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Oregon's Fresh Water Resources Landscape – A Brief Overview

Central Oregon Water Roundtable
Bend – 25 September 2008

Michael E. Campana

Institute for Water & Watersheds

Oregon State University

water.oregonstate.edu

"In the West, when you touch water, you touch everything." -- Wayne N. Aspinall

Presentation Organization

- Oregon's Critical Water Issues
- Oregon Water Status Report
- Water Quality, Quantity, and Use
- Planning (or "Strategizing")
- Concluding Remarks

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Oregon's Critical Water Issues-1

- **Integrating water quality & quantity ("…*and never the twain shall meet*")**
- **Effects of climate change (hydrologic changes, invasives, etc.)**
- **Growth and "Growing Away From Infrastructure"**
- **Aging infrastructure**
- **Columbia River Treaty renegotiation**
- **Environmental flows and aquatic ecosystem/watershed health and restoration**

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Oregon's Critical Water Issues-2

- **Energy-water nexus**
- **Community management, conflict**
- **Integrating land use planning and water planning**
- **"Soft path" approaches (markets, trading, etc.)**
- **Regulatory environment (ASR & AR, reuse, markets, etc.)**
- **Conservation, reuse, recycling, demand management**
- ***Resource inventory – protect what you have (water exports from PNW?)***

Global Warming & Water – "800-pound gorilla"

- Potential to alter hydrology of Oregon and elsewhere
- PNW: warming will change timing (earlier) of snowmelt. So what?
- Snowpack – "free storage" – keeps water till we need it (growing season – late spring, summer)
- If snow melts earlier, may need more water storage, power plants.
- Environmental and water quality issues, invasive species, sediment, forest fires…..

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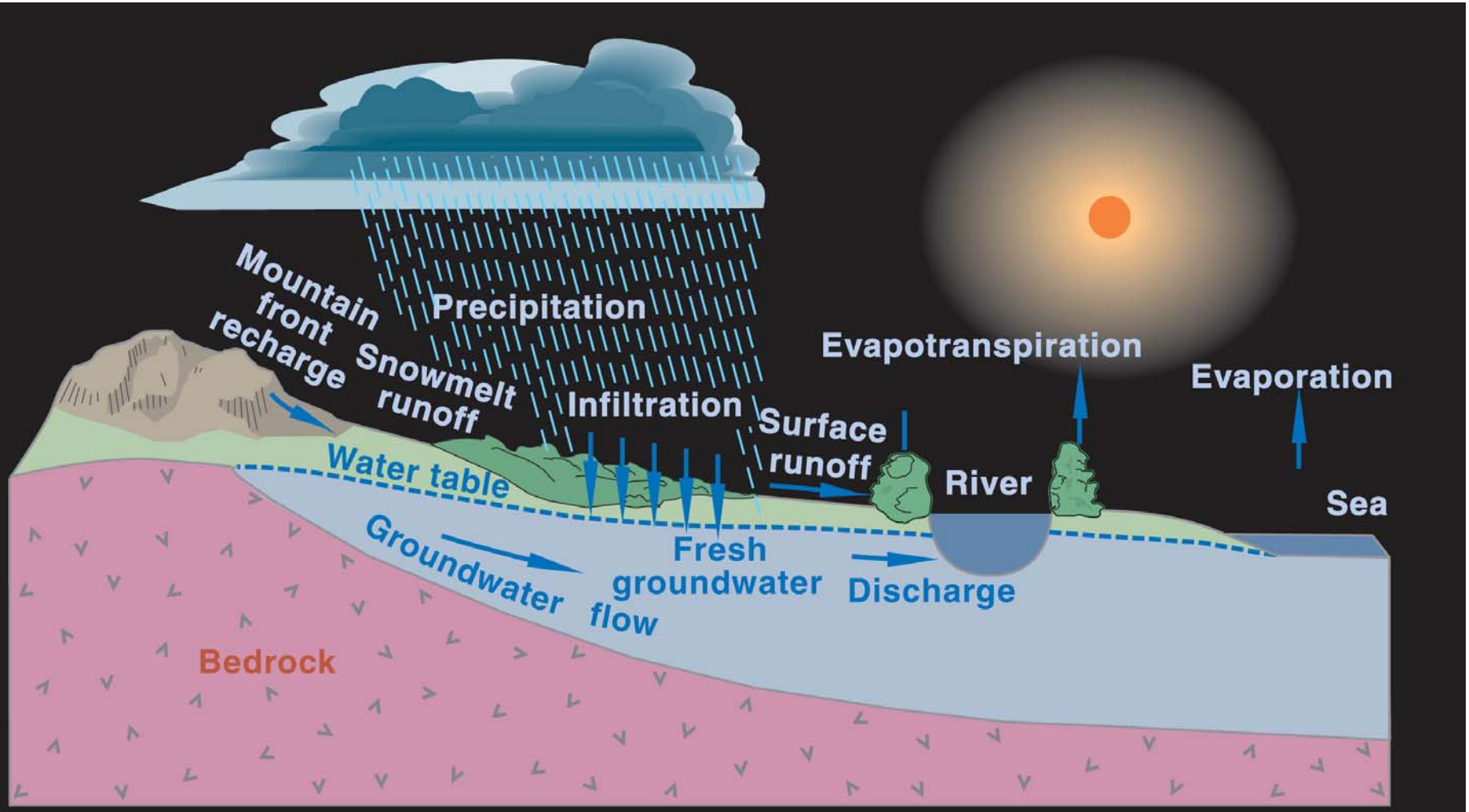

What about groundwater & climate change?

We don't know much. 150 "climate change" observation wells across the US.

(diagram courtesy R. Glennon)

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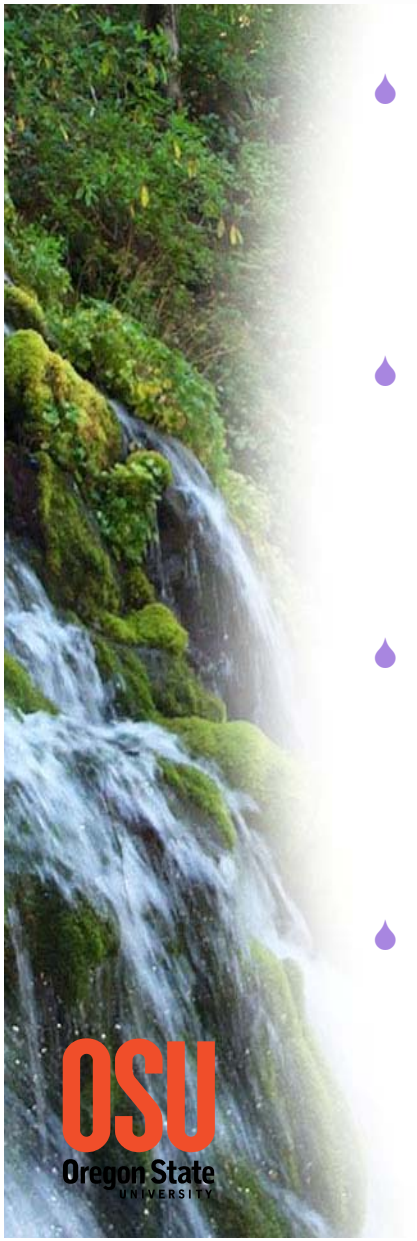
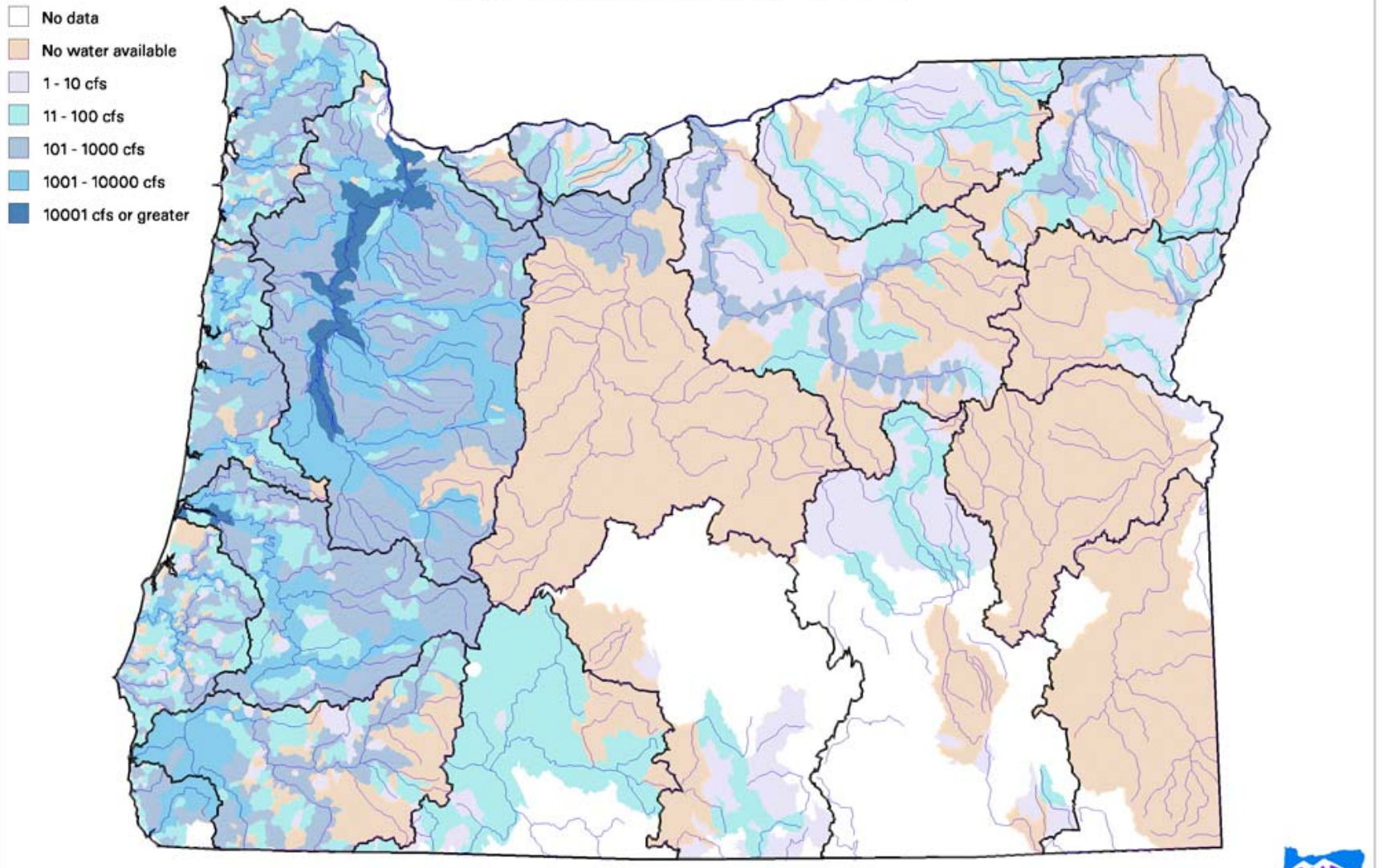
Oregon Water Status Report - 1



- **Government must deal with water quantity and water quality issues as growth is projected to increase by nearly 41% in Oregon by 2030 *(more if we have climate refugees).***
- **Most stream systems in Oregon have been heavily modified to achieve various flood control, agricultural irrigation, navigation, hydropower, recreation, and M&I water supply benefits.**
- **Oregon's water supply is generally fully-allocated and in places, over-allocated, during the low flow summer and fall months. Instream flow needs and flows do not always correspond.**
- **Relative dependence on groundwater in the Willamette Valley and Columbia Plateau region make quality and quantity of groundwater a special concern in these regions.**

JANUARY AVAILABLE STREAMFLOW

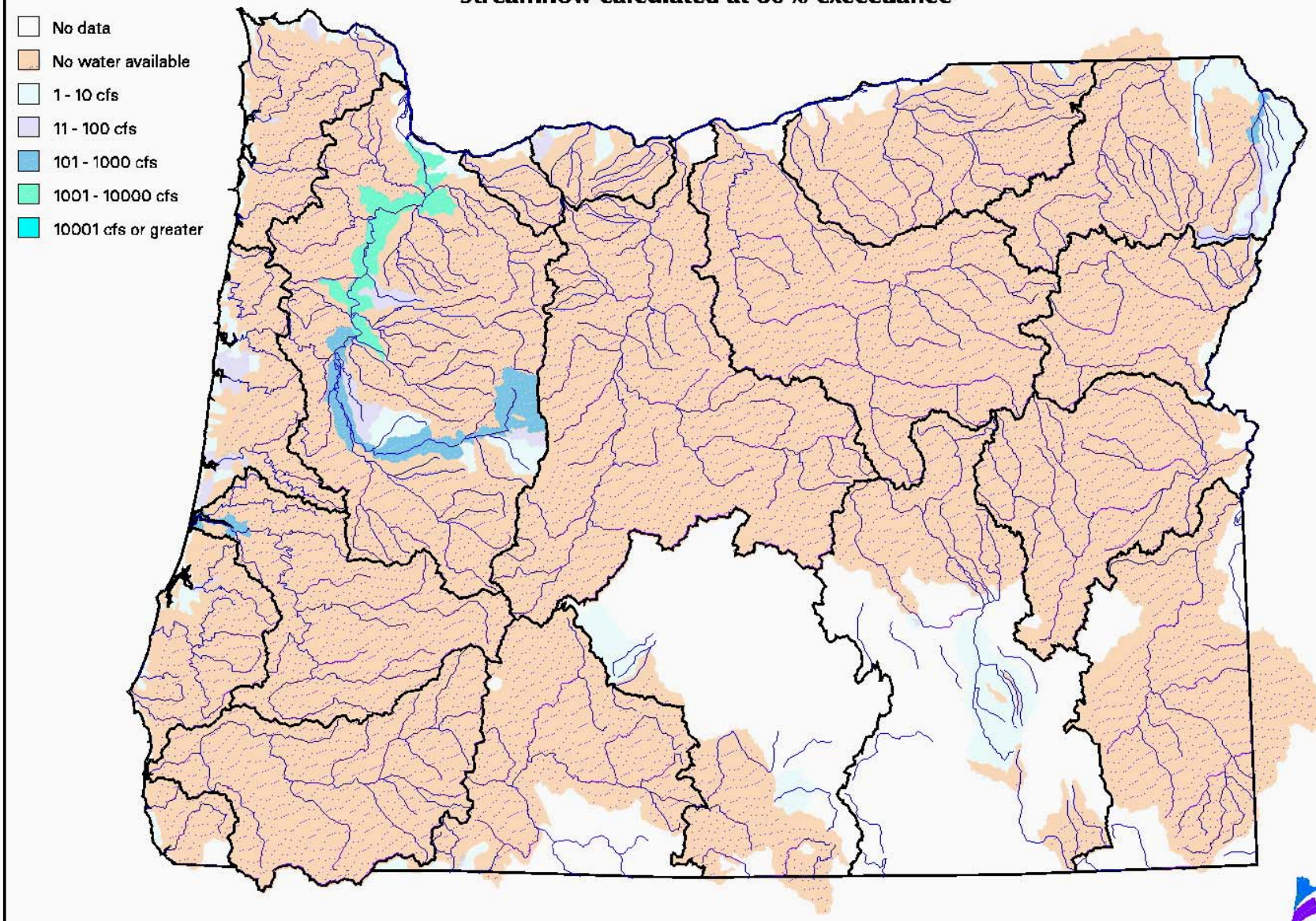
Streamflow Estimated at 50% Exceedance



Map produced February 06, 2007, state-page-month.aml

AUGUST AVAILABLE STREAMFLOW

Streamflow calculated at 80% exceedance



Map produced January 17, 2003.

Marmot Dam Removal

Summer 2007

Sandy River, Oregon

One million cubic meters of sand and gravel fill the reservoir behind Marmot Dam on the Sandy River, Oregon. What will happen to the sediment once the dam has been removed?

Courtesy of Gordon Grant, USDA Forest Service
Watershed Processes Group (www.fsl.orst.edu\wpg)

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The Times They Are A-Changin'

"When I was in graduate school 30 years ago, the question in our hydrology class was, 'How much water can we take out of the stream?' Now, it's 'How much water should we leave in the stream?' " -- Dr. Robert Hirsch, former Associate Director for Water, USGS, 2007

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Oregon Water Status Report - 2

- **Hydroelectric power produces about 42% of Oregon's electricity, which fundamentally impacts aquatic ecosystems (among other uses)**
- **Agricultural irrigation accounts for half of the water withdrawn on the west side of the Cascades, and 90% on the east side.**
- **Desire for community management of water resources is becoming more prevalent**
- **Water reuse, recycling, conservation, and aquifer storage and recovery and artificial recharge (ASR & AR) are attracting more attention as water management tools. ASR: storage, supplementing environmental flows**
- **Columbia River Treaty renegotiation – current treaty (1964) deals only with flood control and hydropower**

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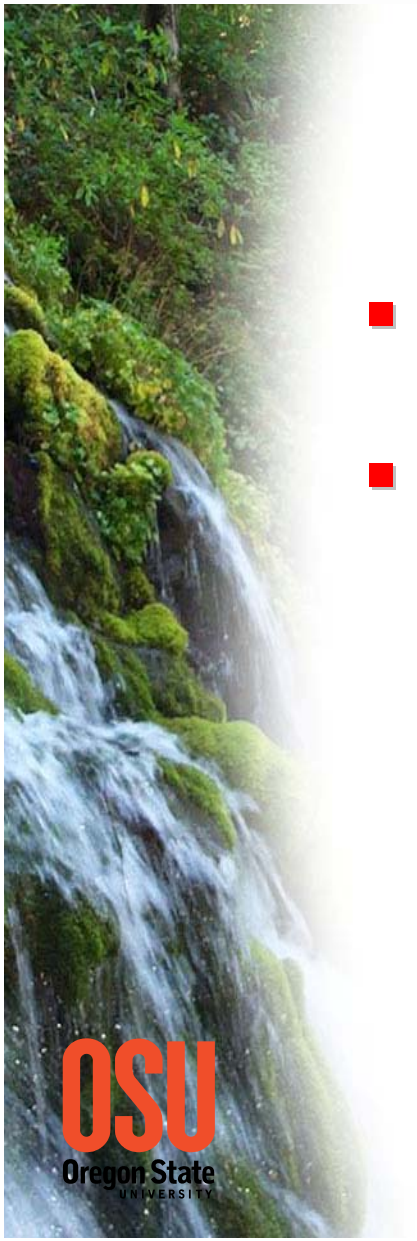
OWRD Water Supply & Conservation Initiative

- **Key step in addressing Oregon's long-term water supply needs**
- **Assessment of existing and future water supply needs**
- **Analysis of conservation opportunities, future storage**
- **Matching fund for community & regional water supply planning**



OWRD Conservation/Reuse/Storage Grant Program

- **Provides matching funds for project planning studies**
- **Opportunities to consider alternative approaches: wetlands for storage, beaver dams to enhance storage/groundwater recharge; ASR & AR to maintain summer instream flows; etc.**

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Other Activities

- **Governor's Headwaters-2-Ocean (H-2-O) Initiative**
- **Water Roundtables – listening sessions around the state**
- **Oregon Business Plan**

Water Use, Quality, & Quantity

Water quality and quantity/water use are *interconnected*. Use affects quality; quality determines use. Quantity can change quality (dilution).

Good example of interdependence of quality and quantity: TMDLs

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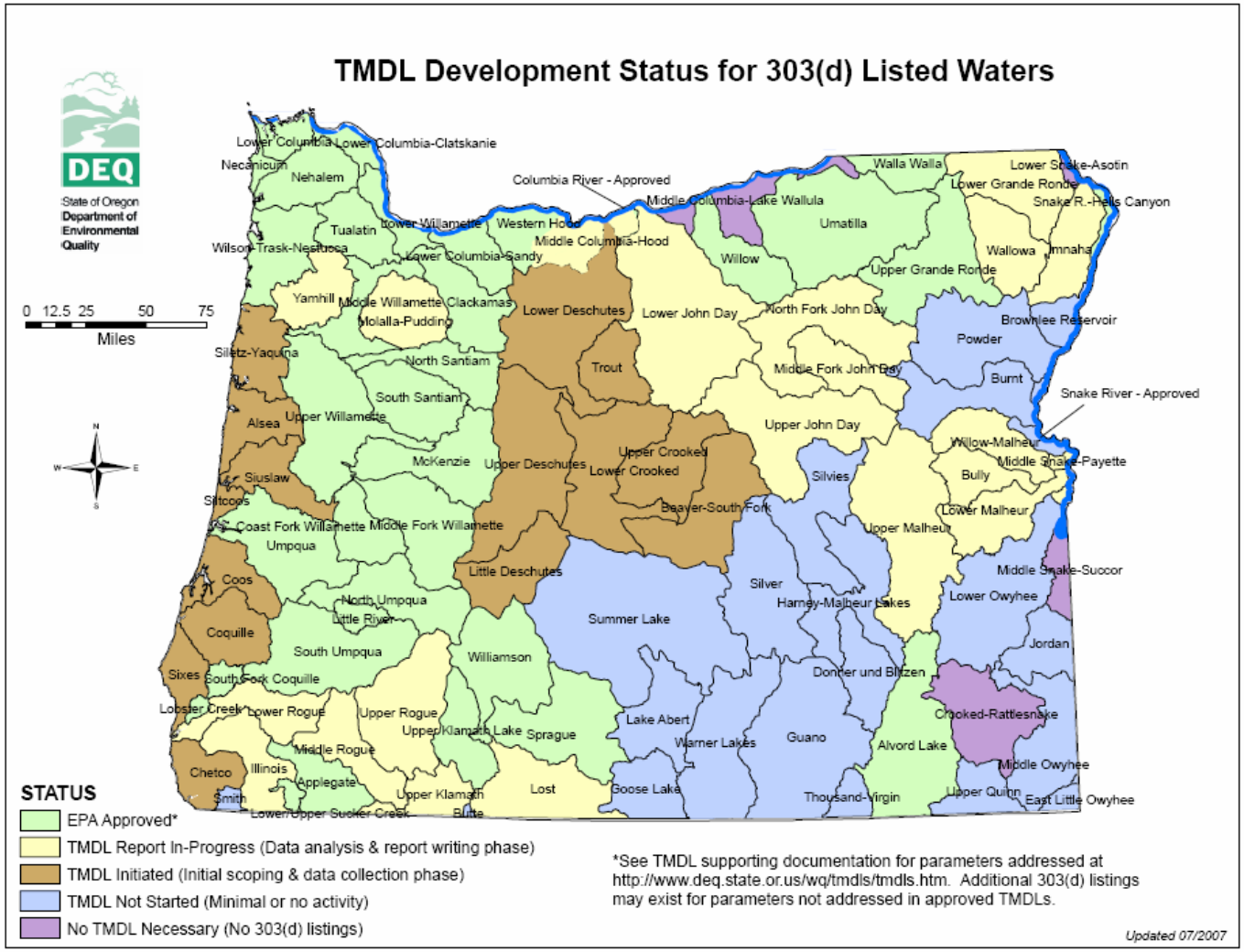
Total Maximum Daily Loads – 1
~ 1400 "Impaired" Water Bodies
Much of State "just initiated, in progress, or not started"



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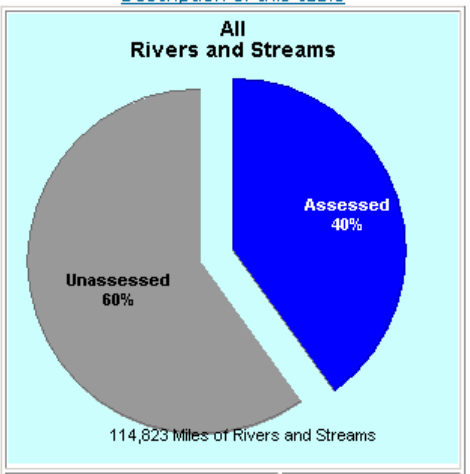
Total Maximum Daily Loads – 2 ~ 1400 "Impaired" Water Bodies Much of State "just initiated, in progress, or not started"

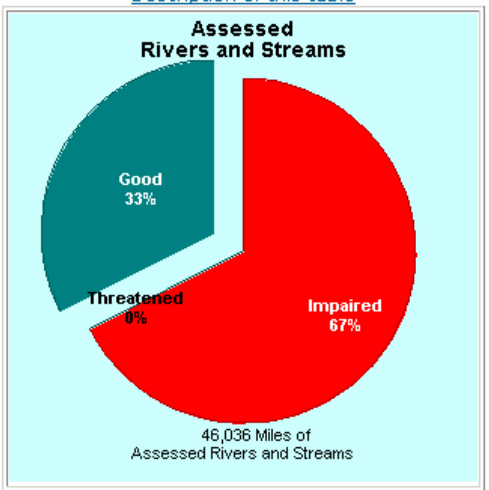
Oregon Assessed Waters
Summary of Water Quality Attainment for Rivers and Streams
Reporting Year 2006

Description of this table



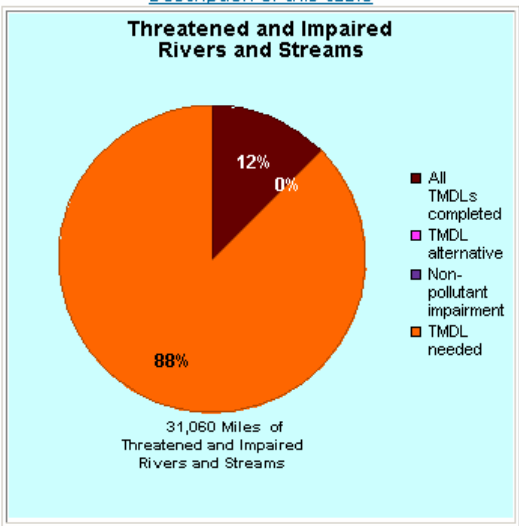
Assessed Status	Miles
Assessed	46,036
Unassessed	68,787
Total Miles	**114,823**

Description of this table



Attainment Status	Miles
Good	14,976
Threatened	0
Impaired	31,060
Total Miles Assessed	**46,036**

Description of this table



TMDL Development Status	Miles
All TMDLs completed	2,338
TMDL alternative	0
Non-pollutant impairment	0
TMDL needed	16,466
Total Threatened and Impaired	**31,060**

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Total Maximum Daily Loads – 3 ~ 1400 "Impaired" Water Bodies Much of State "just initiated, in progress, or not started"

Oregon Causes of Impairment
for Threatened and Impaired Rivers and Streams
Reporting Year 2006

Description of this table

Cause of Impairment	Cause of Impairment Group	Miles Threatened or Impaired
Temperature, Water	Temperature	17,253
Sedimentation/Siltation	Sediment	11,997
Nutrients	Nutrients	11,273
Nutrients - Eutrophication	Nutrients	10,508
pH	pH	5,370
Dissolved Oxygen	Organic Enrichment/Low Dissolved Oxygen	4,261
Fecal Coliform	Pathogens	2,687
Escherichia Coli (E. Coli)	Pathogens	2,359
Iron	Metals (other than Mercury)	1,360
Ammonia, Total	Ammonia	998
Copper	Metals (other than Mercury)	950
Chlorophyll-A	Algal Growth	943
Mercury	Mercury	882

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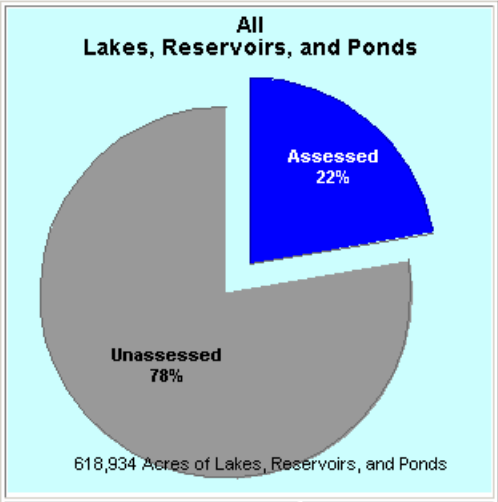
Total Maximum Daily Loads – 4 ~ 1400 "Impaired" Water Bodies Much of State "just initiated, in progress, or not started"

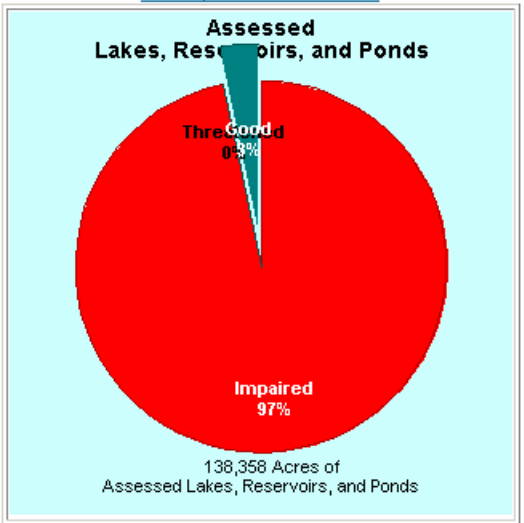
Oregon Assessed Waters
Summary of Water Quality Attainment for Lakes, Reservoirs, and Ponds
Reporting Year 2006

Description of this table



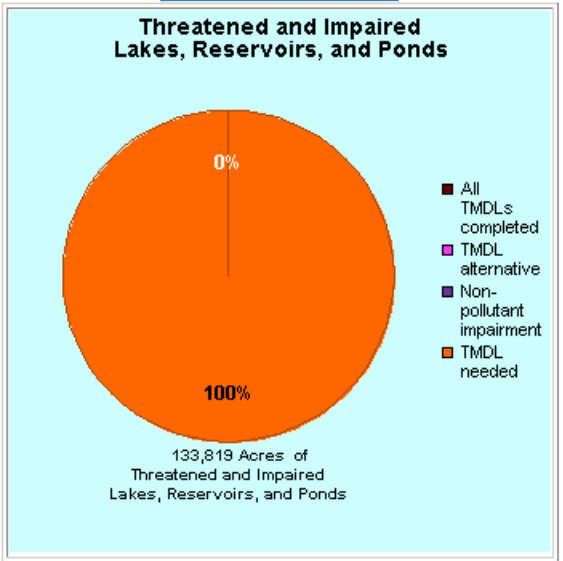
Assessed Status	Acres
Assessed	138,358
Unassessed	480,576
Total Acres	**618,934**

Description of this table



Attainment Status	Acres
Good	4,539
Threatened	0
Impaired	133,819
Total Acres Assessed	**138,358**

Description of this table



TMDL Development Status	Acres
All TMDLs completed	0
TMDL alternative	0
Non-pollutant impairment	0
TMDL needed	2,473
Total Threatened and Impaired	**133,819**

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Total Maximum Daily Loads – 5 ~ 1400 "Impaired" Water Bodies Much of State "just initiated, in progress, or not started"

Oregon Causes of Impairment
for Threatened and Impaired Lakes, Reservoirs, and Ponds
Reporting Year 2006

Description of this table

Cause of Impairment	Cause of Impairment Group	Acres Threatened or Impaired
Dissolved Oxygen	Organic Enrichment/Low Dissolved Oxygen	83,135
Habitat Alterations (Other Than Flow)	Habitat Alterations	83,072
Sedimentation/Siltation	Sediment	80,692
pH	pH	78,785
Chlorophyll-A	Algal Growth	77,902
Temperature, Water	Temperature	68,021
Nutrients	Nutrients	19,112
Aquatic Algae	Algal Growth	19,013
Mercury	Mercury	16,717
Nutrients - Eutrophication	Nutrients	11,687
Dieldrin	Pesticides	10,452
Turbidity	Turbidity	7,870
Escherichia Coli (E. Coli)	Pathogens	7,870
Fecal Coliform	Pathogens	7,870
2,3,7,8-Tetrachlorodibenzofuran	Dioxins	1,041

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Temperature and organic material don't mix well….

The Oregonian

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Potentially toxic bloom infiltrates the Tualatin

Blue-green algae - Chowderlike clumps found along 11 miles of the river are being tested

Friday, July 11, 2008

YUXING ZHENG

The Oregonian Staff

A potentially toxic blue-green algae bloom, "thicker than clam chowder" in one spot, has laced an 11-mile stretch of the Tualatin River between Sherwood and Lake Oswego.

The U.S. Geological Survey in Portland is expected to receive test results today on whether the algae is toxic. Tests earlier this week indicated that the main type of algae present is one that can produce toxins. The discovery comes after a separate incident, when nontoxic algae was found along the Clackamas River.

Officials are asking the public to avoid contact with the water. Residents should wash with soap if they come into contact with it.

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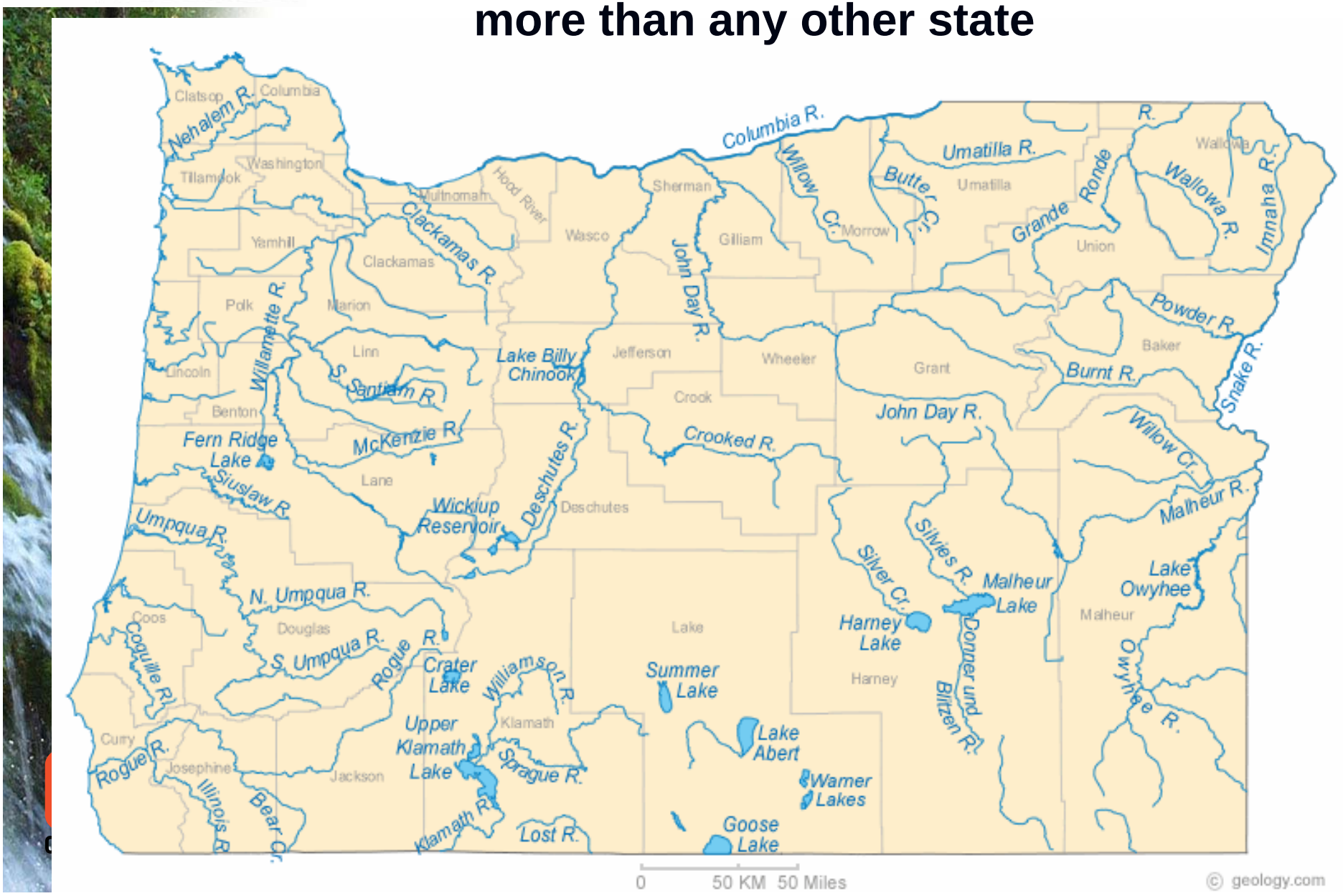
57 rivers and tributaries designated as either federal or state scenic waterways…

more than any other state



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Groundwater Sustainability Indicators in Oregon

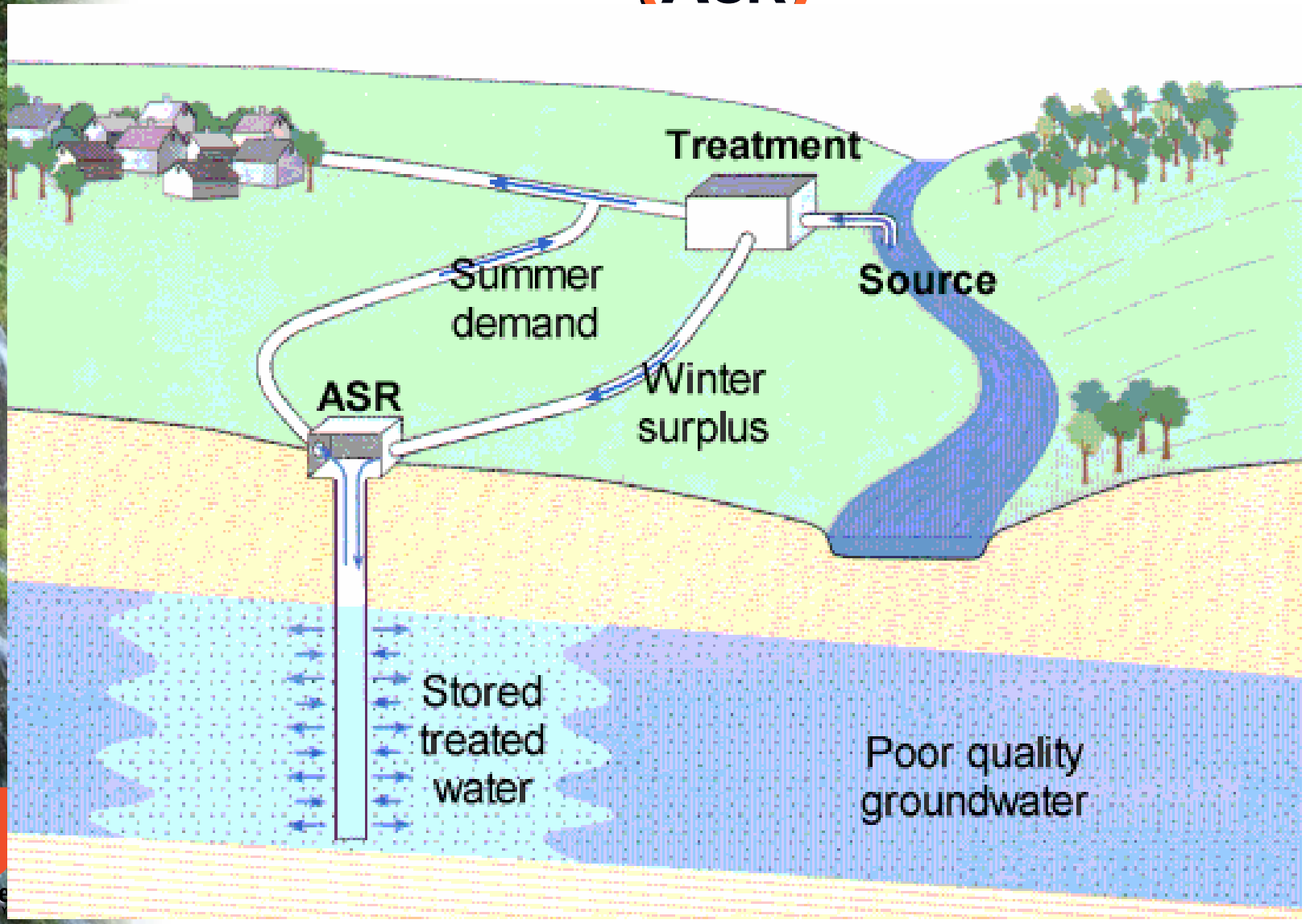
- **Groundwater depletion**

***(First Int'l. Conference on Non-Renewable GW* – PDX, 10/13-14/08**

(www.ngwa.org/development/conferences.aspx)

- **Groundwater vulnerability**
- **Groundwater quality**
- **"No well left behind"**

Aquifer Storage & Recovery (ASR)



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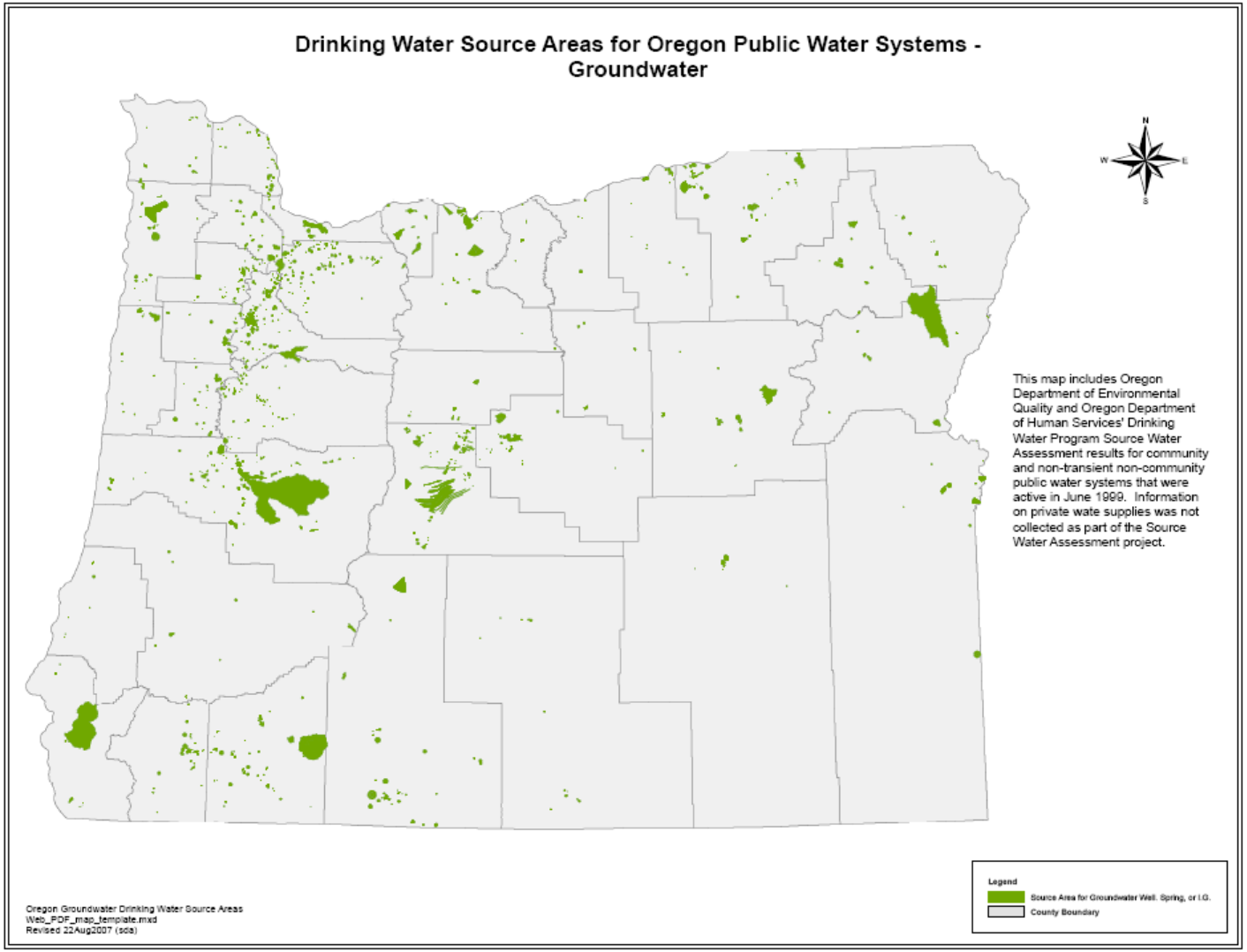
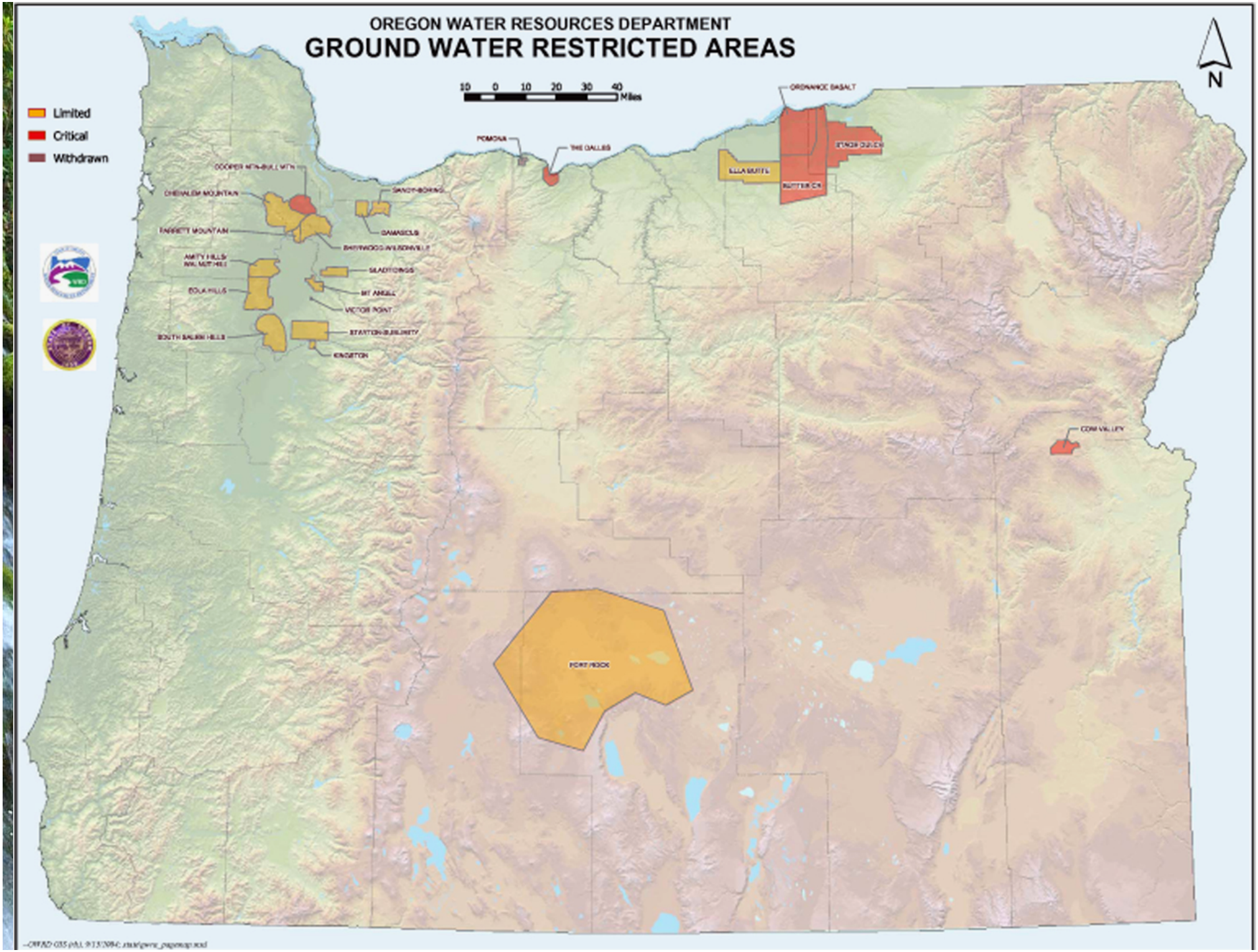
Vulnerable Groundwater & Drinking Water Protection Areas




OREGON WATER RESOURCES DEPARTMENT
GROUND WATER RESTRICTED AREAS
Limited
Critical
Withdrawn
10 0 10 20 30 40
Miles
N
ORDNANCE BASALT
POMONA
THE DALLES
BUTTER CR
COW VALLEY
COOPER MTN-BULL MTN
CHEHALEM MOUNTAIN
PARRETT MOUNTAIN
AMITY HILLS
EOLA HILLS
SOUTH SALEM HILLS
SANDY-BORING
DAMASCUS
SHERWOOD-WILSONVILLE
SILVERTON
MT ANGEL
VICTOR POINT
STAYTON-SUBLIMITY
KINGSTON
FORT ROCK

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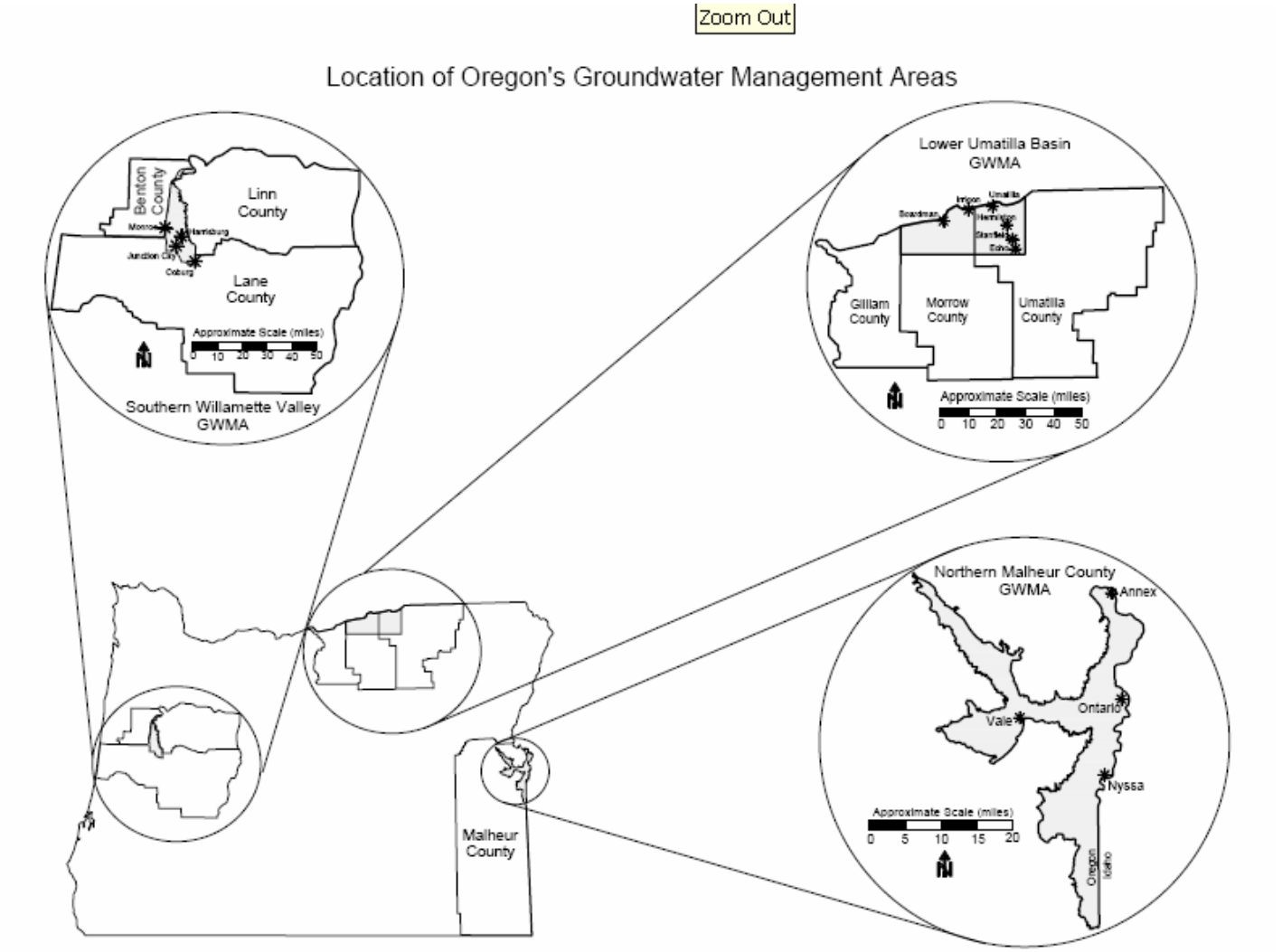
Groundwater Management Areas (GWMAs)



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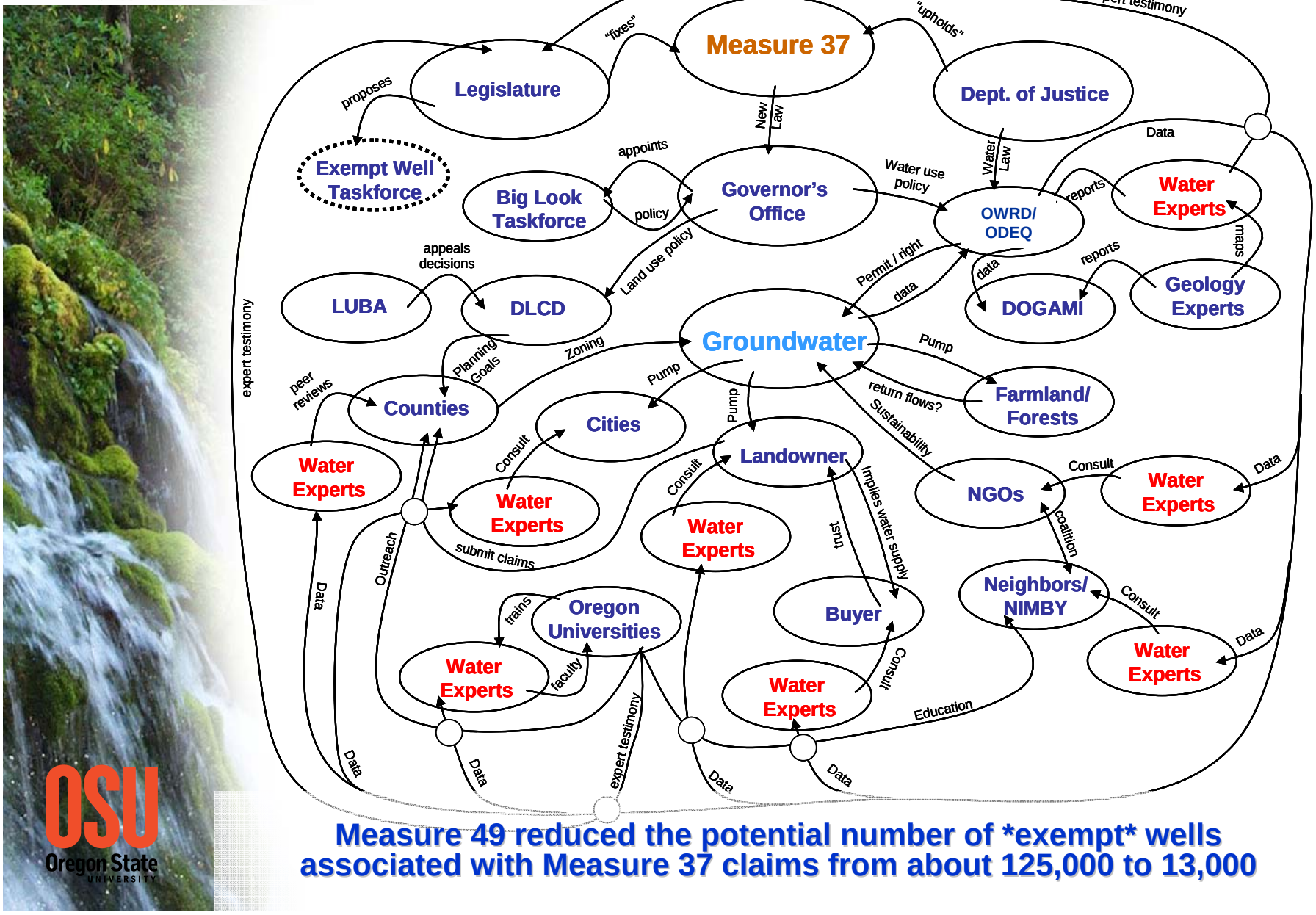
Water & Land Use Nexus



Measure 49 reduced the potential number of *exempt* wells associated with Measure 37 claims from about 125,000 to 13,000

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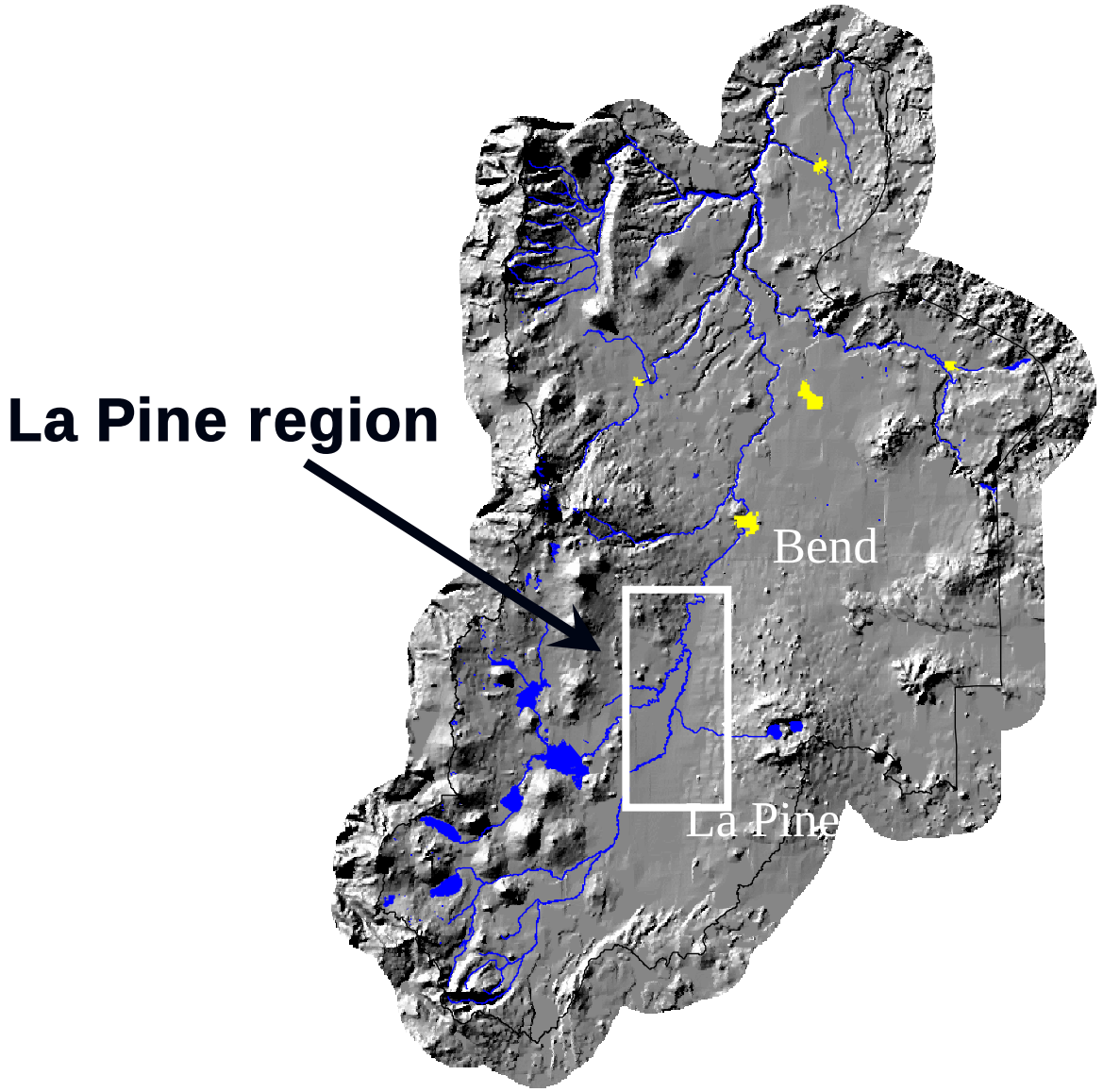
Growth & "Growing Away From Infrastructure" in the Deschutes Basin



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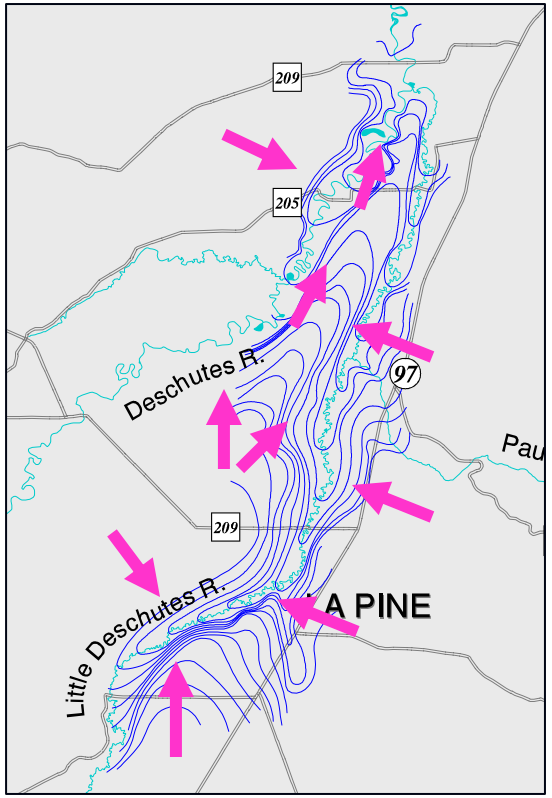
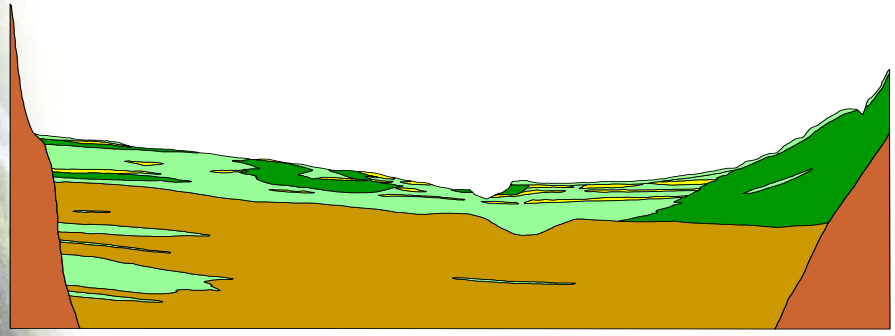
A “Wicked” Problem

- Thin, volcanic soils; shallow groundwater (water table)
- Most homes on septic & individual wells
- Upper 100 feet contains most productive aquifers
- DEQ sampling found areas of high nitrate and ammonium
- 12,000 lots in La Pine area. About 60% of lots developed; area growing rapidly



Map of groundwater flow directions



Geologic Cross-Section

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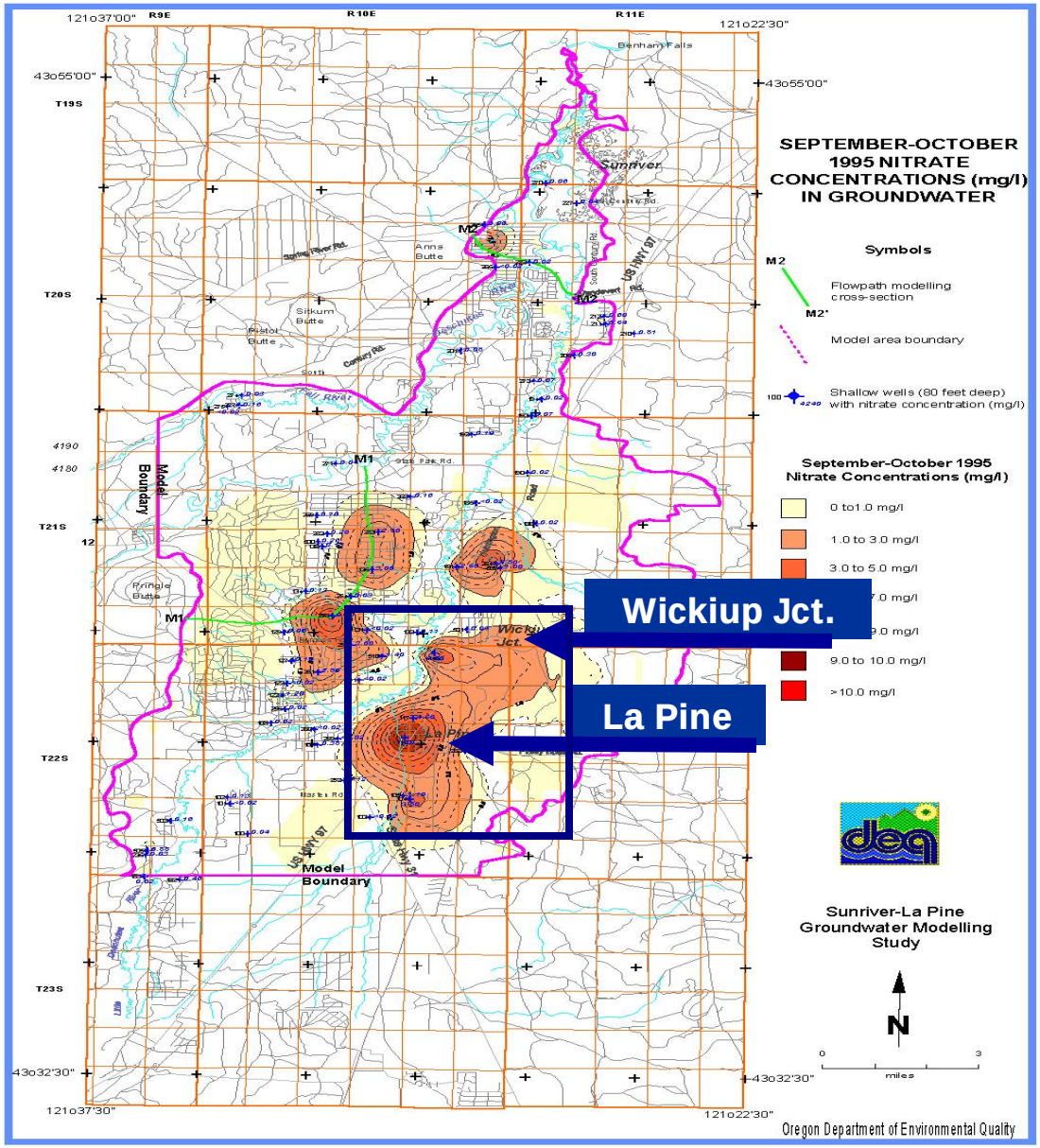
USGS science for a changing world

Oregon Department of Environmental Quality

Nitrate Concentrations in Groundwater (1995)



Proposed Local Rule

Public Reaction

- **Local rule is too expensive**
- **Sewer systems are cheaper**
- **Nitrate isn't a health hazard**
- **USGS modeling isn't credible**

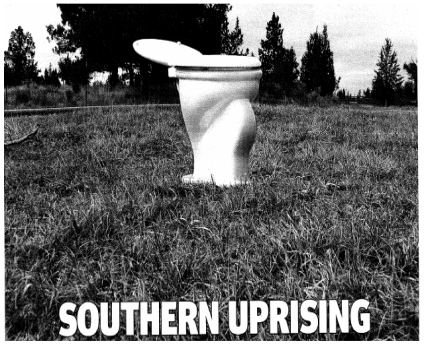
Spaghetti dinners held to raise funds to complete peer review of USGS/DEQ $5.5M study

TROUBLE!

Nitrate fixes raise concerns among La Pine residents

Chasing a Phantom?

Link between nitrate and blue baby syndrome in dispute



Residents quiz geologists on La Pine water

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New Court Definition of 'Navigable Water'

'Any body of water that will float a court decision.'

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Regulatory Changes & Conflict

Capital Press
The West's Ag Website

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Groups slam governor's clean water stand

'I feel like we were summarily dismissed,' representative says

Mitch Lies
Capital Press

Shift from "navigable" to "all" waters – perhaps including groundwater

PORTLAND - Oregon natural resource groups are "very, very upset" over Gov. Ted Kulongoski's decision earlier this month to back a congressional act that broadens the scope of the Clean Water Act.

"I feel like we were summarily dismissed without any outreach," said Jeff Stone, director of government relations for the Oregon Association of Nurseries.

"We are very, very upset about the governor's support," said Katie Fast, government affairs director for the Oregon Farm Bureau Federation.

In addition to not consulting natural resource groups, Fast said the governor also failed to consult the Oregon Department of Agriculture before coming forward with his position.

"I think this is a continued theme that we have seen throughout this administration," Fast said.

House Resolution 2421, known as the Clean Water Restoration Act, would dramatically expand the reach of the Clean Water Act. The bill essentially removes the qualifier "navigable" from the Clean Water Act, expanding the act's reach to all waters of the U.S.

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Unanswered Economic Questions

- What does it cost to access water in Oregon, by geography, use, and source? How do these relate to prices or fees?
- Are water benefits being subsidized in Oregon - for and by what parties?
- Are prices/costs subject to real time market feedback? Should they be?
- Is water the next "corn for ethanol" analog?
- Of what benefit are water banks and ecosystem/water markets in this mix?

  For example, conservation pricing, greenhouse gas emission management in water/wastewater/stormwater treatment processes, and tax credits?

Water Planning – Why Do It?

- Establish an orderly path to the future, ensure quality of life, etc.
- Assess: what you have, don't have, what's needed, what may cause problems
- Develop "*What if?*" scenarios
- Make policy recommendations
- Self-determination
- CYA *(Cover Your Assets) – protect water from external threats*
- See *Capital Press* 5 September 2008 editorial: *http://aquadoc.typepad.com/waterwired/2008/09/never-too-late-for-water-planning-in-the-northwest.html*

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One Approach – New Mexico

(www.ose.state.nm.us/isc_planning_division.html)

- Late 1980s: legislature mandated state water plan, to be crafted from 16 regional plans.
- Provided some funding for 16 regional plans, established guidelines
- State water plan assembled from regional plans
- Complicated by presence of > 20 tribal governments – they have status as "states"
- See www.waterassembly.org for an example of a local group that grew out of the planning process – the Middle Rio Grande (Albuquerque area) Water Assembly

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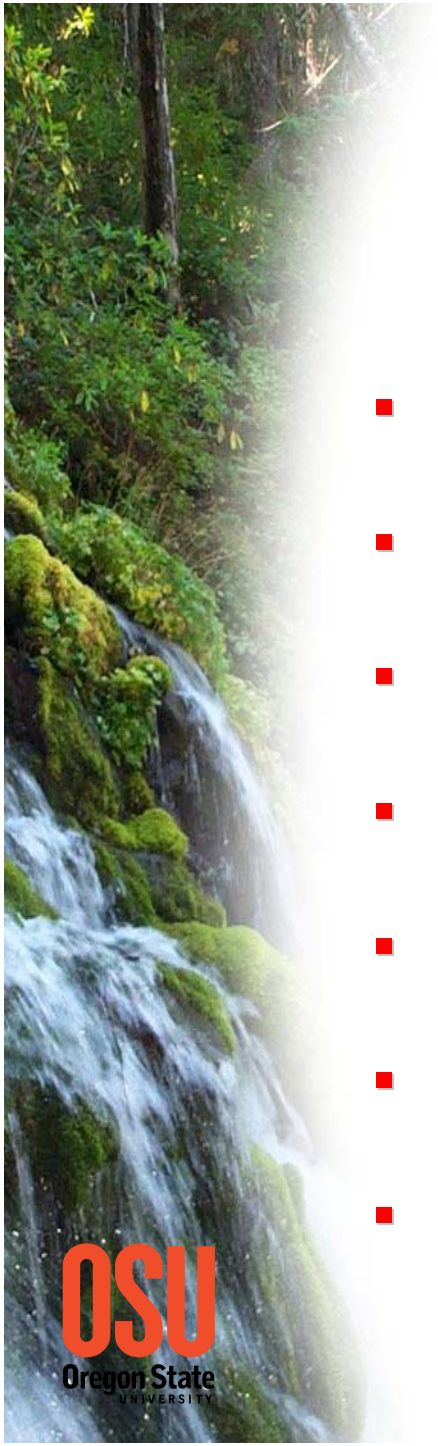

Water Planning - Guidelines

- **Public participation essential – stakeholders must decide upon the "vision"**
- **Done at local/regional level - county, watershed, "region"**
- **Stakeholders should take an active role in developing models ("mediated modeling"; "shared vision")**
- **Plan should be based upon existing water and related law, although changes may be suggested**
- **One approach: present and future water demand must be based upon *currently existing water supplies***
- ***Don't forget ground water, water quality, or the environment!***
- **Late development: include climate change**

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Water Planning - Questions

- What is the available water supply?
- What will be the future quantity and quality requirements, *including environmental requirements?*
- How will the region undertake meeting demand with supply, while meeting quality requirements?
- What are the ramifications of not meeting demand?
- Are there any demands with "infeasible" solutions?

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Concluding Remarks–Wish List 1

- Oregon needs to perform a comprehensive assessment of its water resources – use, supply, quality, needs
- Develop a statewide water resources strategy that addresses water supply, use & quality, growth, climate change, conservation/reuse, and the environment
- Better integrate water planning and land use planning, water quality and water quantity/use
- Must be prepared to make tough decisions, compromises, seek consensus, and involve stakeholders
- Promote ‘soft path’ approaches

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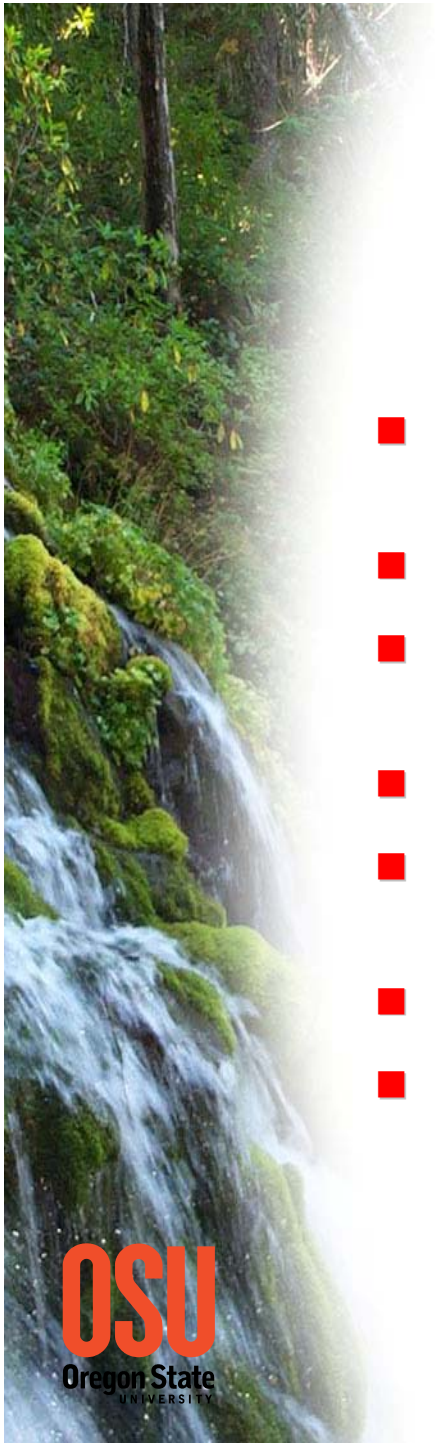

Concluding Remarks–Wish List 2

- Encourage community governance, water planning, and regional partnerships
- Agency coordination
- Research support – Oregon's universities have water expertise
- Don't forget demand management or groundwater
- Examine regulatory environment (ASR, reuse, conservation, etc.)
- Energy-water nexus important
- Investigate feasibility of Columbia Basin Compact

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Subscribe to The Oregon Water List:

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

Read the WaterWired blog:

aquadoc.typepad.com/waterwired

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Questions?

"You are piling up a heritage of conflict and litigation over water rights for there is not sufficient water to supply the land ." – John Wesley Powell, 1893

(photo courtesy: duckboy.com)

Discussing Water Rights, A Western Pastime

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