4. Planning Step 4: Develop Integrated Solutions for Meeting Long-Term Water Needs

The DBWC will describe and seek to prioritize the approaches/tools below individually, identify all interdependencies between them and then attempt to integrate each into a comprehensive, detailed and forward-looking plan for Upper Deschutes Basin water management that will be implemented over a defined and realistic timeline.

4.1 Water Conservation

The water conservation option considered specific tools related to agricultural and municipal demands, including piping district canals, piping privately owned laterals, on-farm infrastructure upgrades (e.g., flood-to-sprinkler shifts in irrigation) and household improvements. Water conservation can decrease demand in particular areas, making water available to meet other water needs in the basin and possibly increasing water security for other users.

4.1.1 District canal & lateral piping

Central Oregon irrigation districts began working with private and public partners in the 1990s to reduce water losses by piping sections of their open distribution canals. This is a proven tool that capitalizes on the fact that these canals, which are dug into porous volcanic basalt, can lose up to 50% of conveyance water into the underlying aquifer. The districts then used Oregon's Allocation of Conserved Water (ACW) statute to restore instream flows to the Middle Deschutes River and key tributaries during the irrigation season, and, to a lesser extent, firm up their water supply reliability. Through the 2010s, for example, COID had permanently restored 68.47 cfs to the Crooked and Deschutes rivers through implementation of piping projects and use of the ACW statute.

Under the summary of water management options in the Basin Study, the opportunities for piping district-owned canals are described as varying widely between and within irrigation districts. Canal piping projects that the BSWG viewed as relatively more cost-effective were estimated to result in approximately 120,000 AF of water savings at total cost of $720M, or an estimated average cost of $6,000 per AF.

[*Insert photograph of pipe or piping project*]

Over the last five years, since the BSWG completed these estimates, the districts have primarily shifted the objective of their canal piping efforts away from the Middle Deschutes to improving flow in the Upper Deschutes River during the winter to help meet the requirements of the Deschutes River Basin Habitat Conservation Plan (HCP), completed in late-2020 by the US Fish and Wildlife Service (USFWS). The HCP is an agreed-upon set of conservation measures to benefit Oregon spotted frog and other aquatic species that enables continued water use through issuance of an Incidental Take Permit under the Endangered Species Act.

The HCP is intended to deliver predictability to water managers by providing certainty on a water storage, release, diversion, and return paradigm through 2050. For the most recent phase of piping activity, the districts, organized through the Deschutes Basin Board of Control (DBBC),

have worked with the Natural Resources Conservation Service (NRCS), Farmers Conservation Alliance, and other basin stakeholders to develop Watershed Plan-Environmental Assessment (EA) documents (i.e., Watershed Plans) to describe district canal and lateral piping projects and meet National Environmental Policy Act requirements. Table 1~~Table 19~~ shows the amount of water to be saved by each district under the existing Watershed Plans.

Table 1~~20~~. Water savings under existing Watershed Plans.

Entity	Project	Status	Date	Miles Piped	Water Made Available for Instream Flow (AF)
Arnold ID	AID Infrastructure Modernization Project	Final EA Approved	Aug-22	11.9	10,446
Central Oregon ID	Smith Rock-King Way Infrastructure Modernization Project	Final EA Approved	Jul-20	7.9	9,392
Lone Pine ID	LPID Infrastructure Modernization Project	Final EA Approved	Aug-21	10.9	1,600
North Unit ID	NUID Infrastructure Modernization Project	Final EA Approved	Jan-23	27.5	N/A
Ochoco ID	OID Infrastructure Modernization Project	Final EA Approved	Dec-20	16.8	2,046
Swalley ID	SID Infrastructure Modernization Project	Approved, moving to construction	Apr-19	16.6	6,172
Tumalo ID	TID Irrigation Modernization Project	Approved, moving to construction	Sep-18	68.8	15,115

The Watershed Plans align with the requirements of the federal Watershed Protection and Flood Prevention Program (PL566), making significant funding available through NRCS (which has approved each Watershed Plan based on its public review process and issuance of a Finding of No Significant Impact). The approved Watershed Plan documents for each of the six irrigation districts that utilize water from the Upper Deschutes detail where specific irrigation improvements will occur, how much water will be saved, and the future use(s) to which the water savings will be put.

The primary outcome of each approved Watershed Plan is authorization for NRCS to provide technical and financial assistance for project implementation through PL-566. Approximately 75% of the funding for the canal piping projects detailed in the Watershed Plan documents is coming (or expected to come) from NRCS through the PL-566 funding program. NRCS provides technical and financial assistance to states, local governments, and Tribal entities through this program for a range of purposes, including agricultural water management and fish and wildlife benefits.

This investment is leveraging approximately $31M in non-federal funding to provide the 25% project match, primarily from the State of Oregon. These state sources include the Oregon Water Resources Department's Water Projects Grants and Oregon Watershed Enhancement Board, primarily using funding received from the federal Pacific Coastal Salmon Recovery Fund. In addition, some districts have used the Oregon Department of Environmental Quality's Clean Water State Revolving Fund.

Unlike funding from the State of Oregon, NRCS does not require commitments of water instream under PL-566. However, primarily to satisfy the regulatory commitments made under the HCP, the Upper Deschutes irrigation districts have agreed in their Watershed Plans to restore instream an amount of water representing most of what is being saved, as described below.

North Unit Irrigation District Supply and Winter Flows in the Upper Deschutes

About half of the water savings generated by the projects NRCS has approved to-date are being shared with North Unit Irrigation District (NUID) to firm up that district's supply and proportionally reduce reliance on water that NUID historically has stored in Wickiup Reservoir for release and use in Jefferson County during the irrigation season. Winter reservoir releases will equate to the volume of actual water received by NUID from Arnold (AID), Central Oregon (COID), and Lone Pine (LPID) irrigation districts during the previous irrigation season. While the planned rates of release are detailed in the Watershed Plans and described below, this volume of water may be adaptively managed by the USFWS and released according to a different rate and schedule to provide maximum benefit for the Oregon spotted frog.

[*Insert photograph of upper Deschutes River*]

Per its Watershed Plan, AID will bypass diversion of 100% of the cumulative volume of water saved through its piping projects (up to 10,526 acre-feet when the right is in full priority) for use by NUID (Figure 1~~Figure 8~~). The other mainstem Deschutes irrigation districts have agreed to allow this volume of water to be diverted out of priority by NUID. In perpetuity, NUID will annually release from Wickiup Reservoir the volume of water equivalent to what it receives from AID at an estimated rate of 32.5 cfs to increase Upper Deschutes winter flow.

Per its Watershed Plan, COID will deliver 100% of the cumulative volume of water saved (up to 9,392 acre-feet when the right is in full priority) through the completed Smith Rock-King Way piping projects for use by NUID (Figure 2~~Figure 9~~). COID will spill the volume of water it shares from the bottom of its system into NUID's canal at a location slightly southeast of Terrebonne. The other mainstem Deschutes irrigation districts agree to allow this volume of water to be diverted, spilled, and used out of priority by NUID. In perpetuity, NUID will annually release from Wickiup Reservoir the volume of water equivalent to what it receives from COID at an estimated rate of 29.4 cfs to increase Upper Deschutes winter flow if released steadily throughout the storage season.

Figure 18. Arnold Irrigation District canal piping pathway diagram.

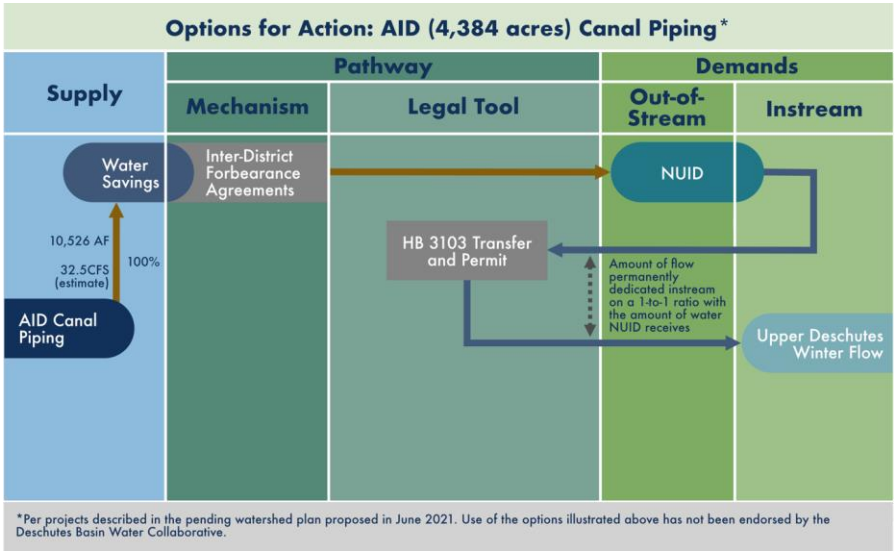
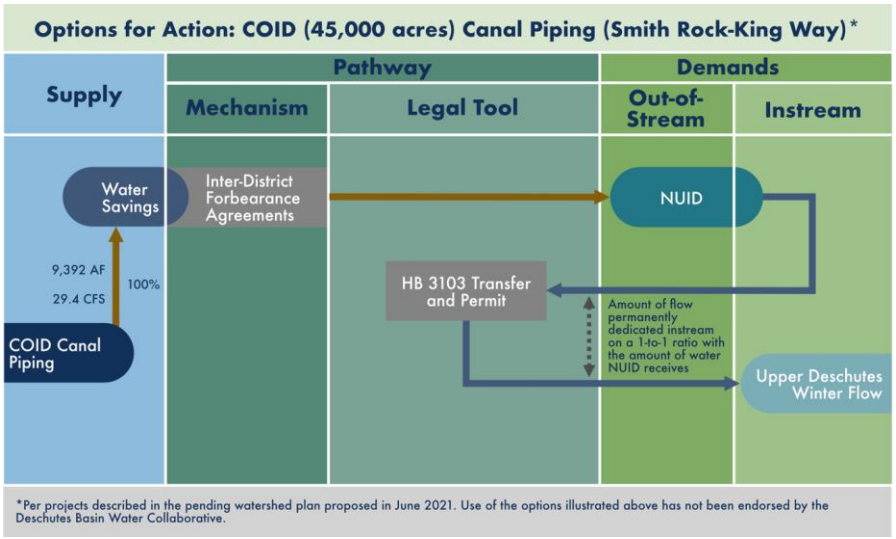


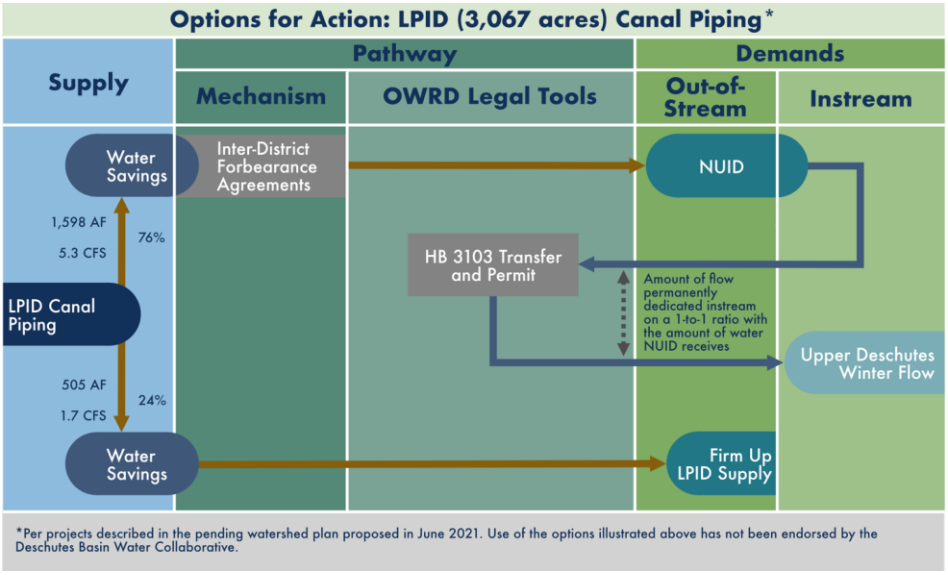
Figure 29. Central Oregon Irrigation District canal piping pathway diagram.



Per its Watershed Plan, LPID will bypass diversion of 76% of the cumulative volume of water saved (up to 1,598 acre-feet when right is in full priority) through its piping projects for use by NUID (Figure 3~~Figure 10~~). The other mainstem Deschutes irrigation districts have agreed to

allow this volume of water to be diverted out of priority by NUID. In perpetuity, NUID will annually release from Wickiup Reservoir the volume of water equivalent to what it receives from LPID at an estimated rate of 5.3 cfs to increase Upper Deschutes winter flow.

Figure ~~3~~10. Lone Pine Irrigation District canal piping pathway diagram.



In sum, AID, COID, and LPID will save up to 21,516 AF of water annually through the piping projects detailed in each approved Watershed Plan that will be shared with NUID. The proportional discharges from Wickiup Reservoir by NUID will be achieved through an OWRD approved transfer adding instream as a beneficial use and issuance of a secondary use of storage right to release the stored water and put it to instream use in the winter months. This policy approach was developed due to the limitations on Oregon's ACW statute that prohibit it from being used to achieve the winter instream flow objective identified by USFWS.

These releases will contribute to compliance with the HCP goals by increasing alignment over time of water operations with the life-history needs of covered species. The winter minimum flow from Wickiup is 100 cfs for the first seven years of the HCP, then increases to 300 cfs for years 8 through 12, and finally increases to 400–500 cfs for the remainder of the permit term (years 13 through 30).

Winter flows in the Upper Deschutes River are an essential element to the HCP, because, historically, that was the time of year when water was stored in the reservoirs, which reduced the downstream river flow to such low levels that fish and wildlife (specifically the Oregon spotted frog) were stranded or killed. Providing these winter flows and increasing them over time to allow for the system and species to adapt, will provide better year-round habitat for fish and wildlife in

the Upper Deschutes River for the first time since the reservoirs were constructed over 80 years ago.

Finally, NUID expects to save up to 6,089 AF of water annually upon completion of the projects detailed in its Watershed Plan (finalized in January 2023). Three-quarters of the water savings will eventually be used to shore up district supply each year while 25% will be released from Wickiup Reservoir to help meet flow requirements detailed in the HCP.

LPID Supply and Irrigation Season Instream Flows

A portion of the water saved (505 AF) by LPID, all the water saved (6,172 AF) by Swalley Irrigation District (SID), and (15,116 AF) by Tumalo Irrigation District (TID) will go to other uses. The smaller share of LPID's saved water will firm up patron supply on existing irrigated lands. The entirety of SID's water savings will be put through OWRD's ACW Program, with 75% of it permanently improving instream flows in the Middle Deschutes River during the irrigation season and 25% used to firm up the district's supply (Figure 4~~Figure 11~~). Similarly, TID's saved water will be put through the ACW, though all of it will be used to permanently improve instream flows on Crescent and Tumalo creeks and protected through the Middle Deschutes (Figure 5~~Figure 12~~). TID intends to dedicate a portion of the saved water as an instream water right on Crescent Creek in fall and spring at a rate and volume determined by the USFWS. The remaining portion of saved water will be allocated at a variable rate and volume as an instream water right on Tumalo Creek during the irrigation season.

Figure 4~~11~~. Swalley Irrigation District canal piping pathway diagram.

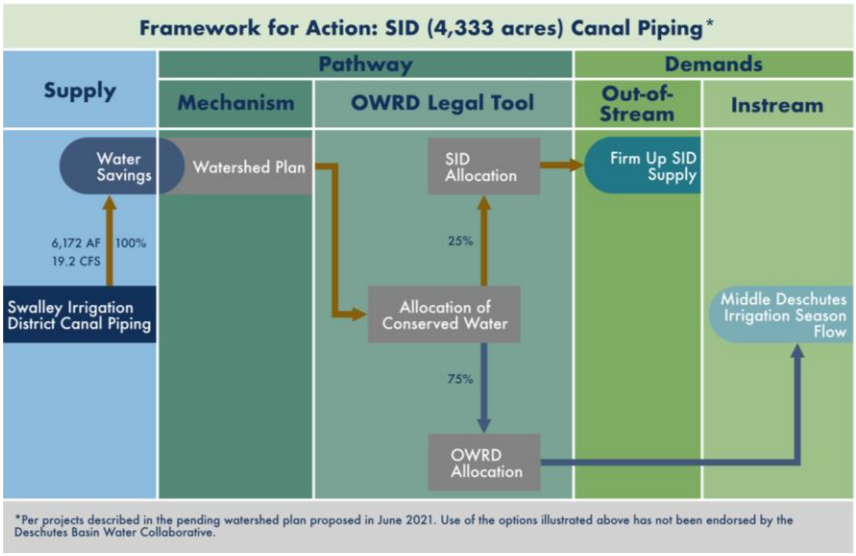
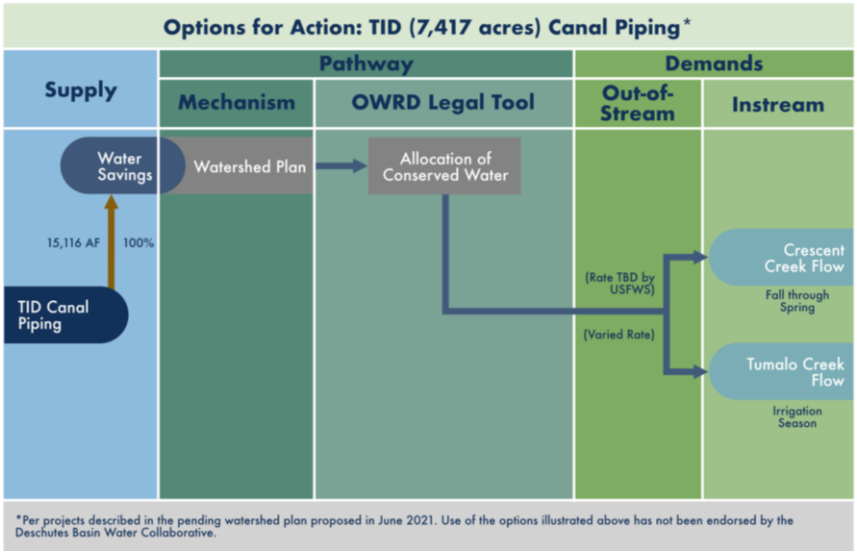


Figure 5~~12~~. Tumalo Irrigation District canal piping pathway diagram.



Anticipated Outcomes

Irrigation district canal piping efforts will benefit the agricultural and instream legs of the three-legged Deschutes basin stool. Depending on whether COCO's case for winter mitigation credits is accepted by OWRD and other stakeholders, these efforts may also benefit the municipal leg of the stool. LPID, SID, and NUID patrons will benefit from increased water supply reliability on existing water-righted acres, the latter from both its own piping efforts as well as the water savings shared with it by AID, COID, and LPID that result from their completed projects. Winter flow on the Upper Deschutes will increase through NUID's releases from Wickiup Reservoir. This reservoir management change also means that in a typical year artificially high flows on the Upper Deschutes in the summer months will be reduced by a similar amount to the winter releases, resulting in a more balanced annual hydrograph for the reach between Wickiup and Bend. Water savings generated by SID will improve summer flows on the Middle Deschutes below Bend and TID's water savings will improve instream flow on Crescent and Tumalo creeks and the Middle Deschutes during the irrigation season and during the shoulder seasons.

Future COID Piping Projects

Besides COID, the other five mainstem Deschutes irrigation districts have detailed all their planned piping projects in each respective Watershed Plan. COID, on the other hand, is in the planning stages for Phases 2-14 of the Pilot Butte Canal piping projects. COID estimates that these projects will cost $250M, with receipt of $187.5M in PL-566 funds anticipated through NRCS and the remaining $62.5M coming from required match sources. If necessary, COID could pursue funding from additional sources other than just OWRD and OWEB for their next project phases given the substantial cost of the project.

[*Insert table from DBBC detailing COID phases 2-14 of canal piping project*]

The volume of water expected to be saved through these piping projects would allow COID to share up to an additional 126 cfs with NUID, spilling the water at the bottom of its system into NUID's canal. Once these COID projects are complete, up to 212.4 cfs will be shared with NUID by the three participating irrigation districts. This shared water will substantially contribute to the HCP flow targets through year 12 and still provide about half of the ultimate flow target of up to 500 cfs.

Because of the large magnitude of the planned federal funding request, COID is required to complete an Environmental Impact Statement (EIS) instead of an EA for the remaining phases of the Pilot Butte Canal piping projects. The regulatory requirements for an EIS are more detailed and rigorous than the requirements for an EA. Further, the EIS process will provide ample opportunity for interested stakeholders to inform the planning process by commenting on COID's proposed projects.

Implementation Obstacles

While the approved canal piping projects are moving forward per the details of each approved Watershed Plan, there are a few existing obstacles to implementation. First, project budgets have grown due to inflation-related price increases on labor and materials. These increases have made securing sufficient match more difficult as well, resulting in the potential for budget shortfalls. Second, in the urbanized areas within the boundaries of both AID and COID, resistance from local residents has made project implementation more challenging. Finally, specific to LPID, NRCS must approve a new bridge over the Crooked River to carry the planned piping. The DBBC anticipates being able to address each of these obstacles as it moves towards project completion.

Issues Flagged for Stakeholder Consideration

Commented [KF1]: Note that some of the below is in flux through conversations between OWRD/DBBC and others

Consensus is lacking amongst stakeholders regarding whether and how AID's, COID's, and LPID's water right should be modified to reflect the water savings resulting from a completed piping project. At this point, DBBC's plan is that the water informally shared with NUID in a given year under the terms of the Watershed Plan documents will remain part of each district's underlying water right. Unless AID, COID, and LPID decide to legally reallocate their water savings to NUID and reduce their water right certificate by a corresponding amount, they will likely require new authority deeming informally shared water as being beneficially used in order to avoid the potential risk of a partial water right cancellation order.

Concurrently, since the shared water won't be put to beneficial use consistent with the terms of each of the three participating district's water rights and priority dates, all the districts have agreed to allow NUID to receive and use it out of priority. The structure, duration, and timing of the water sharing are detailed in existing or forthcoming inter-district agreements. In the future, a re-established Deschutes Water Bank, with requisite authorities in place, may be used for

administration and legal distribution of water to NUID in exchange for winter releases from Wickiup Reservoir.

NUID will subsequently release an equivalent amount of water that it informally receives from AID, COID, and LPID in a given year. NUID will seek OWRD's approval of a transfer adding instream as a beneficial use as well as issuance of a secondary use right to release the stored water and put it to instream use in the winter months. LPID will allocate 24% of the water it saves through its piping project to firm up patron supply on the lands described in its existing water right. This water cannot be applied to new lands not currently described on the water right without use of the ACW Program. Any issues associated with making available water saved through SID canal and lateral piping to instream flow during irrigation season (75%) and to firm up district supply (25%) will be addressed by the district with OWRD through the ACW. Likewise, any issues associated with making available water saved through TID canal and lateral piping projects to instream flow during the shoulder seasons on Crescent Creek, Little Deschutes River, and Deschutes River (47%) and during the irrigation season on Tumalo Creek (53%) will be addressed by the district with OWRD through the ACW.

Central Oregon Cities Organization (COCO) has asked the DBWC to consider the opportunity to put a portion of restored winter water into a water bank to serve as future mitigation credits that address the seasonality of impact issue. COCO asserts that this should be considered given the overall net positive benefits of the DBWC's integrated plan on water availability. Upper Deschutes municipalities intend to provide more information to the DBWC regarding the basis for groundwater mitigation credits being generated from restored winter flow.

4.1.2 Private Lateral Piping/On-farm Irrigation Efficiency Projects

Private laterals are used to convey water from district-owned canals and laterals to privately owned properties. Under the summary of water management options in the Basin Study, it was estimated that approximately 35,000 AF/year could be saved through piping of COID's private laterals at an average cost of $1,000 per AF (with other districts expected to have similar costs).

On-farm infrastructure upgrades include approaches such as converting from flood irrigation to sprinklers. Referencing data developed by Farmers Conservation Alliance (FCA) in 2017, the Basin Study estimated that approximately 65,000 AF could be saved annually through on-farm infrastructure improvements at an average cost of $9,700/AF. However, it was also estimated that about half this amount of water, 30,000 AF/year, could be saved from the most cost-effective COID and NUID on-farm projects at an average cost of $4,000 per AF.

To date, most of the effort and investment in irrigation infrastructure improvements has been focused on piping the districts' main canals. This has primarily occurred because larger volumes of water savings can be generated through single projects, and the districts' sole control over their conveyance infrastructure creates a comparative ease of project implementation. On the other hand, piping private laterals and implementing on-farm upgrades typically requires action and/or agreement by multiple private landowners and can require more complicated and uncertain pathways to using this water to help meet the needs of other districts or the river. The most effective efficiency improvement projects involve all landowners on a single private lateral

in order to both maximize the amount of water savings generated, as well as enable the district's efficient management and conveyance of the pressurized water to participating patrons. Ideally, these project areas are also tied into a segment of district main canal that has also already been piped to enable pressurization of supply and improve water accounting and delivery of the water savings to other designated uses.

Historically, a limited amount of water savings has been generated through private lateral and on-farm efficiency projects that has then been made available to meet other water demands in the basin. Rather, much of the has been implemented to improve district and patron water supply reliability, particularly within NUID, which has faced the biggest delivery reductions due to the district's relatively junior priority water right.

However, several public and private entities are currently collaborating with COID to demonstrate the efficacy of generating and accounting for water savings through lateral piping and on-farm efficiency projects. Under NRCS's Regional Conservation Partnership Program (RCPP), a group of partners including DRC, COID, and the Deschutes County Soil and Water Conservation District are implementing a project called *Smith Rock Irrigation Modernization & Conservation*. The project area is located northeast of Redmond in the Smith Rock-King Way area, where COID recently piped 7.9 miles of their Pilot Butte Canal. The stated objective of the RCPP is to pipe open-earth laterals and implement on-farm efficiency upgrades that will conserve water in COID that can be accounted for by project partners. The long-term goal of the project is to demonstrate the potential for creating a fully piped and pressurized system that is operable on-demand, thereby maximizing water conservation opportunities and facilitating the use of market-based tools. Projects are being primarily funded by NRCS, with additional funds provided by Deschutes County (received through the American Rescue Plan Act) and by OWRD through a Water Projects Grant.

[*Insert project highlight box*]

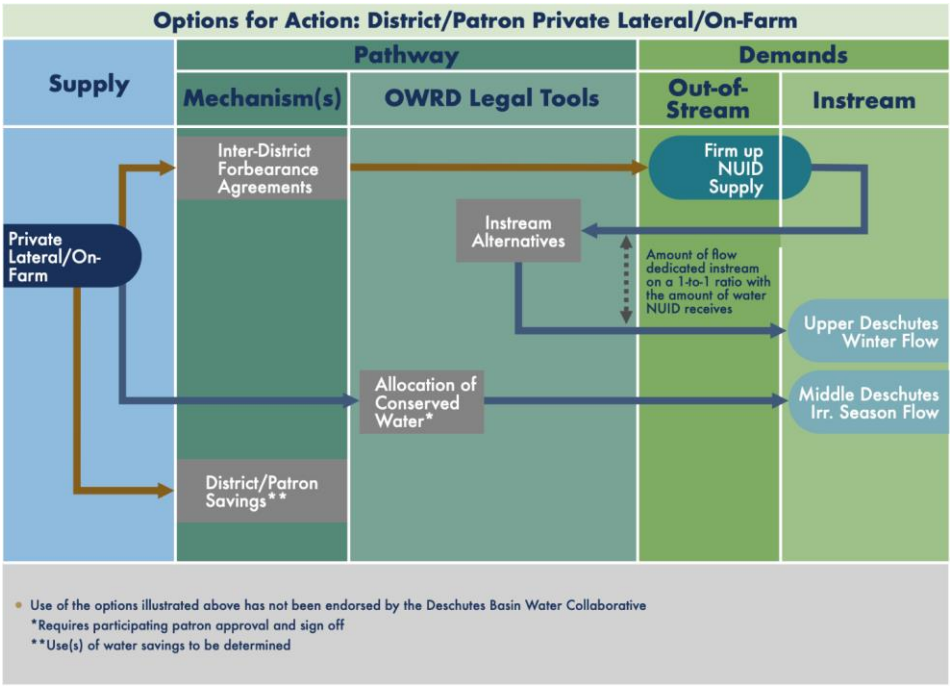
Potential Uses of Water Savings

Since the focus of the RCPP is primarily on accounting for water savings resulting from the pilot projects, little has been determined regarding use of these and potential future savings resulting from piping private laterals and implementing on-farm irrigation application improvements. The RCPP proposal described that the objective of the initiative was to increase water supply for NUID, and allowing NUID to then use stored water to increase critical winter flows in the Upper Deschutes (as is primarily being done with savings resulting from main canal piping projects). However, no saved water has yet been delivered to NUID.

Water savings could also be dedicated through OWRD's Allocation of Conserved Water (ACW) program to an instream water right on the Middle Deschutes River from Bend down into Lake Billy Chinook (Figure 6~~Figure 13~~). However, current district policies only allow use of the ACW program for district owned conveyance projects. Further, due to the Deschutes Groundwater Mitigation Program rules, these non-consumptive water savings could not be allocated through the ACW program to another water user as consumptive use without mitigation of the new use.

Thus, using water savings for irrigation could only happen as a result of a district and patron informally shoring up their supply reliability with savings generated from these projects.

Figure 6~~13~~. District/patron private lateral/on-farm efficiency pathway diagram.



Anticipated Outcomes

In the near-term, of the water anticipated to be saved through these projects, very little will be available to meet other uses in the Upper Deschutes. A more realistic short-term goal is for COID and its RCPP partners to demonstrate the efficacy of measuring and accounting for water savings generated from investments in piping private laterals and improving on-farm application efficiency. Partners can then seek to build off the RCPP pilot to fully pressurize select private laterals and upgrade on-farm irrigation application systems and begin sharing or reallocating the water savings to meet other basin needs, in particular additional supply for NUID in exchange for winter releases from Wickiup Reservoir. This water would benefit water-short NUID farmers and help DBBC achieve its HCP obligations. The fully pressurized systems would contain sufficient measuring devices to account for water savings as well as automated delivery regulating systems like SCADA to efficiently distribute water to the intended use(s). Such technology would also enable the use of market mechanisms, particularly temporary water sharing, by enabling districts to track individual patrons' water use and easily shut off delivery to a patron who is participating in some type of marketing agreement.

Broader Implementation Obstacles

COID has described the challenges of administering and managing the water saved from piping private laterals and improving on-farm efficiencies. More specifically, it has pointed to the challenge of accurately quantifying and delivering water savings to other uses (both the rate at any moment and the overall volume during an irrigation season). COID has also described the additional time and cost required to manage varying water supply amounts to specific parcels across their district that have different rates and overall volumes of water use. In addition, the RCPP project sponsors have indicated that the current group of participating landowners are primarily interested in increasing their water supply reliability in improving their on-farm irrigation systems. Thus, potential lack of landowner willingness to share water savings for alternative uses could be an obstacle to their participation in publicly funded projects whereupon the objective is to generate water savings that can be shared to meet other demands under the three legs of the stool. Nonetheless, some patrons have expressed a desire to use less water than currently delivered to them, creating potential opportunities for this water sharing approach.

Issues Flagged for Stakeholder Consideration

Oregon Revised Statute 545.287 authorizes irrigation districts to "construct or maintain improvements" for the distribution or delivery of water to any tract of land within a district. Further, district boards "may levy and collect an assessment upon all tracts specially benefited by the improvement." DBBC does not encourage districts to proactively make improvements themselves without landowner approval, instead favoring voluntary, patron-driven initiatives. Therefore, the irrigation districts can engage with the DBWC and key basin stakeholders to encourage and support water saving projects developed and implemented by patrons. In particular, district boards can develop, fund and install SCADA and measurement devices to better meet the water management challenges resulting from pressurizing private laterals and on-farm irrigation systems. These efforts are best pursued initially on a collaborative, demonstration basis in specific service areas, starting with the RCPP project area. The districts can consider and apply the lessons learned as they seek to fully pressurize one or more private laterals and all parcels receiving irrigation water.

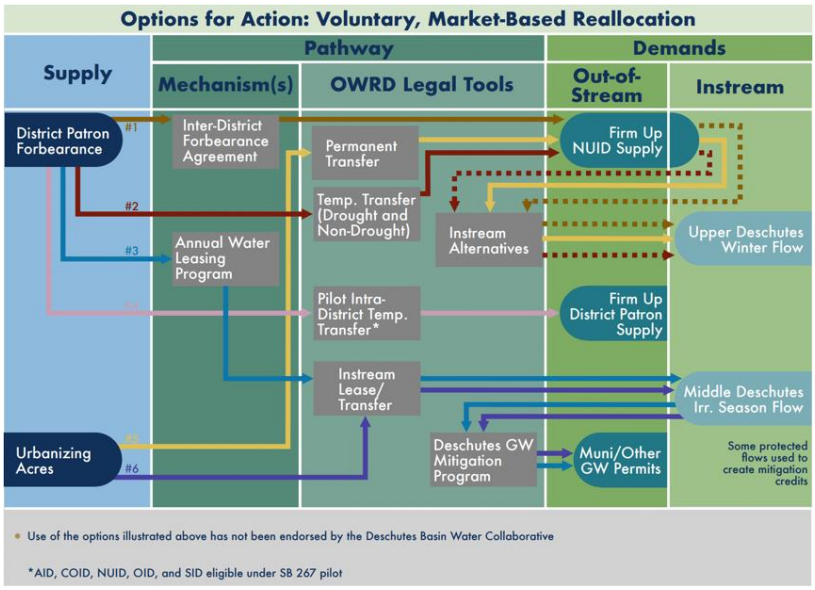
4.2 Market-Based Approaches

Under the summary of water management options in the Basin Study, the market-based option considers the use of price incentives to promote efficient water use and make water supply available to other users and uses. Tools relevant to Upper Deschutes irrigation districts and patrons include the 1) temporary lease of water rights (fallowing acres on an annual or multi-year basis), 2) voluntary duty reduction (incentives to reduce water use per acre), and 3) permanent sale of water rights (transferring irrigation water rights off appurtenant acres in perpetuity) (Figure 7~~Figure 14~~).

Market-based approaches can effectively decrease consumptive demand in one area, making water available to meet other needs in the basin, such as moving it from one irrigator to another, or keeping it instream to improve flow and create mitigation for groundwater users. Assuming district and patron willingness, the Basin Study estimated that market-based approaches provide an opportunity to permanently save up to 160,000 AF of consumptively used water at a total cost

of $65M, or an estimated average cost of $400 per AF. (The unit cost of this estimated amount of "economically available" water is based in part on a discount rate being applied to temporary costs to generate a permanent value). The districts have raised concerns about their ability to administer and manage their conveyance systems over time if this volume of consumptive use water is shared to meet demands outside of their boundaries. Thus, market-based tools should also be integrated with current efforts to pipe the district's canals and laterals (including private laterals), complete with installation of supervisory control and data acquisition (SCADA) systems and measurement devices, to address and manage the challenges with distributing and accounting for water to meet both instream and irrigation uses.

Figure 7~~14~~. Market-based reallocation pathway diagram.



4.2.1 Temporary Water Leasing

For a quarter century, DRC has worked with willing irrigation districts and individual water users to administer an annual water leasing program (AWLP) in the Upper Deschutes (pathway #3). When water is leased instream through OWRD, it is protected with the same priority date as the original water right – providing significant instream benefits to the Middle Deschutes River between Bend and Lake Billy Chinook, Tumalo Creek, and other reaches throughout the basin. In addition to the flow benefits, an instream lease satisfies the beneficial use requirements that prevent the water right from being subjected to potential forfeiture if not used for irrigation, benefiting the patron and the district. On average, water rights holders are paid $7 per acre-foot to participate in a lease, but half of the AWLP's instream leasing participants donate their water at no cost.

Eligible district patrons have the following leasing options available to them:

- Five-year lease (with annual option to opt out);
- One-year standard lease; and
- Split season lease (water used instream part of the season).

Participating districts determine patron eligibility to participate in the AWLP and some districts limit the annual volumes that can be leased instream.

Over the past 25 years, an average of x cfs and y AF has been temporarily restored instream to the Upper Deschutes during each irrigation season. On average, approximately $z have been invested through the AWLP, with funding provided from Avion Blue Water Program, Bonneville Environmental Foundation (BEF), the Columbia Basin Water Transactions Program (CBWTP), Deschutes Brewery, and Oregon Watershed Enhancement Board (OWEB). DRC also maintains a groundwater mitigation bank through which it generates temporary credits based on restored flow that it sells to parties needing mitigation credits, generating revenue for future leasing efforts.

In addition to helping meet the instream leg of the stool, water can be temporarily moved within (pathway #4) irrigation districts to improve irrigation supply reliability of existing patrons on their water-righted acres. AID, COID, NUID, OID and SID all have pilot authority from OWRD to temporarily transfer water from one patron to another within each district during the irrigation season. Such a temporary transfer would be expected to result from one patron compensating another for the use of their water to improve supply reliability in a given irrigation season. Like with an instream lease, the temporary movement of water between water users also requires approval of the relevant irrigation district board.

OWRD also authorizes water to be temporarily moved from the patron of one district to the patron of another district with the approval of both irrigation district boards (pathway #2). OWRD's temporary transfer process can be cumbersome to use for an annual lease of a water right across districts. Thus, the agency has developed a quicker, easier process to use during a drought declaration when patron demand for additional irrigation water might be greatest. Both the drought and non-drought processes formally reallocate water temporarily between patrons from different districts. This is distinct from the informal forbearance of water by the patron of one district for use by the patron of another district as has recently occurred under the pilot water bank developed by COID and DRC to temporarily share water with NUID patrons in conjunction with partial (25%) winter releases from Wickiup Reservoir (see summary below).

4.2.2 Duty Reductions

Despite being highlighted under the Basin Study, OWRD does not currently authorized "partial-duty" leases or transfers. Thus, any effort to share water derived from diverting and applying less to specific parcels over the course of an irrigation season would need to occur informally. This approach could potentially be developed further as part of the nascent Deschutes Water Bank (see below).

4.2.3 Permanent Water Transfers

Compared to temporary leases, the permanent reallocation of water instream (pathway #6) or within and across irrigation districts (pathway #5) has been limited to date (primarily due to the lack of support by district boards based on administrative and management concerns). If board support exists, OWRD is authorized to approve the permanent transfer of water from a district's historical point of diversion to a dedicated instream water right, downstream through the Middle Deschutes River, or from one place of use to another.

Earlier in the DRC's history, a memorandum of understanding (MOU) was developed with COID and SID to permanently transfer instream a small portion of the two districts' overall water rights that were appurtenant to acreage that had been converted from agriculture to residential development in Bend and Redmond. COID permanently transferred nearly 38 cfs instream in the Middle Deschutes by selling the water rights appurtenant to 2,166 urbanized acres. In addition to the purchase price paid for the water rights, payment in the form of "exit fees" were made to the two districts to offset the corresponding reduction in future patron assessment fees. The resulting instream water rights were also the basis for the issuance of permanent groundwater mitigation credits for the City of Bend and Avion Water. These transfers occurred through an earlier iteration of Deschutes Water Alliance's Water Bank, administer by the DRC, which faded as concerns rose within the districts about the potential impacts of additional permanent instream transfers on water rights administration and management.

OWRD also authorizes the permanent transfer of water rights either within or across the Upper Deschutes irrigation districts with board(s) approval (pathway #5). Such transfers would involve a change in the point of diversion and place of use, with the original priority date remaining intact for the recipient district/patron. Demand for more senior and reliable water rights exists in the Upper Deschutes, particularly from NUID farmers who have seen a decrease in their irrigation water supply under recent drought conditions due to their relatively junior priority date. However, reluctance from the more senior irrigation districts to permanently reduce their supply and water right certificates has precluded such transfers from occurring. Instead, the districts are temporarily sharing water with NUID, primarily water saved through canal piping projects with the potential to share lateral and on-farm savings and consumptive use water made available from annual irrigation forbearance agreements.

In the near-term, DRC and DBBC are rebuilding the Deschutes Water Bank, initially focused on allowing for the temporary sharing of forborne consumptive use water from willing COID patrons to NUID. If political support increases for authorizing the permanent reallocation of water rights through OWRD's transfer processes, particularly from acreage that has experienced residential development, the mechanism could be a cost-effective tool for increasing instream flow in the Middle Deschutes River in perpetuity and potentially issuing groundwater mitigation credits for municipalities and/or increasing water supply reliability for NUID patrons and releasing water from Wickiup Reservoir in the winter as required under the HCP.

Both private and public funding sources could be readily accessed to cover the cost of a water purchase and any associated exit fees required to keep the participating district whole. Funding from private entities like BEF and public programs such as the CBWTP and OWEB's Water

Acquisition Program would be invested with the primary objective of restoring flow to the Middle Deschutes in summer and the Upper Deschutes in winter. Other public sources like the NRCS PL-566 program could be a potential source of funding with the primary objective of enabling NUID to improve its water supply reliability while simultaneously meeting the requirements of the HCP. Finally, private and public water suppliers would be interested in purchasing permanent mitigation credits derived from the transfer of water to the Middle Deschutes in perpetuity.

AID is currently demonstrating the efficacy of this approach as it transfers portions of its water right from remnant parcels that have been urbanized to instream water rights on the Middle Deschutes Rivers to serve as the basis for permanent groundwater mitigation credits.

4.2.4 Groundwater Mitigation Credits

As described in Section 3.2.2 and further considered in section 4?, the Deschutes Groundwater Mitigation Program was developed to provide for new groundwater uses while maintaining scenic waterway and instream water right flows in the Deschutes Basin. To date, the most effective and utilized approach for generating mitigation credits has been through the temporary lease or permanent transfer of the consumptive use portion of existing water rights. Under the earlier version of the Deschutes Water Bank, the portions of COID and SID water rights transferred instream from urbanized acres in perpetuity were the basis for the creation of permanent groundwater mitigation credits acquired by the City of Bend and Avion Water Company. As district reluctance to support permanent transfers of water rights has grown, the recent portfolio of groundwater mitigation credits has been primarily derived from leased water and are temporary in nature. Thus, many groundwater permit holders are currently relying on the ongoing generation of temporary credits from instream leasing on the Middle Deschutes for their permits to remain in compliance with the requirements of the Groundwater Mitigation Program. It is important to note that municipalities have prioritized securing a permanent and reliable supply of mitigation credits to support community water needs in perpetuity.

4.2.5 Deschutes Water Bank

As mentioned above, DRC and DBBC are rebuilding a basin-wide water bank (Deschutes Water Bank), initially through the receipt of a Water Marketing Strategy Grant from Reclamation in 2018 and continued as part of a subsequent $1.37M Drought Resiliency Program award from the federal agency in 2022. In its first two years, the pilot program is providing a small amount of water to NUID during the irrigation season (pathway #1) to mitigate drought-caused water supply shortages and compensating participating COID patrons for this temporary movement of water. Winter flow in the Upper Deschutes is also increased through additional releases from Wickiup Reservoir. The program is limited to COID patrons served by the Pilot Butte Canal who have used water in at least one of the past two years.

Under the first two years of the pilot, NUID agreed to release the equivalent of 25% of the water it receives from COID through the Deschutes Water Bank from Wickiup Reservoir in the following winter to increase instream flows on the Upper Deschutes River as required under the HCP. Given the recent drought conditions in the Upper Deschutes Basin, there was general

support for NUID's partial release of winter water relative to what they received from COID during the summer. However, some stakeholders advocate that the winter releases should be equivalent to what NUID receives during normal or wet years, particularly if the program is publicly funded in the future. Moving forward, the Deschutes Water Bank will need to resolve the question of the appropriate amount of NUID winter flow release relative to the summer irrigation water it receives.

The pilot water sharing program between DRC, COID, and NUID represents an initial effort to reestablish and potentially expand the use of the Deschutes Water Bank to help meet the water needs of the three legs of the stool in the Deschutes Basin. The Deschutes Water Bank has the potential to be an efficient and mechanism for moving water while alleviating concerns about price speculation ("highest bidder") and affordability for buyers in NUID and sellers in COID. Other water sharing and reallocation tools and approaches could potentially be added to the Deschutes Water Bank's portfolio, but only with the explicit support of key basin stakeholders that represent the three legs of the stool. This might include temporary sharing of water savings and the permanent reallocation of water rights from urbanized acreage.

4.2.6 Anticipated Outcomes

In the near-term, water made available for sharing through market-based approaches is expected to be temporary in nature and continue to primarily occur through the AWLP and the Deschutes Water Bank pilot. Water restored to the Middle Deschutes River through the AWLP is an important component of efforts to improve flows in this reach during the generally dry irrigation season. This restored flow will also serve as an important basis for the temporary mitigation credits that enable groundwater permit holders to comply with OWRD requirements. However, the opportunity to maximize the full potential of market-based tools as described in the Basin Study will continue to be limited by the reluctance of irrigation district boards to support this approach, particularly pertaining to the permanent reallocation of water.

4.2.7 Implementation Obstacles

The movement of water through use of market-based approaches is primarily limited by the lack of political support from the board of directors of Upper Deschutes irrigation districts and to a lesser extent concerns raised by individual patrons. The following issues underly the reluctance of the districts to embrace these tools despite their significant potential to cost-effectively help meet other demands in the Upper Deschutes:

- the operational challenge of conveying (or pushing) water down the system and managing water delivery at the lateral level if one or more parcels is dry (e.g., the rotation schedule used to deliver water along a lateral may need to be altered if one or more of the parcels along that lateral are dry);
- the administrative challenge of managing district water right certificate(s) as water is moved either temporarily or permanently to other uses;
- concern about letting water leave the district to meet other basin needs, particularly during water-short years; and

- equity concerns regarding how acquired water is provided to individual patrons and at what cost.

4.2.8 Issues Flagged for Stakeholder Consideration

Through engagement with the DBWC, the irrigation districts have an opportunity to develop, fund, and install SCADA and measurement devices to better meet the water management challenges resulting from 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. Stakeholders should also consider how best to address the district's water rights administration challenges that could result from more active use of these tools. Other topics for further discussion include the basis for the 25% Wickiup release percentage during pilot transfers and what the appropriate percentage should be for future temporary sharing or permanent transfers. Regarding the Groundwater Mitigation Program, municipalities will work with districts to expand the pool of mitigation credits from permanent transfers of water to instream use, and work to identify and advance other transactions and mechanisms for generating credits beyond what has currently been utilized.