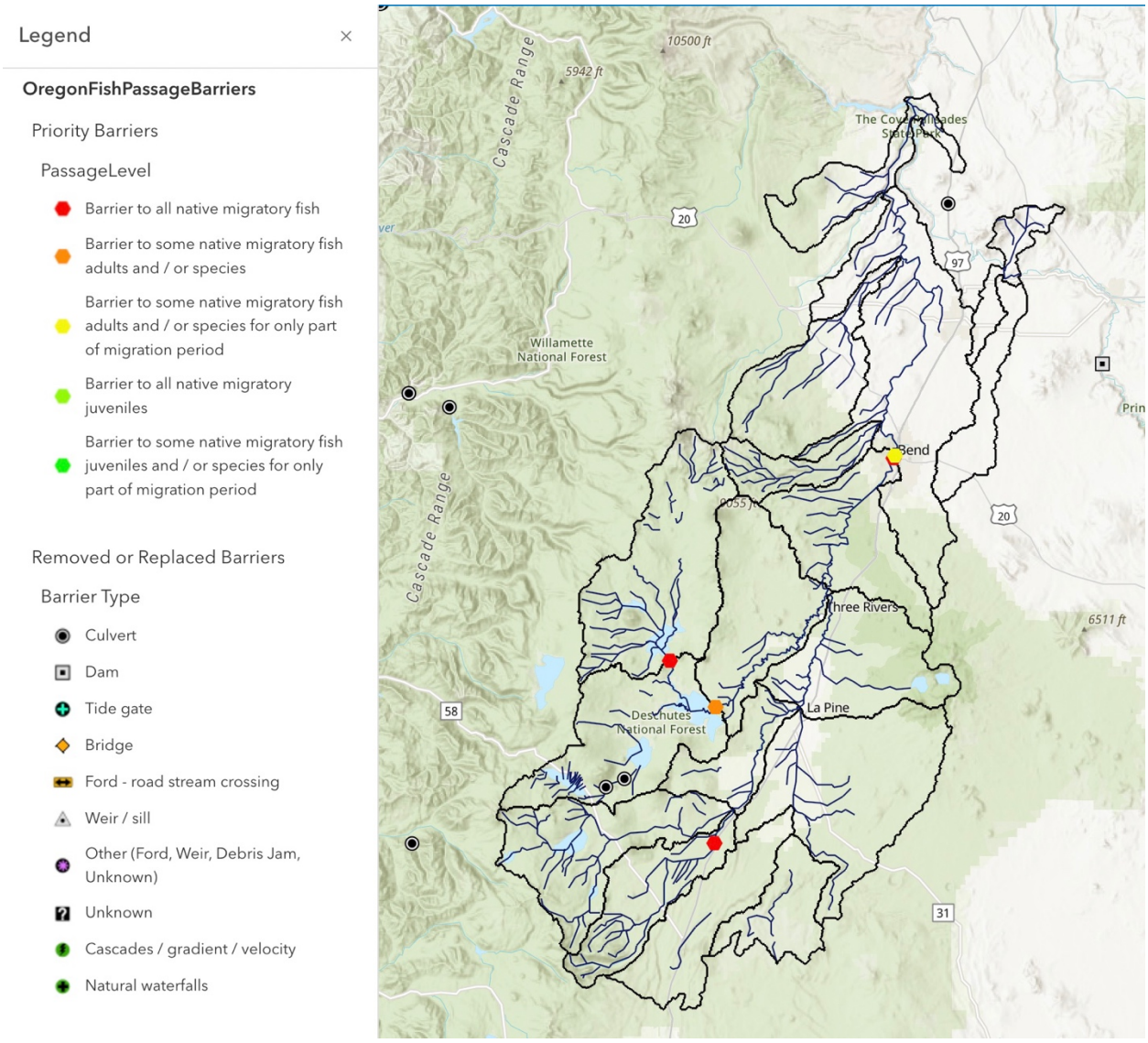
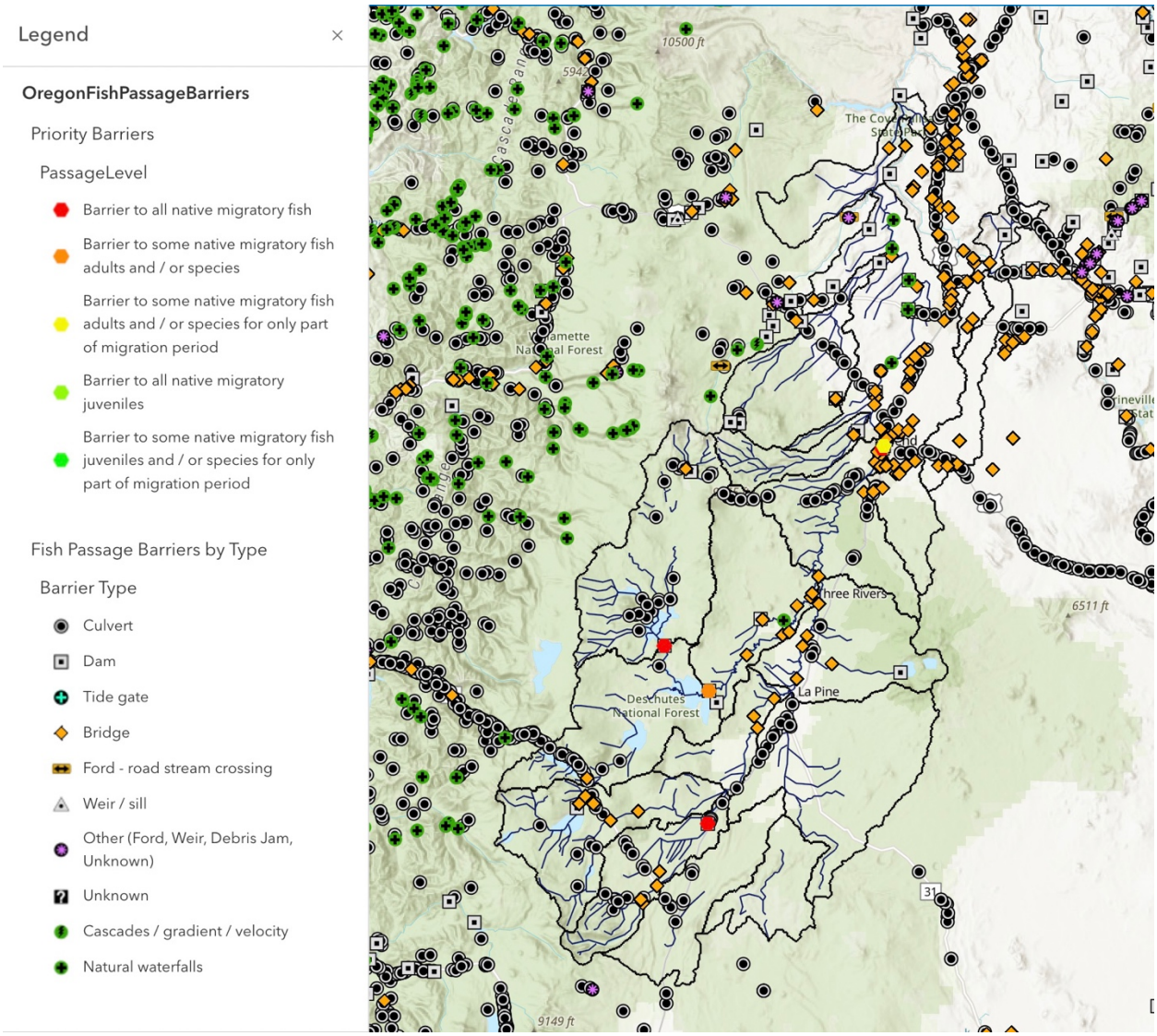


Figure 4. All fish passage barriers in the Upper Deschutes Basin (from ODFW spatial tool, note that it includes areas outside the Basin).



Structures which divert surface water from the Deschutes River into irrigation canals or municipal intake systems also pose a challenge to fish passage, as fish may unintentionally migrate up those channels if there are no screens in place to prevent them from doing so. All canals and municipal intakes have fish screens installed; however, some may need to be improved [**confirm with agricultural representatives whether this is true or not**]. NUID recently (2023) received $10 million in funding through the Bipartisan Infrastructure Law to fix or replace fish screens on its Main Canal.

4.6 Infrastructure (non-irrigation)

While many of the strategies in this Chapter are focused on irrigation infrastructure (canal and lateral piping), there is other, non-irrigation infrastructure used to collect, deliver, and store water for other uses. This section will primarily focus on municipal infrastructure, which includes

water treatment facilities, delivery systems, sewer systems, wastewater treatment and disposal (or reuse) facilities, stormwater management infrastructure, and more.

[**Question to PT/municipal representatives** – which of these areas to cover in this Plan and in how much detail?]

4.6.1 Aging water and wastewater systems

Much of the physical infrastructure to store, divert, and convey water in the Upper Deschutes Basin was constructed in the 20th century. The dams on the Upper Deschutes River were built between 1910 and 1965 and the diversion structures and canals that distribute water to the basin's agricultural lands were constructed in the early 1900s. The districts have been planning and implementing irrigation modernization efforts to upgrade and pipe their irrigation canals, as discussed in Section 4.1.1. However, the aging of the basin's water infrastructure poses a potential hazard to humans and the environment. The US Army Corps of Engineers (USACE)'s National Inventory of Dams database classifies five of the dams in the Upper Deschutes Basin as having "high" hazard potential:

- Wickiup Reservoir
- Crane Prairie Reservoir
- North Canal Diversion
- Sunriver Effluent Lagoon
- Wickiup East Dike

Emergency Action Plans must be completed by owners of all high hazard dams and sent to the Dam Safety Program and to the Oregon Department of Emergency Management. These plans outline preventative and response measures to take to ensure dam safety for any dam classified as having high hazard potential. In addition, the Oregon Legislature enacted Senate Bill 788 in 2009, which authorized OWRD to charge an annual fee for dams/reservoirs. This fee is used to support Oregon's Dam Safety Program. Dam owners have the responsibility to maintain their structures so they are not hazardous to life and property and this program provides information and technical support to them. Fees are based on the hazard rating of each dam and are assessed each year.

[**Question to PT/ag & muni representatives** – what to include here in addition to/instead of this language? Realize above language is about irrigation infrastructure and this section is meant to be about non-irrigation infrastructure. Would need information from cities to flesh out]

4.6.2 Energy efficiencies

Ongoing efforts to modernize irrigation conveyance infrastructure in the Upper Deschutes Basin can also provide energy savings in addition to water savings. Instead of relying on electric pumps, updated designs take advantage of gravity to pressurize and move water through the system. Pressurization of the District system is anticipated to increase the use of more efficient sprinkler systems versus flood irrigation systems over time, and to significantly reduce pumping energy costs to patrons and associated demand on the public utility grid (Crew 2016) [Do we hae a source quantifying how much energy could be saved, if necessary to include?]. Once canals have been replaced with pipes, pressurization in those pipes can be used to power a turbine and

generate renewable electricity. In some cases, farmers and ranchers can use that pressure to install their own small hydroelectric projects, further reducing their energy costs (source). Irrigation modernization projects in the Deschutes Basin have been led by the districts, with investments from NRCS, the Energy Trust of Oregon, and other state and federal sources. The Energy Trust of Oregon "offers key early-stage funding and strategic support to help irrigation districts and farmers update irrigation infrastructure and explore hydroelectric technology to generate clean energy, both along irrigation lines and on farms." They have partnered with Farmers Conservation Alliance to fund irrigation modernization projects in 25 districts across the state of Oregon (Farmers Conservation Alliance 2021). They also offer incentives for the generation of hydropower using pressure in irrigation pipes.

[Once irrigation canals have been fully piped, pressurization also allows districts better operational control over the movement of water through their system.]
[**Agricultural representatives** – would appreciate input on what to say here on operational benefits of pressurization, if necessary to discuss in detail]

[**Question to PT/agricultural representatives** - solar panel installation on canals was listed in outline – do we want to include? That is an option only for open-air canals]

[**Question to PT/municipal representatives** – would appreciate input from City of Bend about their hydro project, which was included in outline]

4.6.3 Recycled or reclaimed water projects

Per ODEQ's definition, water reuse is "the recycling of treated wastewater derived from domestic and industrial sources for beneficial purposes". Treated wastewater can be reused for irrigation as well as for commercial and residential applications as a way to manage wastewater and conserve potable surface water and groundwater supplies. Under OAR 340-055-0007, "it is the policy of the Environmental Quality Commission to encourage the use of recycled water for domestic, agricultural, industrial, recreational, and other beneficial purposes in a manner which protects public health and the environment of the state."

The City of Bend's Water Reclamation Facility (WRF) was constructed in 1981 to collect and treat municipal wastewater and discharge the treated effluent into seepage ponds. Citing projected increases in population, and thus wastewater influent, the City developed a WRF Plan in 2008 to improve efficiencies and expand capacity of the facility (Carollo Engineers 2008). Construction of the WRF Secondary Expansion and Efficiency Project was completed in 2016 [**confirm**], allowing the plant to treat an additional 2 million gallons of wastewater per day, bringing its total treatment capacity to 9 million gallons per day [**confirm**]. Most of the treated effluent was discharged into seepage ponds, but as of 2008 [**confirm**], some of that was reclaimed and used to irrigate a nearby golf course. The City no longer reclaims treated wastewater effluent [**confirm**], though the opportunity exists to restart its previous programs or consider new beneficial purposes for the reuse of treated wastewater. The biosolids produced during the treatment process are beneficially reused with land application to local agricultural sites (Carollo Engineers 2008).

For 45 years, the City of Redmond has utilized an Effluent and Biosolids Complex and Water Pollution Control Facility to treat, repurpose, and discharge all treated wastewater. The City of Redmond has developed plans to transition the Effluent and Biosolids Complex operation into a more sustainably and environmentally friendly treatment alternative utilizing ponds and wetlands designed to treat wastewater. Final design of the Redmond Wetlands Complex was completed in December 2022 and constructed was scheduled to begin in Spring 2023 [**confirm timeline**]. The existing complex reuses treated wastewater to produce high-quality Orchard Grass Hay and produces biosolids that are used as fertilizer on agricultural lands.

The expansion of the capacity of municipal wastewater treatment facilities in the Upper Deschutes Basin provides an opportunity to increase the amount of treated wastewater that is reused for beneficial purposes. This includes the potential for reused water to be directly integrated into irrigation canals to help meet agricultural demands. OAR 340-055 authorizes the reuse of treated wastewater for various types of agriculture, including:

- any agricultural or horticultural use;
- orchards or vineyards if an irrigation method is used to apply recycled water directly to the soil;
- processed food crops;
- pasture for animals;
- sod;
- firewood, ornamental nursery stock and Christmas trees; and
- commercial timber; and fodder, fiber and seed crops not intended for human ingestion.

The City of Bend's WRF produces Class A treated wastewater, which is the highest level of treatment and thus is allowed to be used for any of the above types of agriculture. Under OAR 340-055, any recycled water use in Oregon requires, at minimum, a National Pollutant Discharge Elimination System (NPDES) permit or a Water Pollution Control Facilities (WPCF) permit and a "Recycled Water Use Plan". In addition to agricultural reuse, treated wastewater could also be recycled for municipal uses, including irrigation of city parks or golf courses.

[**Question for PT/municipal representatives** - Redmond reuses some treated wastewater for hay, does Bend have plans for water recycling or reclamation for irrigation or municipal uses? If so, discuss here]

4.6.4 Graywater, rainwater, stormwater

Graywater, rainwater, and stormwater are other potential sources of water which, if managed appropriately, could be used for the beneficial purposes of reducing municipal demand for water or increasing groundwater recharge.

Under Oregon law (ORS 454.605), graywater includes wastewater discharged from showers and bathtubs, bathroom sinks, kitchen sinks and laundry machines. Graywater does not include toilet discharge, garbage wastes (kitchen sinks with garbage disposal units) or wastewater contaminated by soiled diapers. If appropriately collected and handled, graywater can be safely reused for flushing toilets and urinals as well as irrigating certain trees and plants. Reuse of

graywater reduces the demand on other sources of water, such as potable water, surface water and groundwater (OAR 340-053-0090).

[**Question to PT/municipal representatives** - don't see info for Cities of Bend or Redmond for graywater reuse. Should this be discussed in this Plan? Do the cities reuse that water for any other purposes or have plans to in the future?]

Rainwater harvesting is the capture, diversion, and storage of rainwater for a number of different purposes. Although water is publicly owned in Oregon, state law allows residents to collect runoff from rooftops and store it in reservoirs, rain barrels, water tanks, or other containers. For those with less than an acre of property, harvested and stored rainwater can reduce municipal water demand by providing an alternative source for irrigating landscapes, vegetables, or small fruit gardens.

[**Question to PT/municipal representatives** - don't see info for Cities of Bend or Redmond for rainwater harvesting. Should this be discussed?]

Stormwater is any precipitation that collects on and runs off the land. Stormwater runoff collects and transports pollutants and debris from both urban and rural landscapes as it moves across the land surface. As such, permits are required for municipalities to manage the stormwater drainage within their cities and annual reports are required to keep the permits. The City of Bend Stormwater Utility has two ODEQ permits for discharging stormwater through the storm sewer system – one for discharges to the river, and the other for discharges to groundwater. These permits are required by the Federal Clean Water Act and the Federal Safe Drinking Water Act. The City's Integrated Stormwater Management Program (ISWMP) describes a framework for the City of Bend's planned activities to minimize pollutants from reaching surface and groundwater sources (City of Bend 2023).

[**Question to PT/municipal representatives** – what to add here, if anything? Stormwater is managed for water quality, and although it does contribute to surface water flow and groundwater supply, there isn't any way to control that supply since it's dependent on precip?]

4.6.5 Safety (e.g., seismic, flood risk)

-Reference seismic safety from piping projects

[**Question to PT/agricultural representatives** – what to include here, if anything? Can't find info on this in SIPs or other documents about canal piping]

4.6.6 Regional partnerships

-Reference DBBC integrated piping strategy

[**Question to PT/agricultural representatives** – what to include here, if anything? Just describe integrated piping strategy?]

4.6.7 Long-term maintenance strategies

[**Question to PT/agricultural representatives** – what to include here, if anything?]

4.7 Instream Flow Protections

To ensure that the implementation of the approaches/tools described in this Chapter will have a lasting benefit to instream/ecological flow, this Plan will identify ways to "protect" those flows against potential future appropriations of surface water. Existing protections for instream flow are discussed in detail in Section 2.2.2 include instream water rights, Allocation of Conserved Water, State Scenic Waterways flows, and more.

[This section will identify other potential protections which may be able to ensure that water saved through conservation or marketing actions will achieve its intended instream/ecological benefit.]

[**Question for PT** - Do we have thoughts on the above statement? Is this the intention? DBWC hasn't really discussed any other protections for instream flow (that I'm aware of)]

4.7.1 New instream water rights

Through the existing mechanisms established by the Instream Water Rights Act and Allocation of Conserved Water (ACW) statutes, new instream water rights can be obtained to protect flows in the Upper Deschutes Basin. One of the mechanisms created by the Instream Water Rights Act allows for temporary leases, time-limited transfers, or permanent transfers of existing water rights for other uses to be voluntarily converted from out-of-stream use to instream use (OAR 537.348). In addition, there are some protested water rights which were applied for by agencies through another of the mechanisms established by the Act and which may get resolved in the future and become new ISWRs.

The expansion of water marketing pathways described in Section 4.2 could lead to new temporary and permanent instream water rights. To date, most of the water dedicated instream from market-based activities has come through the DRC's Annual Water Leasing Program (ALWP) and has been temporary in nature. That is expected to continue in the near-term, although permanent acquisitions of instream water rights could be pursued further in the future and would provide long-term instream flow protection.

Water savings could also be dedicated through OWRD's ACW program to an instream water right on the Middle Deschutes River from Bend down into Lake Billy Chinook.

[**Question to PT** – what else to add here? We have more in depth discussions of instream water right protections in Sections 4.1 and 4.2]

4.7.2 Streamflow restoration priorities

Section 3.1 describes the overall needs for instream and ecological flow restoration across the Upper Deschutes Basin. On a broad scale, streamflow restoration efforts are generally for the purpose of attempting to return the Deschutes River to a more natural hydrograph – by increasing winter flows in the Upper Deschutes (below Wickiup), which are unnaturally low due

to impoundment of water in upstream reservoirs, and by increasing summer flows in the Middle Deschutes (below Bend), which are lowered by surface water diversions during the irrigation season. The pathways outlined in Sections 4.1 and 4.2 would dedicate water to these reaches at these times of year, in addition to providing benefits to the other legs of the stool.

[PLACEHOLDER: A more detailed analysis would be required to prioritize specific reaches in which streamflow restoration should be focused. Such an analysis could identify flow amounts needed to meet instream/ecological needs (from Riverware or the modified presumptive standard) in a given reach, monitor current flows in that reach, and prioritize reaches by both the magnitude of flow restoration needed. Another criterion could evaluate priority reaches by the amount or quality of fish and OSF habitat that is has historically provided or currently does provide. Streamflow restoration actions can then be identified to improve or maintain flows in those reaches. Such an analysis would also pair with the analysis of flow restoration with reach-specific habitat restoration priorities discussed in Section 4.5.1. This level of analysis is out of the scope of this Plan, but future work could be conducted by the DBWC Ecological Needs Committee, led by ODFW and/or USFWS.]

[**Question for PT/ODFW/instream representatives** – is it worth including this? Or perhaps just adding to implementation plan as area of future work needed. Don't necessarily have capacity to do this analysis – could agencies offer assistance?]

4.7.3 Improved measurement/monitoring

As discussed in Section 4.4.1, expanding the existing network of stream gages and agricultural water use measurement devices will be needed to account for water savings from conservation and marketing activities and ensure/track their benefit to instream flow. Irrigation water use measurement devices should be installed as part of district or private lateral piping projects and on-farm efficiency improvements.

[**Question to PT** - more to add here? Seems like it's already discussed in 4.4.1. Perhaps move that here and water use measurement goes in the above section?]

4.7.4 Consult with ODFW (per ecological flow needs)

[**Question to** PT - discussed in Section 4.7.2 kind of? Necessary to add anything more here?]

4.8 Water Quality Protections

Describe relative to ecological needs and the relationship of existing and potential "protections" of water saved through implementation of approaches/tools.

4.8.1 Pollution reduction strategies

4.8.2 Nonpoint source projects

4.8.3 Source water protection

4.8.4 Toxics (e.g., nutrients reduction)

4.8.5 Education and outreach

[**Question to PT/ODEQ** – don't have much for any of these sections. What should be included and in what detail? Would appreciate ODEQ input on this as well]

4.9 References

Bureau of Reclamation and Oregon Water Resources Department. 2019. "Upper Deschutes River Basin Study."

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