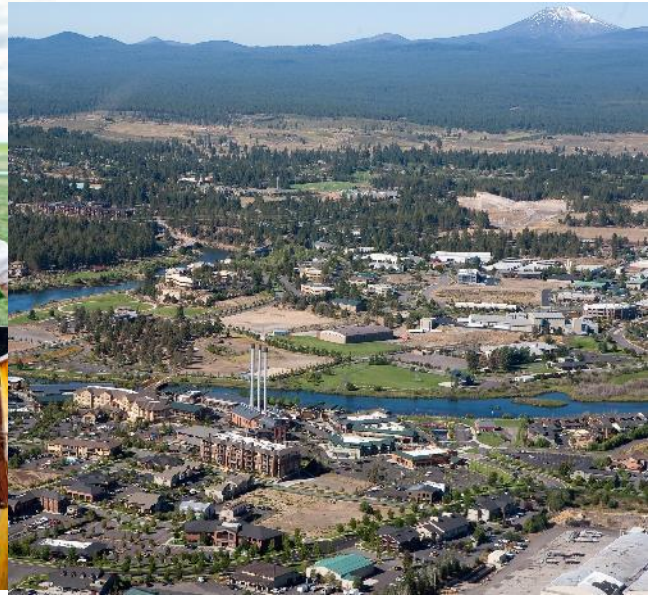
THE UPPER DESCHUTES BASIN STUDY

Water for agriculture, rivers & cities



Water in the Deschutes

Who needs it?

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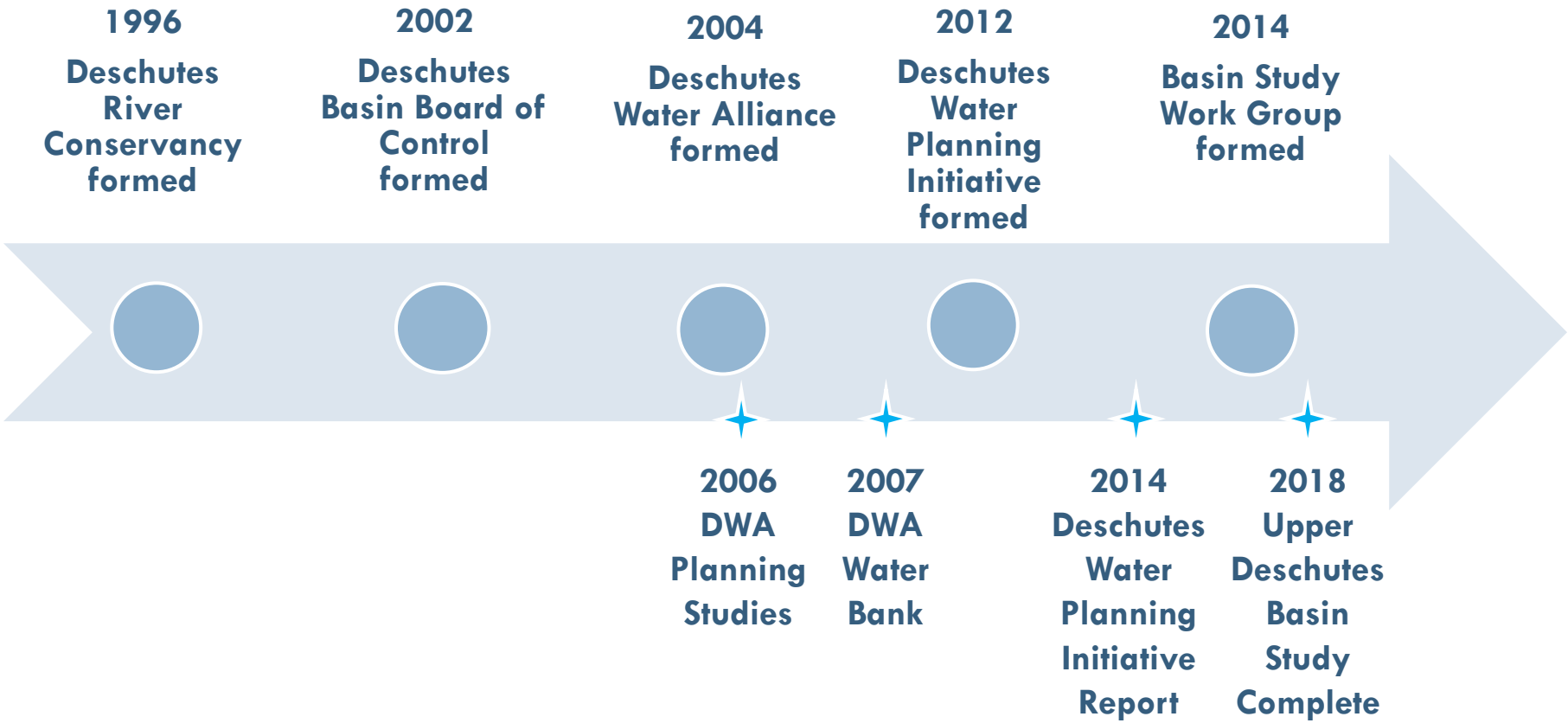
- **Rivers and streams** – over appropriation and flow alteration.
- **Junior water right holders** – production agriculture.
- **The Cities** – long-term supply for growing populations.
- **Climate change** may increase shortfalls

History of Working Together in the Deschutes



Ongoing Projects & Flow Restoration

Collaborative Progress in the Basin

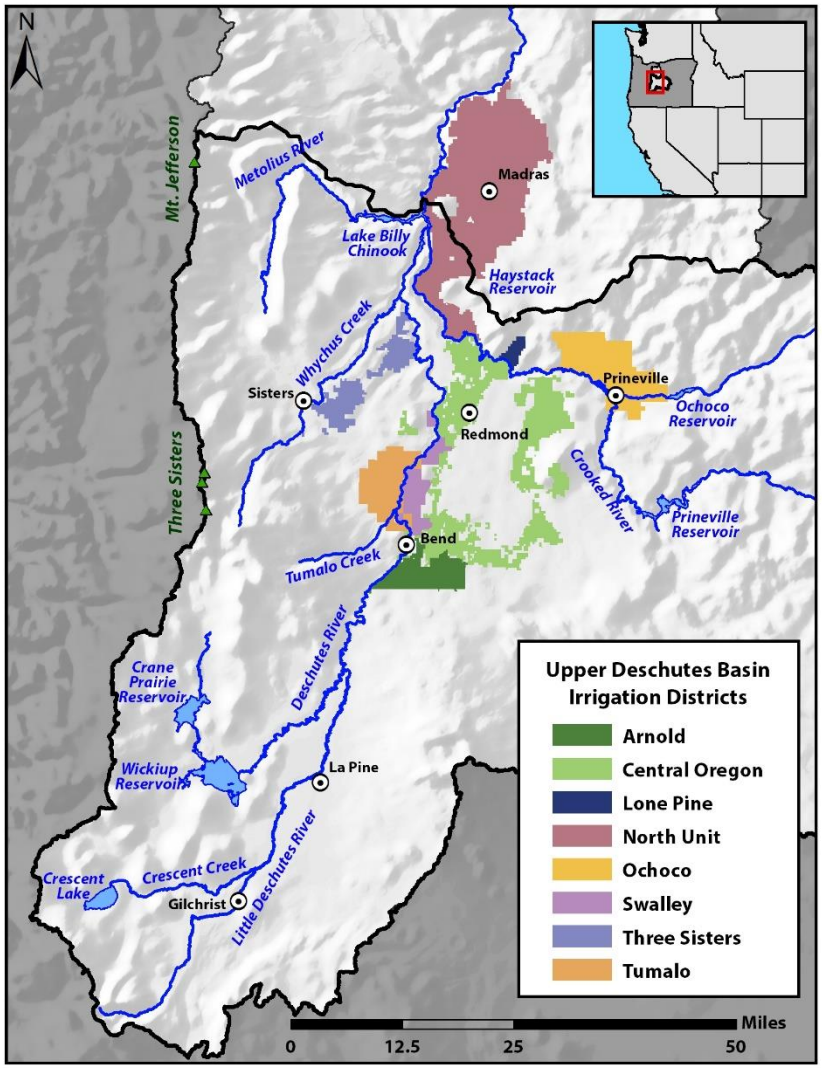
Whychus Creek

0 cfs 20 cfs

Middle Deschutes

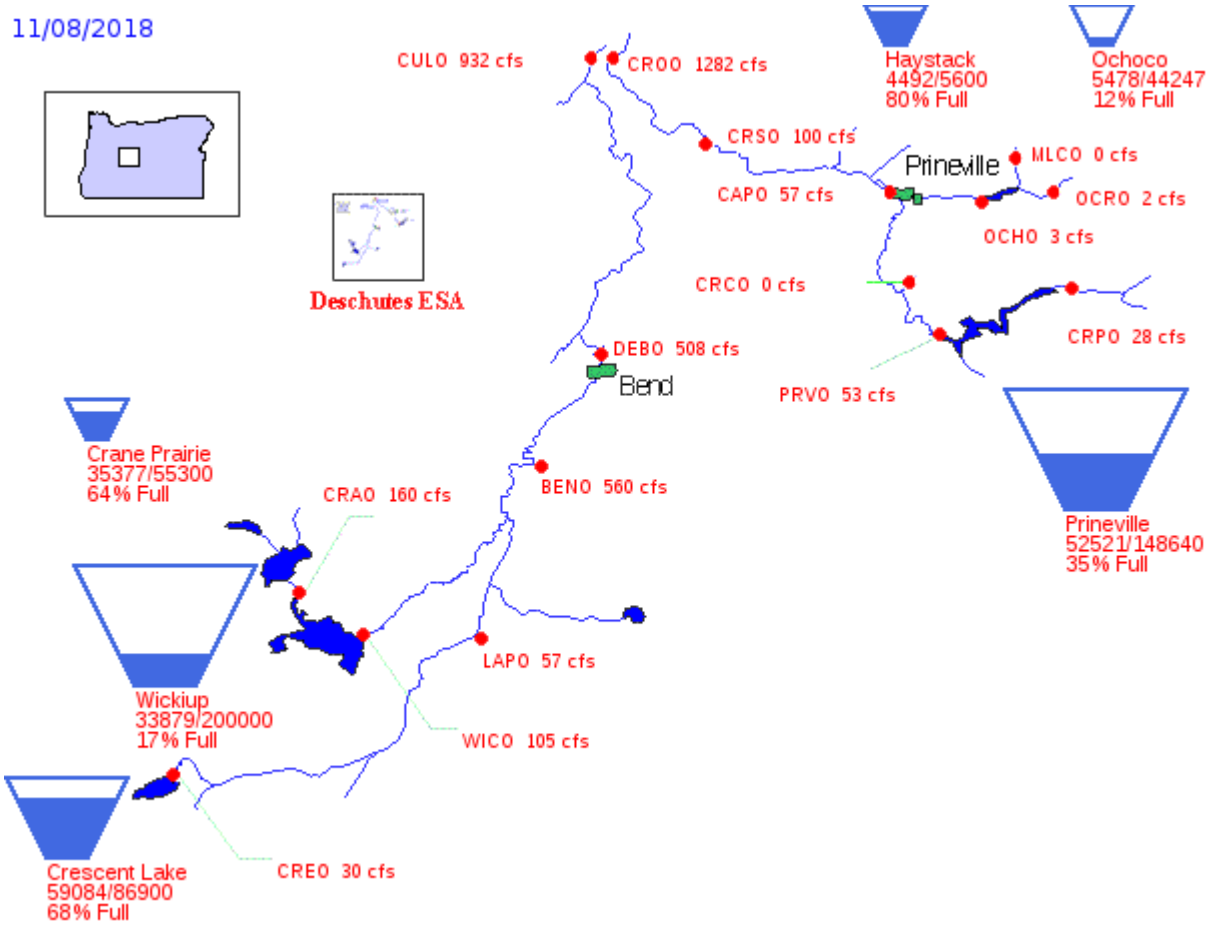
30 cfs 130 cfs

Key Issues Now



- Upper Deschutes River flow restoration
- Addressing water supply risk for agricultural interests
- Addressing instream flow shortages
- Addressing water supply for muni/quasi

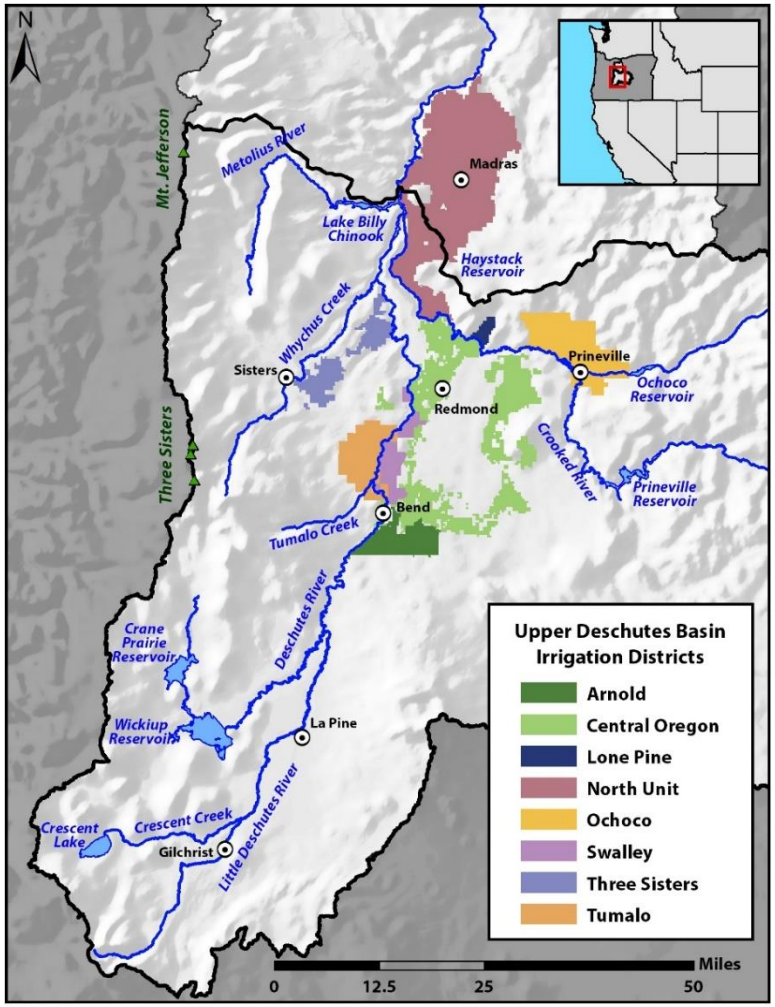
Deschutes Basin Reservoirs



Upper Deschutes
Low Winter Flows

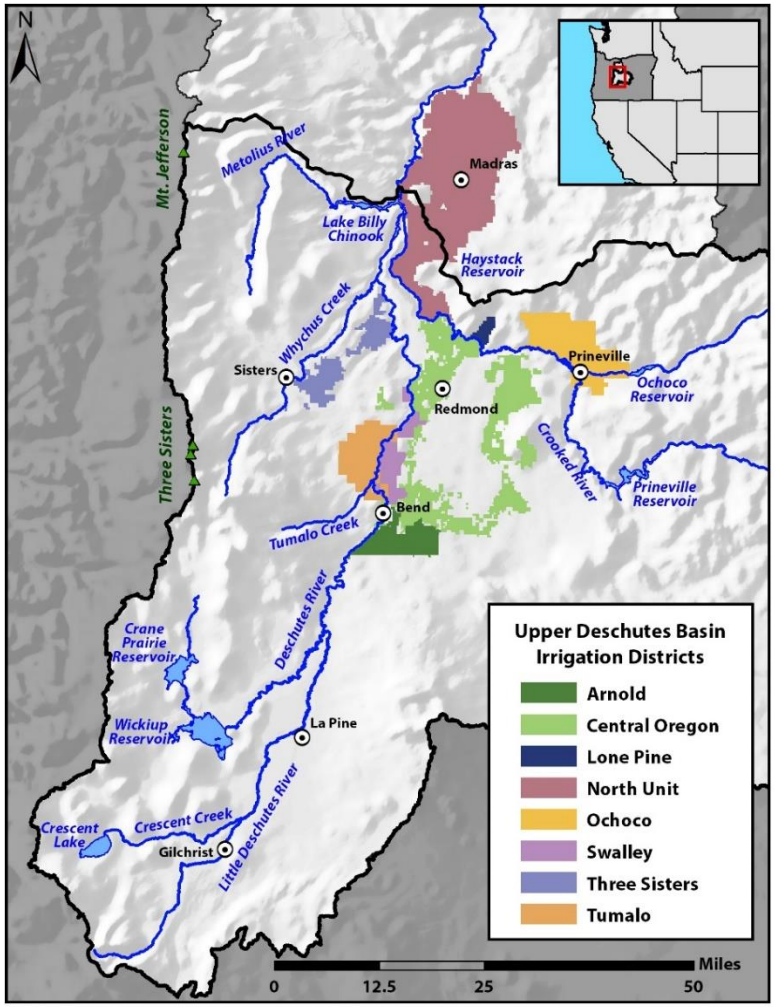
Upper Deschutes
High Summer Flows

Changing Reservoir Management



- Restoring flows for fish and wildlife habitat puts agricultural water supply at risk
- Conservation, water marketing and moving water between districts will be necessary

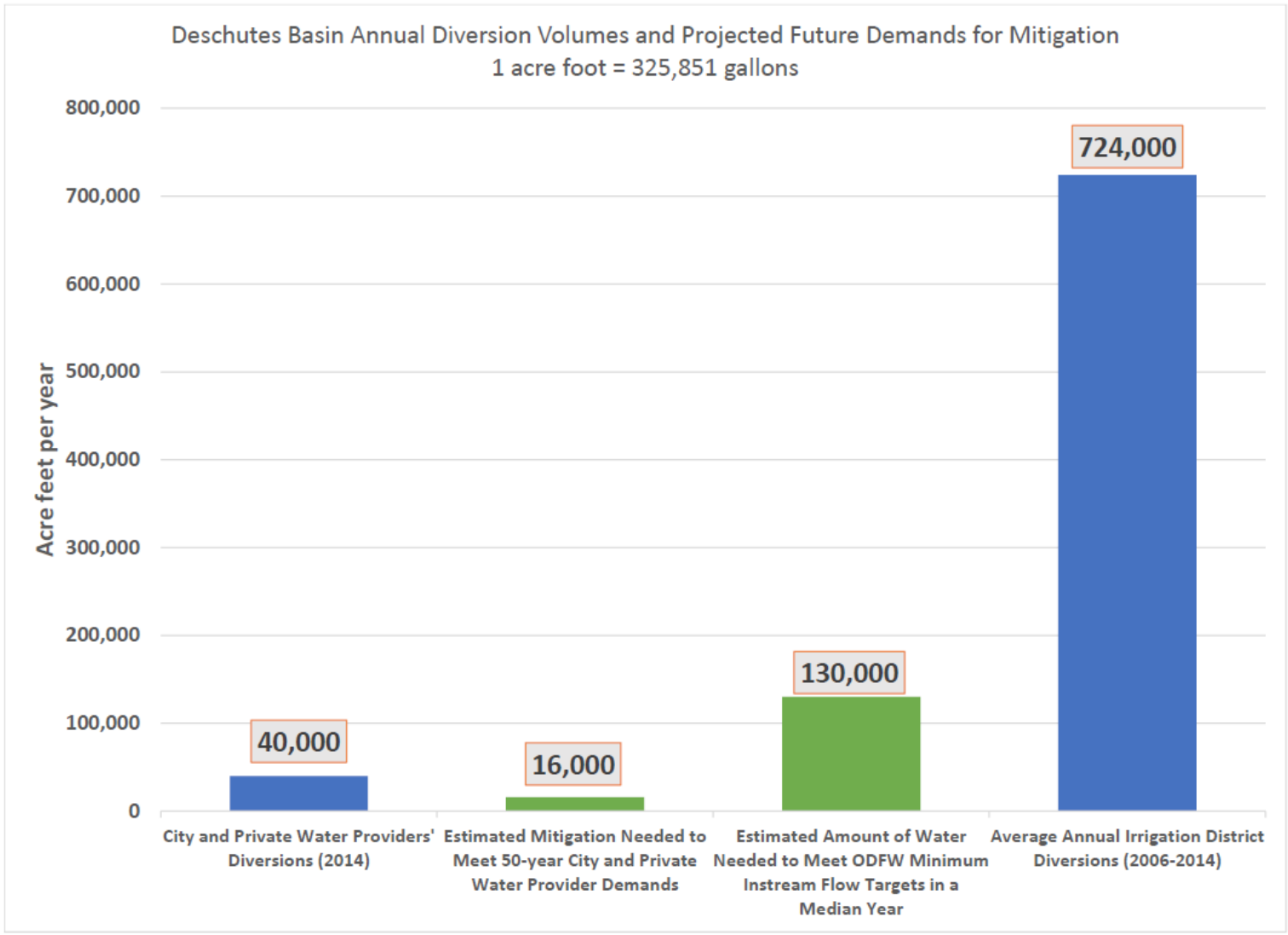
Instream Flow Needs in Other Reaches



- Whychus Creek
- Tumalo Creek
- Middle Deschutes River
- Lower Crooked River
- Little Deschutes River
- Crescent Creek

Municipal Demand

Deschutes Groundwater Mitigation Program



Summary of Shortages

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- 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

Balancing the Deschutes
"The Big Play"

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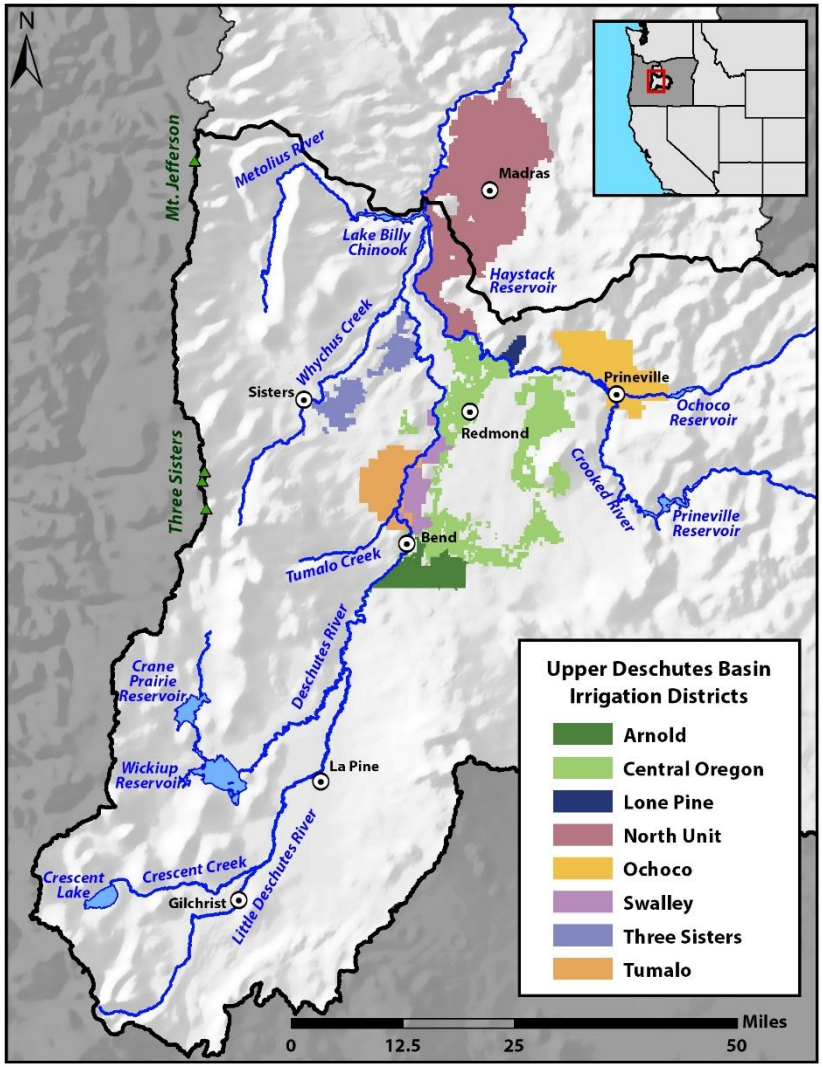
- Generate water in COID
- Move water to NUID to increase reliability
- Reduces demand for Wickiup storage
- Restore Upper Deschutes flows
- Explore mitigation opportunities



Study Approach

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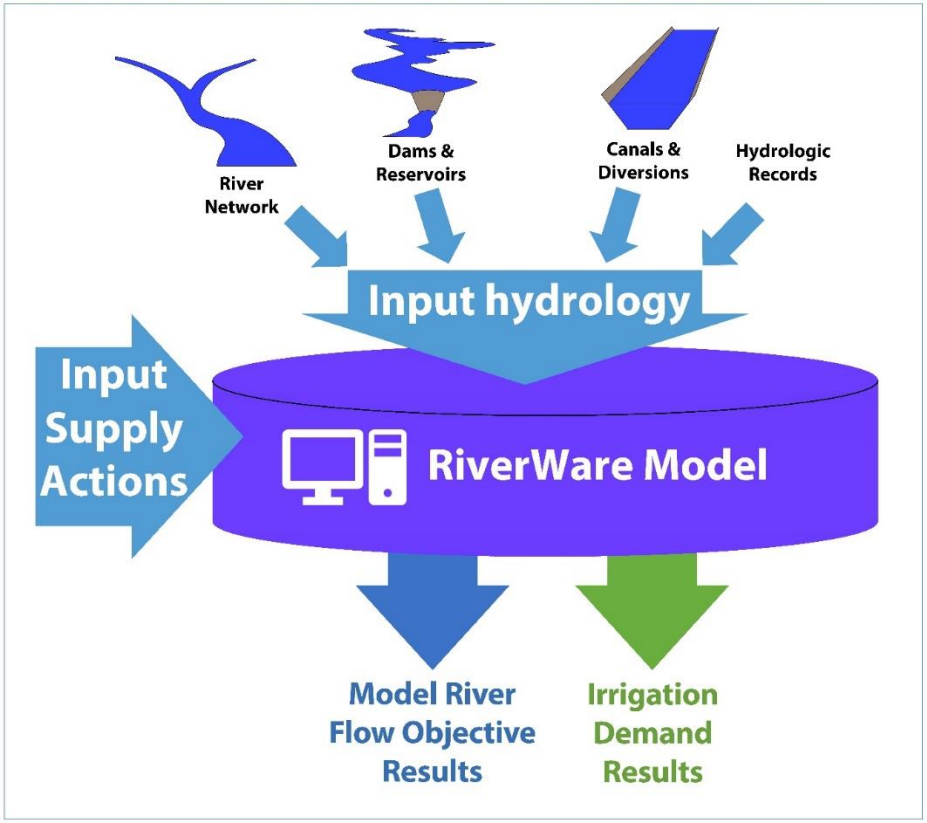
- Evaluate tools to generate water
- Evaluate tools to move water
- Combine tools into scenarios
- Evaluate how well water supply goals were met



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Basin Study Work Group

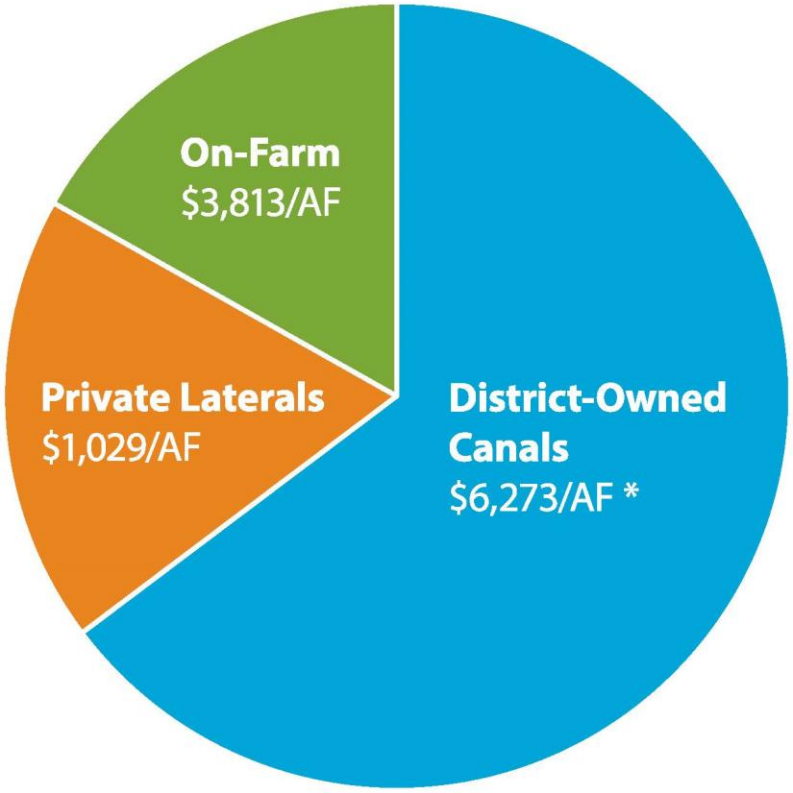
- Central Oregon Irrigation District
- North Unit Irrigation District
- Arnold Irrigation District
- Swalley Irrigation District
- Lone Pine Irrigation District
- Tumalo Irrigation District
- Ochoco Irrigation District
- Three Sisters Irrigation District
- City of Bend
- Avion
- City of Madras
- City 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

Water Supply Tools Studied

- Water Conservation Infrastructure
- Market-Based Approaches
- Storage Concepts

Water Conservation Infrastructure

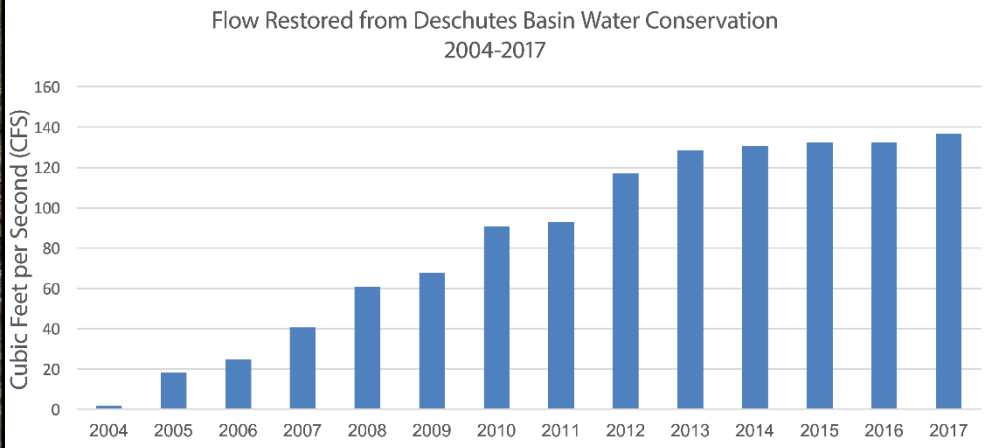
- Actions that increase efficiency of irrigation water delivery and use
  - Piping canals
  - Piping private laterals
  - On-farm infrastructure upgrades
- Total opportunity is ~200,000 AF; $986M



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

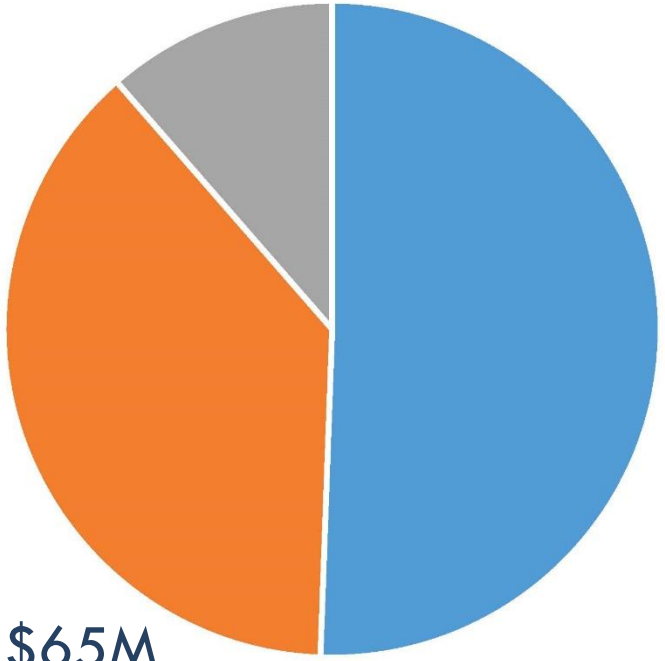
Water Conservation Infrastructure

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



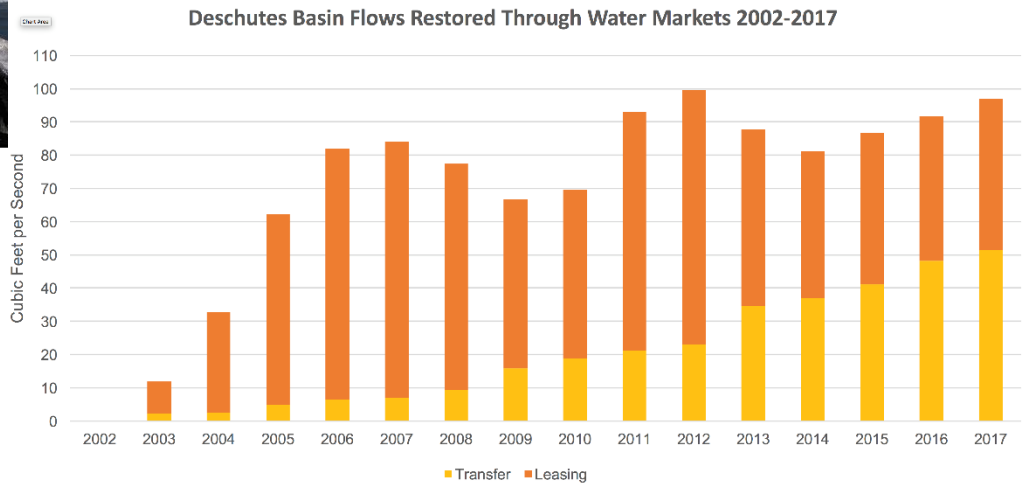
Water generated can move from farm to farm, or farm to river

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

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

Market-Based Solutions

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

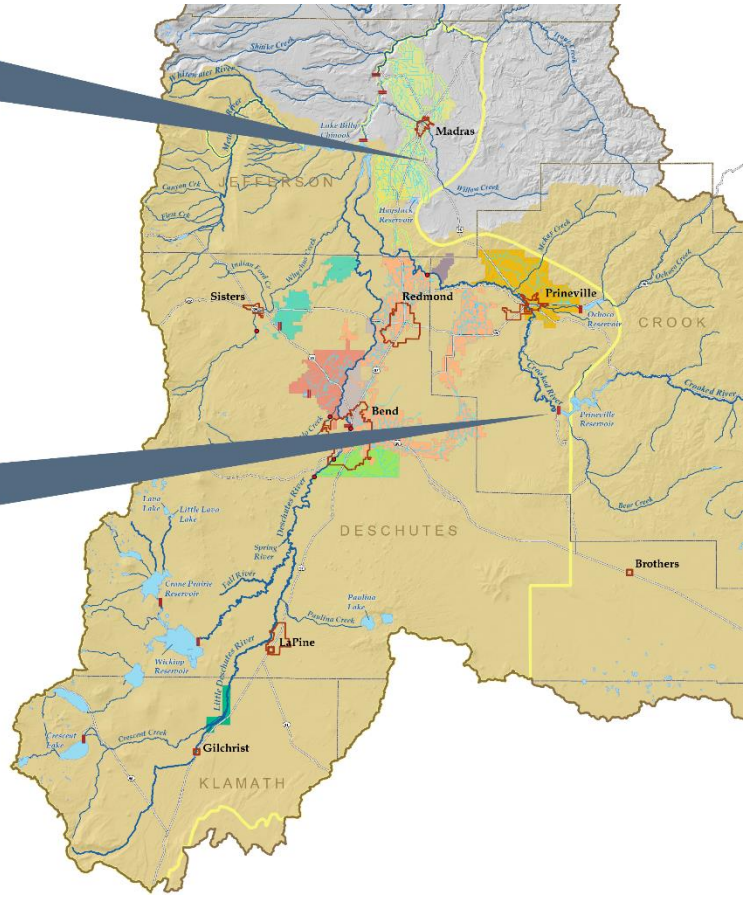
Storage Concepts

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

The What

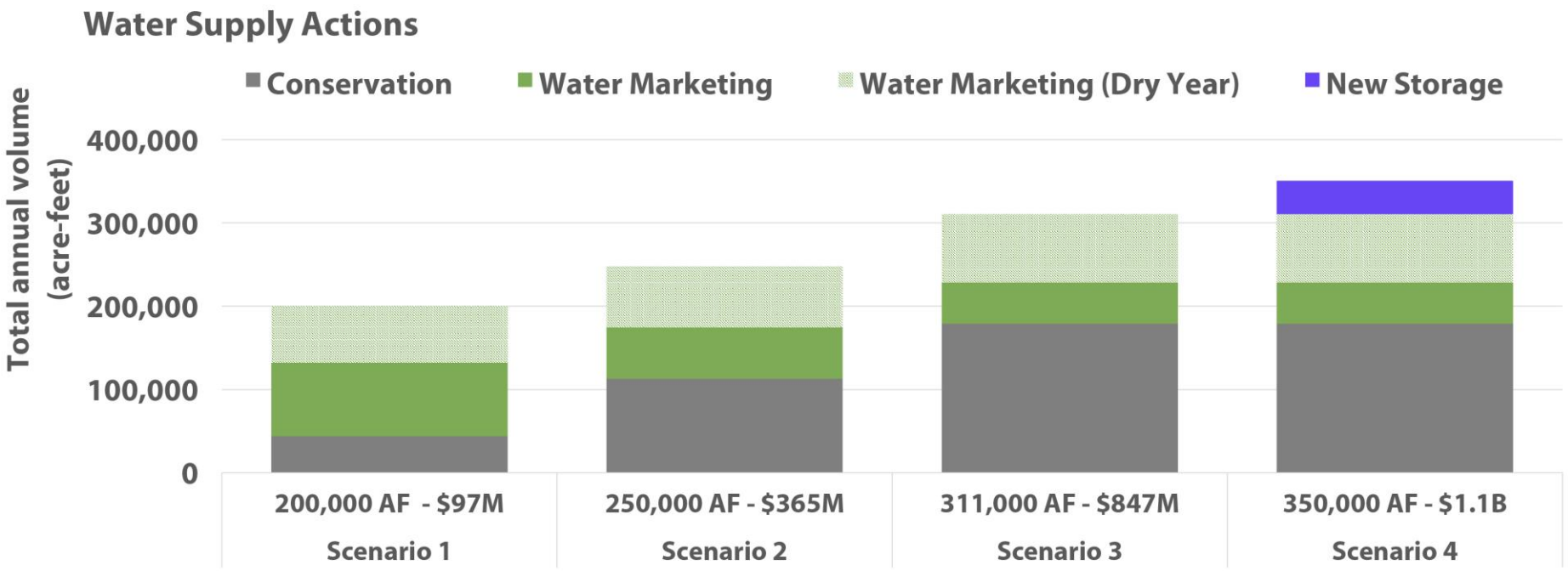
- Combined tools and water movement to inform potential strategies
- Hypothetical, assumed actions could be done
- Included significant irrigation demand reductions through heavy investment

The So-What

- Met most instream and out of stream needs in most years
- Integrated solutions are the most cost and time-effective
- Opportunities exist to solve the problems in the Deschutes

*success will require financial and cultural commitment

Scenario Modeling Inputs



Priority Take-Aways

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- Secure match for piping projects (leverage Federal PL566 funding)
- Develop or clarify pathways to move water most efficiently between districts
- Integrate water conservation and water marketing activities
- Develop or clarify pathways to protect water in the Upper Deschutes River
- Develop or clarify reliable pathways to generate groundwater mitigation

Priority Take-Aways

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- Continue to invest in collaboration
- Continue to improve hydrologic modeling capability to support assessment of:
  - Potential climate change impacts
  - Groundwater impacts of basin water management strategies

Next Steps

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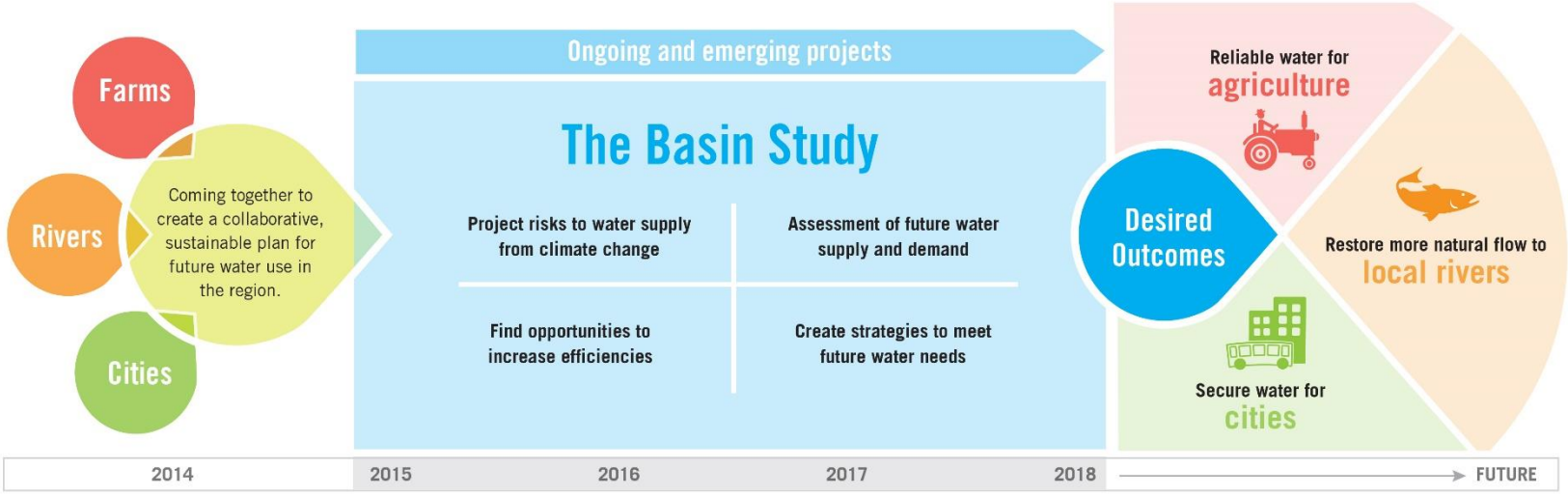
- Finalize report (Jan 2019)
- Use study results to inform continued implementation of solutions and basin water management plan



Discussion

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- Basin Study materials available online at: www.deschutesriver.org
- https://www.usbr.gov/pn/studies/deschutes/