The Snake-Columbia Basin, the Water-Energy Nexus, and the JNWI

Michael E. Campana

Director, Institute for Water & Watersheds

Professor of Geosciences

Oregon State University

"The meek shall inherit the earth but not its water rights."

--apologies to J. Paul Getty

Institute for Water and Watersheds

Talk Organization

- Words of Wisdom: Setting the Stage
- IWW and Water at OSU
- Snake-Columbia Basin Issues
- The Joint Northwest Water Institute (JNWI)
- Summary

OSU Oregon State University

Institute for Water and Watersheds

Who Said These and When?

1) *"You are piling up a heritage of conflict and litigation over water rights for there is not sufficient water to supply the land."*

2) *"You've been studying water for over 100 years. Haven't you answered all the questions?"*

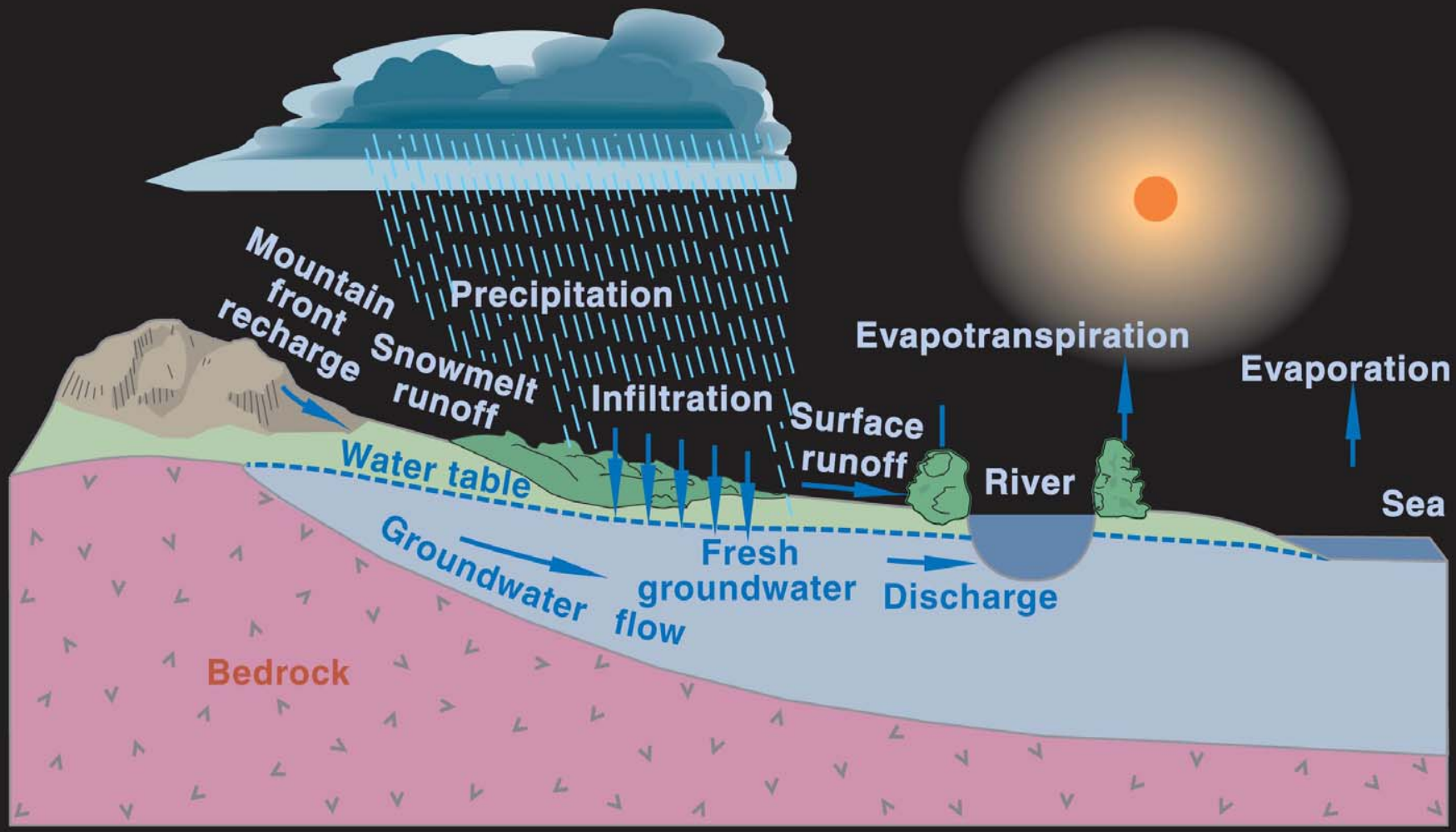
OSU Oregon State University

Institute for Water and Watersheds

1) John Wesley Powell (1893)

2) A 20-something Congressional staffer to a 50-something government hydrologist (2006)

OSU Oregon State University



The Hydrologic Cycle

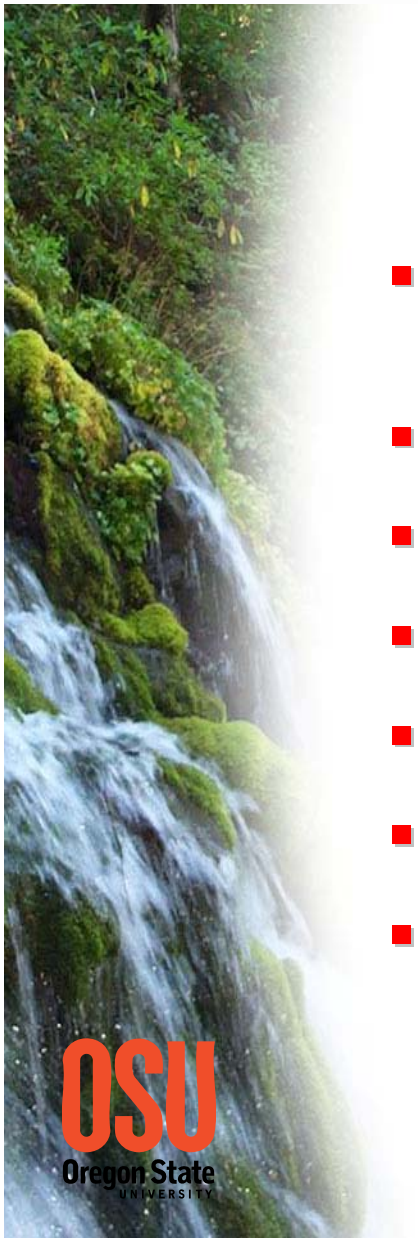
(courtesy R. Glennon)

Institute for Water and Watersheds

IWW and Water at OSU

- **IWW: created by the faculty, it is a campus-wide organization established to foster *collaborative work* in research, teaching, and outreach in water resources, and pursue funding opportunities that otherwise might be missed**
- **80+ water faculty at OSU**
- **Strong collaborative ethic**
- **Interdisciplinary-multidisciplinary teams – complex issues**

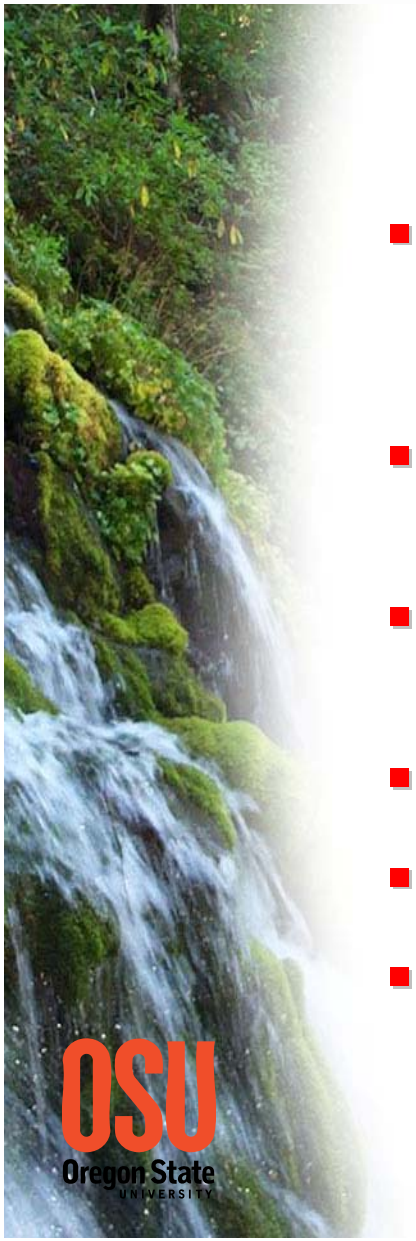
Institute for Water and Watersheds



Water at OSU - 1

- Program in Water Conflict Management and Transformation
- Instrumentation – fiber optics, nanosensors
- Environmental flows
- Stream and fisheries ecology
- Economics
- Pacific Northwest Hydrologic Observatory
- Forest hydrology

Institute for Water and Watersheds



Water at OSU - 2

- Water Resources Graduate Program – *five degrees* (3 MS, 2 PhD) in water resources science, engineering, policy/management
- H.J. Andrews Long-Term Ecological Research (LTER) Site
- Marine science, climate change – College of Oceanic and Atmospheric Sciences
- Extension – outreach
- Sea Grant
- Land Grant

Snake-Columbia Basin

Red dots = Corps of Engineers dams

Yellow dots = Other dams

Population:
7 million

Average Annual Discharge:
200 MAF/year or 124 million gpm (at mouth)

Area: 260,000 mi^2

Institute for Water and Watersheds

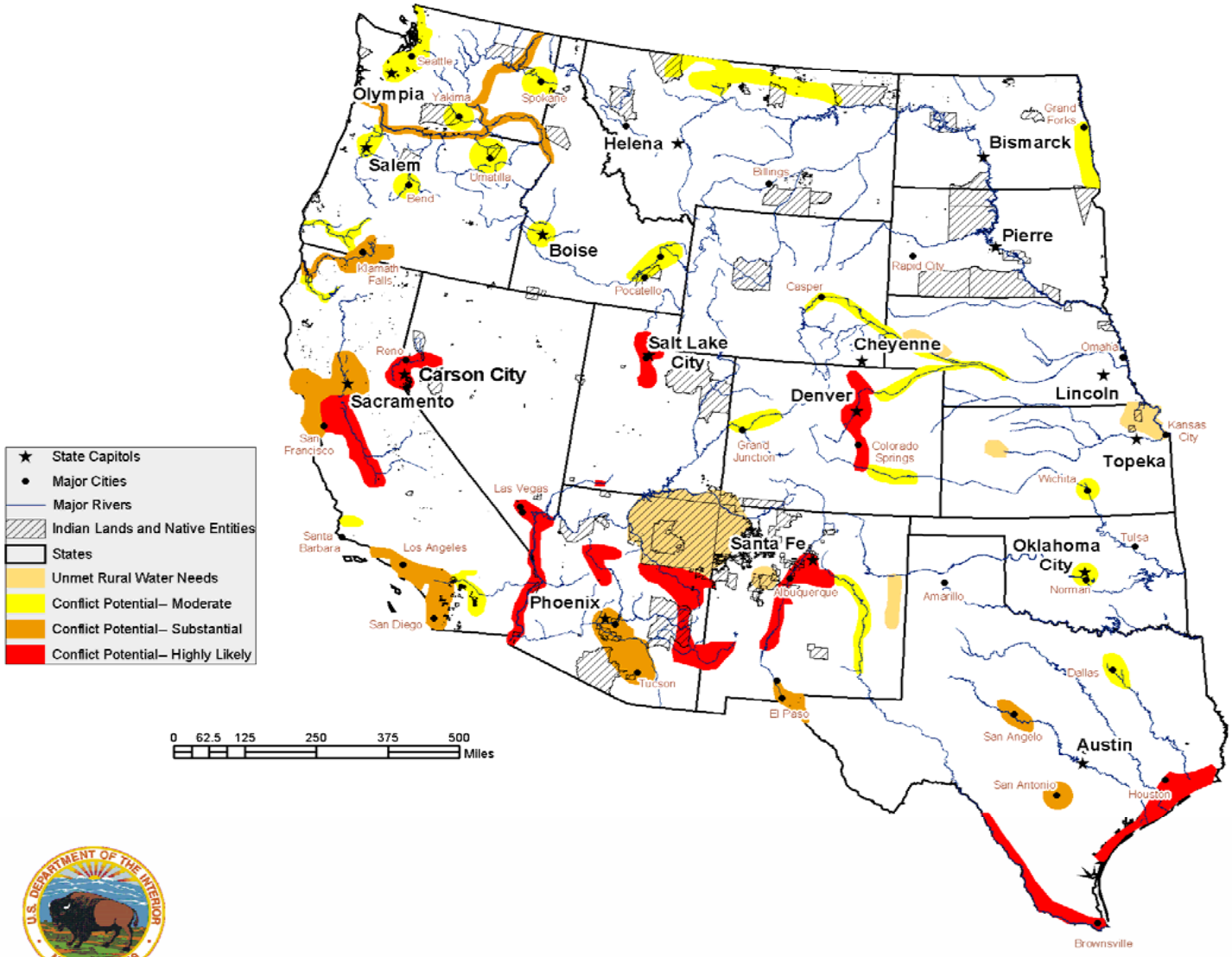
SCB Water Issues

- Environmental flows
- Other competing uses: irrigation, municipal and industrial (M&I), recreation, power generation, waste dilution, first nations' water rights, energy production (biofuels), storage for flood control
- Non-renewable ground water use
- Water quality
- Transboundary water issues (CRT, etc.)
- Effects of climate change (*"The climate system is an angry beast and we are poking at it with sticks."* – W. S. Broecker)

OSU Oregon State University

Potential Water Supply Crises by 2025

(Areas where existing supplies are not adequate to meet water demands for people, for farms, and for the environment)



May 2003

Institute for Water and Watersheds

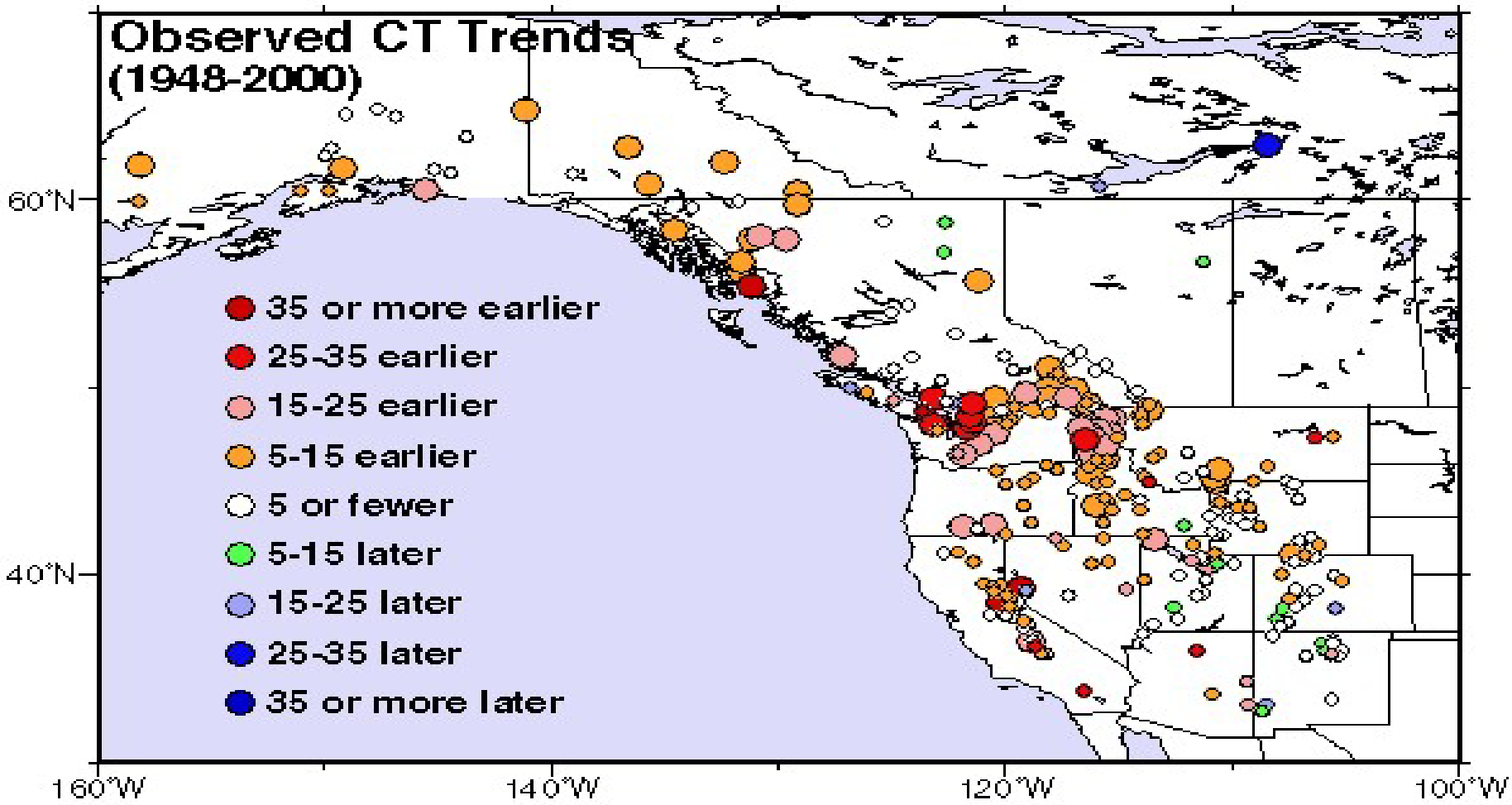
Columbia River Treaty

- In 1964, Canada and the USA ratified the Columbia River Treaty (CRT). The CRT coordinates flood control and optimizes electrical energy production in the CRB.
- Canada agreed to build three storage dams. A fourth dam - Libby Dam – was built in the USA.
- In return for the storage of water, Canada is entitled to one half of the additional power generated at the American power plants on the Columbia River.
- No official expiration date, but the CRT provides for renewal, termination, or renegotiation after 60 years (2024), *if* 10 years' notice is given (2014).

OSU Oregon State University

Science Article (2/20/04)
Global Warming in the West

Changes in Snowmelt Runoff in the Mountains of the West



Timing of snowmelt runoff is occurring 1-4 weeks earlier across the West during the last 3 decades (Stewart et al., 2005)

Institute for Water and Watersheds

Early Snowmelt – A Problem?

- More storage (dams, subsurface storage) may be needed, especially in snowmelt-dominated rivers
- Will affect ecosystems
- Must also consider dilution effect (quality considerations)
- Fires

OSU Oregon State University

Institute for Water and Watersheds

SCB-PNW Water Problems

- Environmental flows
- Other competing uses: irrigation, municipal and industrial (M&I), recreation, power generation, waste dilution, first nations' water rights, energy production (biofuels), storage for flood control
- Non-renewable ground water use
- Water quality
- Transboundary water issues (CRT, etc.)
- Effects of climate change
- Dealing with uncertainty

Complex system, complex problems

OSU Oregon State University

Joint Northwest Water Institute

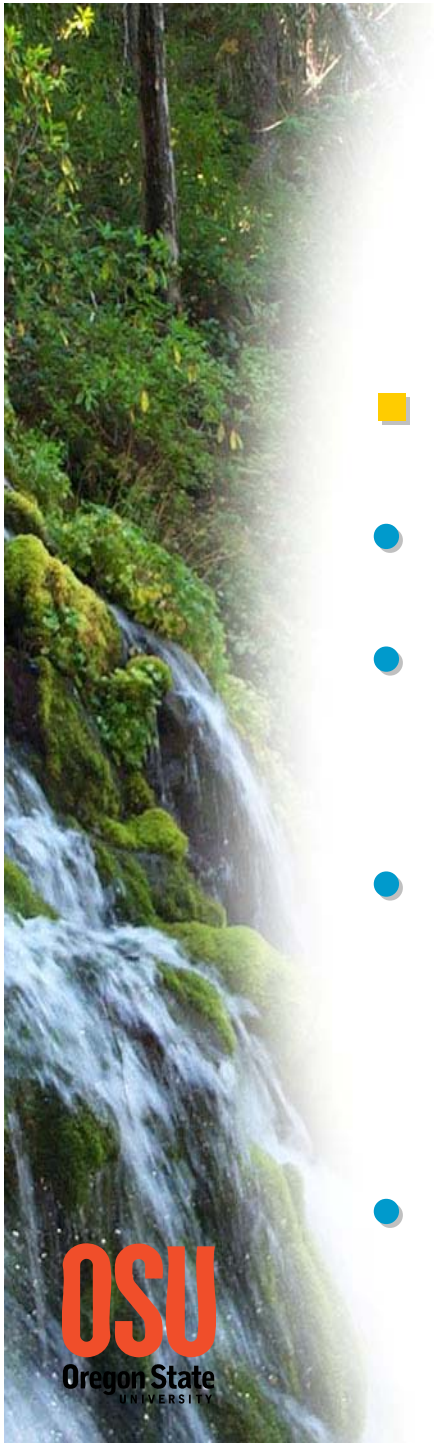
- ***Research alliance*** **(PNNL- INL-OSU) to deliver S&T for sustainable water-energy resource management in the Northwest**
- **Resolve regional water resource management issues common to federal, state, tribal, local, and private interests.**
- **Accelerate deployment of *next-generation* S&T to address emerging, increasingly complex, water-energy resource management issues.**
- **Provide scientific basis for improved water and energy resource management policy**
- **Establish a legacy of excellence in collaborative resource management research and technology development in the Northwest.**

S&T Development: Opportunities/Examples

- Improved water storage benefits
  - Ground water storage and recovery
- Wind/hydroelectric integration
- Energy resource development
  - Unconventional fuels (wind, biofuels, etc.)
  - Geothermal
  - Tidal/wave

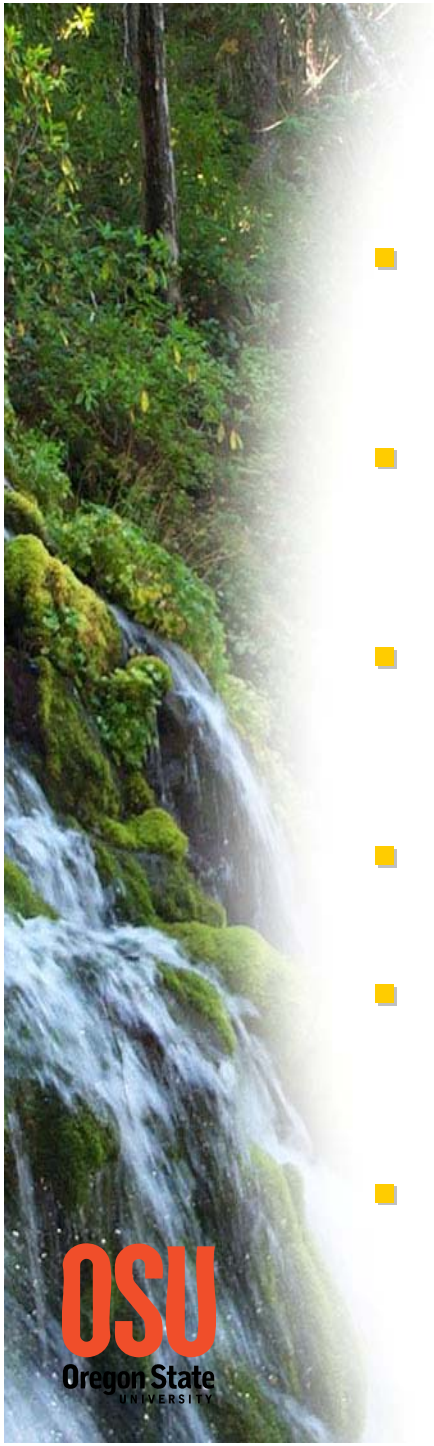
So What?

- **Science-based decision machinery at water-energy nexus**
- **Water conflict management**
- Train
- Provide alternative dispute resolution services
- Conduct shared vision modeling to build consensus



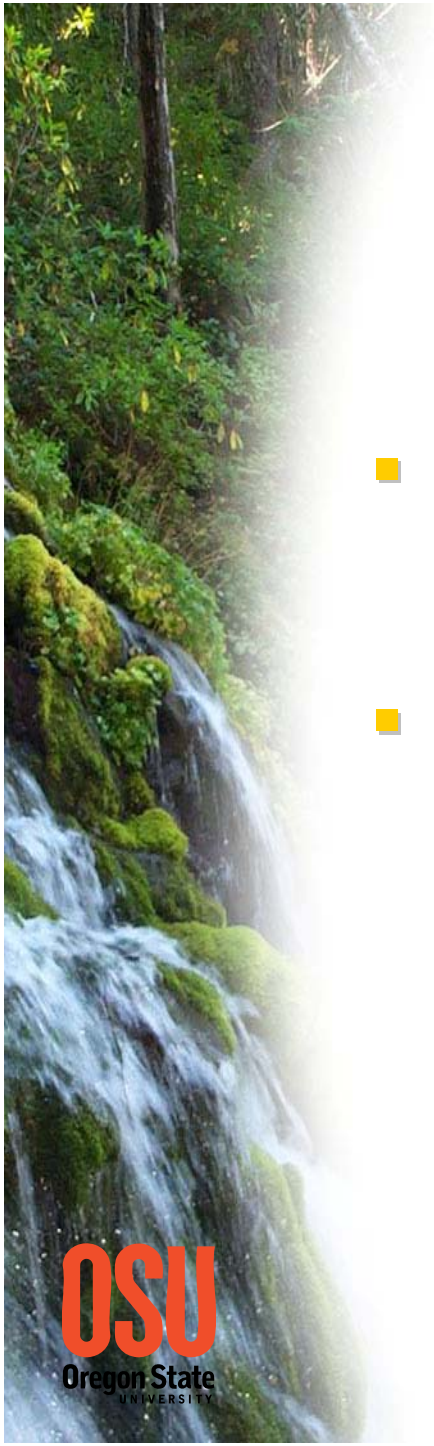
So What? (more)

- **Improved decisions**
- Reduced uncertainty
- Faster, cheaper, more defensible regulations/permits
- Integrated: cross-regional and cross-border, water quality and quantity, ecosystems
- Multiple spatial and temporal scales



Why JNWI?

- Pacific NW is home to *complex problems* – can serve as a template for other areas in USA and beyond
- Synergy among three top-drawer institutions: Federal-State-Private Partnership
- OSU is Land-Grant University – skill in developing materials to help the "folks in the field"
- Energy and water are *inextricably linked* – need to consider both simultaneously
- Training of future leaders in *sustainable* water-energy planning, development, and management
- FY2008 OSU Request: **$1.5M**



Getting Off the Ground

- ***Snake-Columbia Basin Energy-Water Summit*, June 25-27, 2007, Boise, ID.**
- ***International Conference on Non-Renewable Ground Water*, September 2008, Portland, OR (tentative date/location). Just received support confirmation from UNESCO-IHP, 2/14/07! Focus on Umatilla Basin as case study**

Thank You!

Water Rights, 2050?

"The more things change, the more they remain the same."

(courtesy: duckbov.com)

Discussing Water Rights, A Western Pastime

Institute for Water and Watersheds

water.oregonstate.edu

541 737 2413

aquadoc@oregonstate.edu

The Oregon Water List (TOWL):

lists.oregonstate.edu/mailman/listinfo/oregon-water-list

WaterWired blog:

www.typepad.com/waterwired