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

In this Planning Step, the DBWC will first list and describe each potential strategy, and corresponding set of tools, for generating shareable water, improving supply reliability, restoring flows and habitat for fish and wildlife, and improving water quality.[1] These strategies and tools are organized by one of three primary categories: 1) irrigation, 2) municipal and domestic, and 3) watershed management and restoration.

4.1 Irrigation

Agricultural water conservation, ***market-based incentives***, ***enhanced/new storage infrastructure, irrigation policy,*** and ***education/outreach*** are the five strategies by which water supply could be generated from irrigation.

4.1.1 Agricultural Water Conservation

- Agricultural water conservation involves irrigation system modernization to promote efficient water use and voluntarily make water supply available to other users and uses.
- Potential tools include
    - District Canal and Lateral Piping
    - Private Lateral Piping
    - On-Farm Efficiency Projects
    - Monitoring and Measurement

4.1.1.1 District Canal & Lateral Piping

Opportunity

- Piping district conveyance canals conserves water that seeps into the underlying aquifer through open ditches composed of porous volcanic basalt (up to 50%). This saved water can be used to meet other demands.
- The Upper Deschutes River Basin Study estimated in 2019 that additional piping would result in approximately 120,000 AF of water savings at total cost of $720M, or an estimated average cost of $6,000 per AF.

Challenges and Issues

- Growing project costs and non-federal match challenges
- Resistance to canal piping from some residents (save our canals)
- Allocation of Conserved Water Statute currently does not support moving water between districts in exchange for winter flow restoration. There is a need to clarify pathways with sufficient assurances.
- Lack of consensus amongst stakeholders regarding the status of conveyance (or carry) water allocated to the Upper Deschutes irrigation districts under the 1934 Duffy Decree

4.1.1.2 Private Lateral Piping

Opportunity

[1] Only the strategies/tools on this list that are endorsed by the entire DBWC will be pursued under the Plan.

- Private laterals convey water from district-owned canals and laterals to patron-owned properties.
- Piping private laterals conserves water that seeps into the underlying aquifer through open ditches composed of porous volcanic basalt (up to 50%). This saved water can be used to meet other demands.
- The BSWG estimated in 2019 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).

Challenges and Issues

- Growing project costs and match challenges
- Limited district authority to require upgrades to private systems
- Patron willingness to participate in private lateral piping projects
- High transaction costs associated with coordinating multiple landowners on shared laterals
- District board support for using water savings associated with patron duties to meet basin needs
- District willingness to reduce deliveries based on reduced needs in private systems

4.1.1.3 On-Farm Irrigation Efficiency Projects

Opportunity

- On-farm water application system upgrades include activities such as converting from flood irrigation to sprinklers and improving efficiencies through other technology
- BSWG estimated that approximately 65,000 AF could be saved annually through on-farm infrastructure improvements at an average cost of $9,700/AF.
    - It was also estimated then that about half this amount of water, 30,000 AF/year, could be saved from the most cost-effective on-farm projects at an average cost of $4,000 per AF.

Challenges and Issues

- Landowners may be primarily interested in increasing their own water supply reliability
- Unclear path to mobilize on-farm water savings for other needs
- Some districts do not currently deliver less than full delivery rate
- Most districts have conserved water policies that only allow for district-owned conserved water projects (barrier if using Allocation of Conserved Water Statute)
- Many funding sources require public benefit (i.e. water protected instream)

4.1.1.4 Monitoring and Measurement

Opportunity

- Increased district monitoring and measurement beyond the point of diversion creates the opportunity for water conservation in the following ways:
    - The installation of SCADA (supervisory control and data acquisition) and telemetry enables the districts to better monitor and control the amount of water entering points throughout their delivery systems, resulting in improved management and potential water savings.

    - The installation of on-farm meters enables the collection of information about on-farm water use and provides opportunities for incentivized water sharing through water bank mechanisms. Additionally, the combination of on-farm irrigation efficiency projects and on-farm metering enables projects to utilize the ACW program to restore streamflows.
- Consumptive use monitoring through tools such as Open ET provides opportunities to limit water delivery to the amount of water being beneficially used by crops, generating water savings that could be used to meet other needs in the basin.

Potential Beneficiaries of Agricultural Water Conservation Strategies

- Improved district water supply reliability
- North Unit Irrigation District/Upper Deschutes winter flows and associated riparian and wetland habitat restoration
- Middle Deschutes summer flows and associated water quality benefits

4.1.2 Market-Based Approaches

- Market-based tools involve the use of incentives to promote efficient water use and voluntarily make water supply available to other users and uses.
- Tools include:
    - Instream Leasing and Temporary Transfers
    - Voluntary Duty Reductions
    - Permanent Water Rights Transfers
    - Deschutes Water Bank
- BSWG estimated in 2019 that market-based tools provided 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 was based in part on a discount rate being applied to temporary costs to generate a permanent value of leased water).

4.1.2.1 Instream Leasing & Temporary Transfers

Opportunity

- Instream leasing compensates a water right holder to fallow acres for 1-5 years or for a part of an irrigation season (split-season lease). The lease is administered through the Oregon Water Resources Department and the leased water is protected instream. The water rights holder retains the water right and receives a year of beneficial use of the instream use of the water.
- Temporary transfers involve the leasing of a water right to another water user for a period and requires specification of which acres the water is being leased from and which acres the water is being used on. Temporary transfers are administered through the Oregon Water Resources Department; the water rights holder retains the water right and receives a year of beneficial through the transfer.
- An expedited process could be utilized in or triggered by a Drought Declaration.

Potential Beneficiaries

- Instream leases result in instream flows in irrigation season (largely Middle Deschutes and Tumalo Creek).

- Temporary transfers can move water rights within or between irrigation districts (contingent on district approvals).

Challenges and Issues

- Operational challenge for district of conveying (or pushing) water down the system and managing water delivery at the lateral level if one or more parcels is dry
- Administrative burden of managing district water right certificate(s) as water is moved temporarily to other uses

4.1.2.2 Voluntary Duty Reductions

Opportunity

- Voluntary reduction in on-farm duty through increased efficiency, improved water management, or crop choice
- This tool could be utilized or triggered by a Drought Declaration.

Potential Beneficiaries

- Reduced demand on system may benefit junior users (districts) next in line
- Saved water could be used to improve summer instream flows or NUID reliability in exchange for Upper Deschutes winter flows if managed through a water bank or through other agreements.

Challenges and Issues

- OWRD does not currently authorize "partial duty" leases or transfers (unless resulting from an ACW project) so water savings would stay within the system unless trades are set up through contractual agreements or a water bank mechanism
- Potential operational challenges for district of conveying (or pushing) water through the system if cumulative reductions in demand exceed thresholds; opportunities should increase with increased piping; problem areas could be identified/piped in the interim

4.1.2.3 Permanent Water Rights Transfers

Opportunity

- The permanent transfer of water from a district's historical point of diversion to a dedicated instream water right or from one place of use to another. Administered through the Oregon Water Resources Department and results in a permanent change to the water right.

Potential Beneficiaries

- Transfers can benefit patrons on specific acres within an irrigation district
- Transfers can occur between irrigation districts on specified acres
- Water can be transferred permanently instream in the irrigation season in the Middle Deschutes or Tumalo Creek
- Permanent instream transfers can generate groundwater mitigation credits for cities

Challenges and Issues

- Operational challenge for district of conveying (or pushing) water down the system and managing water delivery at the lateral level if one or more parcels is dry

- Financial implications for district of patrons permanently exiting and no longer paying annual assessments
- Broader district concerns about letting water permanently leave district boundaries to meet other basin needs, particularly during water-short years
- Equity concerns regarding how acquired water is provided to individual patrons and at what cost

4.1.2.4 Deschutes Water Bank (mechanism for current and potential market-based tools)

Opportunity

- DRC and DBBC are currently rebuilding the Deschutes Water Bank, initially through the receipt of a Water Marketing Strategy Grant from Reclamation in 2018 and continuing as part of a subsequent $1.37M Drought Resiliency Program award from the federal agency in 2022.
- If successfully developed over time with full stakeholder support, the water bank could be the umbrella under which some existing and future market-based tools are administered and implemented.
- Opportunities include moving water freed up through market-based incentives from senior districts to junior districts in exchange for winter flows in the Upper Deschutes.
- Additional flexibility could be enabled by a Drought Declaration.

4.1.3 Enhanced/New Storage

- Enhanced/New Storage Infrastructure involves creating or relocating agricultural water storage to promote efficient water use and improve streamflows
- Potential tools include:
    - Relocated Storage
    - Bulge Storage Ponds
    - Lake Billy Chinook
    - Cloud Seeding

4.1.3.1 Relocated Storage

Opportunity

- Relocate a portion of the existing storage in Wickiup Reservoir downstream to potential off-channel storage sites closer to NUID agricultural lands (ex. Expanded Haystack Reservoir; Monner Reservoir proposed site)

Potential Beneficiaries

- NUID patrons
- Upper Deschutes instream flow in winter through downstream delivery to new storage

Challenges and Issues

- Cost ($30M to $300M in construction)
- Land acquisition, mitigation and infrastructure

4.1.3.2 Bulge Storage Ponds

Opportunity

- Construct "bulge in the system" temporary storage facilities (bulge ponds) that allow districts to manage and deliver their legally diverted water right during the irrigation season
- Most bulge ponds are relatively small and may be allowed without requiring a water right permit

Potential Beneficiaries

- Improve operational flexibility for districts irrigation water delivery
- Others?

Challenges and Issues

- Dam plans and specifications must be submitted to OWRD if more than 10 feet in height and impounding more than 9.2 AF

4.1.3.3 Lake Billy Chinook

Opportunity

- Permanently relocate existing NUID pumps on the Crooked River to a pumping station on the Lake Billy Chinook reservoir pool
- Could include transfer of Wickiup storage to Lake Billy Chinook

Potential Beneficiaries

- NUID patrons with more reliable water supply
- Crooked River flow during irrigation season
- Upper Deschutes instream flow in winter through downstream delivery to new storage
- Middle Deschutes instream flow in irrigation season from previous POD at Bend to the new downstream POD

Challenges and Issues

- Cost (up to $350-400M in construction and $5-10M or more/year for pumping and operations)
- Extensive feasibility and analysis still needed on costs and benefits specific to evolving project details

4.1.3.4 Cloud Seeding

Opportunity

- Cloud seeding is a weather modification technique that introduces silver iodide into existing clouds to aid in the formation of ice crystals. It could potentially increase precipitation in Central Oregon.

Challenges and Issues

- Effectiveness uncertain

4.1.4 Irrigation Policy

- Irrigation policy involves promoting efficient water use through legislation or regulation.
- Potential tools include:

    - Regulating for “Beneficial Use” and Against “Waste”
    - Irrigation Efficiency Standards
    - Mandatory Tiered Pricing
- This strategy and the corresponding tools could be utilized or triggered by a Drought Declaration.

4.1.4.1 Regulating for “Beneficial Use” and Against “Waste”

Opportunity

- Better definition of and enforcement by OWRD of beneficial use without waste provision of Oregon water law.

Potential Beneficiaries

- Users with less reliable water rights and instream flows during irrigation season

Challenges and Issues

- Would require state leadership

4.1.4.2 Irrigation Efficiency Standards

Opportunity

- Conditioning the rates or volumes associated with water rights to be consistent with available irrigation application technologies that would reduce water use per acre
- This tool could be utilized or triggered by a Drought Declaration.

Potential Beneficiaries

- Users with less reliable water rights and instream flows during irrigation season

Challenges and Issues

- Would require state leadership
- Cost impacts for water rights holders to upgrade systems

4.1.4.3 Mandatory Tiered Pricing

Opportunity

- In a tiered pricing structure, the patron’s price per unit of water used increases above defined thresholds of usage. Tiered pricing incentivizes water conservation and discourages non-essential use of water.

Potential Beneficiaries

- Water generated from incentivized conservation could benefit patrons with less reliable water rights and instream flows during irrigation season

Challenges and Issues

- Would require state leadership/regulation to promote the use of tiered pricing
- Or it would require irrigation district boards to enact such tiered pricing policy

4.1.5 Education and Outreach

- Efficient water use can be promoted through education and outreach
- Potential tools include:
    - Direct Landowner Education Outreach
    - District-Wide Education and Outreach
- This strategy and the corresponding tools could be ramped up following a Drought Declaration and district curtailment.

4.1.5.1 Patron Education and Outreach

Opportunity

- Educating new property owners provides an opportunity to instill responsible water management practices.
- Educating specific landowners who are using water wastefully, identified through ditch rider observation or neighbor-driven complaints, could reduce water use in the district

Challenges and Issues

- Staff capacity
- District willingness to adjust water deliveries throughout the system based on end users reduced water needs

4.1.5.2 District-Wide Education and Outreach

Opportunity

- On-going outreach and social-marketing campaigns, which include the use of the district website, social media, text messaging, snail mail, and open houses and events, can help educate patrons about ongoing conservation efforts and opportunities.

Challenges and Issues

- Staff capacity

4.2 Municipal and Domestic

Water conservation, ***policies***, and ***municipal infrastructure*** are the three strategies by which water supply could be generated from municipal and domestic water use.

4.2.1 Water Conservation

- Cities could extend existing supplies through use of conservation tools that reduce per capita water demand
- Potential tools include:
    - Municipal Water Management and Conservation Plans
    - Voluntary Conservation Measures
    - Waterwise Landscaping

4.2.1.1 Municipal Water Management and Conservation Plans

Opportunity

- These plans are updated regularly and can include efficiency standards and/or can incentivize voluntary conservation measures.

4.2.1.2 Voluntary Conservation Measures

Opportunity

- Central Oregon cities are developing voluntary conservation measures that municipal water users can employ to reduce their water use; incentives or rebates could be used to encourage adoption.

4.2.1.3 Waterwise Landscaping

Opportunity

Cities can incentivize xeriscaping, turf removal etc.

4.2.2 Policies

- Municipalities could extend existing supplies through use of policies that reduce per capita water demand
- Potential tools include:
    - Municipal Efficiency Standards
    - Mandatory Tiered Pricing
    - Landscape and Outdoor Watering Restrictions
    - Exempt Wells Measurement, Reporting, and Regulation
    - New Groundwater Use through Deschutes Basin Groundwater Mitigation Program

4.2.2.1 Municipal Efficiency Standards

Opportunity

- Municipalities can also enact standards for water efficient appliances and sprinkler systems. Incentives or rebates can be used to help reduce costs of upgrades.

4.2.2.2 Mandatory Tiered Pricing

Opportunity

- In a tiered pricing structure, the patron's price per unit of water used increases above defined thresholds of usage. Tiered pricing incentivizes water conservation and discourages non-essential use of water.

4.2.2.3 Landscape and Outdoor Watering Restrictions

Opportunity

- One of the largest uses of municipal water is for watering residential lawns or city parks and open spaces. Municipalities can set restrictions to limit or prevent this type of outdoor water use, particularly in times of drought.
- This tool could be utilized or triggered by a Drought Declaration.

Challenges and Issues for all Municipal Water Conservation and Policy Strategies Above

- Cities would need to implement the above tools
- Potential cost implications for water patrons

4.2.2.4 Exempt Wells Measurement, Reporting, and Regulation

Opportunity

- Requiring measurement and reporting on exempt wells could reduce demand on the aquifer

Challenges and Issues

- State will and/or capacity to regulate exempt wells

4.2.2.5 New Groundwater Use through Deschutes Basin Groundwater Mitigation Program

Opportunity

- Under the Deschutes Basin Groundwater Mitigation Program, cities can access new groundwater permits by securing groundwater mitigation credits. 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 irrigation water rights.

Challenges and Issues

- The Groundwater Mitigation Program has a sunset date of January 2, 2029, and a cap of 200 cfs of new groundwater development that can be offset through mitigation.
- There is also a desire by municipalities to expand the types of tools which can generate mitigation credits if they meet parameters of reducing consumptive use and protecting water instream.
- Any changes to the existing program, including extending the sunset date and increasing the cap, requires policy change at the state level
- *Add Owen stuff here.*

Potential Beneficiaries for all Municipal Water Conservation and Policy Strategies

- Municipalities would be the beneficiaries of the above-described tools and strategies

4.2.3 Municipal Infrastructure

- Cities could extend existing supplies through the creation of infrastructure that recycles, reclaims, or reuses municipal water.
- Potential tools include:
    - Recycled or reclaimed water projects
    - Graywater, rainwater, stormwater

4.2.3.1 Recycled or reclaimed water projects

Opportunity

- Cities could explore opportunities to recycle or reclaim graywater to boost supply or provide water to other needs.

Challenges and Issues

- DEQ NPDES Permitting

Potential Beneficiaries

- Treated wastewater can be reused for irrigation as well as for commercial and residential applications

4.2.3.2 Graywater, rainwater, stormwater

Opportunity

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

Potential Beneficiaries

- Municipalities

4.3 Environmental

Habitat and watershed restoration, water quality protection and restoration, environmental policies, additional analyses and monitoring, and ***education/outreach*** are the five strategies by which water supply and/or water quality improvements could be facilitated.

4.3.1 Habitat and Watershed Restoration

- Involves projects aimed at restoring habitat to improve hydrologic function.
- Potential tools include:
    - Natural Storage
    - Channel, Riparian, and Wetland Restoration
    - Fish Passage Barriers/Screening

4.3.1.1 Natural Storage (i.e., channel, floodplain, riparian, wetland, upland restoration)

Opportunity

- Increasing the natural storage capability (the sponge) in riparian, wetland, and upland areas can attenuate available precipitation and increase late summer streamflow, boosting water reliability for streams and irrigation water users.

4.3.1.2 Channel, Riparian, and Wetland Restoration

Opportunity

- The Upper Deschutes River channel has been highly altered due to flow alterations, has increased about 20% in width, and much of the channel is disconnected from its floodplain.
- Restoring physical habitat and reconnecting wetlands is critical to complement planned flow restoration activities to restore river function and habitat for Oregon spotted frog, redband trout, and other native species.

4.3.1.3 Fish passage barriers/screening

Opportunity

- Address any remaining fish passage barriers (ex. Mirror Pond Dam)
- Update existing fish screens as needed (ex. NUID diversion at North Canal Dam)

4.3.2 Water Quality Protection and Restoration

- Streamflow is a major driver for water quality issues in the Upper Deschutes Mainstem. Water management strategies identified throughout this plan, such as restoring instream flows in the summer, improve water quality (temperature, dissolved oxygen, pH).
- The Upper Deschutes and Little Deschutes subbasins are on ODEQ's medium priority list for TMDL development and are estimated to be submitted for EPA approval in April of 2030.
- Potential tools for addressing water quality protection and restoration include:
    - Nonpoint Source Pollution Reduction
    - Point Source/Permitted Input Management
    - Source Water Protection
    - Water Temperature Reduction

4.3.2.1 Nonpoint Source Pollution Reduction

Opportunity

- The Deschutes Basin Water Quality Status and Action Plan identified the tools being implemented to address nonpoint source pollution from agricultural, forest, urban, and recreational land uses (Oregon Department of Environmental Quality 2011).
- Additional tools for reducing nonpoint source pollution into waterways of the Upper Deschutes Basin may be identified as part of the forthcoming TMDL development process.

4.3.2.2 Point Source/Permitted Discharge Management

Opportunity

- As of December 2023, 58% of the NPDES permits in Oregon have not been renewed on time; Oregon DEQ is committed to improving the NPDES individual permit backlog through continuous improvement.
- The forthcoming TMDL documents will describe the sources of pollutants that cause water quality impairments and will identify potential solutions for reducing pollutant loading into waterways from point and nonpoint sources.

4.3.2.3 Source Water Protection

Opportunity

- Source water protection is accomplished by effective state public health programs, environmental protection, land use policies, pro-active land stewardship, and by implementation of local drinking water protection efforts by communities and public water suppliers.

4.3.2.4 Water Temperature Reduction

Opportunity

- The health and survival of fish species is hindered when stream temperatures increase, which is more likely to occur when stream flows and inputs from spring discharge have declined.
- Monitoring both stream temperatures and how groundwater declines have and will continue to impact cold-water spring discharges (further discussed in the monitoring sections of this plan) will provide information about how additional tools, such as flow

augmentation, riparian improvement, and groundwater protection, can be utilized to reduce stream temperatures.

4.3.3 Environmental Policies

- Environmental policies involve enacting legislation that would improve streamflows.
- Potential tools include:
    - Establishing Minimum Flows
    - Resolving Protested Instream Water Right
    - Required Survival Flows for Fish and Wildlife
    - Public Interest/Environmental Review on Transfers

4.3.3.1 Establish Minimum Flows

Opportunity

- Set and enforce minimum streamflows needed to support fish and wildlife
- This tool could be utilized or triggered by a Drought Declaration.

Challenges and Issues

- Impacts to other water users in an over-appropriated system

4.3.3.2 Resolve Protested Instream Water Right

Opportunity

- Resolving protested ODFW instream water right in the Middle Deschutes would increase assurances for instream needs in this reach into the future

Challenges and Issues

- OWRD backlog on water rights protests; legislative fix?
- Instream water right would have a junior priority date and wouldn't guarantee flows

4.3.3.3 Required Survival Flows for Fish and Wildlife

Opportunity

- Establish minimum flows to prevent devastating impacts to fish and wildlife during low-water years
- This tool could be utilized or triggered by a Drought Declaration.

4.3.3.4 Public Interest/Environmental Review on Transfers

Kimberley, can you please help flesh this one out for us?

4.3.4 Additional Analyses and Monitoring

- Additional analyses could provide additional information to assist in making water management decisions.
- Potential tools include:
    - Land Use Planning and Development Analyses
    - Spring and Groundwater-Dependent Ecosystems Analyses
    - Groundwater Monitoring

4.3.4.1 Land Use Planning and Development

Opportunity

- Aligning state water and land use policies could provide direction for scarce water resources

Challenges and Issues

- More work needed on specifics

4.3.4.2 Springs and Groundwater-Dependent Ecosystems Analyses

Opportunity

- Surface water and groundwater are interconnected in the Deschutes Basin.
- All water management strategies and scenarios should be assessed for potential impacts to springs and groundwater-dependent ecosystems so tradeoff analyses can take place.

Challenges and Issues

- More work needed on specifics

4.3.4.3 Groundwater Monitoring

Opportunity

- Increased and improved groundwater monitoring could provide valuable data to assist in decision making and project prioritization.

4.3.5 Education and Outreach

- Efficient water use can be promoted through education and outreach
- Potential tools include:
    - Raise the Deschutes Campaign

4.3.5.1 Raise the Deschutes Campaign

Opportunity

- Education and outreach campaigns, such as the Raise the Deschutes Campaign, provide opportunities to inform and engage the public and water users.