Northwest **Power** and **Conservation** Council

March 7, 2017

MEMORANDUM

TO: Council members

FROM: Leslie Bach

SUBJECT: Water markets and flow restoration presentation

BACKGROUND:

Presenters: Bruce Aylward (AMP Insights) and Leslie Bach

Summary: Water markets are expanding and maturing as a key aspect of multi-sector water management, and as a tool for improving streamflows for fish and wildlife. Bruce and Leslie will provide a high-level overview of water markets and water transactions across the western U.S. and the Columbia River Basin.

Relevance: Water acquisitions are identified as a core measure in the Habitat Strategy section of the 2014 Fish and Wildlife Program (page 42).

Background: Inadequate streamflow has been identified in the Columbia Basin Subbasin Plans and other key documents as a major limiting factor that impacts the productivity of native anadromous and resident fish in the northwestern United States. Water markets and transactions are an effective tool for addressing this key limiting factor. At the same time, water markets provide an important water management tool for agricultural producers and for municipalities addressing increasing water demands. The scale and extent of water markets have been growing across the west, and the Columbia Basin is a leader in advancing water

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market approaches, including the Columbia Basin Water Transactions Program.

More Info: Aylward, Bruce, David Pilz, and Leslie Sanchez. 2016. “Political Economy of Water Markets in the Western United States.” Portland: AMP Insights and Ecosystem Economics.

Culp, Peter W., Robert Glennon, and Gary Libecap. 2014. “Shopping for Water: How the Market Can Mitigate Water Shortages in the American West.” The Hamilton Project and Stanford Woods Institute for the Environment. Discussion Paper 2014-05.

Szeptycki, Leon F., Julia Forgie, Elizabeth Hook, Kori Lorick, and Phillip Womble. 2015. “Environmental Water Rights Transfers: A Review of State Laws.” Water in the West Program, Stanford University.

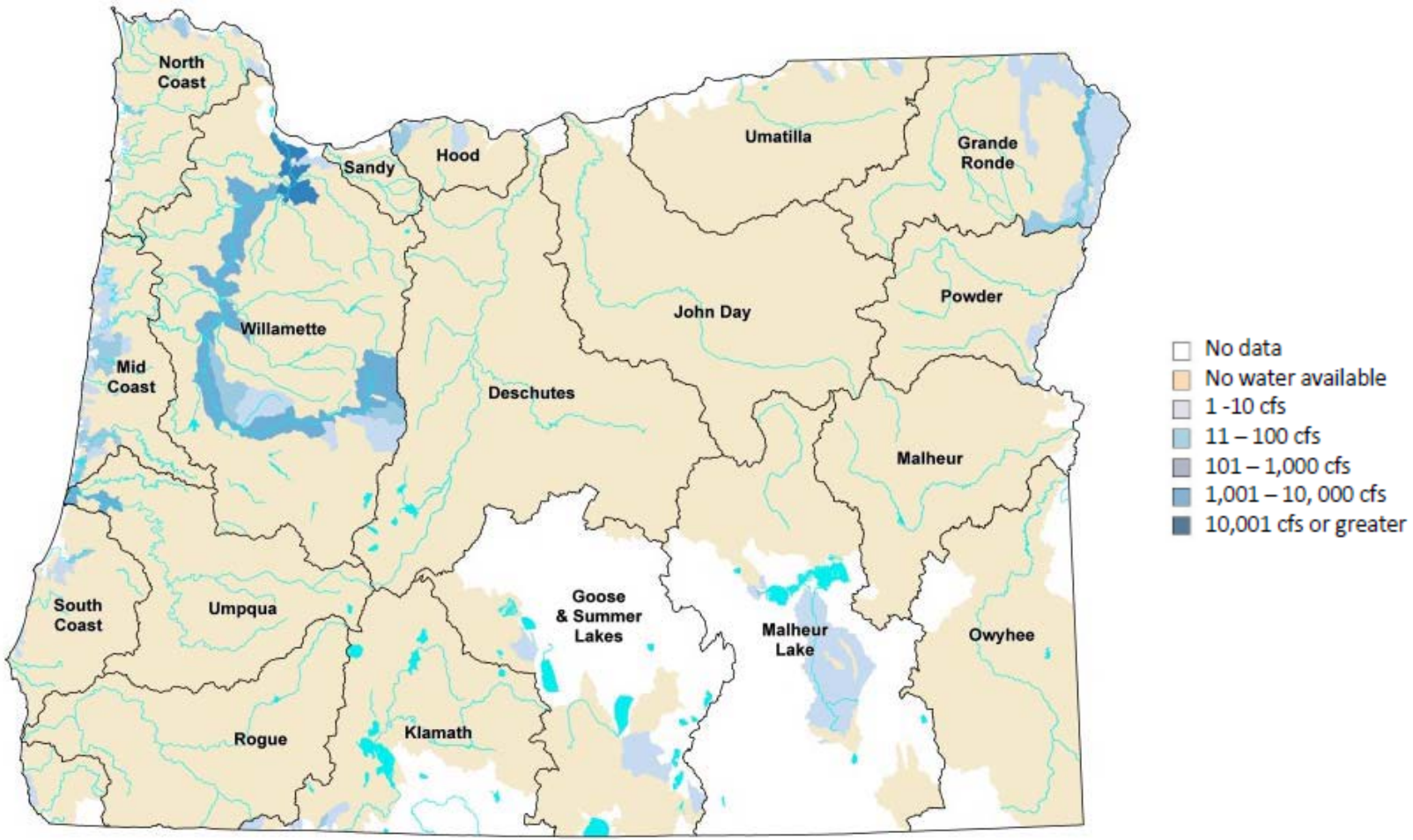
Water Markets: Using Cooperative Market-Based Solutions to Secure Water

Wood River Valley, Idaho © Steve Barnard

Presentation Outline

- Water availability: current and future
- Streamflow-ecology relationships
- Water markets: genesis, status and trends (with some brief examples)
- Outcomes and benefits

In most places in the western U.S. water is fully-, or over-appropriated



Oregon August available streamflow (Oregon Water Resources Department)

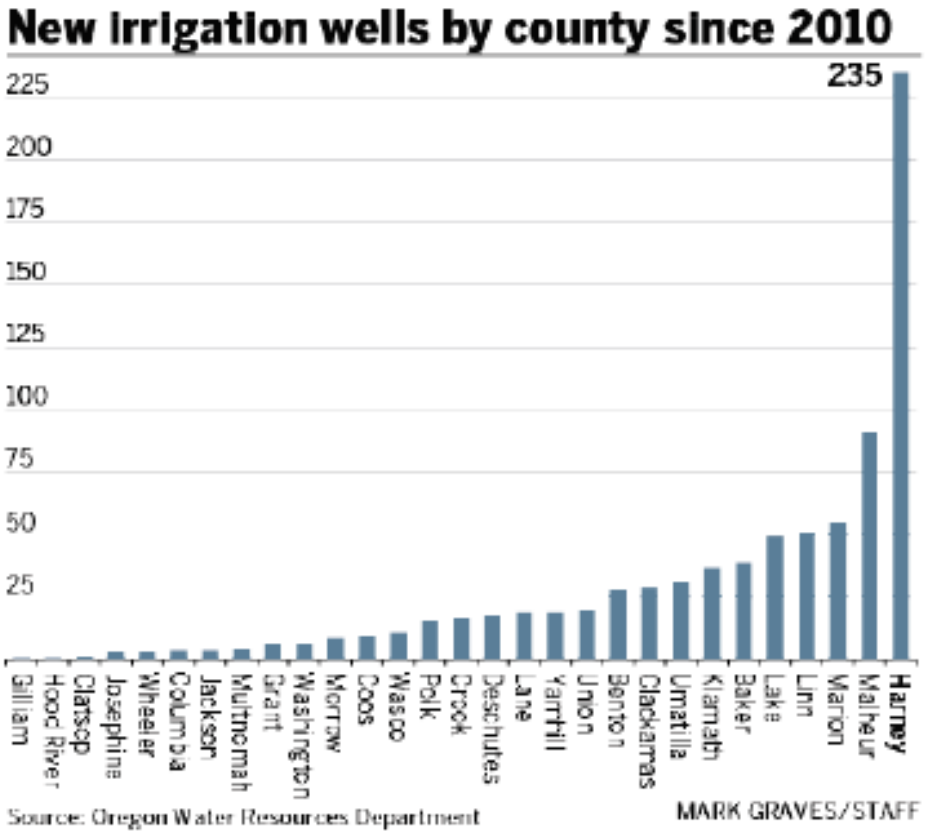
Demands on groundwater are increasing

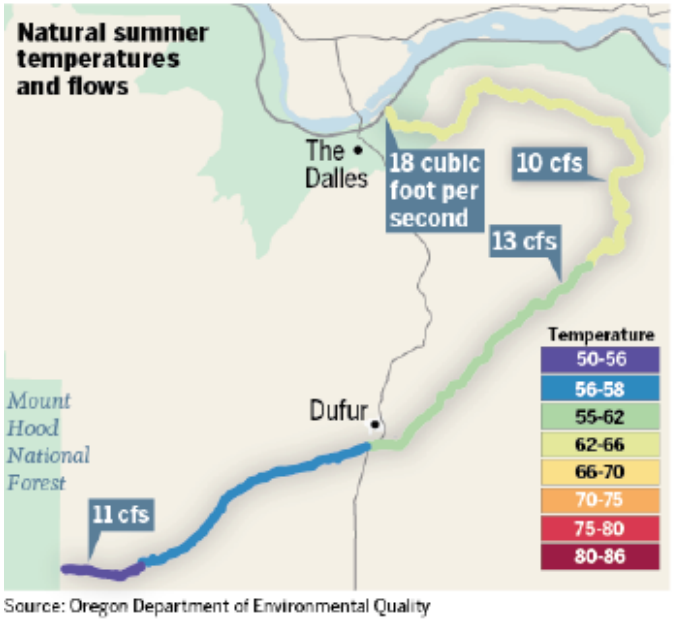
MARK GRAVES/STAFF

Rolling irrigation pipe stands ready in a Dufur Valley field, farm country along Fifteenmile Creek south of The Dalles. In Oregon, the amount of water landowners are allowed to extract statewide totals nearly 1 trillion gallons annually -- enough to fill 150 million tanker trucks. An analysis by The Oregonian/OregonLive has found farmers in a quarter of eastern Oregon, the driest part of the state, are allowed to pump more underground water each year than rains deposit.

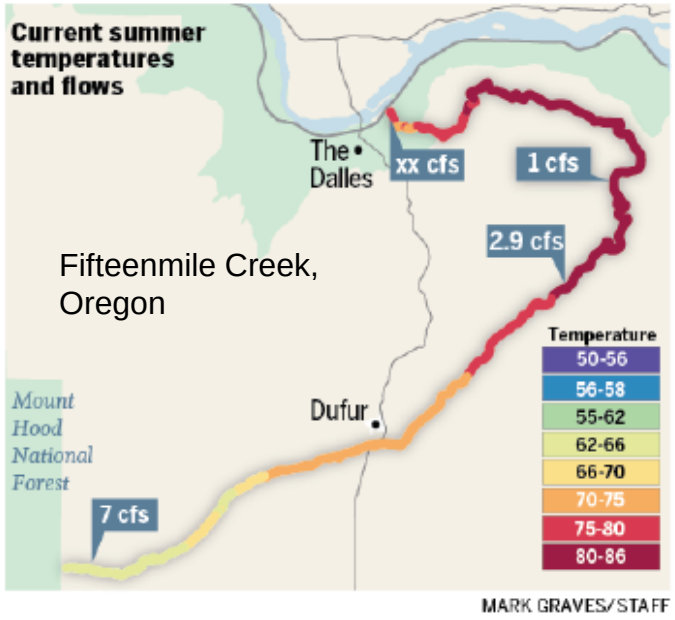
DRAINING OREGON

By KELLY HOUSE and MARK GRAVES
The Oregonian/OregonLive





Source: Oregon Department of Environmental Quality



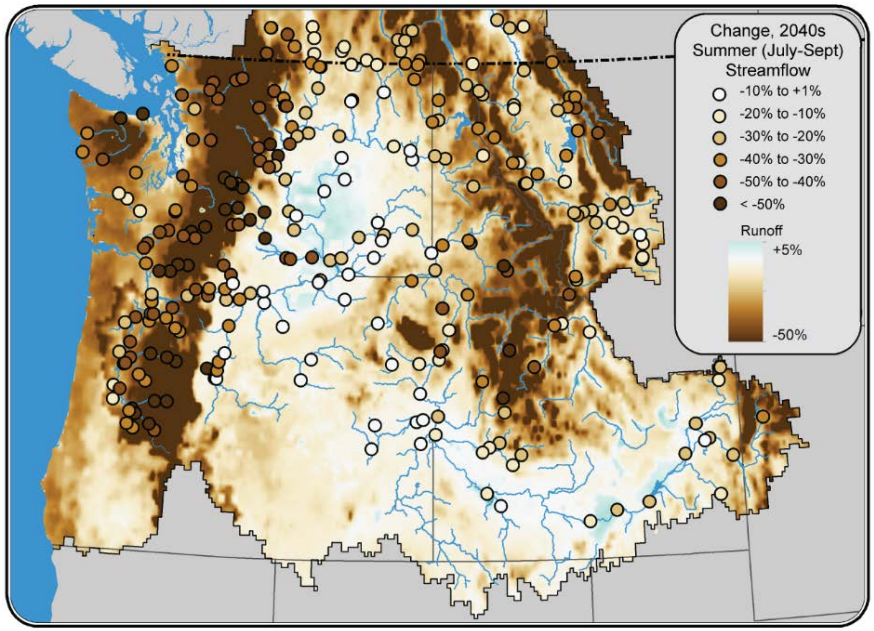
MARK GRAVES/STAFF

Flows and temperatures are already highly altered

From: Draining Oregon. Kelly House and Mark Graves

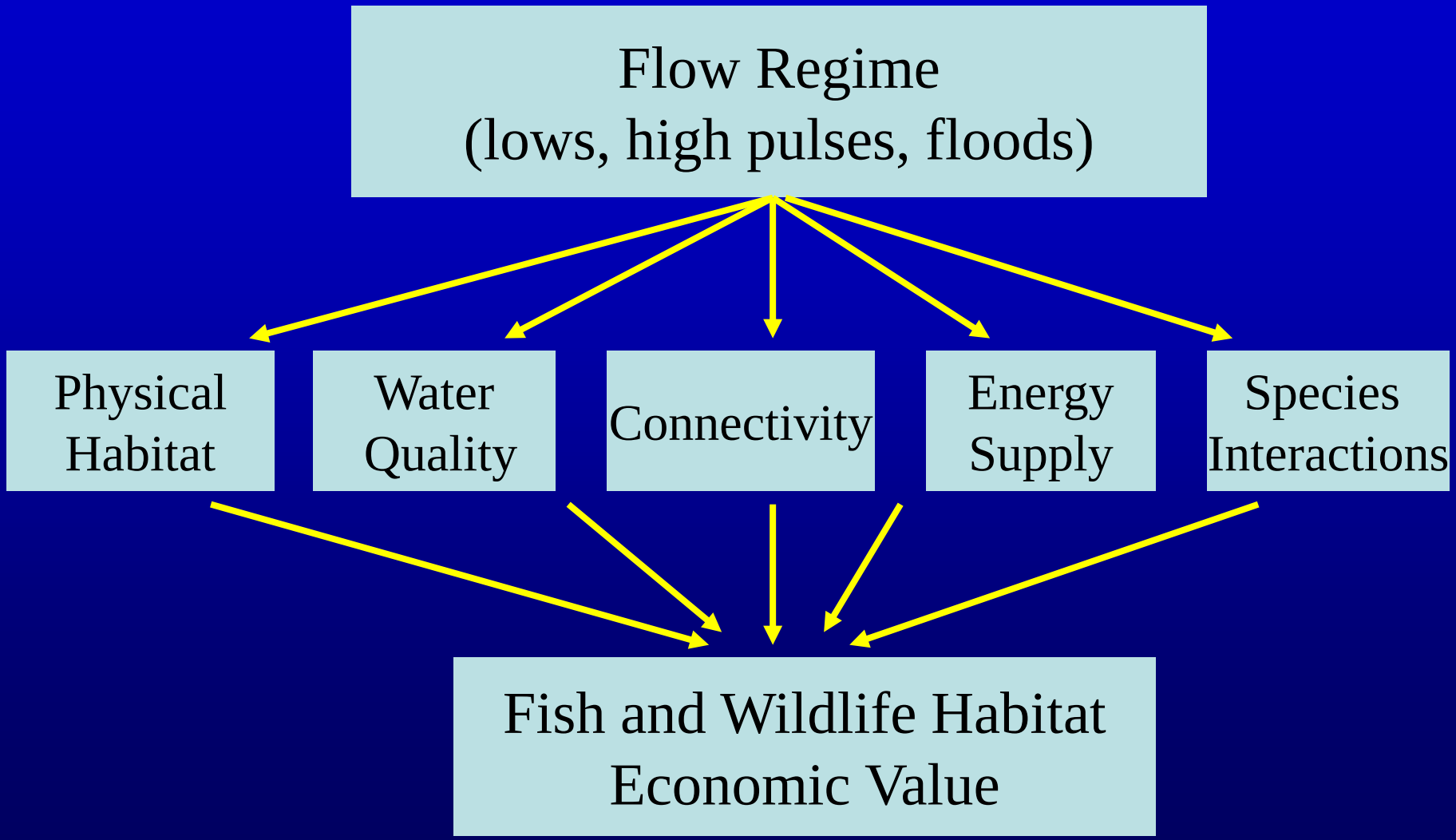
Climate change will potentially increase the impacts on summer flows

Reduced Summer Flows

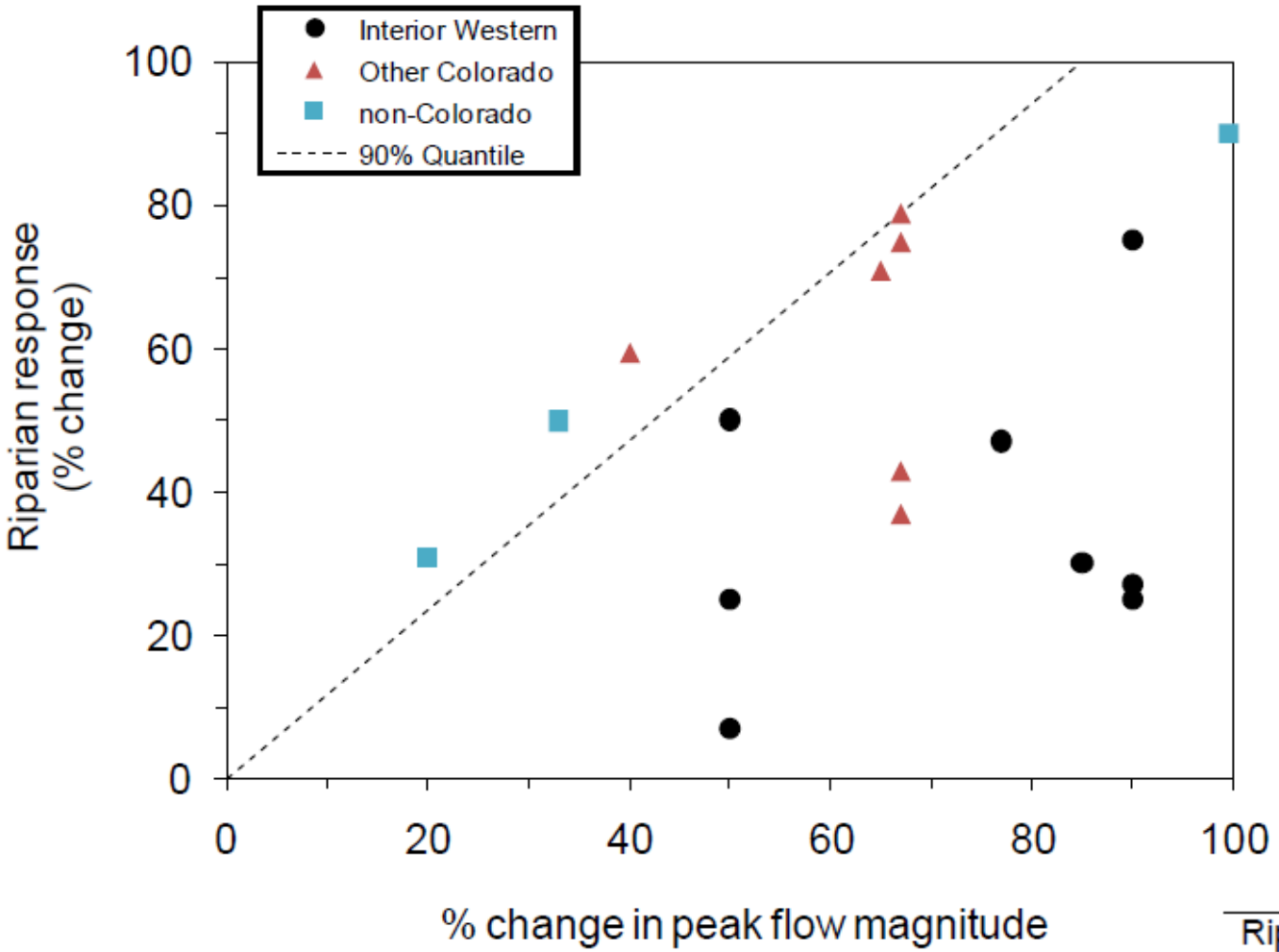


From: Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014

Flow as a Master Variable



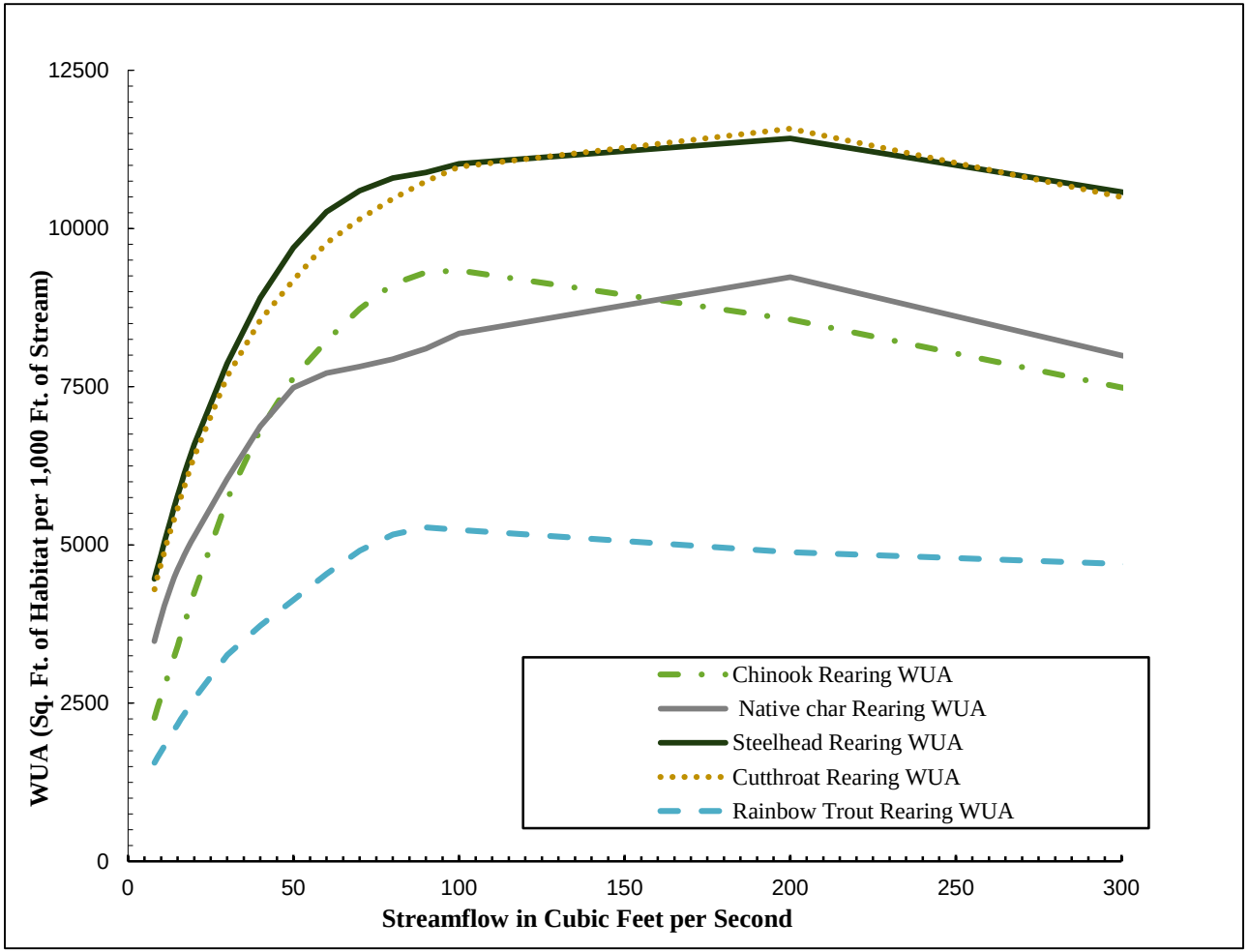
Flow-ecology relationships



Riparian Response	Peak-flow change
10%	8%
25%	21%
50%	42%
75%	64%

Wilding and Poff, 2008

Flow-ecology relationships

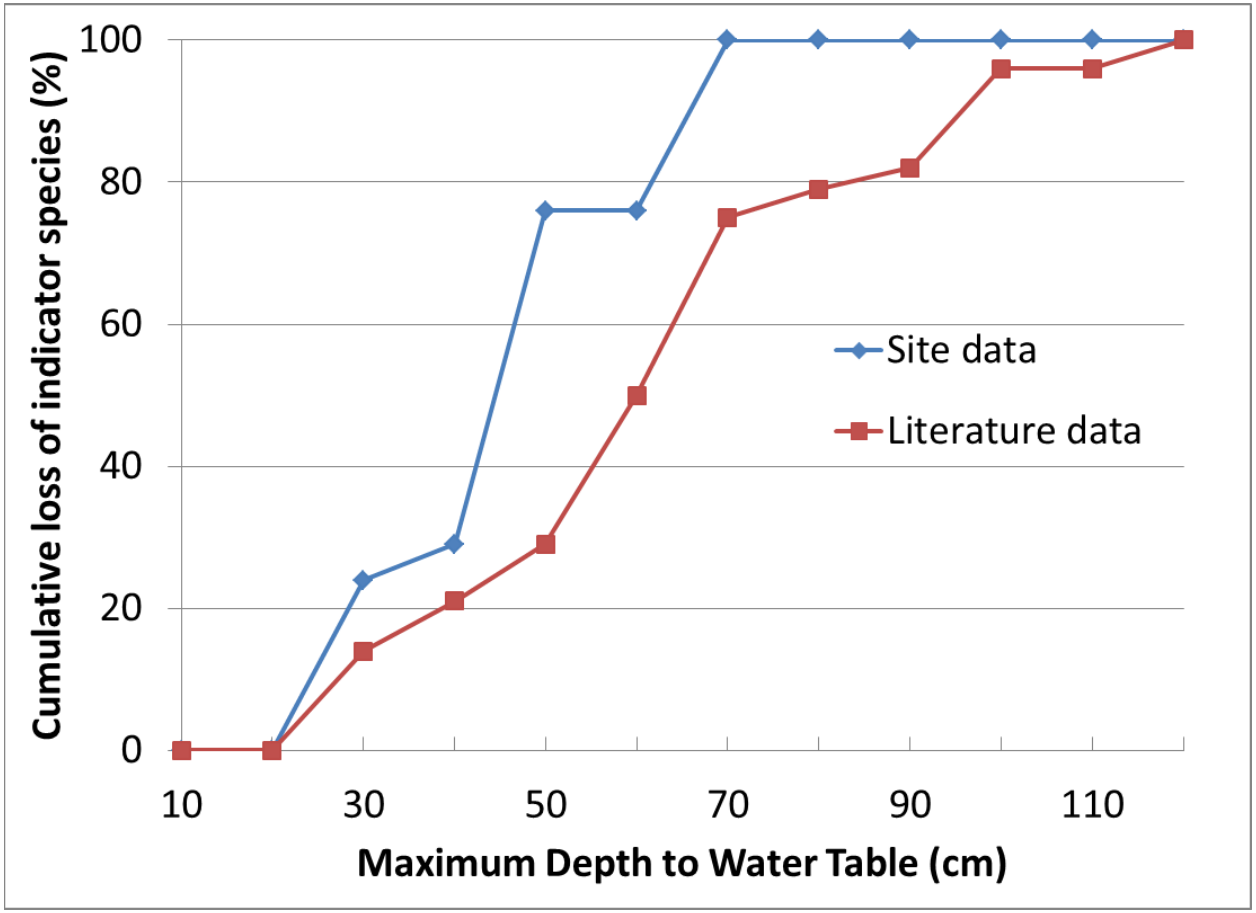


From: CBWTP

Groundwater-ecology relationships



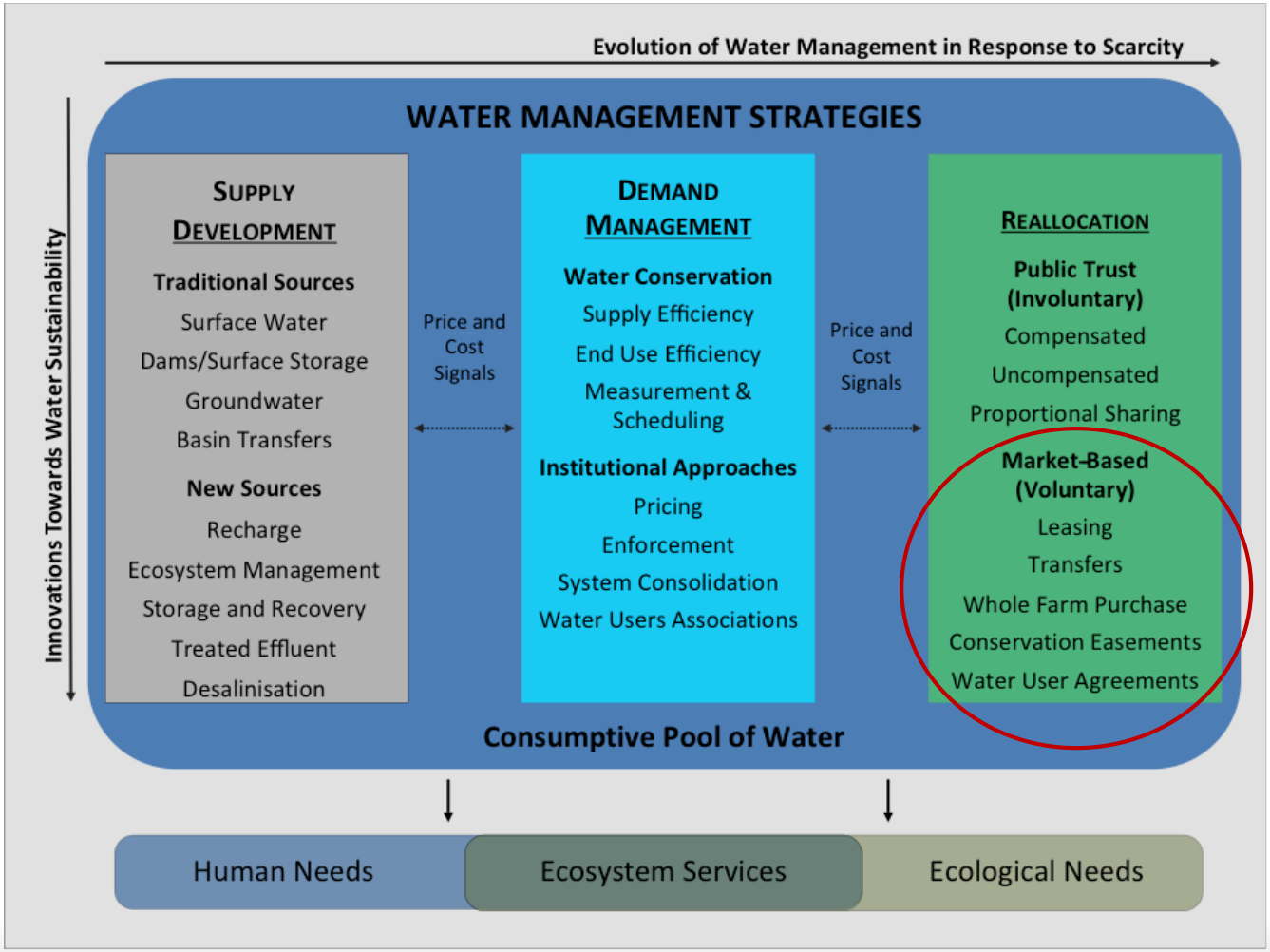




A species is "lost" when water table drawdown exceeds the 75th percentile of its range

Aldous and Bach, 2014

Potential Water Management Solutions



Water Markets Overview

Water market: a set of rules, set by the appropriate authority, to govern the exchange of water rights between willing buyers and sellers.

Enabling Conditions for Trade in Water Markets

1. Resource scarcity
2. Well defined, secure & flexible property rights
3. Tradable & transferable rights

Role of Water Markets

- Meet changing economic needs for water
  - balance supply/demand
  - manage conflict
- Meet social needs
  - protect uses/avoid impacts
- Meet environmental needs
  - avoid impacts/provide for restoration

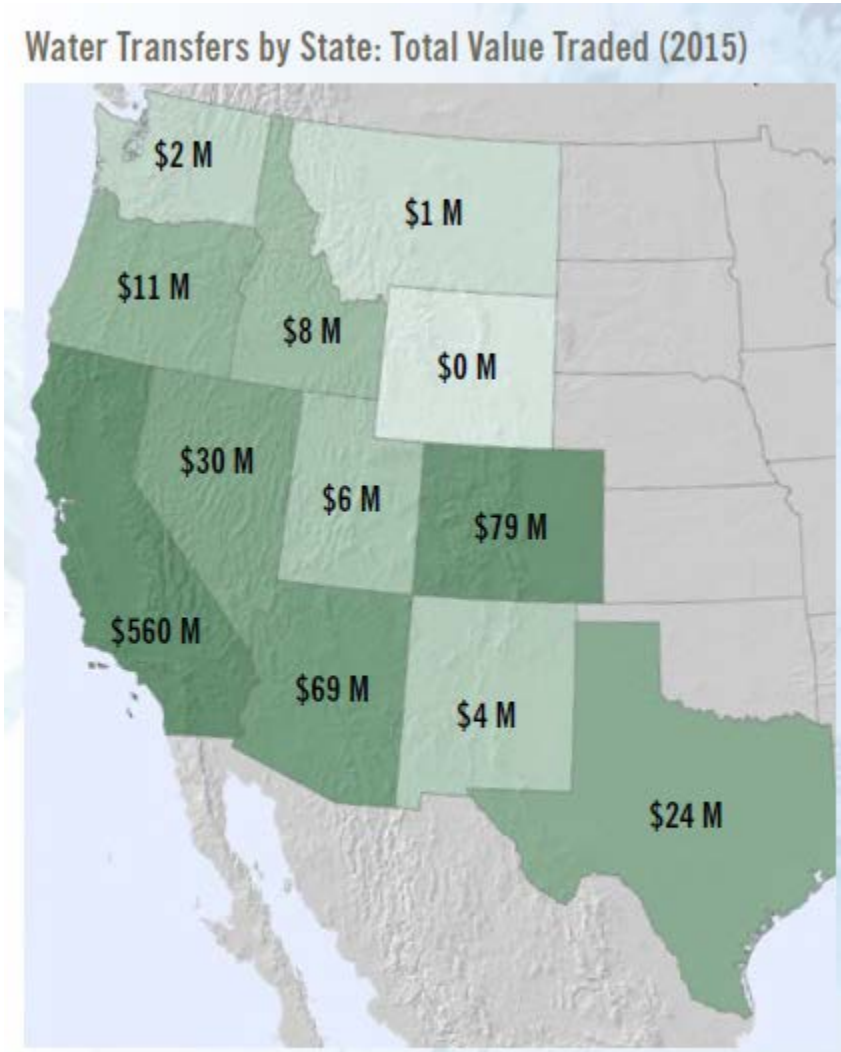
Drivers of Market Activity

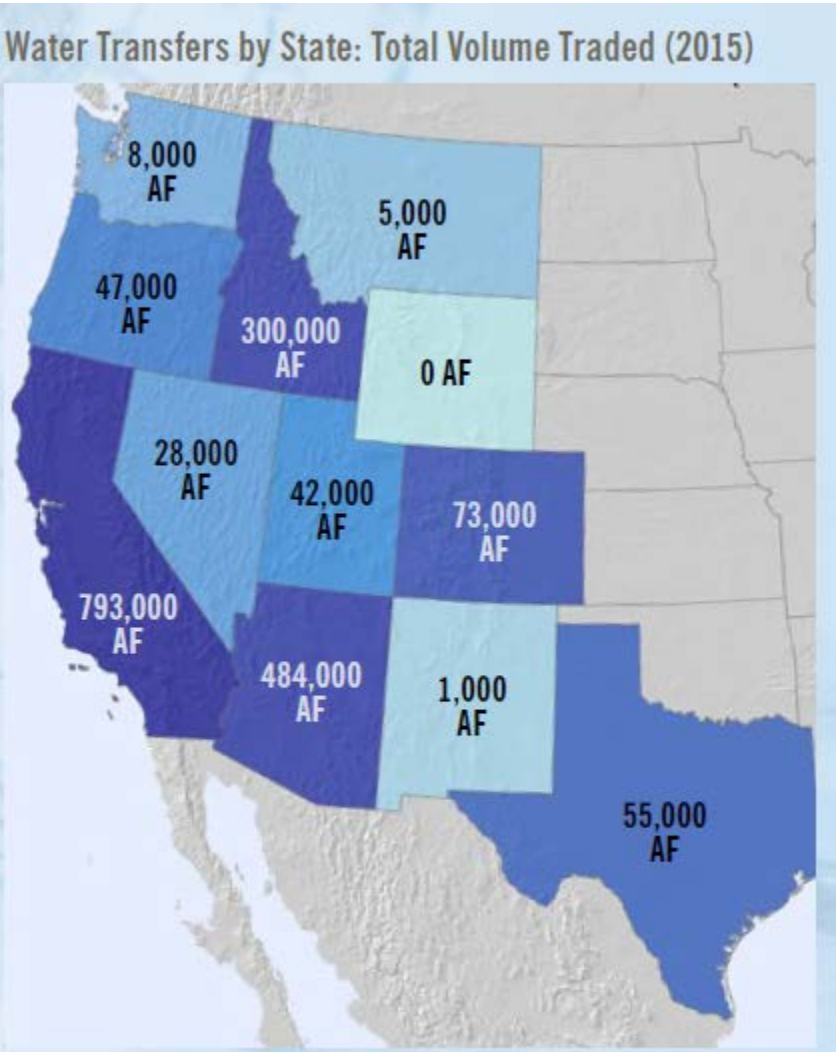
- Gains from trade
- Buyer willingness and ability to pay
- Seller willingness to participate
- “Endowment effect” and expectations of value
- Market efficiency and transaction costs

Water Transactions Overview

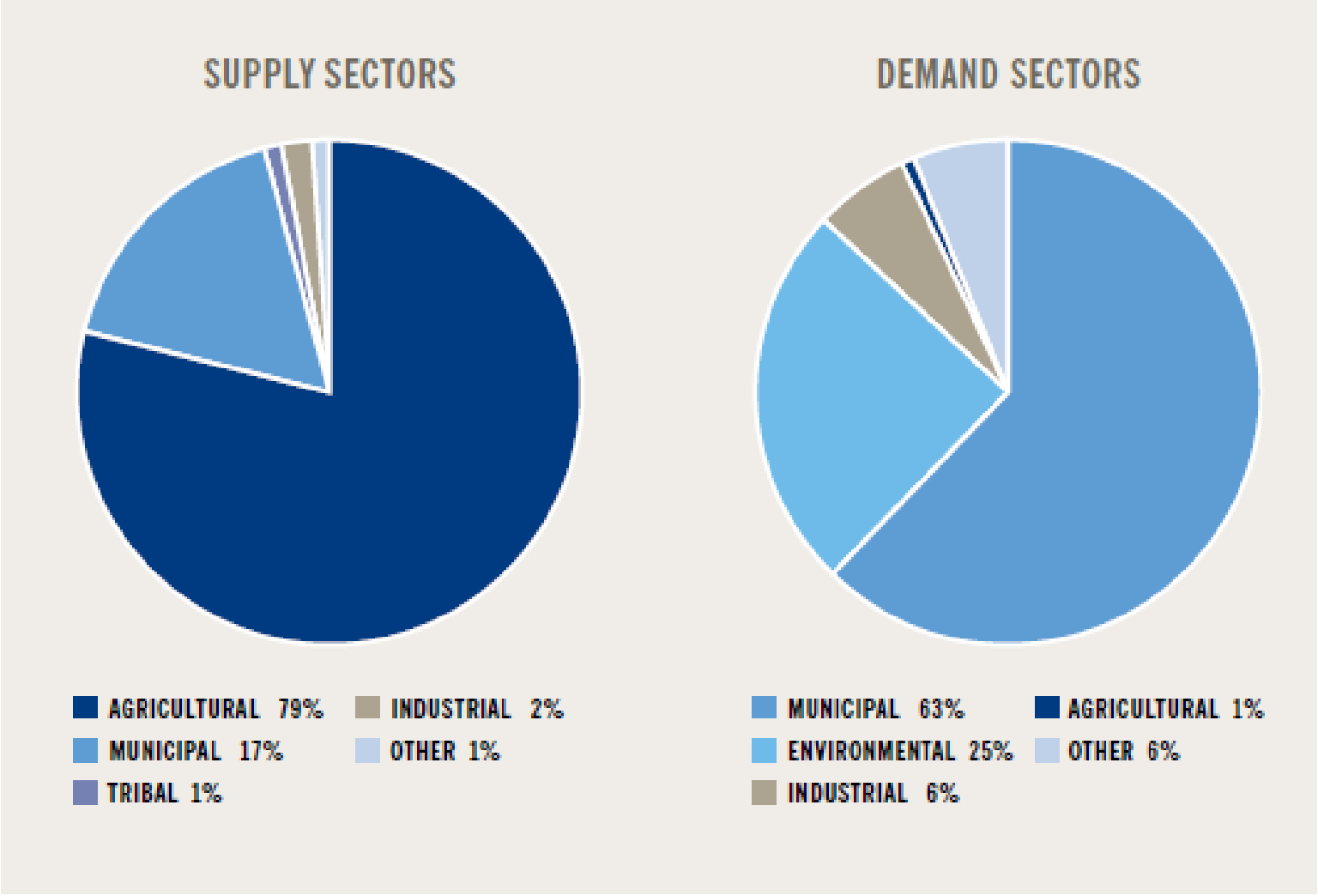
Water Transaction: willing seller/buyer agreements by which the water right user exchange their water right or commits to a change in their water use in return for consideration

- Water right purchase and sale (including w/land)
- Water right full or split-season lease
- Deficit irrigation or crop substitution
- Forbearance agreements
- Point of diversion changes
- Source switches
- Water use efficiency upgrades and conserved water
- Non-diversion agreements
- Minimum flow agreements
- Groundwater recharge and storage



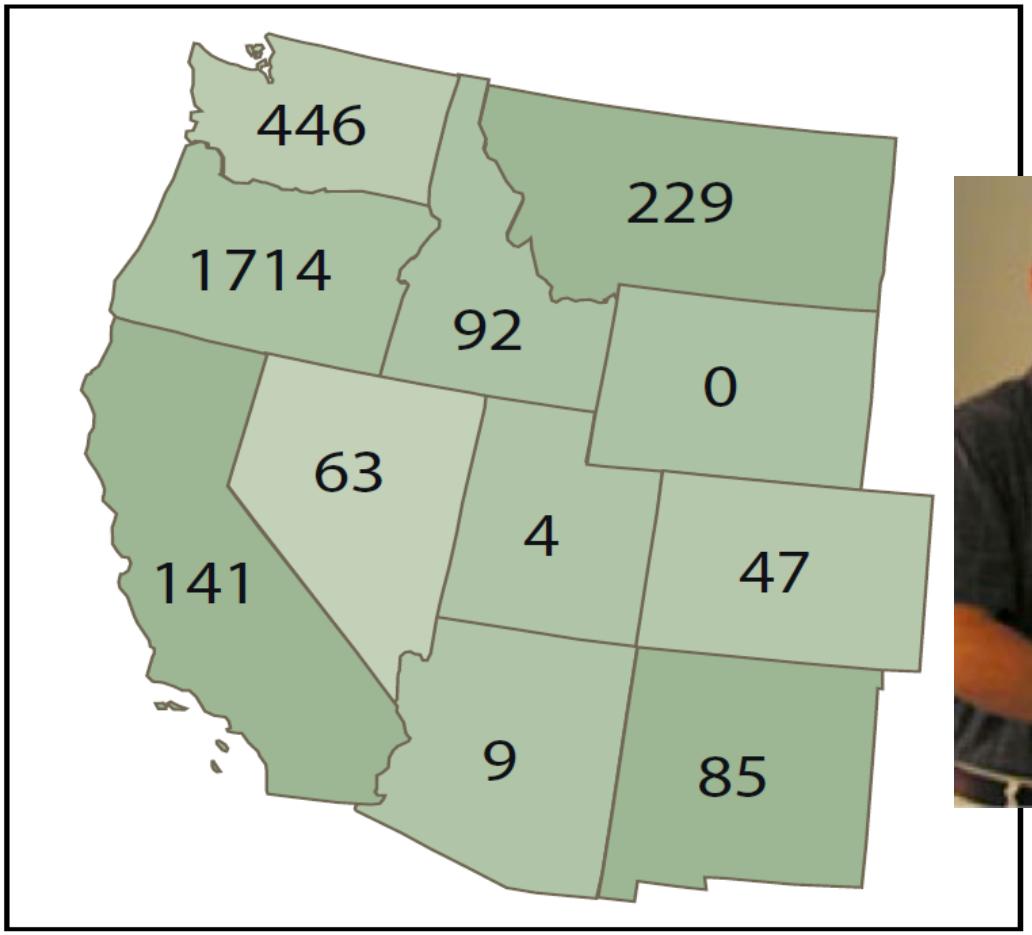


From: WestWater Research, 2017

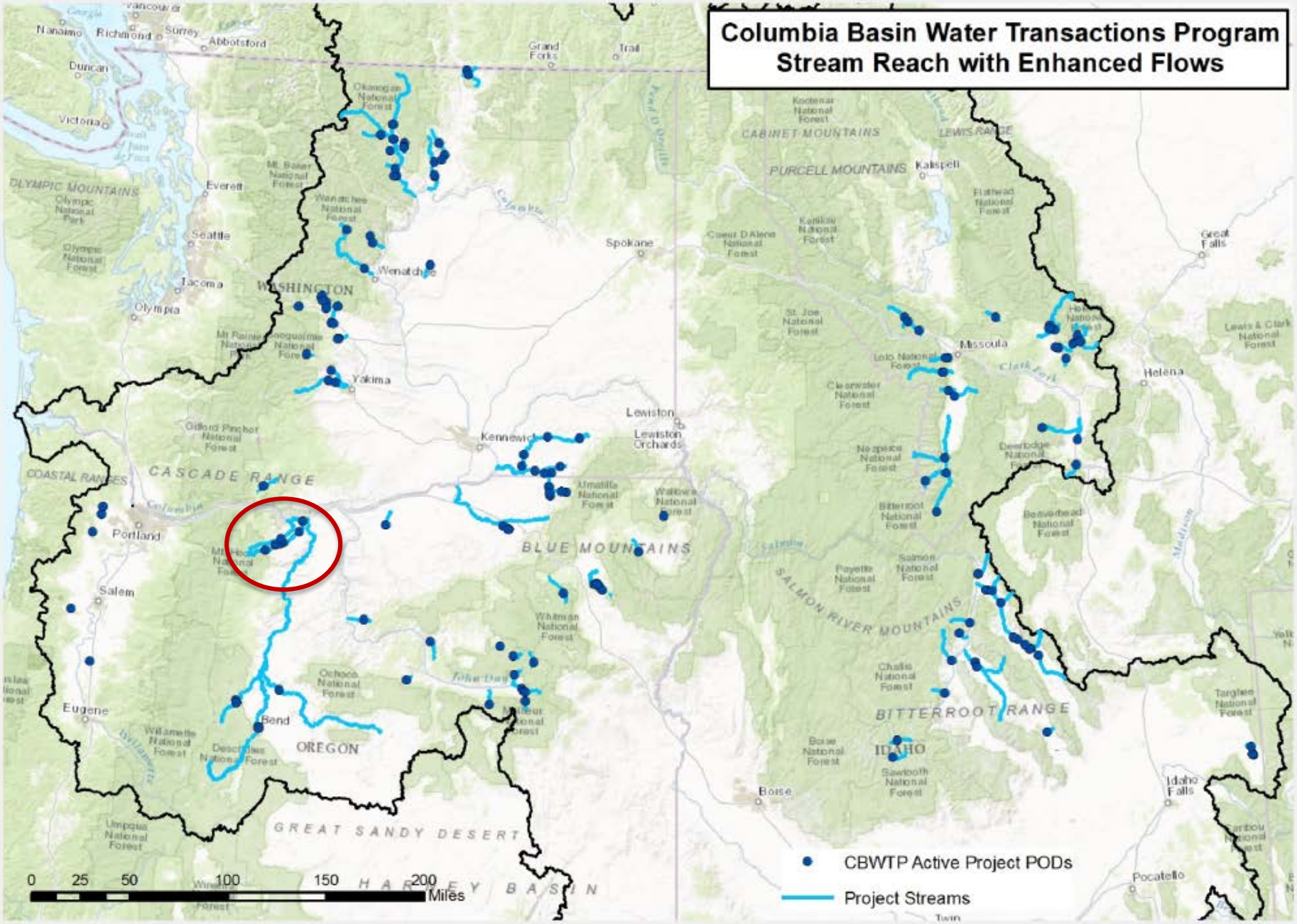


From: West Water Research, 2017

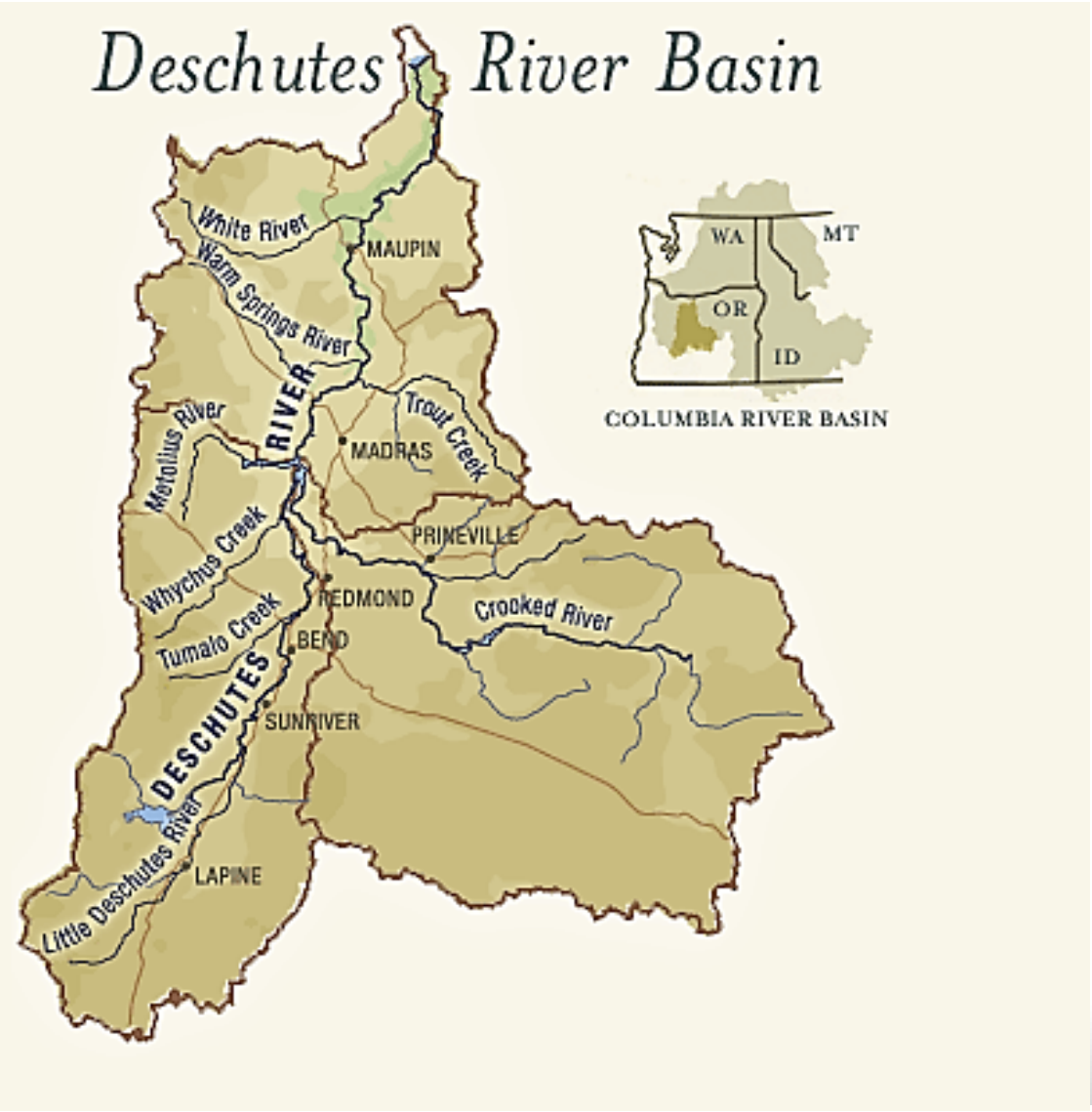
Instream Leases/Sales 1987-2007



From: Scarborough, 2010

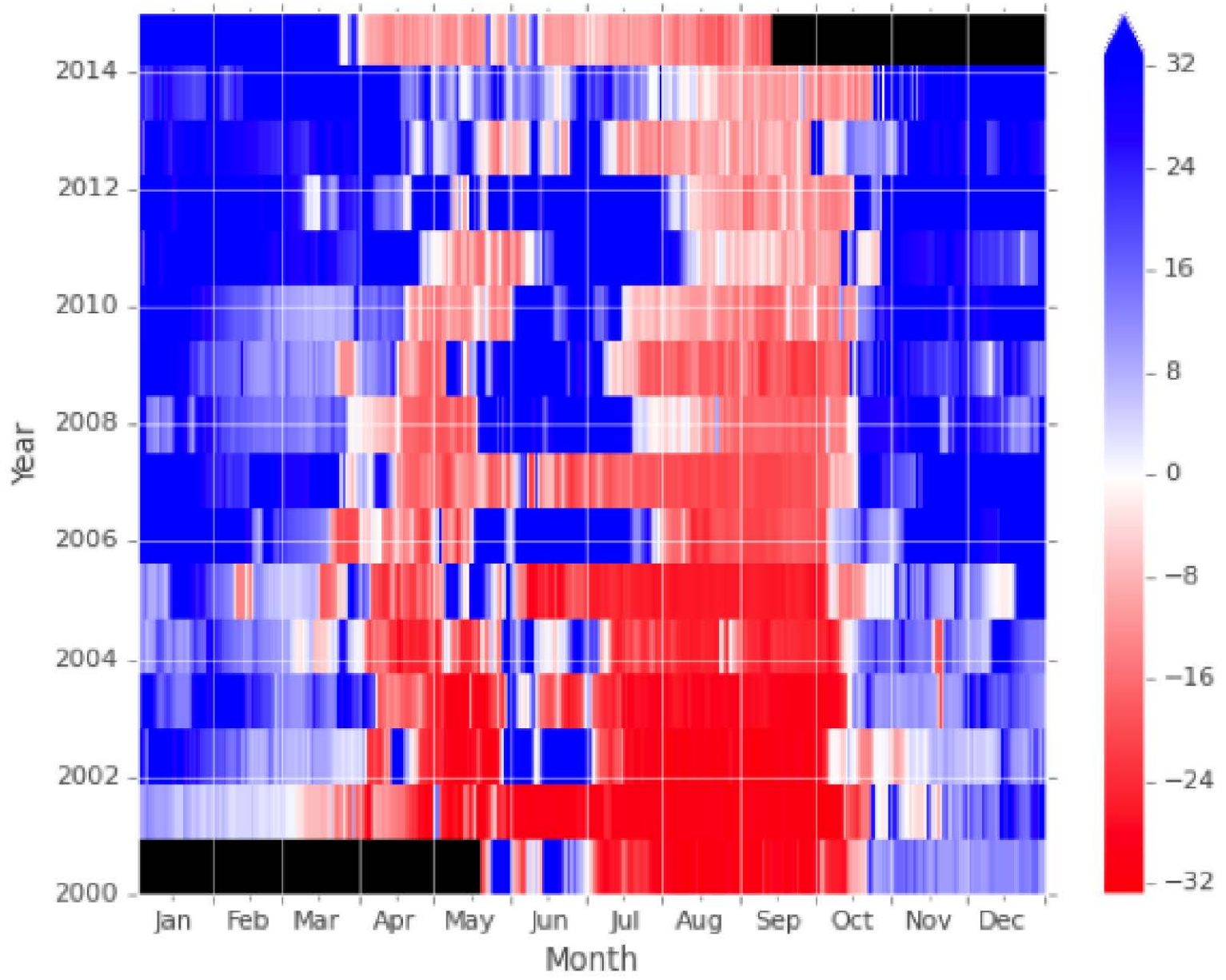

Columbia Basin Water Transactions Program
Stream Reach with Enhanced Flows
CBWTP Active Project PODs
Project Streams
0 25 50 100 150 200
Miles
WASHINGTON
OREGON
IDAHO
CASCADE RANGE
BLUE MOUNTAINS
PURCELL MOUNTAINS
CABINET MOUNTAINS
SALMON RIVER MOUNTAINS
BITTERROOT RANGE
GREAT SANDY DESERT
HARNEY BASIN
Seattle
Spokane
Portland
Yakima
Wenatchee
Kennewick
Lewiston
Missoula
Helena
Bend
Eugene
Salem
Boise
Pocatello
Idaho Falls
Kalispell
Great Falls

Whychus Creek



Transactions that provide mitigation water:

- Instream leases
- Permanent instream transfers
- Allocation of conserved water

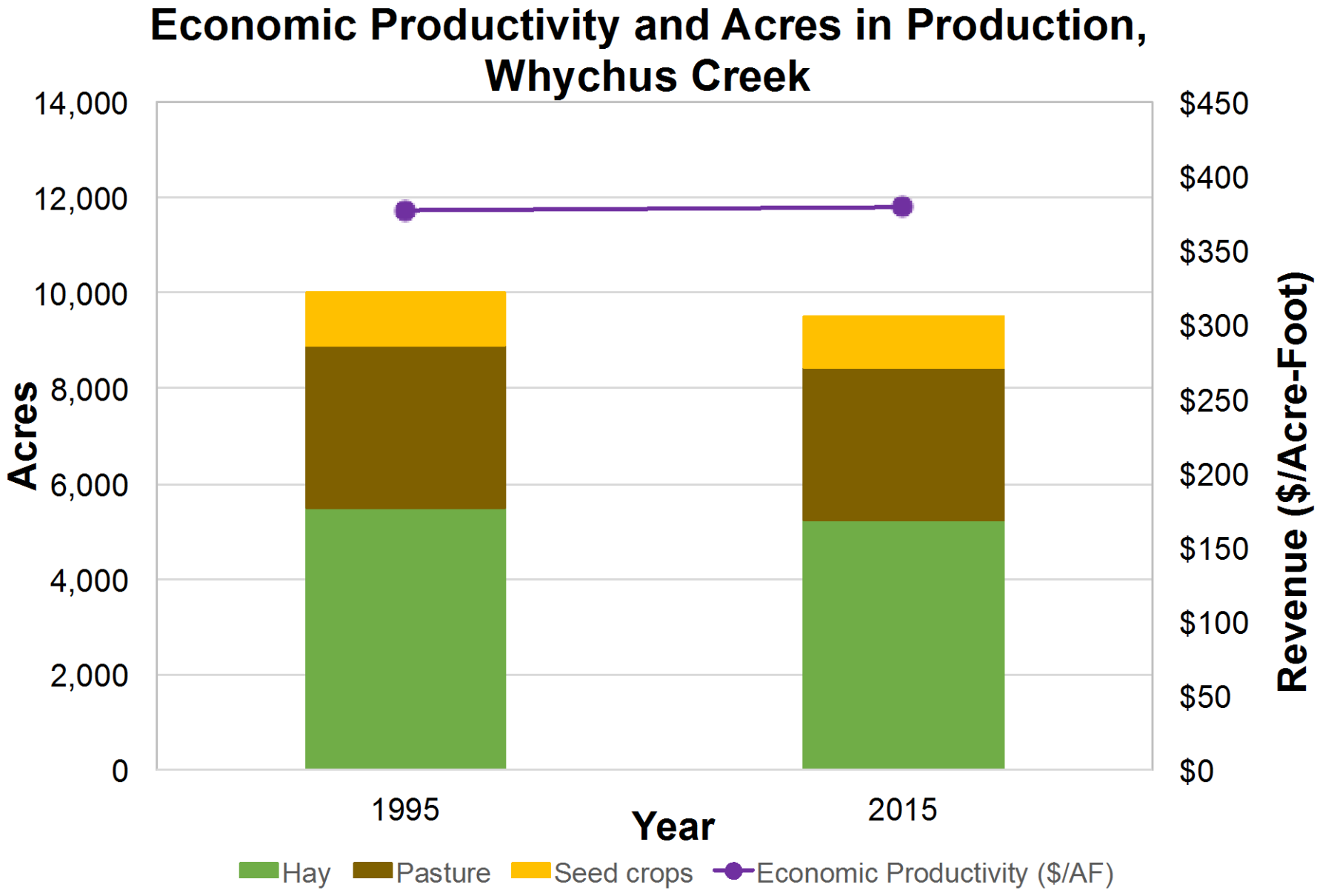


Whychus Creek: Improvement in Streamflow vs 33 cfs target

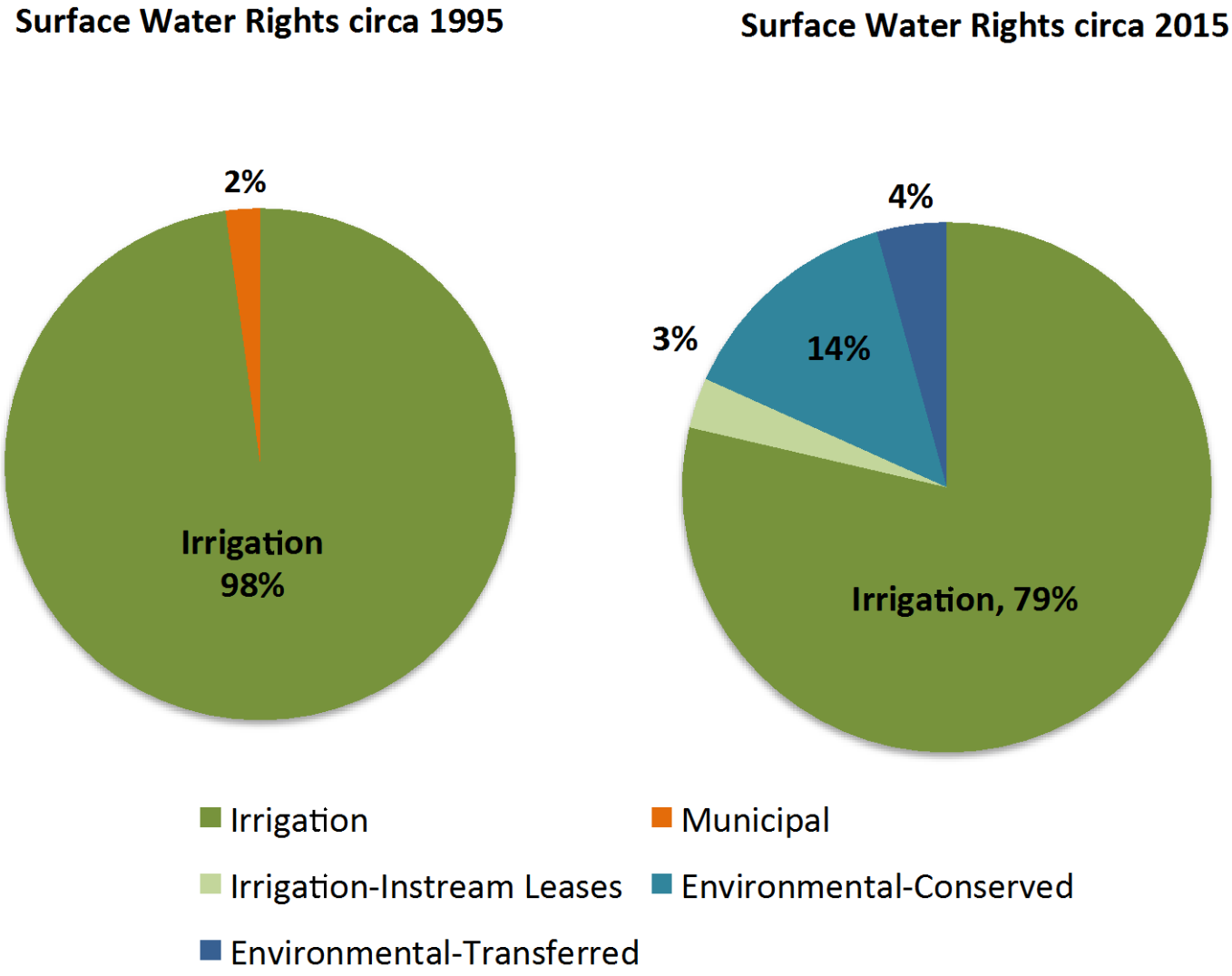
Whychus Creek in Sisters

Before Transactions

With Transactions



Economic Vitality of Agriculture Before/After Transactions



Water Right Allocations Before/After Transactions

Measuring Success

Environmental Flows
- **Flow target attainment**
- **Flow reliability (security and permanence)**
- **Flow cost-effectiveness**

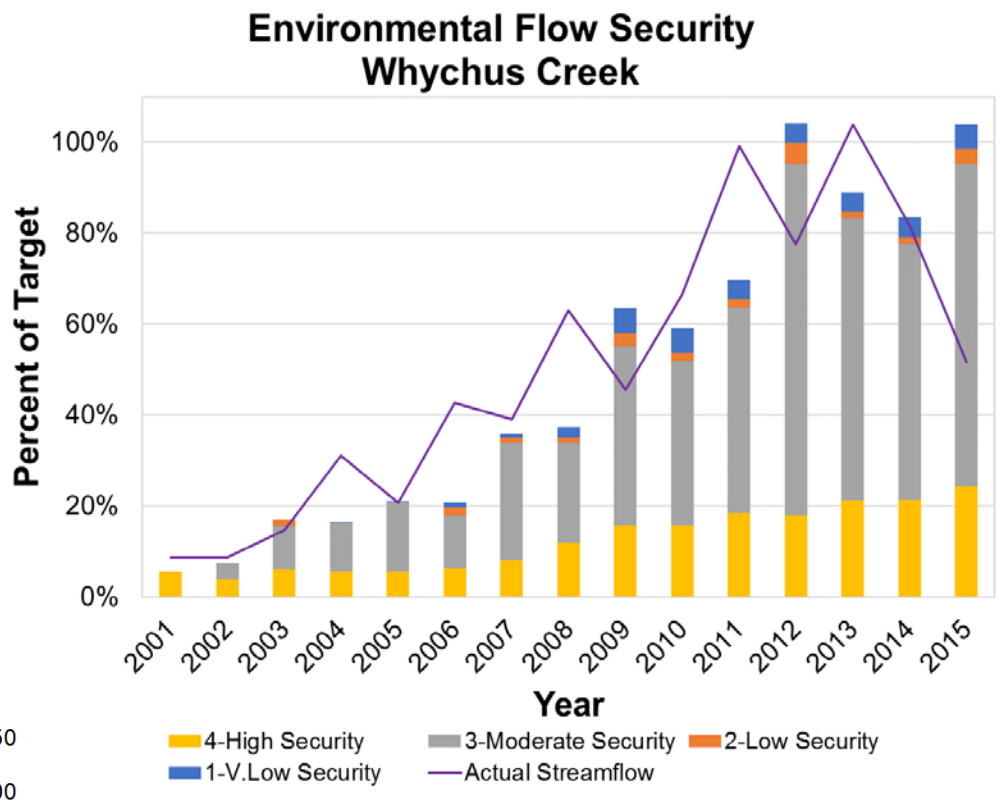
Rural Economics
- **Economic productivity of acres in irrigated agriculture**
- **Trends in irrigated farm labor**

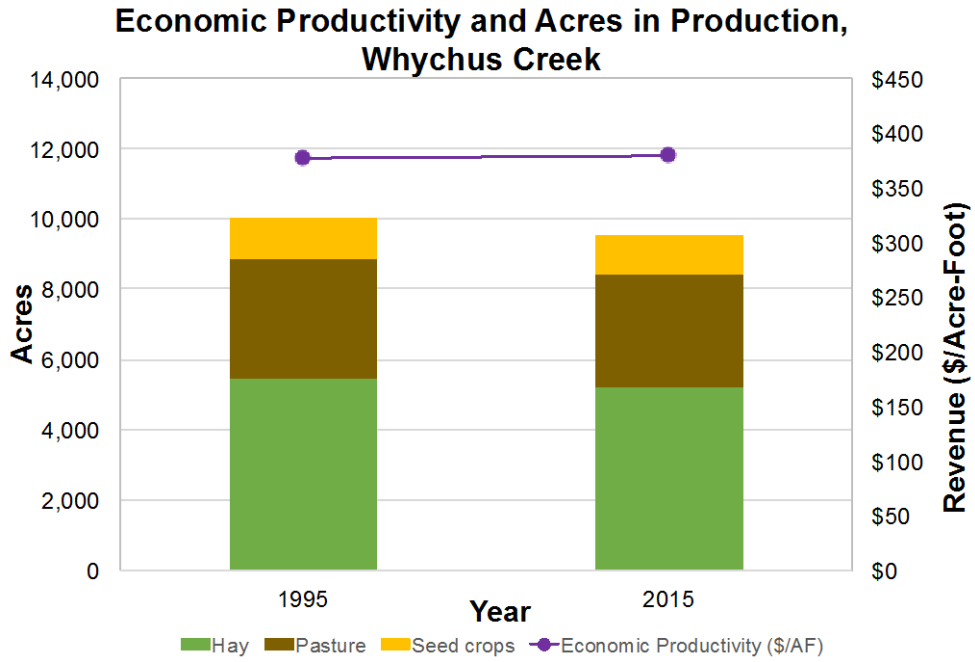
Municipal and Industrial Water Supplies
- **Cost of meeting future water demands**

Multi-sector water use and Allocation
- **Water use by sector**
- **Change in water allocation by sector**

Draft From: Science for Nature and People Working Group

Measuring Success: Indicators





Questions