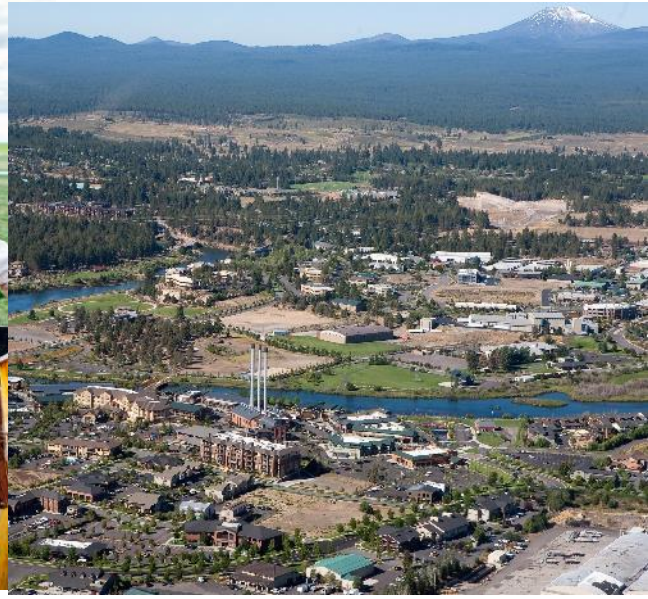
THE UPPER DESCHUTES BASIN STUDY

Water for agriculture, rivers & cities

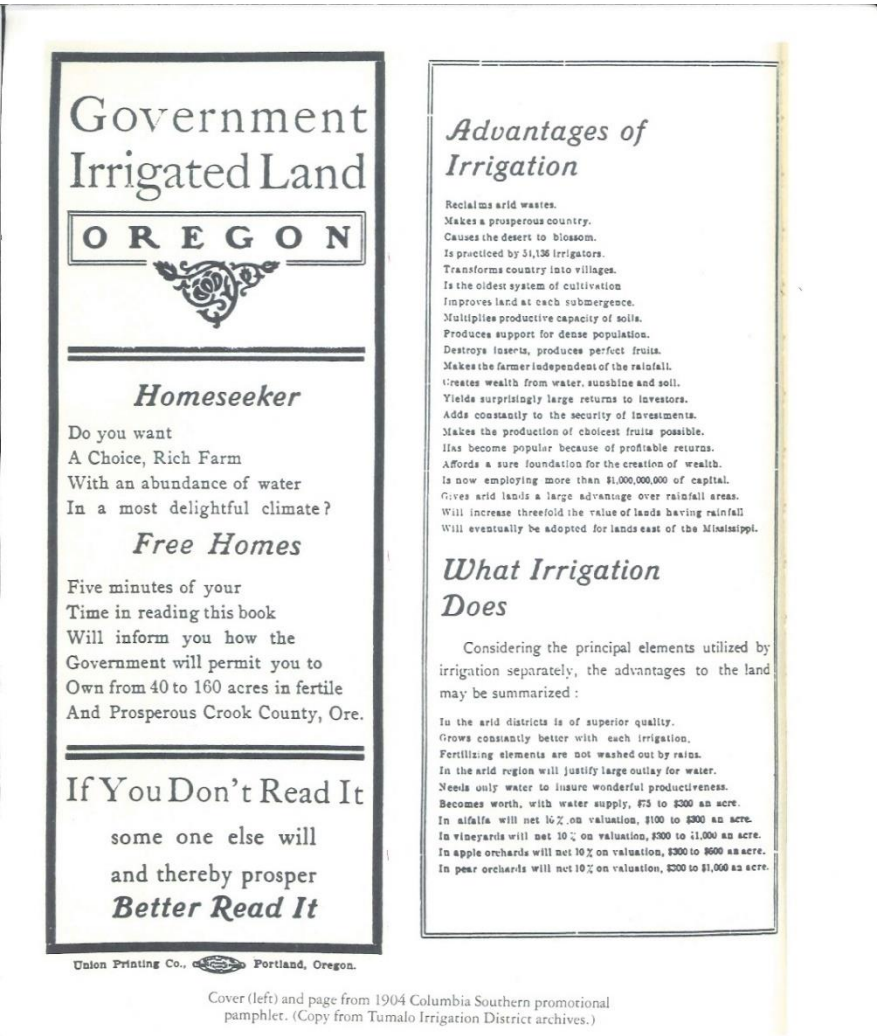


OUTLINE

THE UPPER DESCHUTES BASIN STUDY
Water for agriculture, rivers & cities

- Context- why a Basin Study?
- What the Basin Study is/isn't
- Key information from the Basin Study
- How to learn more/provide input
- Q & A
- Poster Open House

History/Context



Government Irrigated Land

OREGON

Homeseeker

Do you want
A Choice, Rich Farm
With an abundance of water
In a most delightful climate?

Free Homes

Five minutes of your
Time in reading this book
Will inform you how the
Government will permit you to
Own from 40 to 160 acres in fertile
And Prosperous Crook County, Ore.

If You Don't Read It
some one else will
and thereby prosper
Better Read It

Union Printing Co., Portland, Oregon.

Advantages of Irrigation

Reclaims arid wastes.
Makes a prosperous country.
Causes the desert to blossom.
Is practiced by 51,136 irrigators.
Transforms country into villages.
Is the oldest system of cultivation
Improves land at each submergence.
Multiplies productive capacity of soils.
Produces support for dense population.
Destroys insects, produces perfect fruits.
Makes the farmer independent of the rainfall.
Creates wealth from water, sunshine and soil.
Yields surprisingly large returns to investors.
Adds constantly to the security of investments.
Makes the production of choicest fruits possible.
Has become popular because of profitable returns.
Affords a sure foundation for the creation of wealth.
Is now employing more than $1,000,000,000 of capital.
Gives arid lands a large advantage over rainfall areas.
Will increase threefold the value of lands having rainfall
Will eventually be adopted for lands east of the Mississippi.

What Irrigation Does

Considering the principal elements utilized by irrigation separately, the advantages to the land may be summarized:

In the arid districts is of superior quality.
Grows constantly better with each irrigation.
Fertilizing elements are not washed out by rains.
In the arid region will justify large outlay for water.
Needs only water to insure wonderful productiveness.
Becomes worth, with water supply, $75 to $300 an acre.
In alfalfa will net 16% on valuation, $100 to $300 an acre.
In vineyards will net 10% on valuation, $300 to $1,000 an acre.
In apple orchards will net 10% on valuation, $300 to $600 an acre.
In pear orchards will net 10% on valuation, $200 to $1,000 an acre.

Cover (left) and page from 1904 Columbia Southern promotional pamphlet. (Copy from Tumalo Irrigation District archives.)

- Starting in the 1800s, federal and state policies encouraged westward settlement by making land and irrigation water accessible
- This led to a diverse agricultural economy and culture in Central Oregon

Unintended Consequences

- State granted more water rights for out of stream use than exist instream in summer months in some cases
- Low or altered streamflows
- Instream flows not awarded ‘beneficial use’ under state water law until 1987

Collaborative Progress Restoring Flows

Whychus Creek

0 cfs 20 cfs

Middle Deschutes

30 cfs 130 cfs

Remaining Issues

- Streamflow restoration needs still exist
- Restoring the Upper Deschutes River is a particularly complex and significant issue

Additional Demands for Water

Growing urban communities

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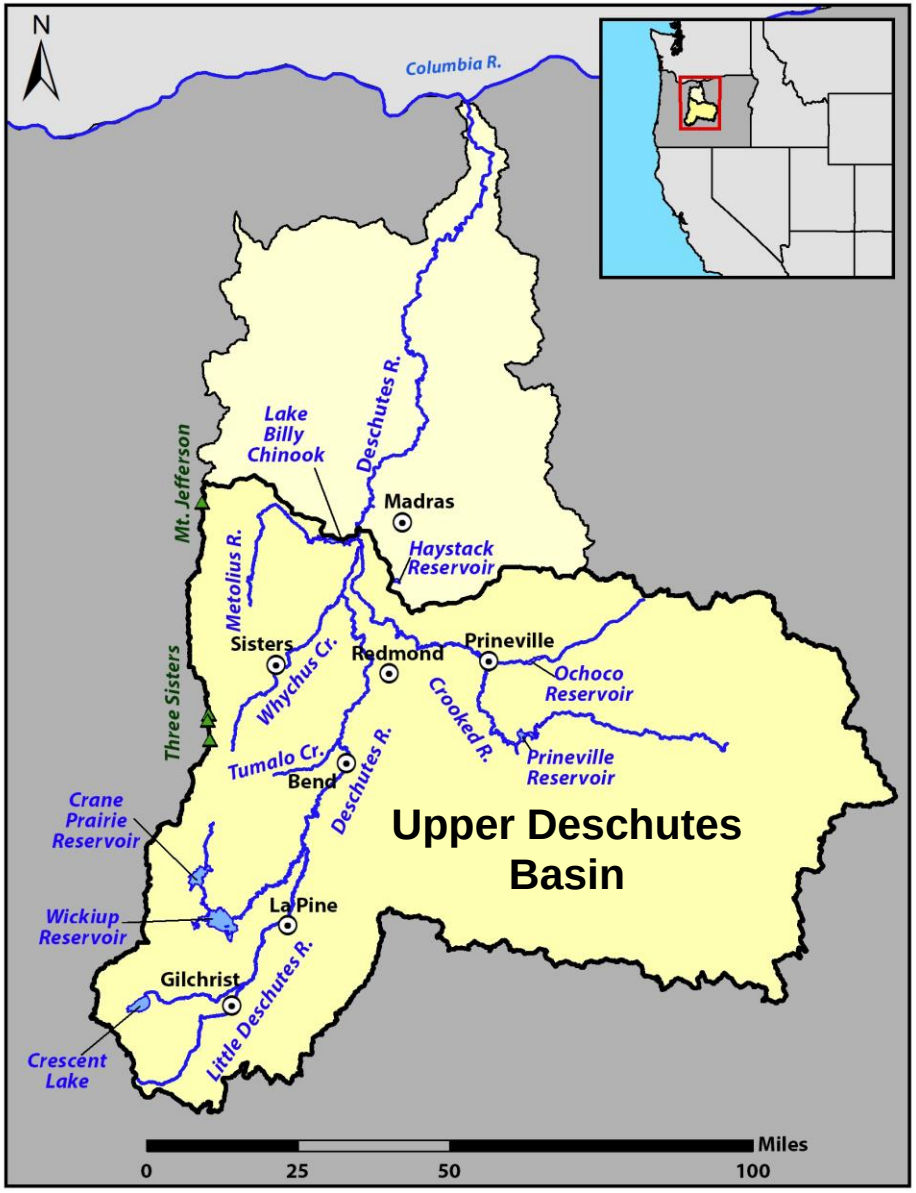

How do we meet current and future water needs?

Basin stakeholders chose to apply for and secure a Basin Study to provide information on solutions

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Basin Study Work Group

- Central Oregon Irrigation District
- North Unit Irrigation District
- Arnold Irrigation District
- Swalley Irrigation District
- Lone Pine Irrigation District
- Tumalo Irrigation District
- Ochoco Irrigation District
- Three Sisters Irrigation District
- City of Bend
- Avion
- City of Madras
- City of Redmond
- City of LaPine
- City of Prineville
- USDA Forest Service
- Department of Environmental Quality
- US Fish and Wildlife Service
- Confederated Tribes of Warm Springs
- Deschutes County
- Coalition for the Deschutes
- Crooked River Watershed Council
- Upper Deschutes Watershed Council
- Sunriver Anglers
- Central Oregon Flyfishers
- Deschutes River Conservancy
- Trout Unlimited
- Native Reintroduction Network
- Bureau of Reclamation
- Oregon Water Resources Department
- Oregon Land and Water Alliance
- Oregon Department of Agriculture
- Deschutes Soil and Water Conservation District
- Portland General Electric
- WaterWatch
- Deschutes Water Alliance
- Bend Paddle Trail Alliance

Basin Study Basics

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- 3 Year Study
- $1.5 Million (Funded by Reclamation & Oregon Water Resources Department)
- Bureau of Reclamation Study Framework
- Co-managed by Bureau of Reclamation & Basin Study Work Group

RECLAMATION
Managing Water in the West
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

OREGON
WATER RESOURCES DEPARTMENT

Other Supporting Funders

- Meyer Memorial Trust
- Bella Vista Foundation
- Oregon Community Foundation
- National Fish and Wildlife Foundation
- Collins Foundation
- Lamb Foundation

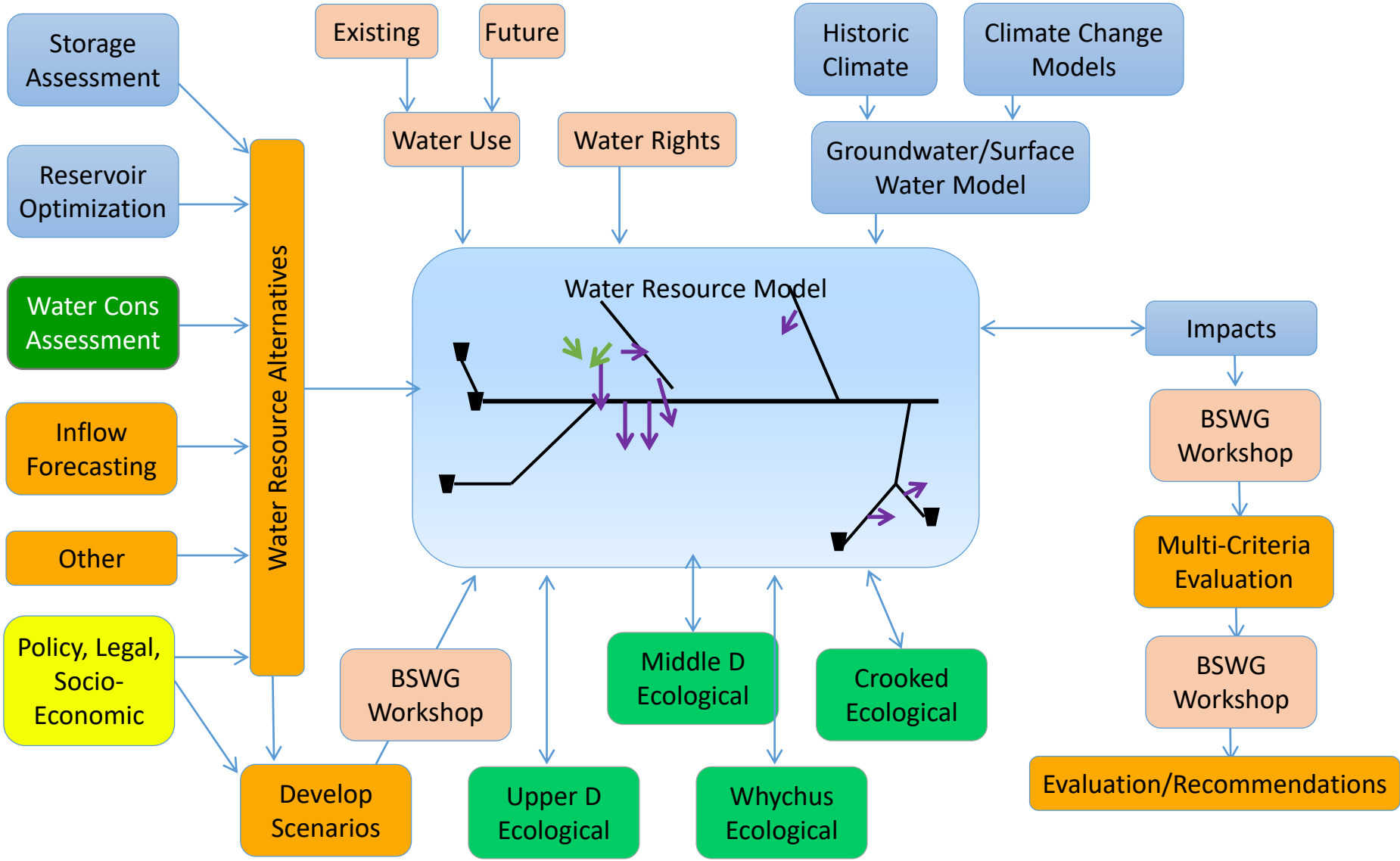
Objectives of Basin Study

- Evaluate and quantify current and future water supply and demand, including climate change projections
- Develop and analyze potential tools that could be considered for addressing identified imbalances in supply and demand
- Evaluate potential water management tools in terms of effectiveness, cost, environmental impact, risk, stakeholder response and other factors

What the Basin Study is not

- Implementation Plan
  - The study will not propose or recommend any particular action
- Habitat Conservation Plan
- NRCS Watershed Plans

Basin Study - Overview



Study Take-Aways

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- We have a good set of water supply tools to meet needs; all have opportunities and barriers
- To address shortages, particularly in dry years, we will need to consider all the available tools
- This will require significant investment, financially and culturally

Water Supply Goals

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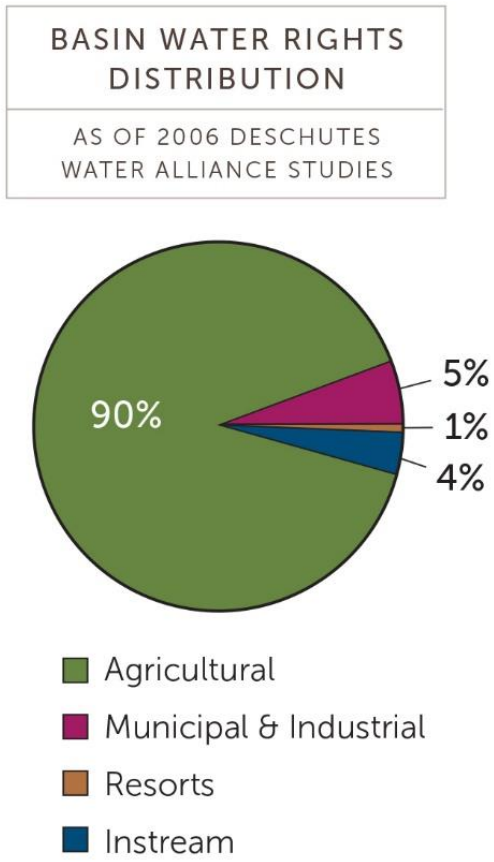
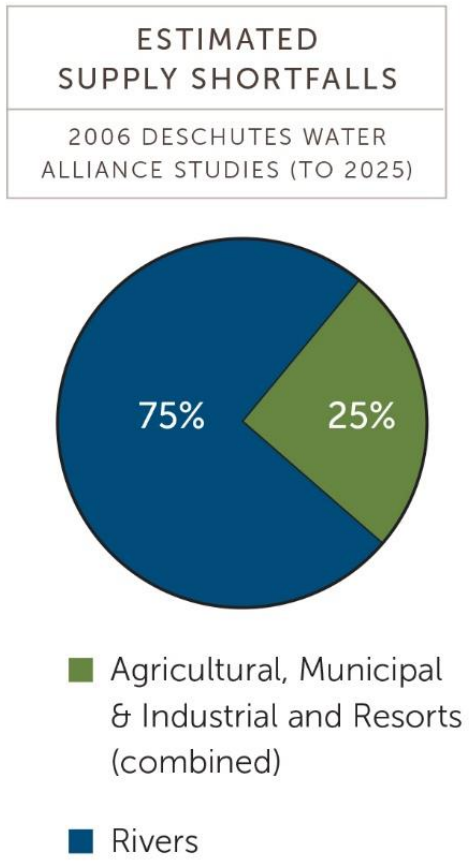
Water for agriculture, rivers & cities

- Secure and maintain **streamflows and water quality** for the benefit of fish, wildlife and people
- Secure and maintain a reliable and affordable supply of water to **sustain agriculture**
- Secure and maintain a safe, affordable and high quality water supply for **urban communities**





Irrigation Demand

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- Acre-foot = water needed to cover an acre with a foot of water
- Average annual surface water diversion for major irrigation districts is **724,000 AF**
- Goal to maintain existing water supply reliability
- More challenging for "junior" irrigation districts

Total Annual Inflows to the Basin
• 860,000 to 2.3 million AF

Municipal Demand

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- Current annual demand: 40,000 AF (mostly groundwater)
- Projected 50-year demand will require 16,000 AF of water dedicated instream for groundwater mitigation

Total Annual Inflows to the Basin
• 860,000 to 2.3 million AF

Instream Demand

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- Instream demands were modeled at 2 levels
  - Current State Instream Water Rights
  - In some reaches, higher flows that may provide broader ecological benefits

Total Annual Inflows to the Basin
• 860,000 to 2.3 million AF

Shortages

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Water for agriculture, rivers & cities

- Median shortages associated with meeting instream water rights and existing irrigation demands are **~130,000 AF**. Shortages range up to 300,000 AF in dry years.
- To meet higher flows that may contribute to broader ecological benefits in some reaches, median shortages are **~200,000** AF, ranging up to 400,000 AF in dry years.

Total Annual Inflows to the Basin
• 860,000 to 2.3 million AF

The need for **integrated** solutions

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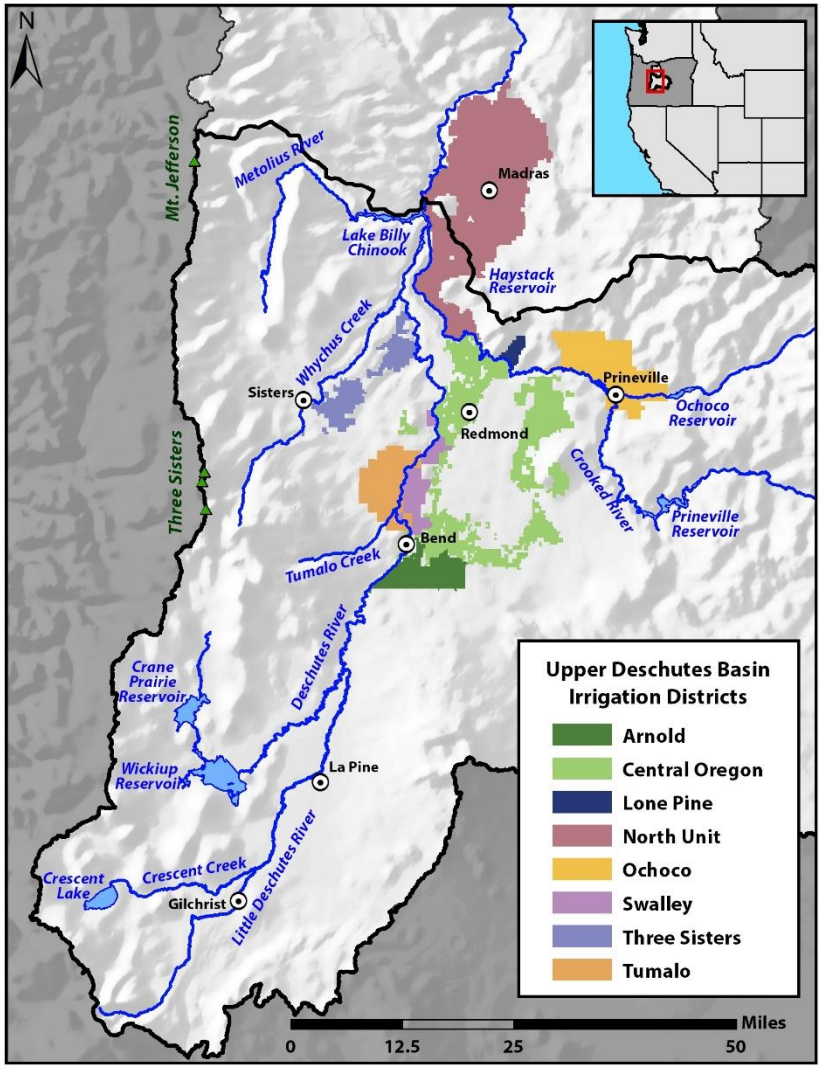
- 8 irrigation districts
- 5 reservoirs
- Low and altered streamflows
- Cities and private water suppliers
- A finite supply of water

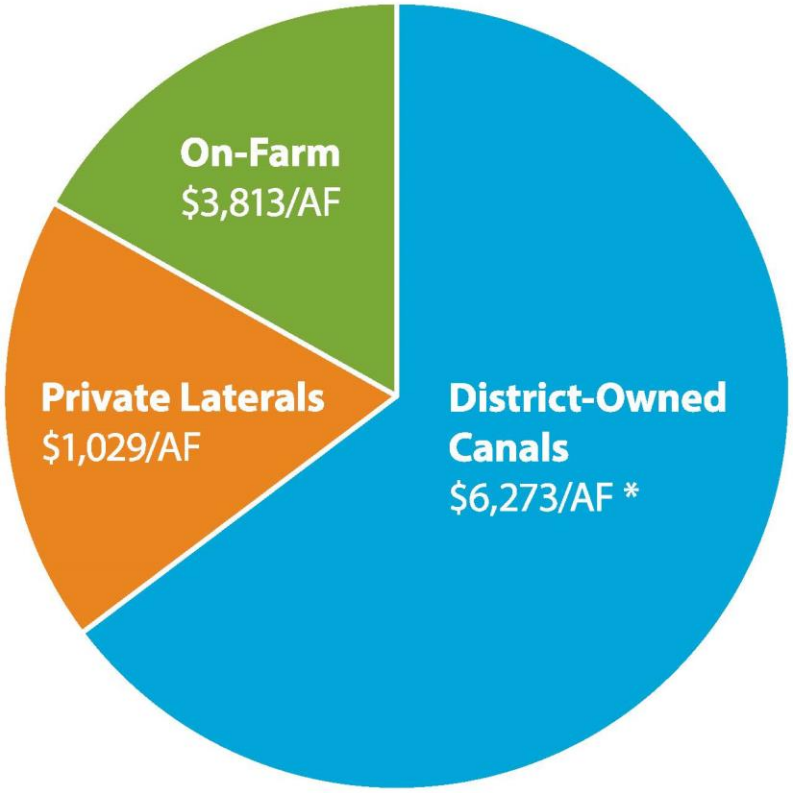


Water Supply Tools Studied

1. Water Conservation Infrastructure
2. Market-Based Approaches
3. Storage Concepts

Water Conservation Infrastructure

- Actions that increase efficiency of irrigation water delivery and use
  - Piping canals
  - Piping private laterals
  - On-farm infrastructure upgrades
- Total opportunity is ~200,000 AF; $986M
- Cost-effectiveness varies widely by project



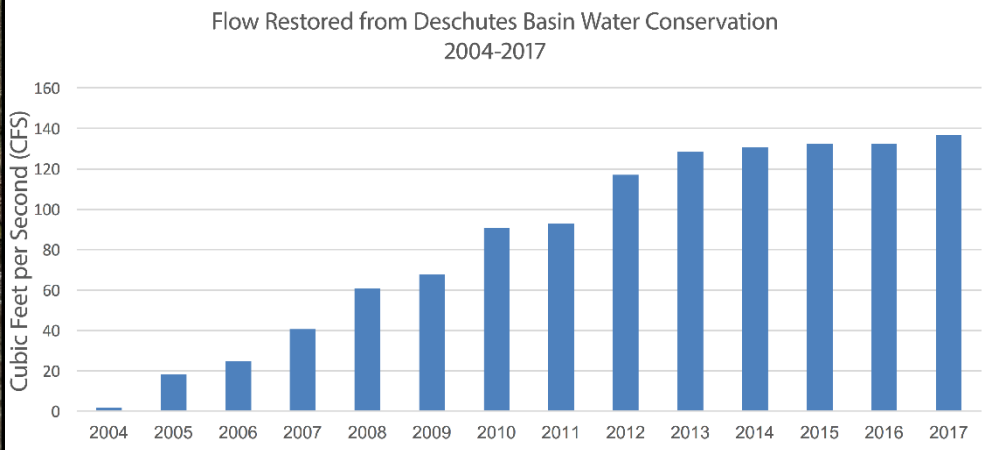
***Opportunities and costs vary widely between and within districts.**

Water Conservation Infrastructure

- Benefits
  - Upgrading infrastructure improves management and operations
  - No impact to irrigated acres
  - Piping canals and laterals increases opportunities for other tools like water marketing
- Barriers
  - Piping district canals is expensive
  - Potential opposition
  - Work on private laterals and on-farm requires action by multiple private parties

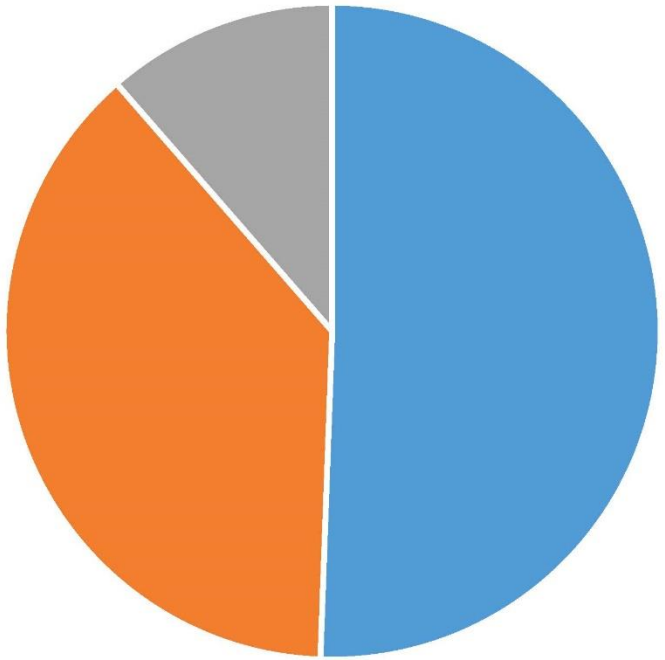
Water Conservation Infrastructure

A Proven Tool in the Deschutes



Market-Based Solutions

- Using price incentives to change water use behavior
  - Temporary lease of water rights
  - Voluntary duty reduction
  - Permanent water transfers



Water generated can move from farm to farm, or farm to river

~164,000 acre-feet may be available; $65M

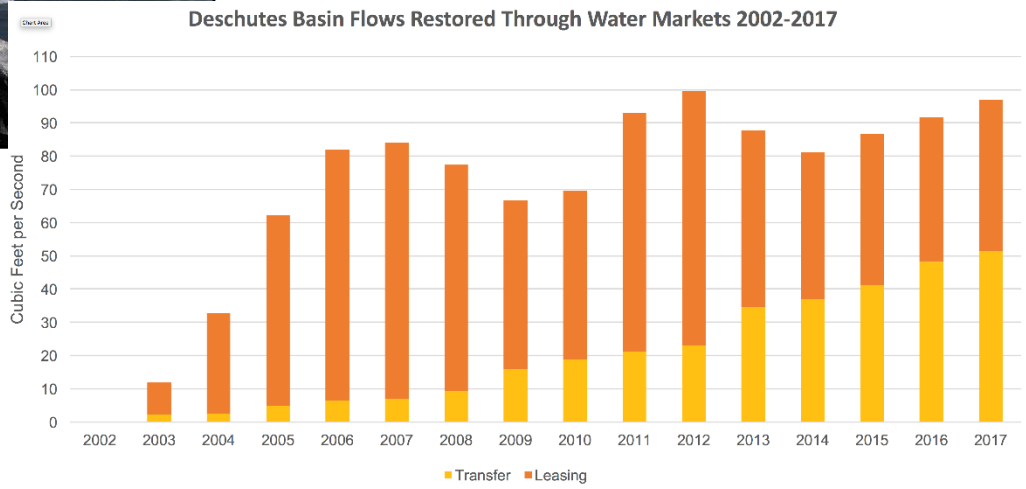
Costs range from $132/AF- $685/AF

Market-Based Solutions

- Benefits
  - Water may be available now at relatively low cost
  - Temporary tools are flexible and can be scaled in dry years
- Barriers
  - District operational issues
  - Need policies/programs to facilitate
  - Costs may increase due to the need to coordinate with multiple private parties

Market-Based Solutions

A proven tool in the Deschutes



Storage Concepts

Why Storage?

- It may be possible to improve streamflows by relocating existing storage and/or adding water storage capacity to provide flexibility in water operations

- Challenges
  - Land acquisition
  - Environmental impacts
  - Site-specific conditions
  - Permitting
  - Existing utilities & infrastructure
  - Historic properties
  - Cost
  - Fish Passage
  - Dam safety considerations
  - Other issues

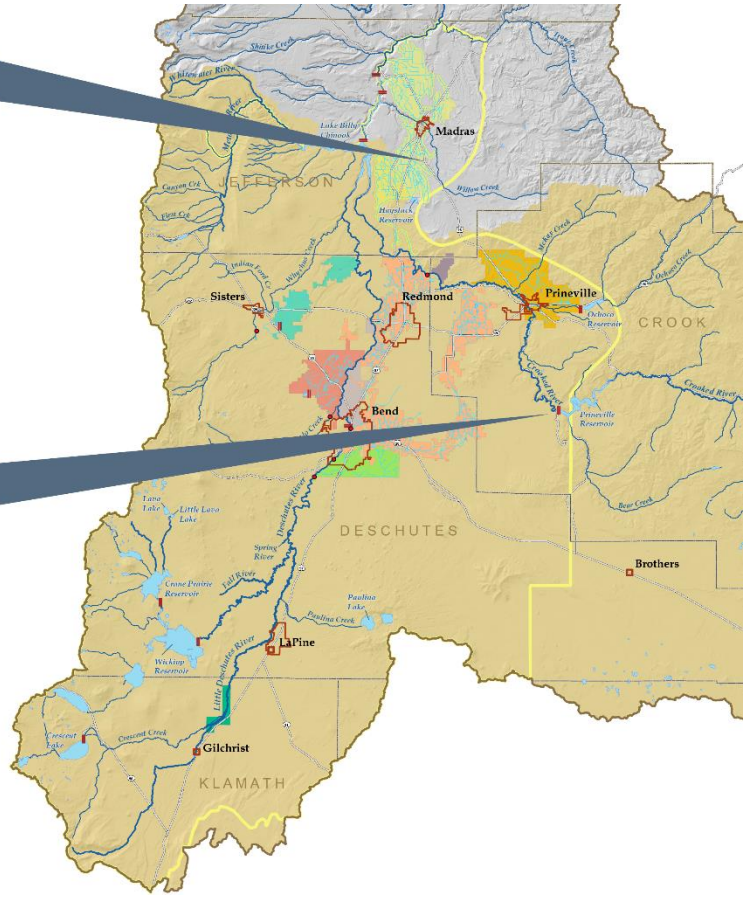
Storage Concepts

Upper Deschutes River

- A possible future concept could relocate existing storage in Wickiup Reservoir to potential off- channel storage sites closer to North Unit Irrigation District (NUID).
- Could use NUID Main Canal to send water to new or expanded off-channel storage facilities.
- Potential storage from 5,000 to 70,000 AF
- Construction costs could exceed $100-300M

Crooked River

- Potential to recover 4,500 AF of storage space in Prineville Reservoir that has been lost to sedimentation
- Construction costs could exceed $1M



*Years of investigations would be needed before any particular project could be advanced

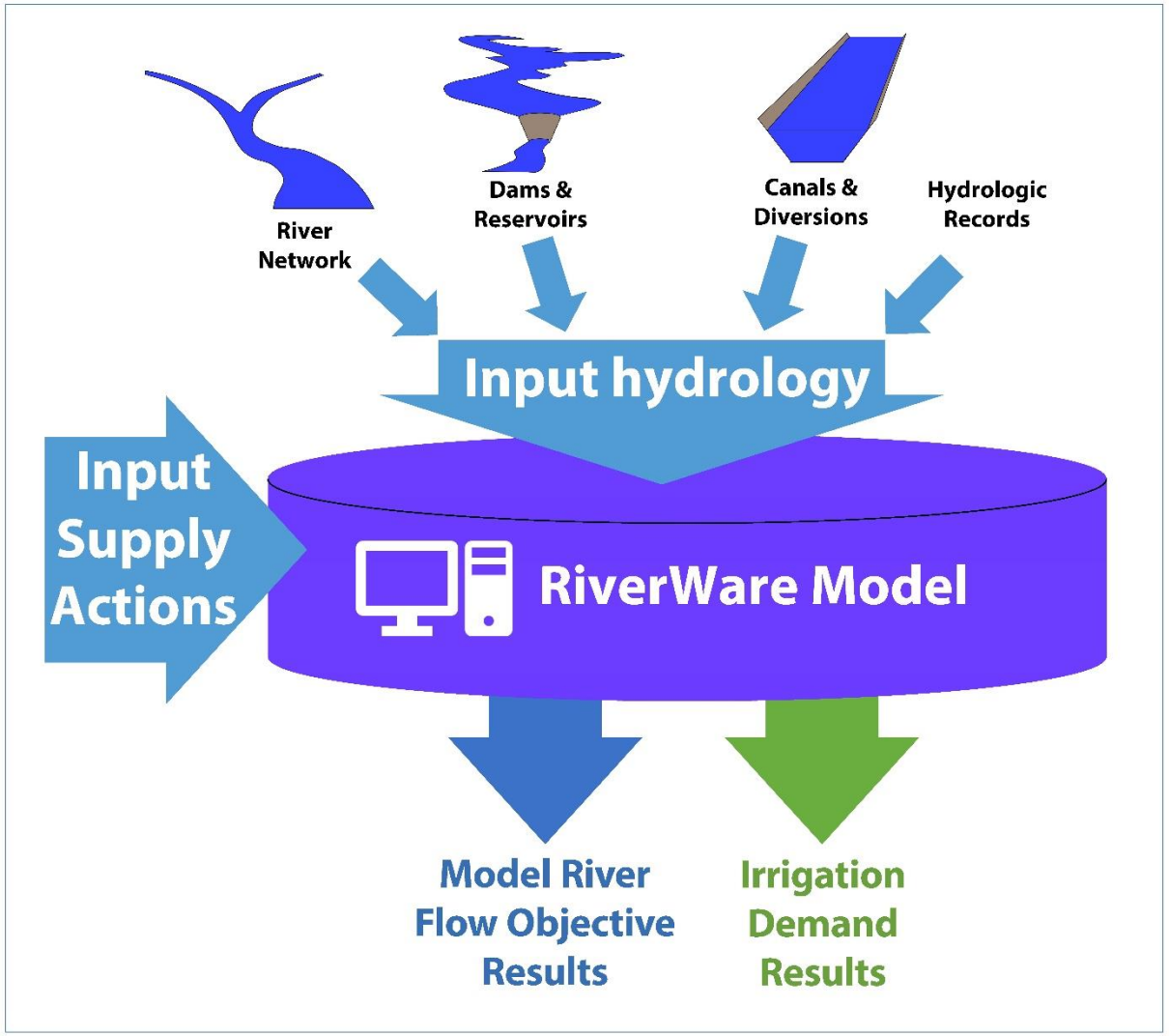
Overview of Tools

Water Supply Tool	Supply (AF)	Total Cost	Avg $/AF
Water Conservation Infrastructure	200,000	$986 M	$4,930
Market-Based Incentives	164,000	$65 M	$398
Storage	40,000	$200 M	$5,000

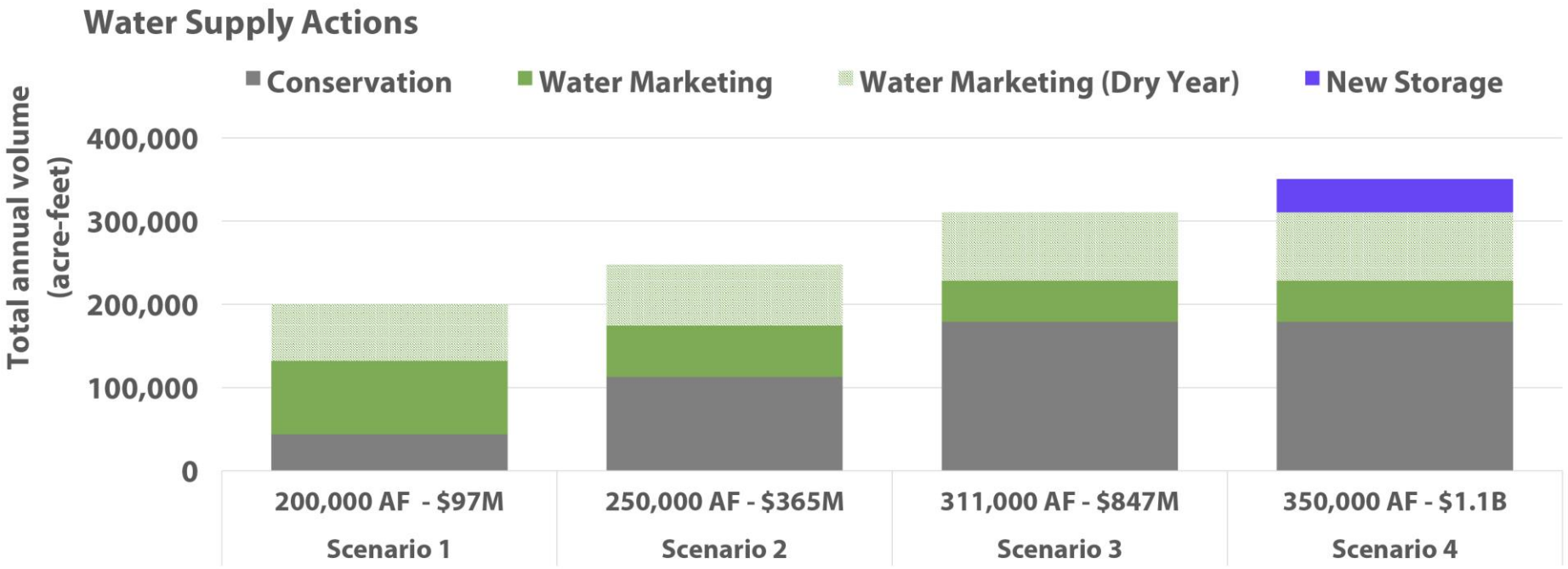
Water Management Scenarios

- **Purpose:** to give us information about what putting different combinations of tools together can achieve. *Hypothetical scenarios to inform evaluation of solutions.* ***Not implementation plans or prescriptions.***
- 4 Water Management Scenarios:
  - 2 designed to meet instream water rights
  - 2 designed to try to meet higher flows
  - All try to meet irrigation demands, which are reduced through water supply actions
  - Various proportions of market-based and infrastructure tools
  - All move water between senior and junior users and to the rivers

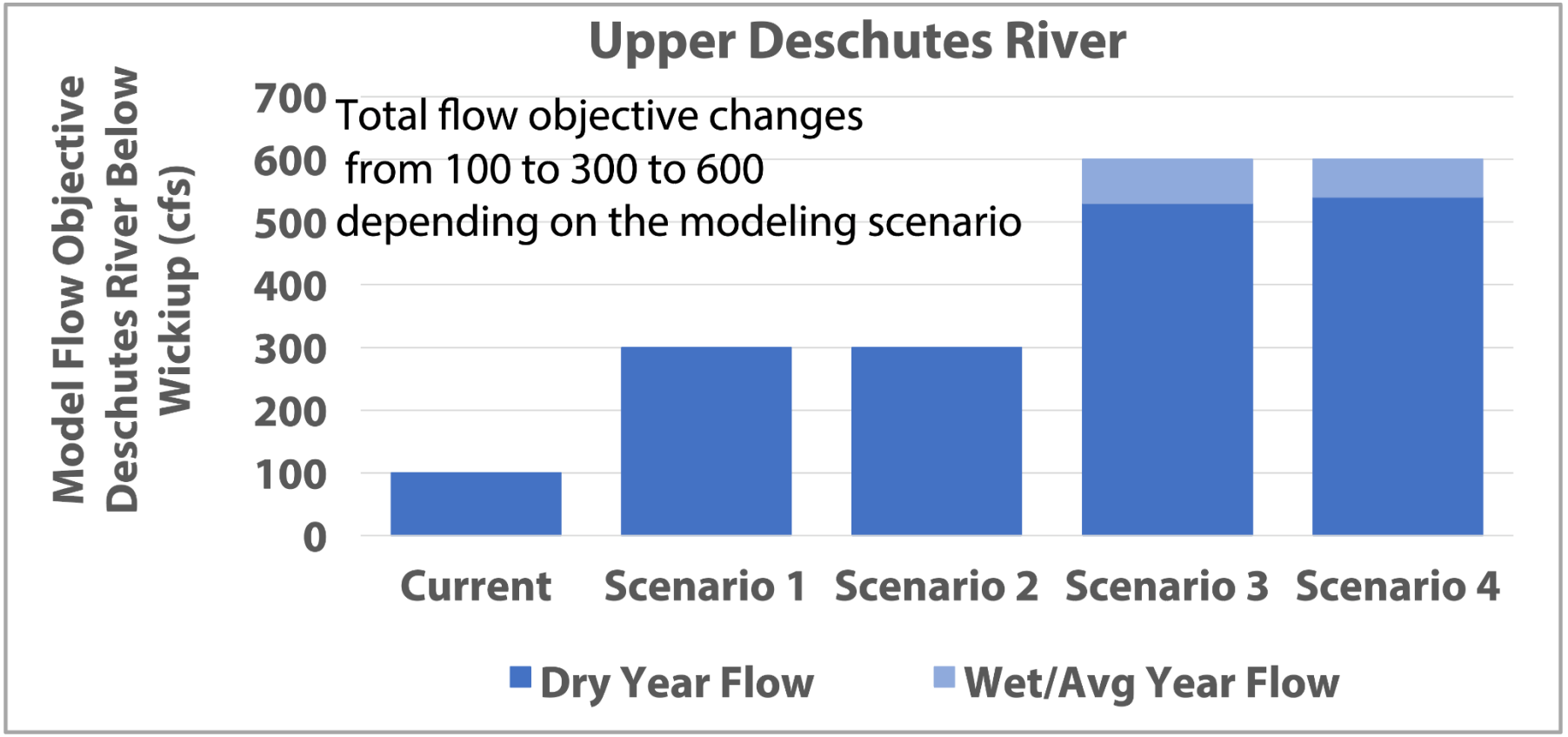
Water Management Scenarios Modeling



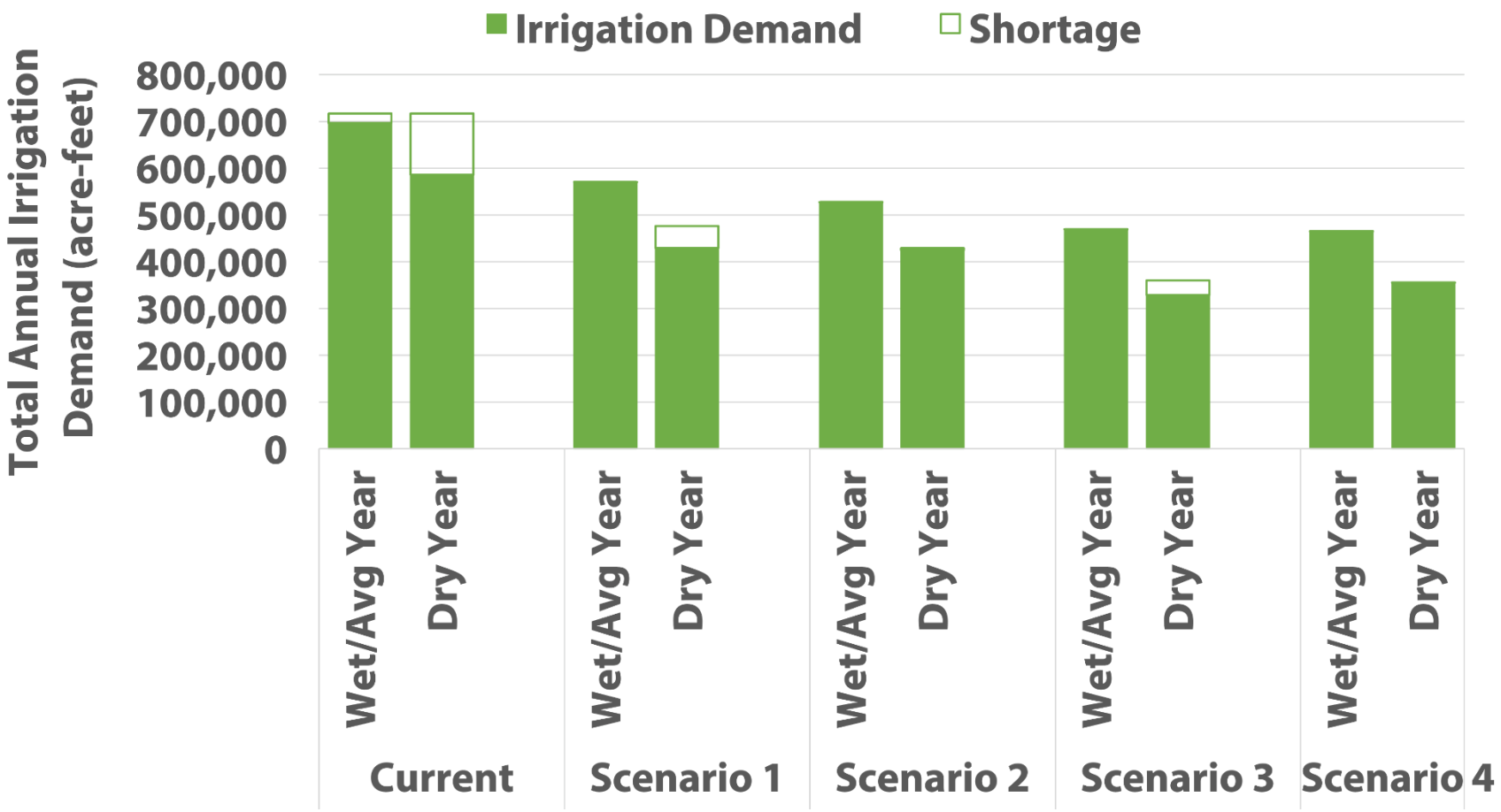
Modeling Inputs



Example Results

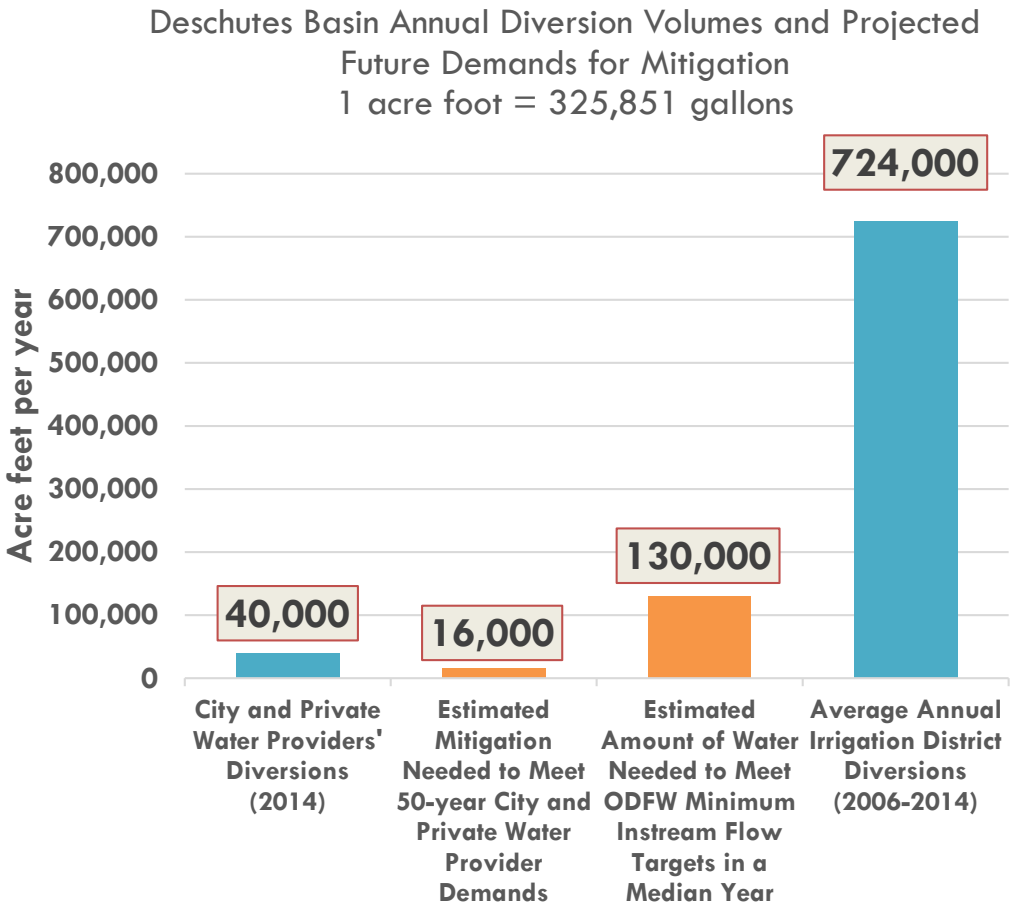


Example Results



Meeting Future Groundwater Needs

Municipal, Industrial, Commercial, Irrigation



- 16,000 AF of groundwater mitigation needed for municipal
- Comes from dedicating water instream
- Study will evaluate how well the tools and scenarios meet this need

Instream Studies

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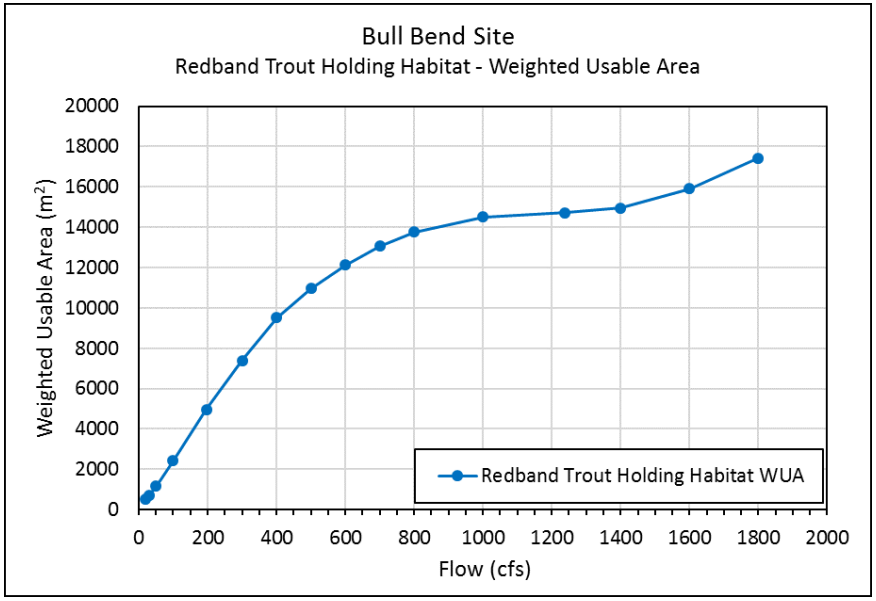
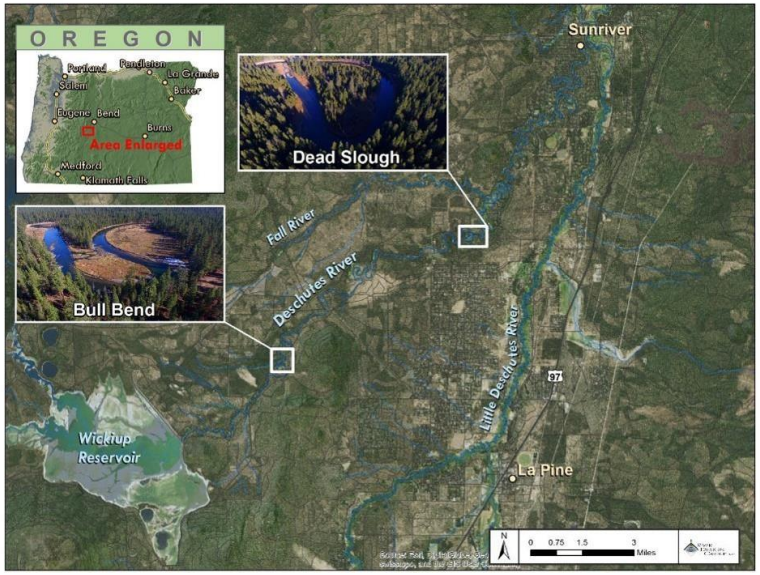
- Upper Deschutes Habitat Modeling
- Flow-Temperature Assessments (Middle Deschutes, Tumalo Creek, Whychus Creek, Lower Crooked River)





Other Study Elements

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- Additional Snow Telemetry Stations
- Gaging at diversions
- Potential Forecasting Improvements
- Groundwater/Surface Water Switches and Aquifer Recharge
- Legal and Policy Issues

Next Steps

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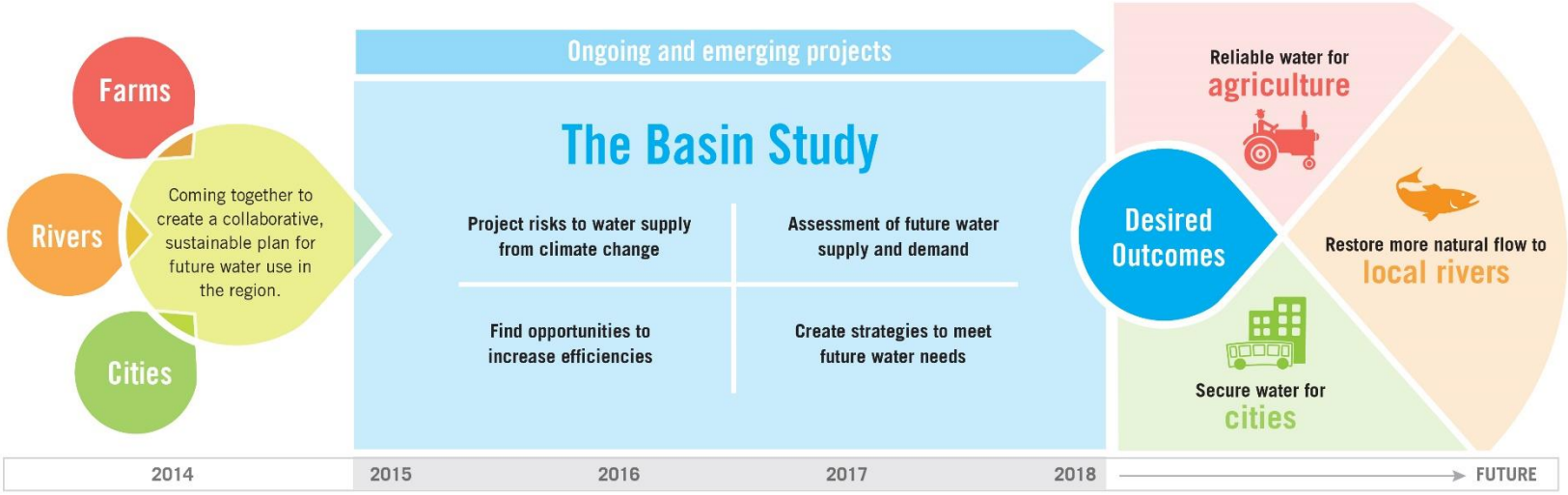
- Gather input
- Evaluate results
- Draft report
- Study results can be used to inform continued implementation of solutions



How to get involved

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- Provide input today (comment box)
- Email input: bor-pnr-udbasinstudy@usbr.gov
- Sign up for BSWG email list
- https://www.usbr.gov/pn/studies/deschutes/
- Posters available online at: www.deschutesriver.org

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Questions & Poster Open House