Groundwater in Oregon

Oregon Water Resources Commission
October 13, 2016

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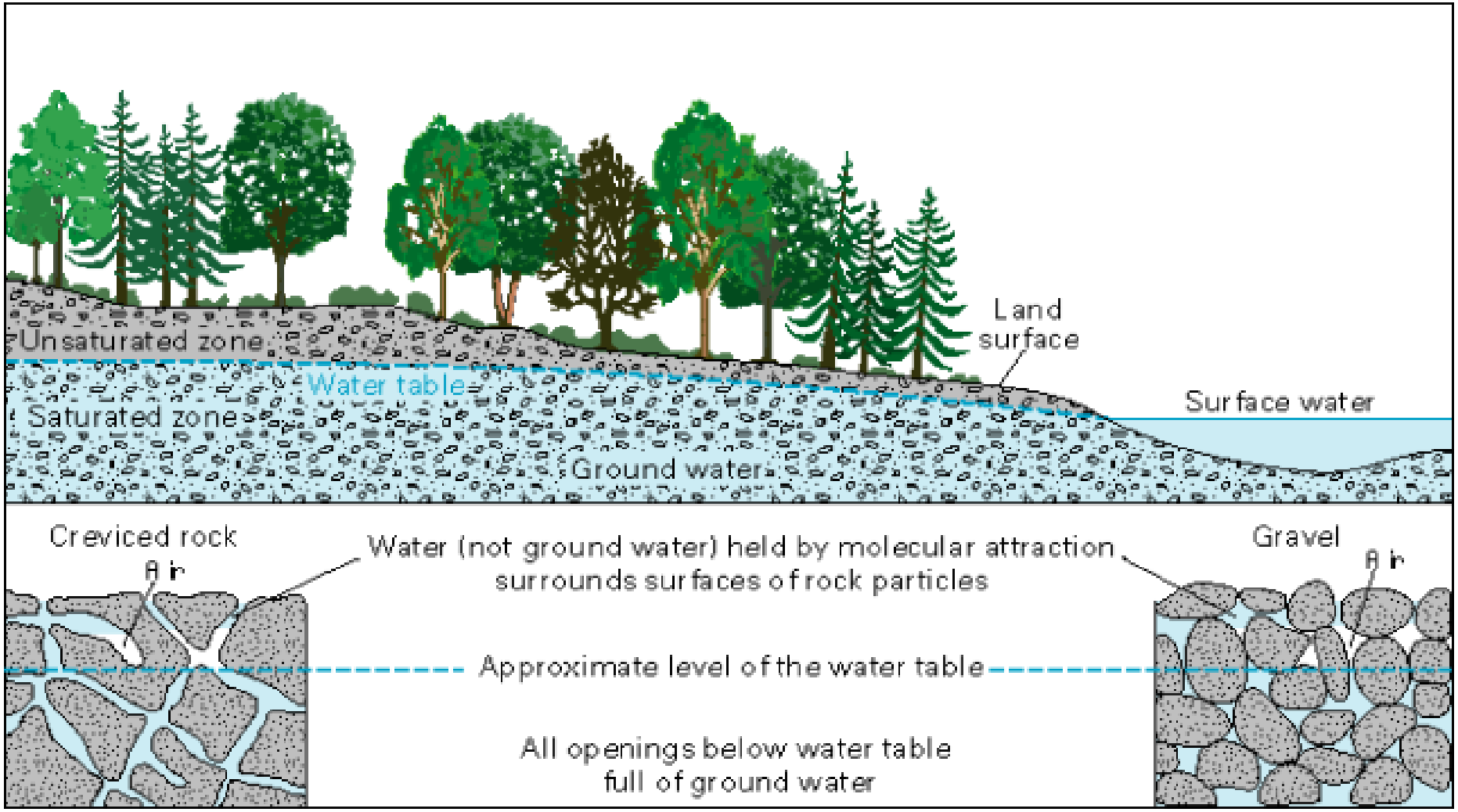
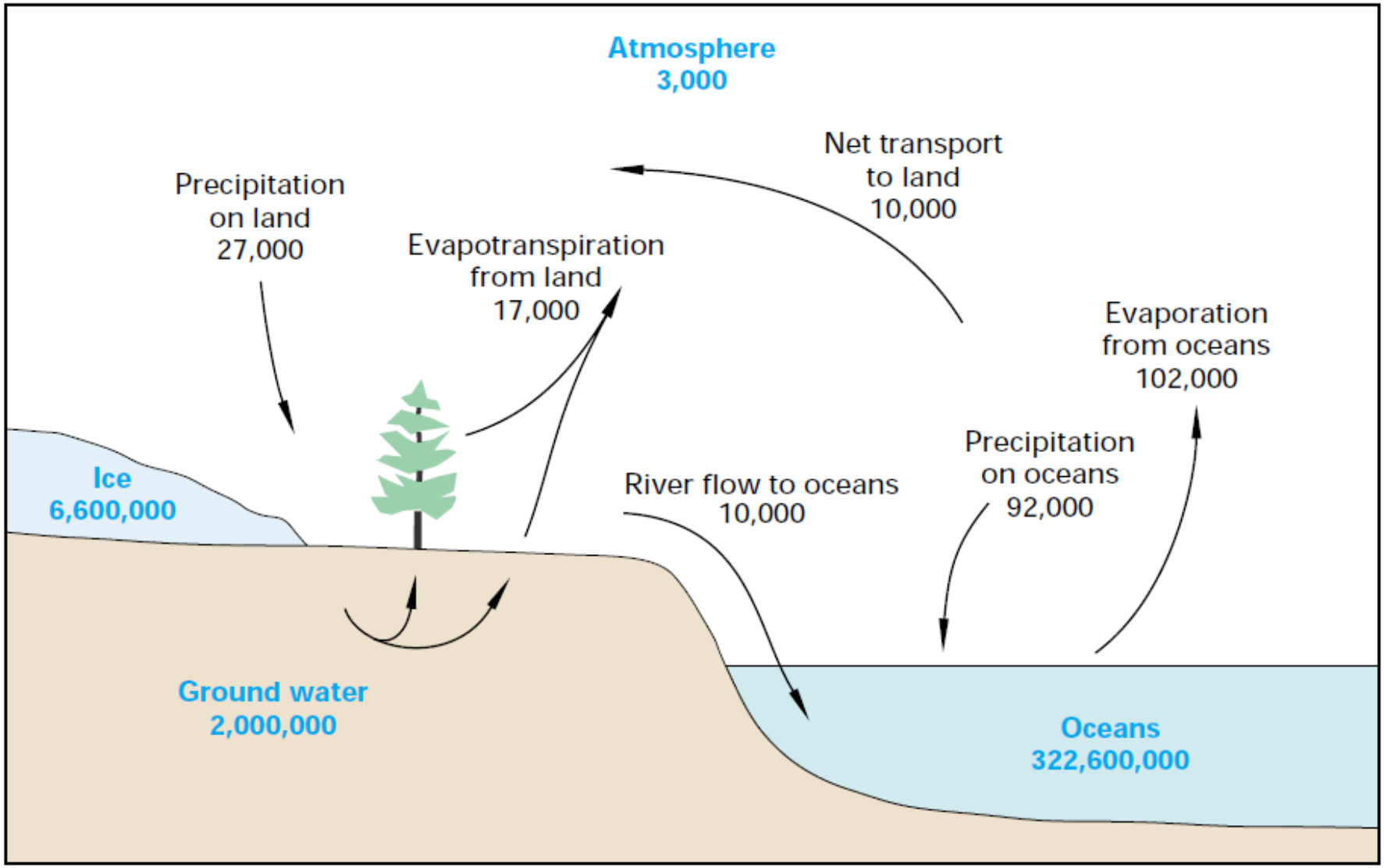
Groundwater 101

What is Groundwater?



Source: USGS (http://water.usgs.gov/edu/earthgwaquifer.html)

Groundwater in the Water Cycle

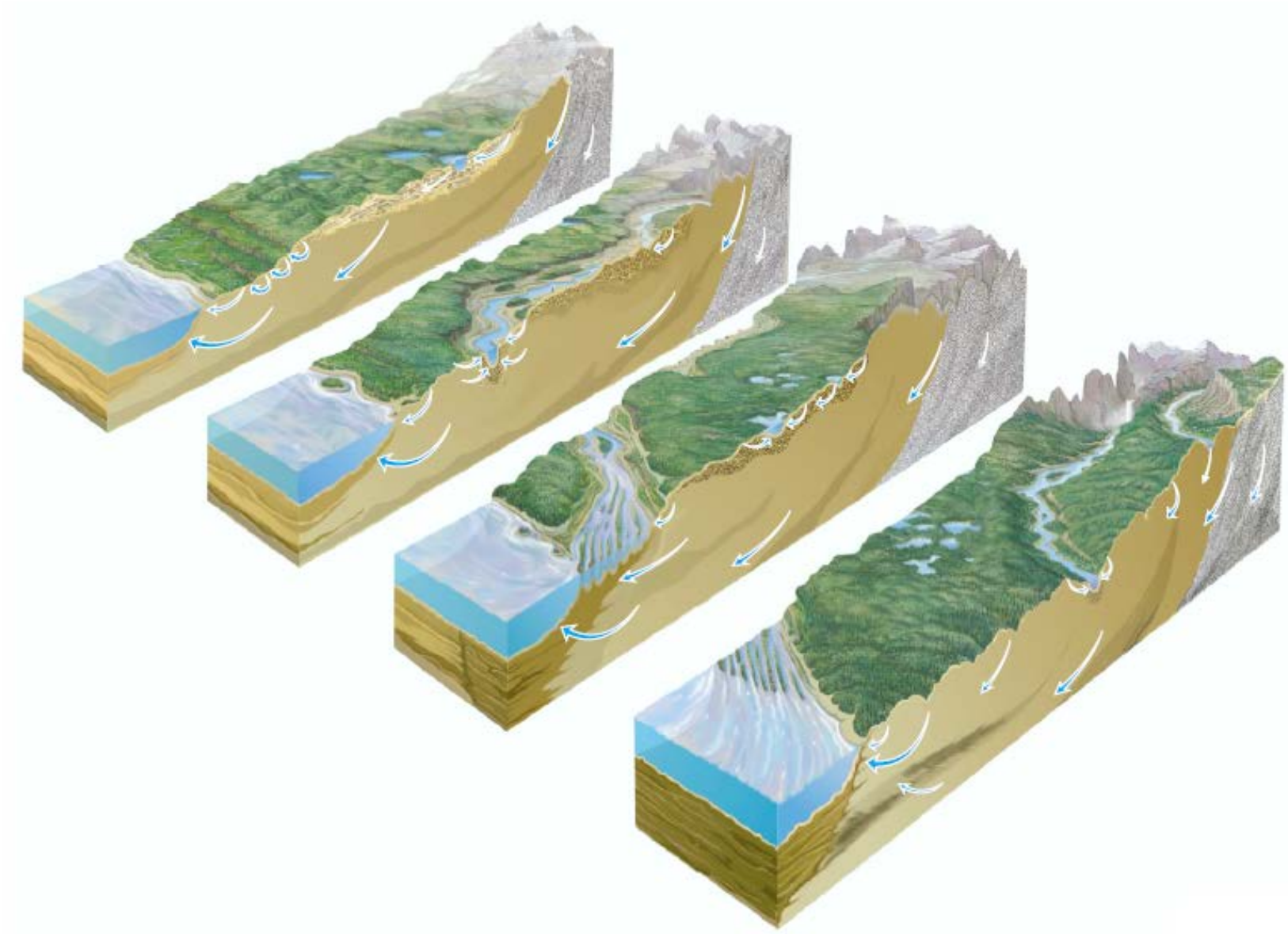


Pools are in cubic miles

Fluxes are in cubic miles per year

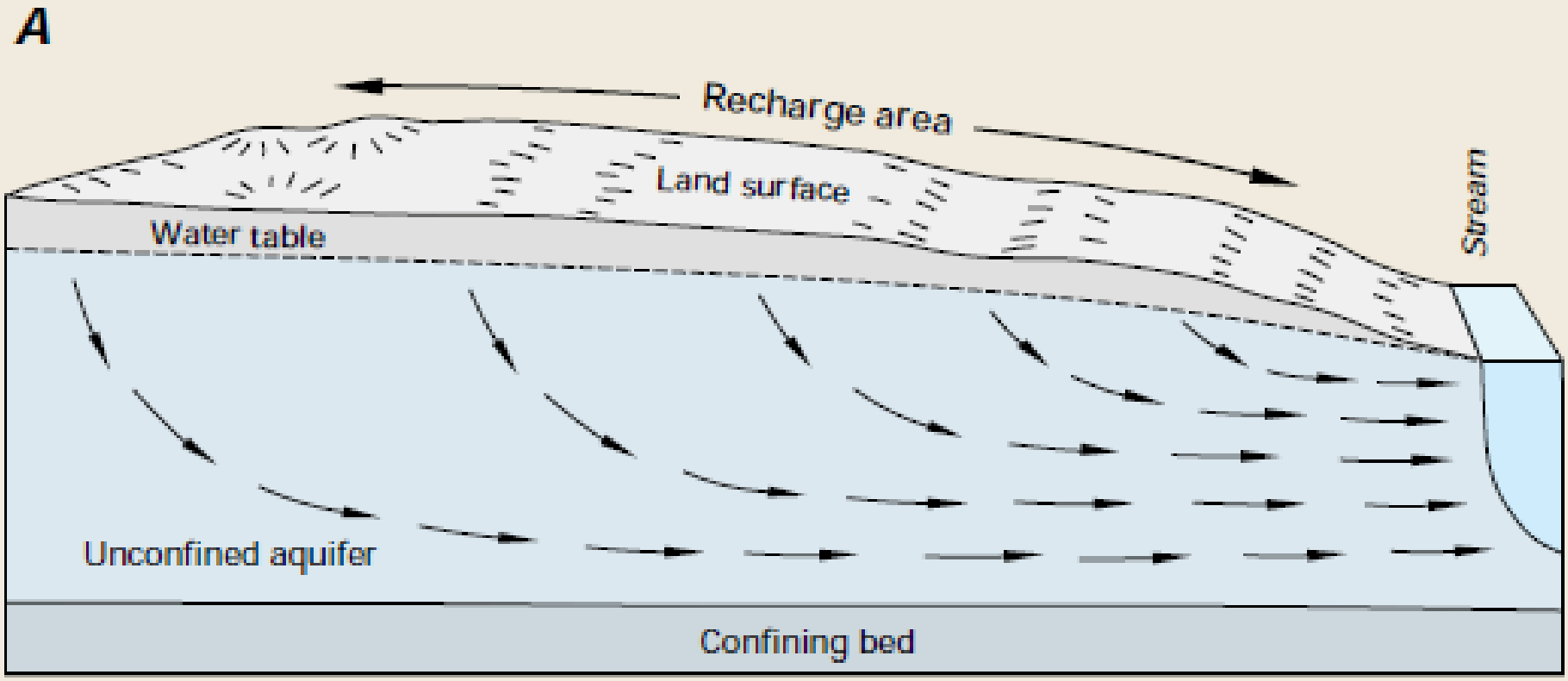
USGS Circular 1139, Groundwater and Surface Water: A Single Resource

Groundwater Flow Paths



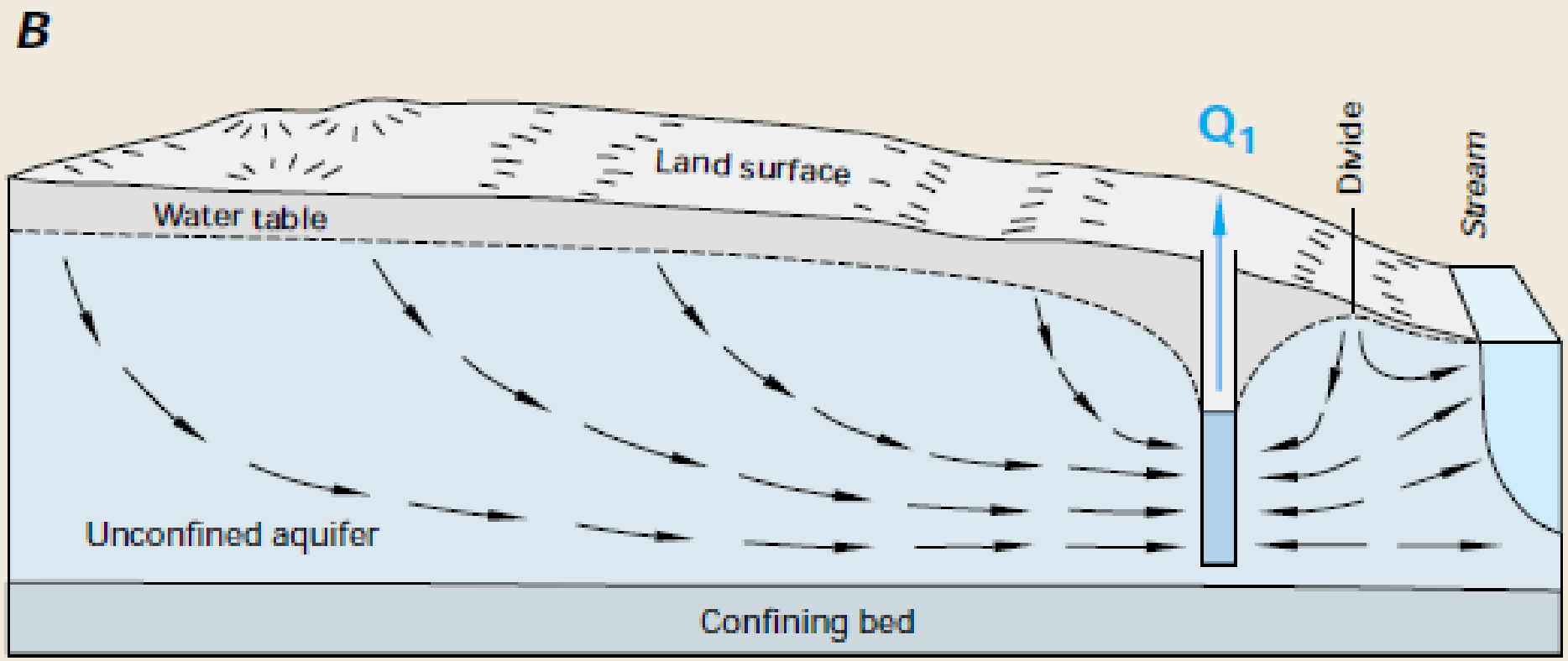
USGS Circular 1139, Groundwater and Surface Water: A Single Resource

Groundwater Discharge



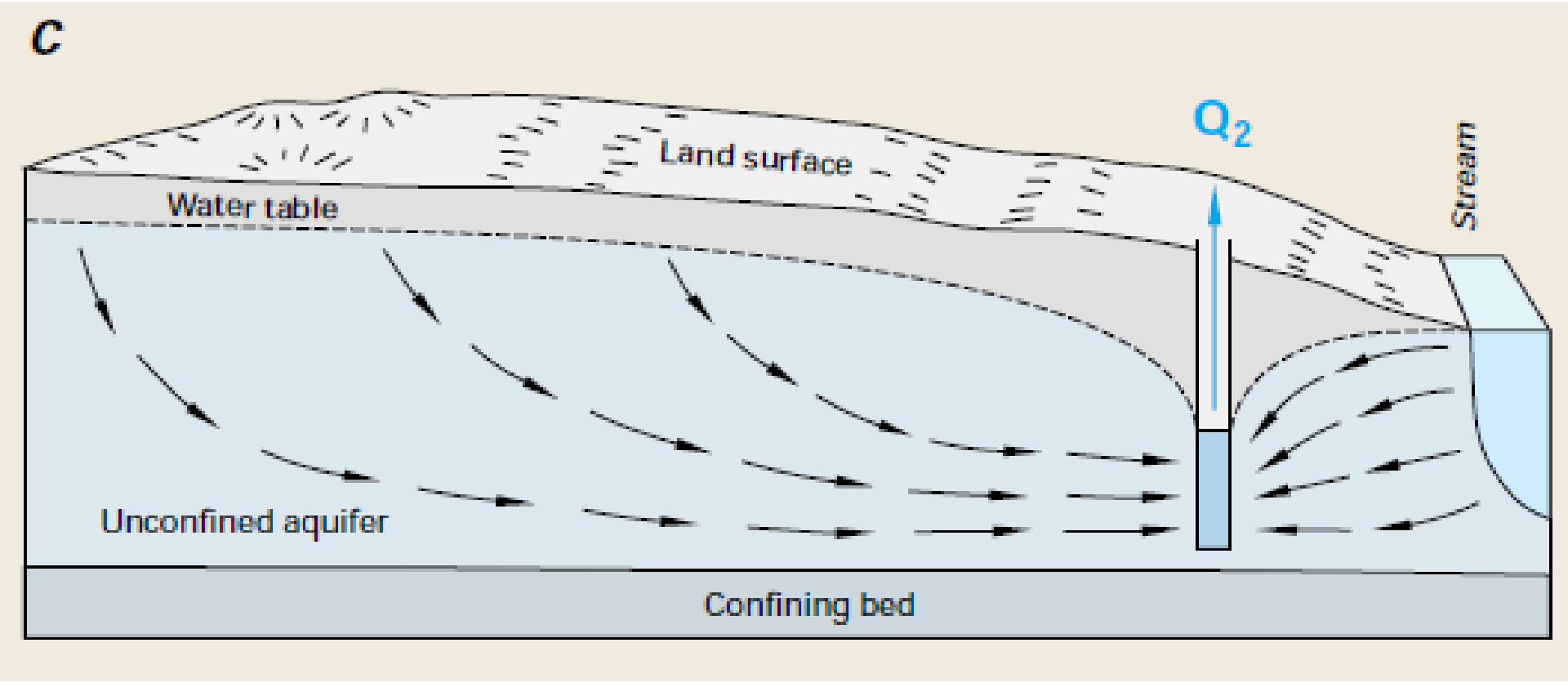
USGS Circular 1139, Groundwater and Surface Water: A Single Resource

Groundwater Capture



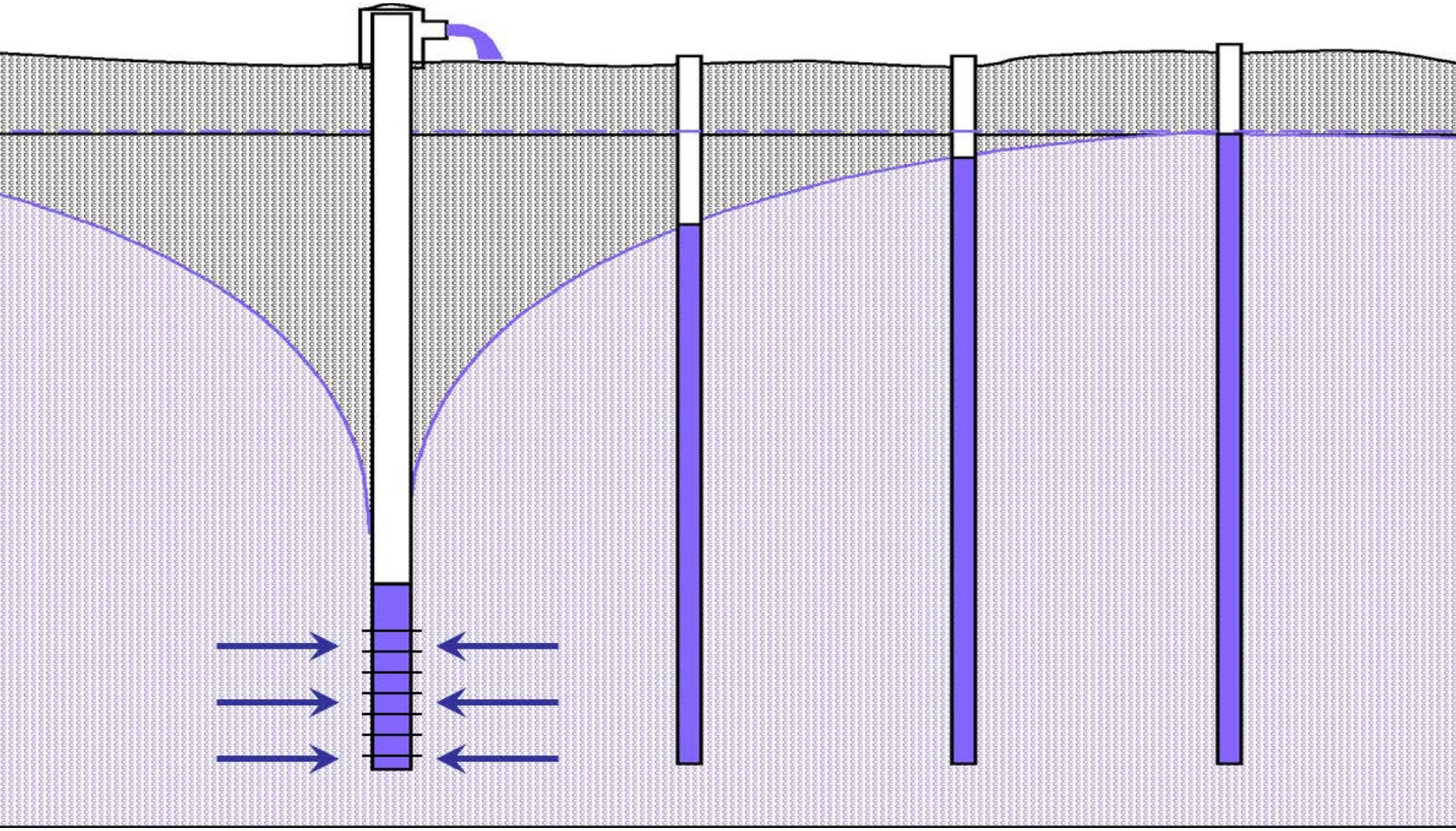
USGS Circular 1139, Groundwater and Surface Water: A Single Resource

Streamflow Capture



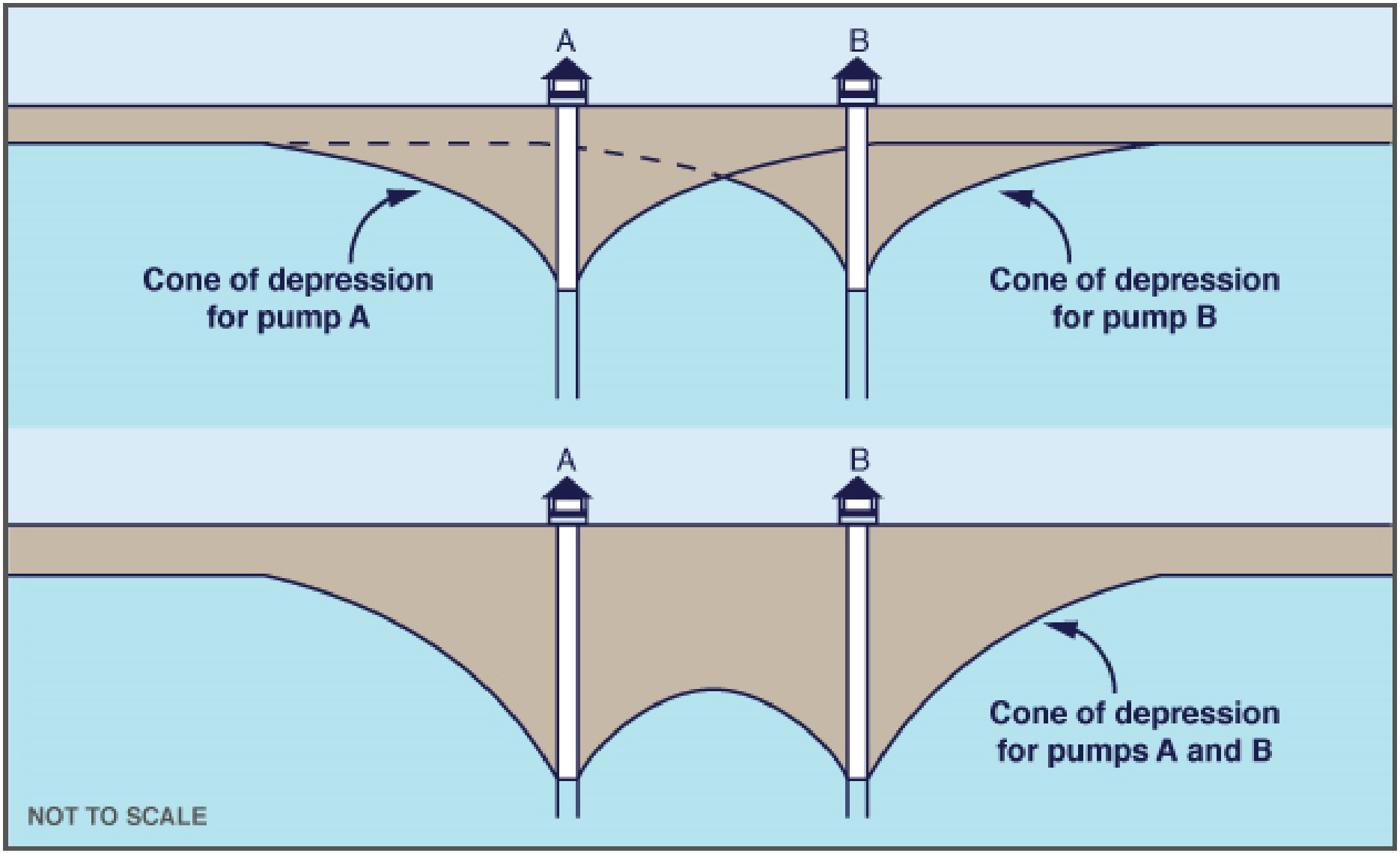
USGS Circular 1139, Groundwater and Surface Water: A Single Resource

Groundwater Cone of Depression



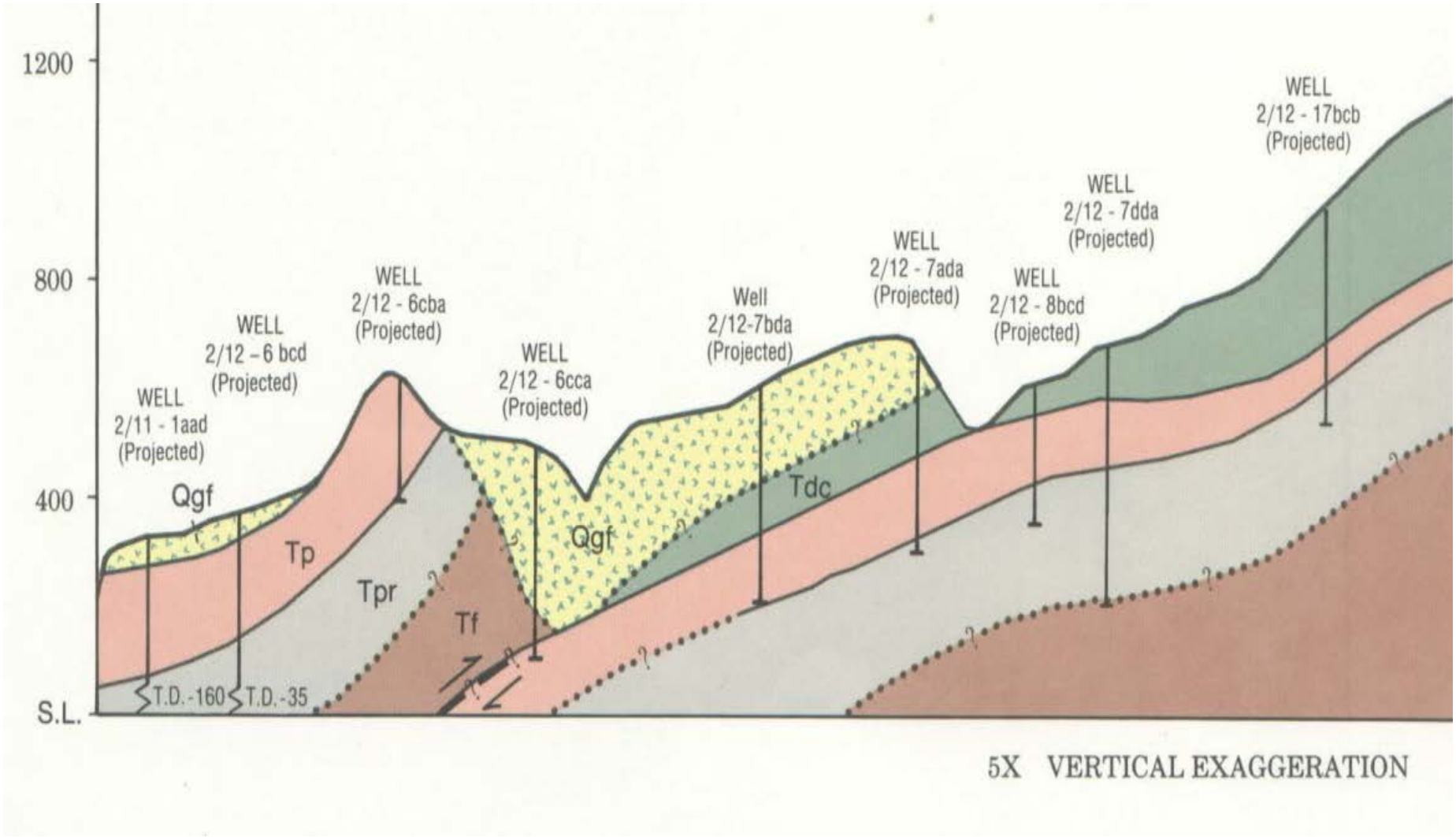
Source?

Well Interference



Source: USGS (via http://ponce.sdsu.edu/effect_of_groundwater_pumping.html)

Additional Complexity



Statutory Authority

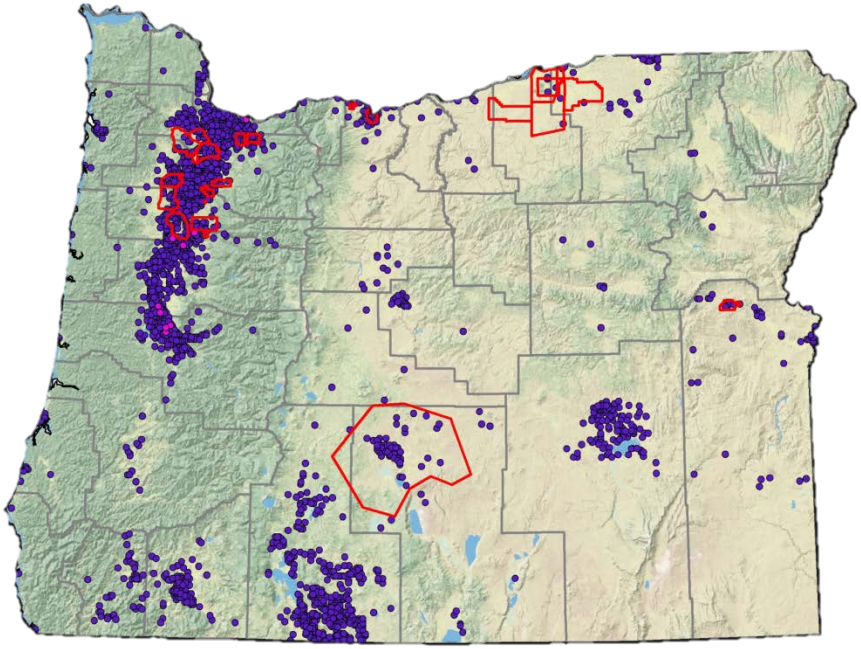
The Groundwater Act of 1955

- Water is a Public Resource
- Prior Appropriation System
- Groundwater – Surface Water Connection
- Study Groundwater Systems

ORS 537.505 to 537.795 and ORS 537.992

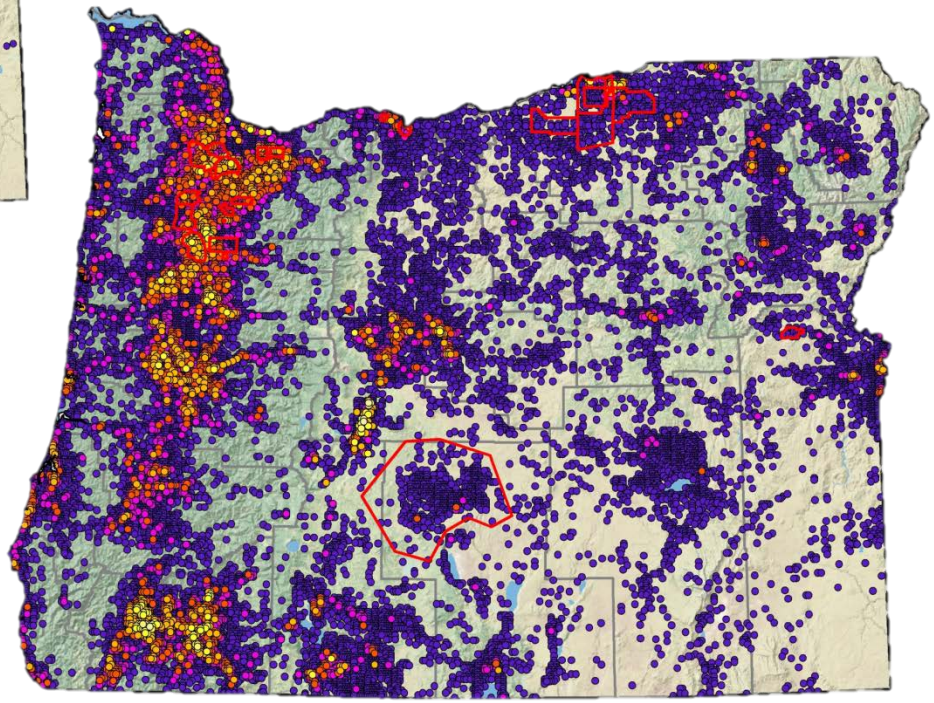
Groundwater Development 1955 to 2016

Water Well Density



1955
4,660 well logs

2016
256,800 well logs



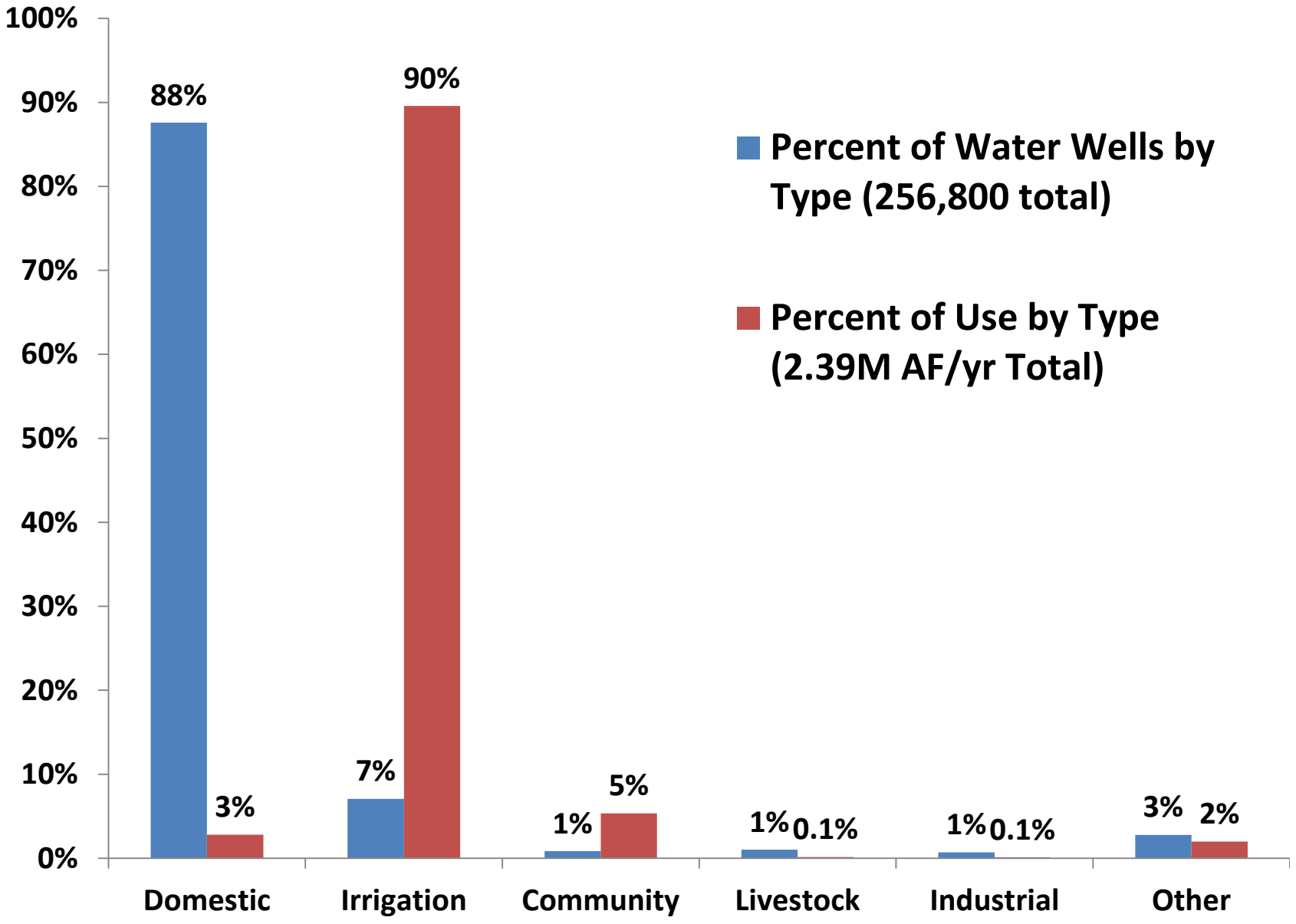
Density of Water Well Logs per 640 Acres

1 - 16	(<= 1 well / 40 acres)
17 - 32	(<= 1 well / 20 acres)
33 - 64	(<= 1 well / 10 acres)
65 - 128	(<= 1 well / 5 acres)
129 - 256	(<= 1 well / 2.5 acres)
257 - 320	(<= 1 well / 2.0 acres)
>320	(<= 1 well / 1.0 acres)

Counties

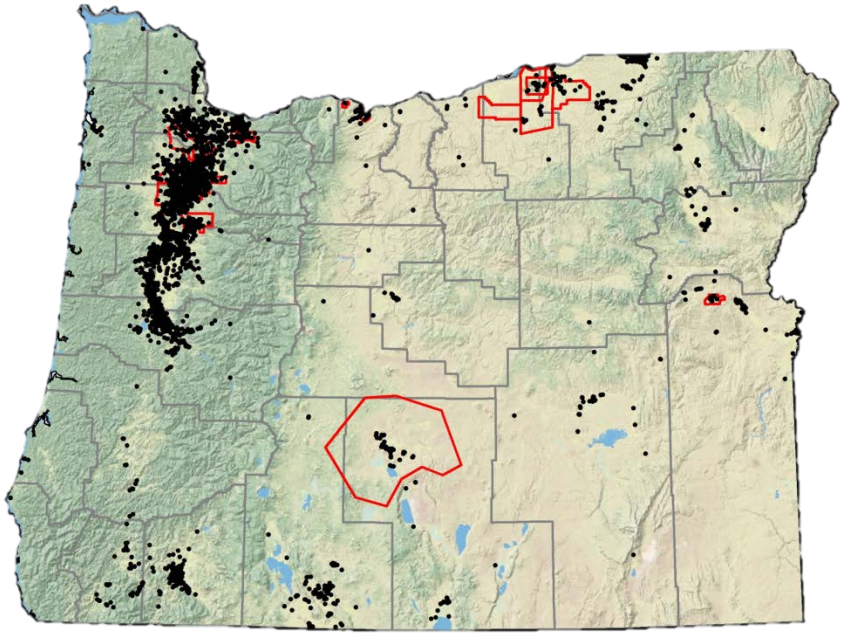
Ground Water Restricted Areas

Groundwater Use in Oregon



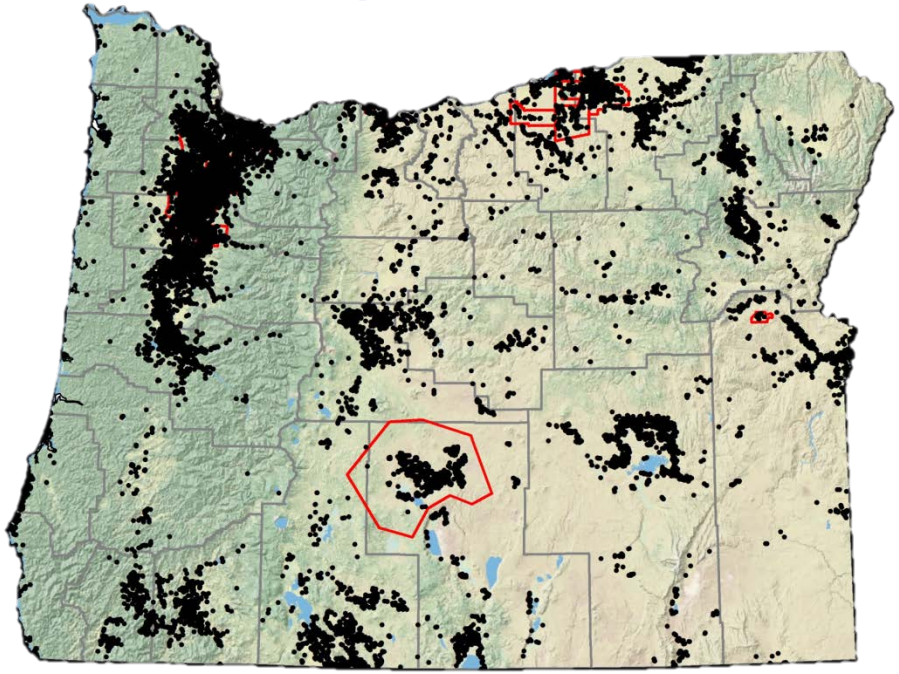
Source: Maupin and others, 2014

Water Right Wells

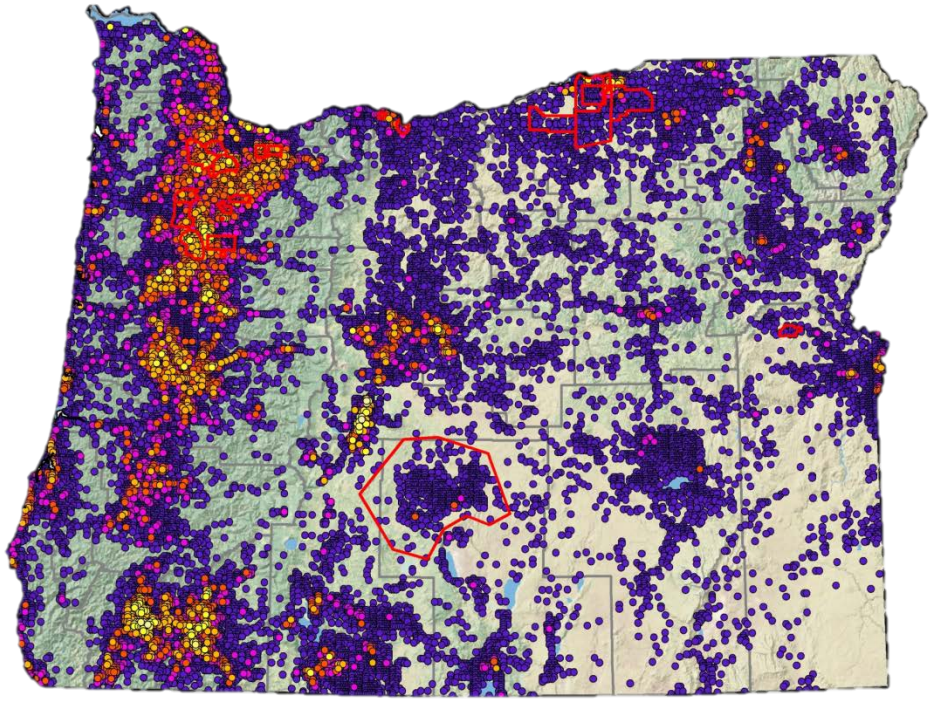


1955
4,400 wells

2016
25,000 wells

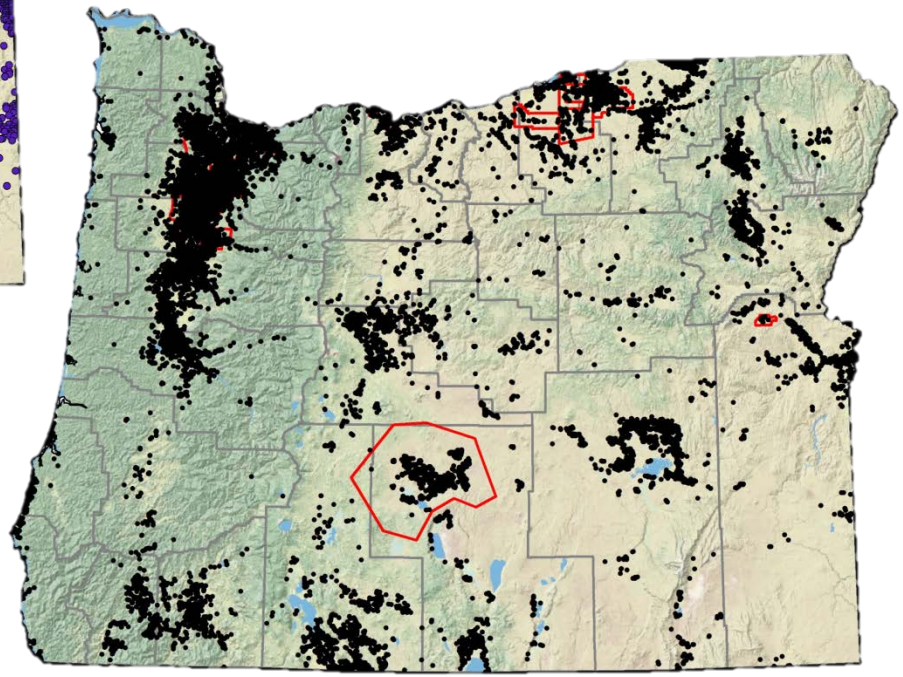


2016 Total Wells vs Water Right Wells



256,800 total wells

25,000 water right wells



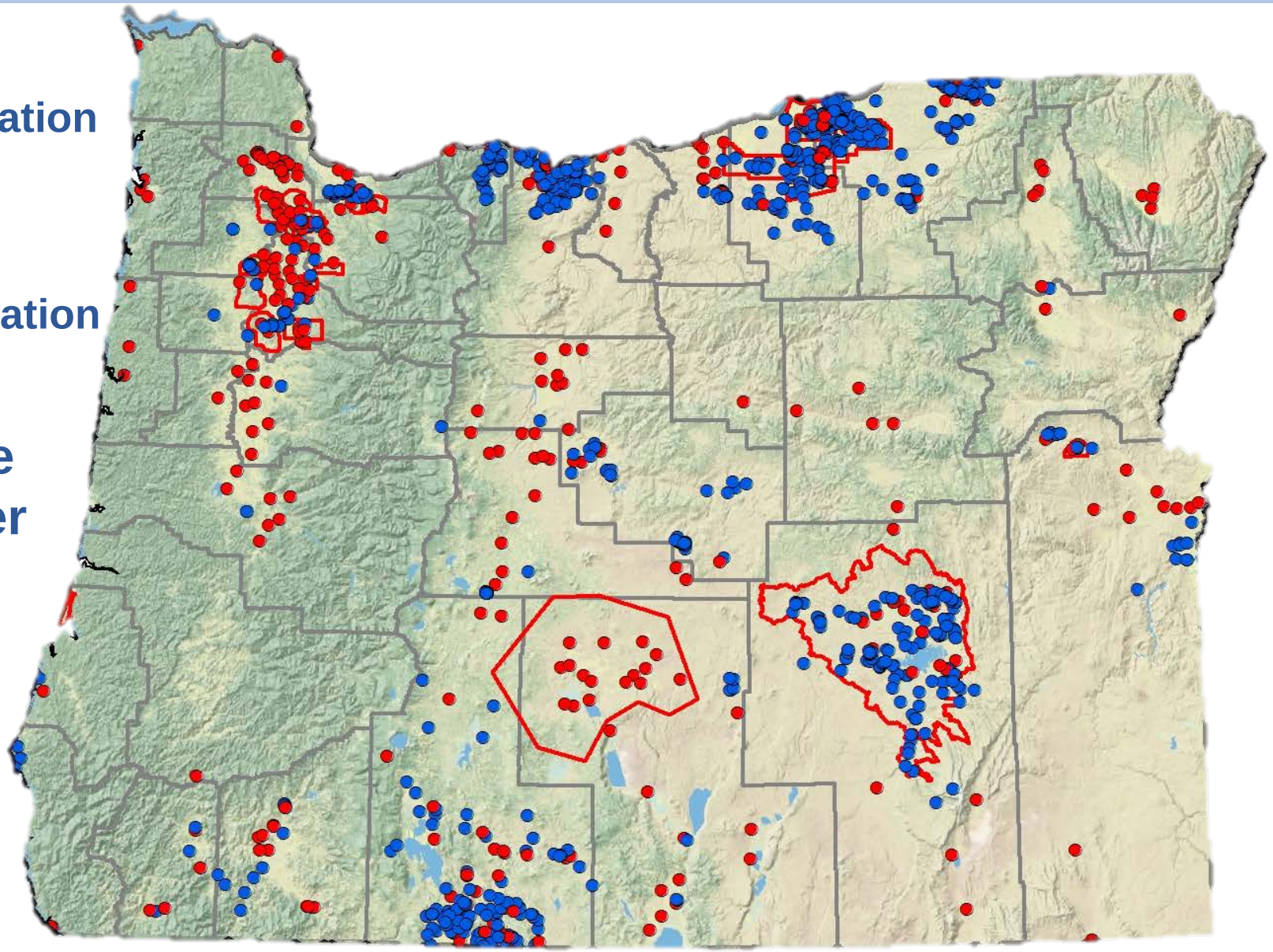
Understanding Groundwater

Current Observation Wells

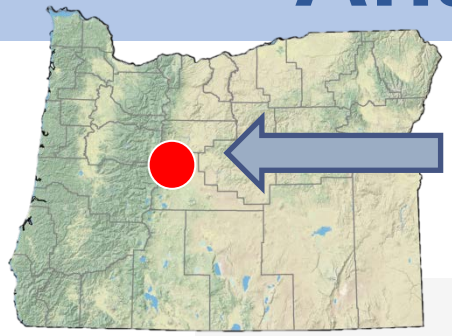
State Observation Well

Other Observation Well

378 State
870 Other



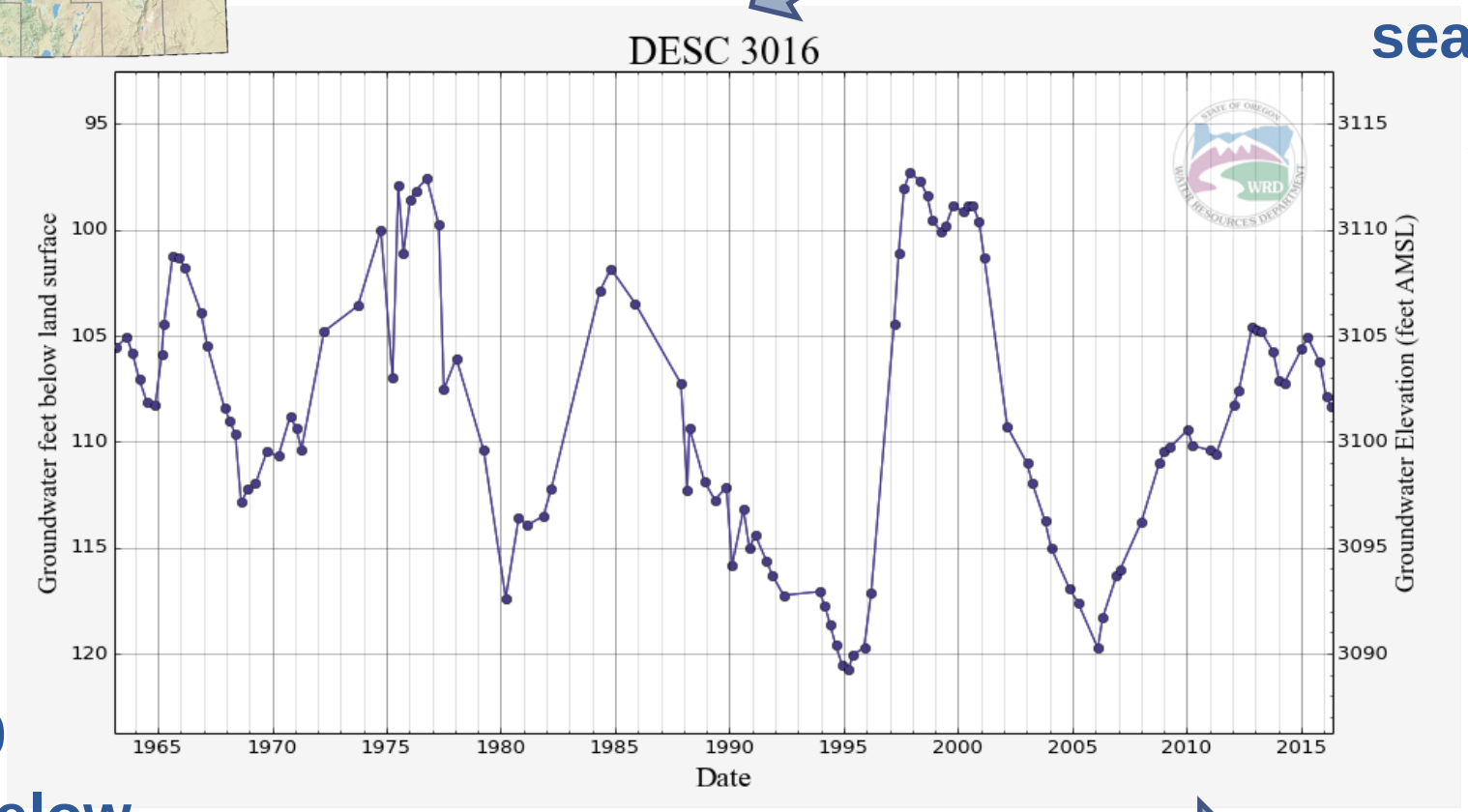
Anatomy of a Hydrograph



Well Location

Well Log ID

Feet above sea level



95

120

Feet below land surface

3115

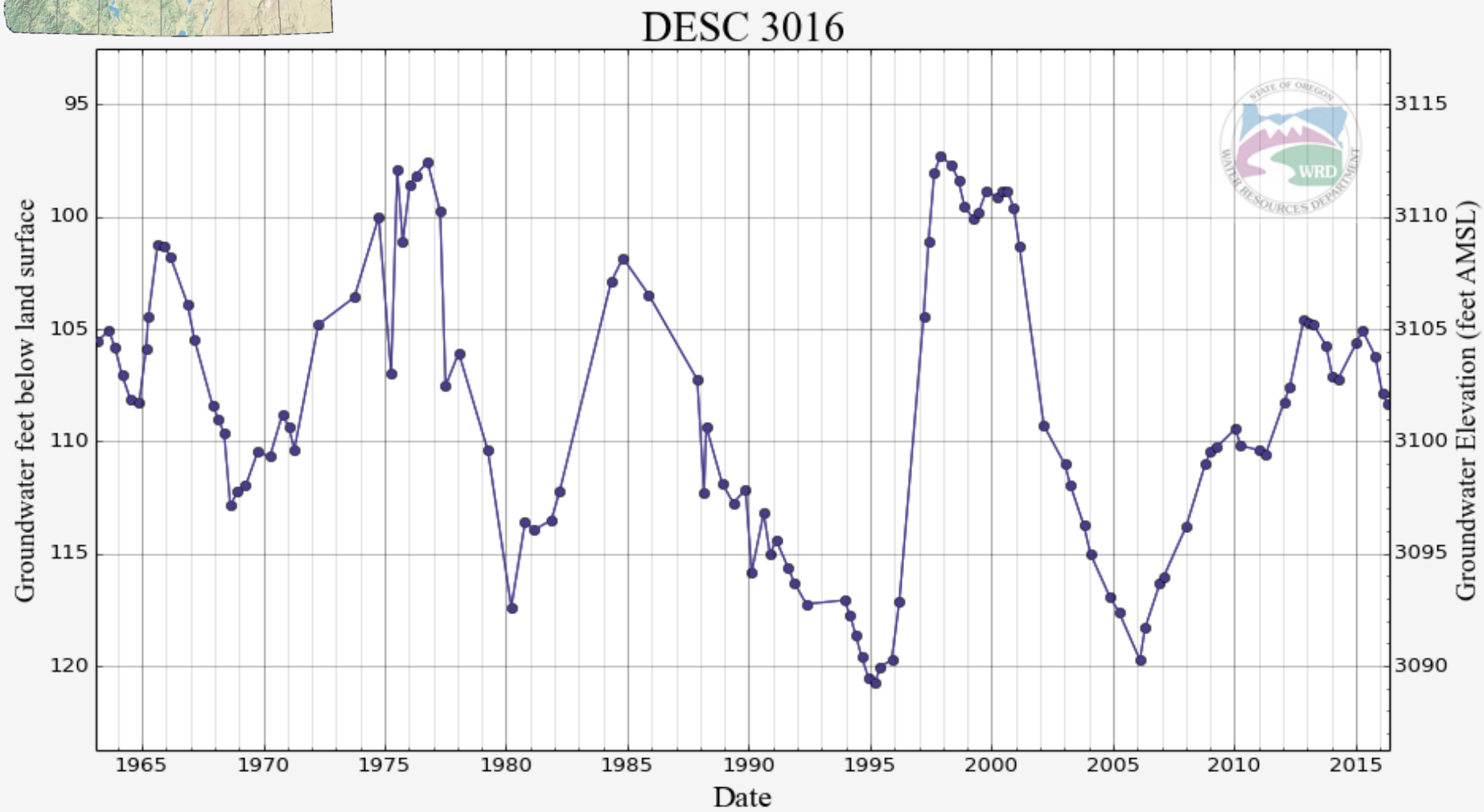
3090

1965

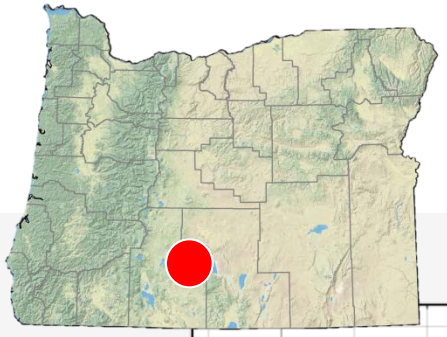
2016

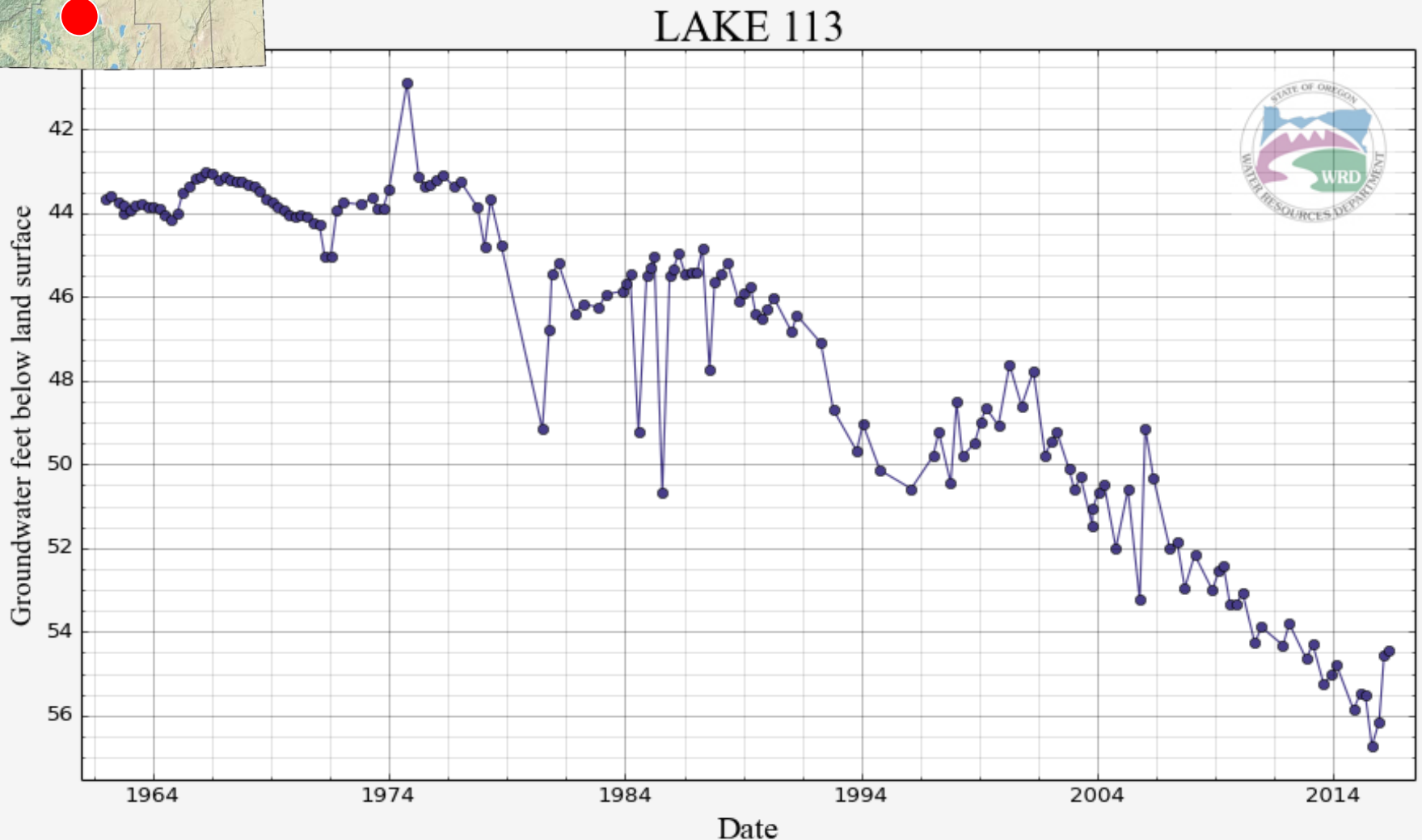
Increasing Time

Decadal Climate Cycles

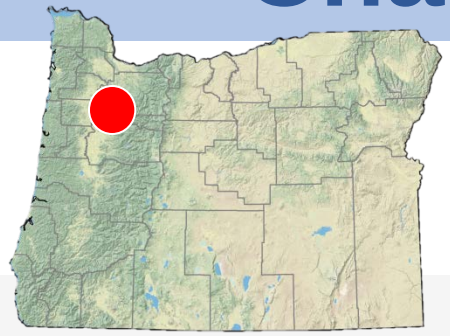


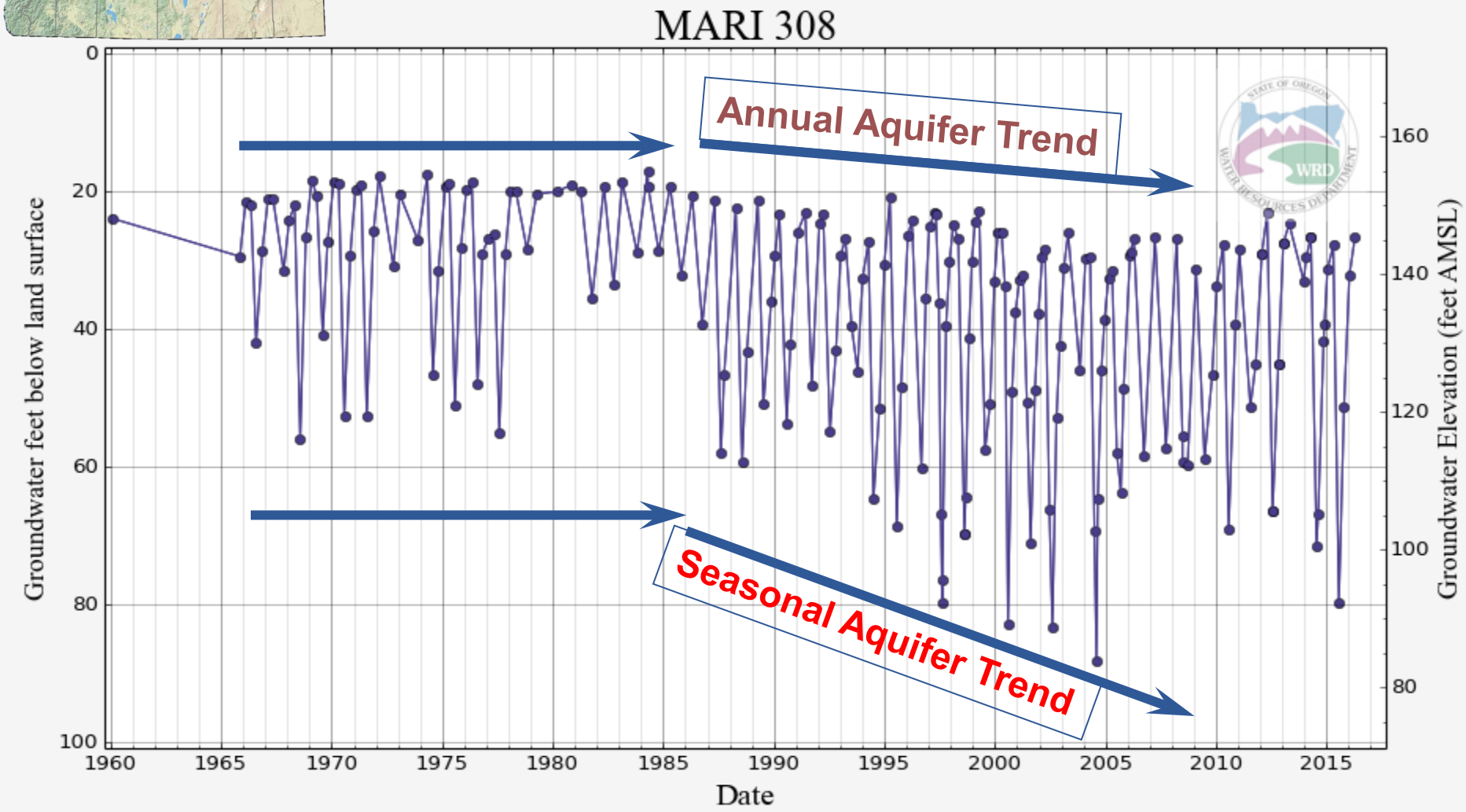
Climate Cycles and Well Withdrawal



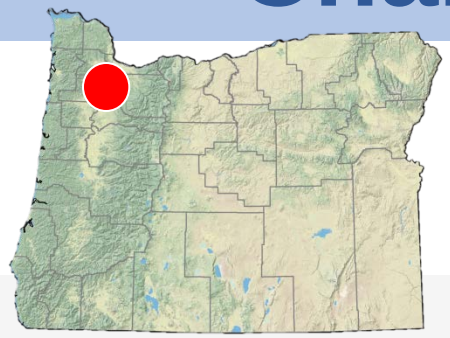


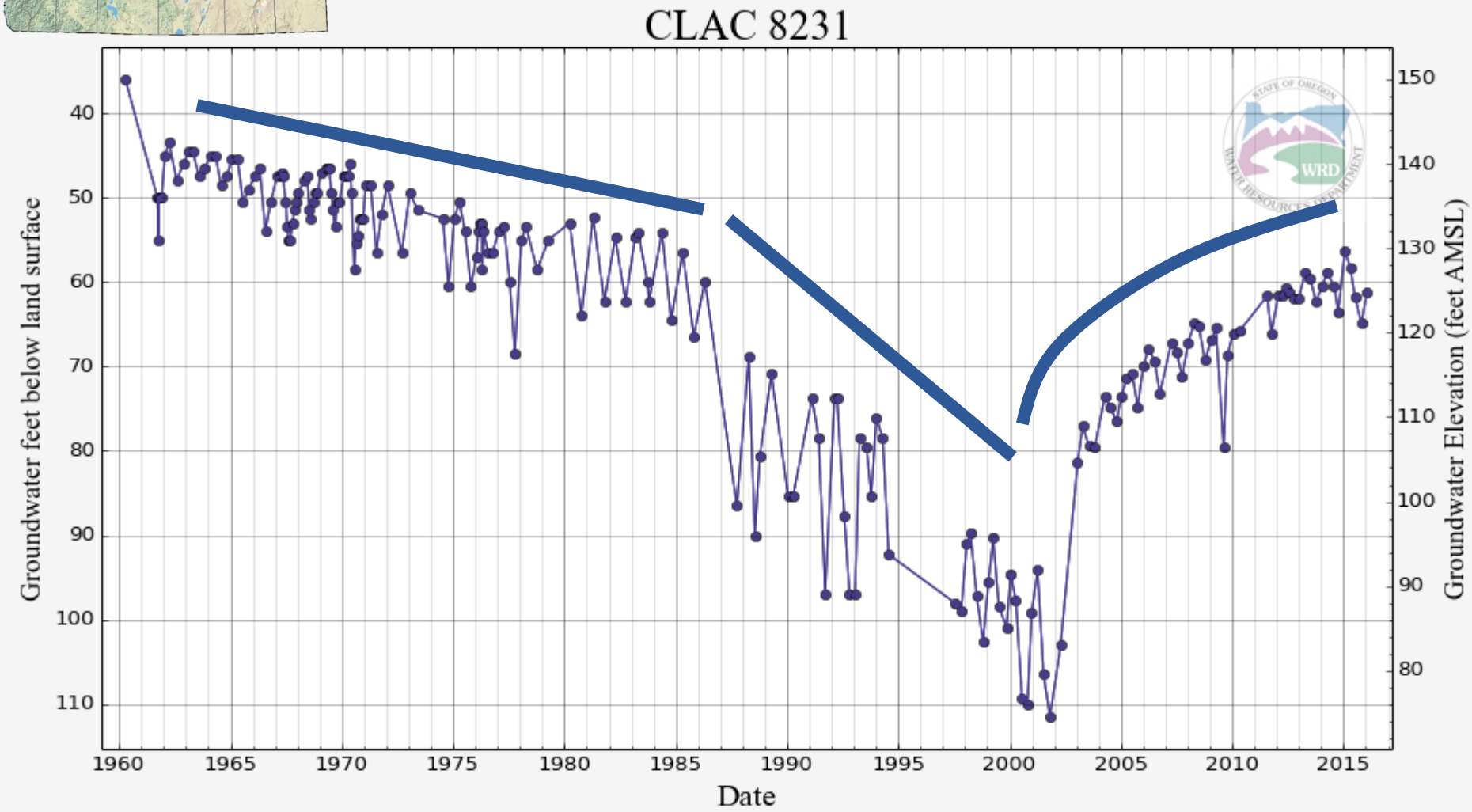
Changing Trends Over Time



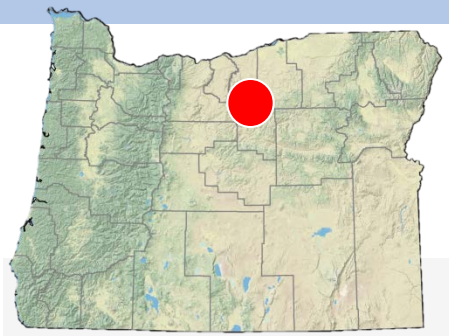


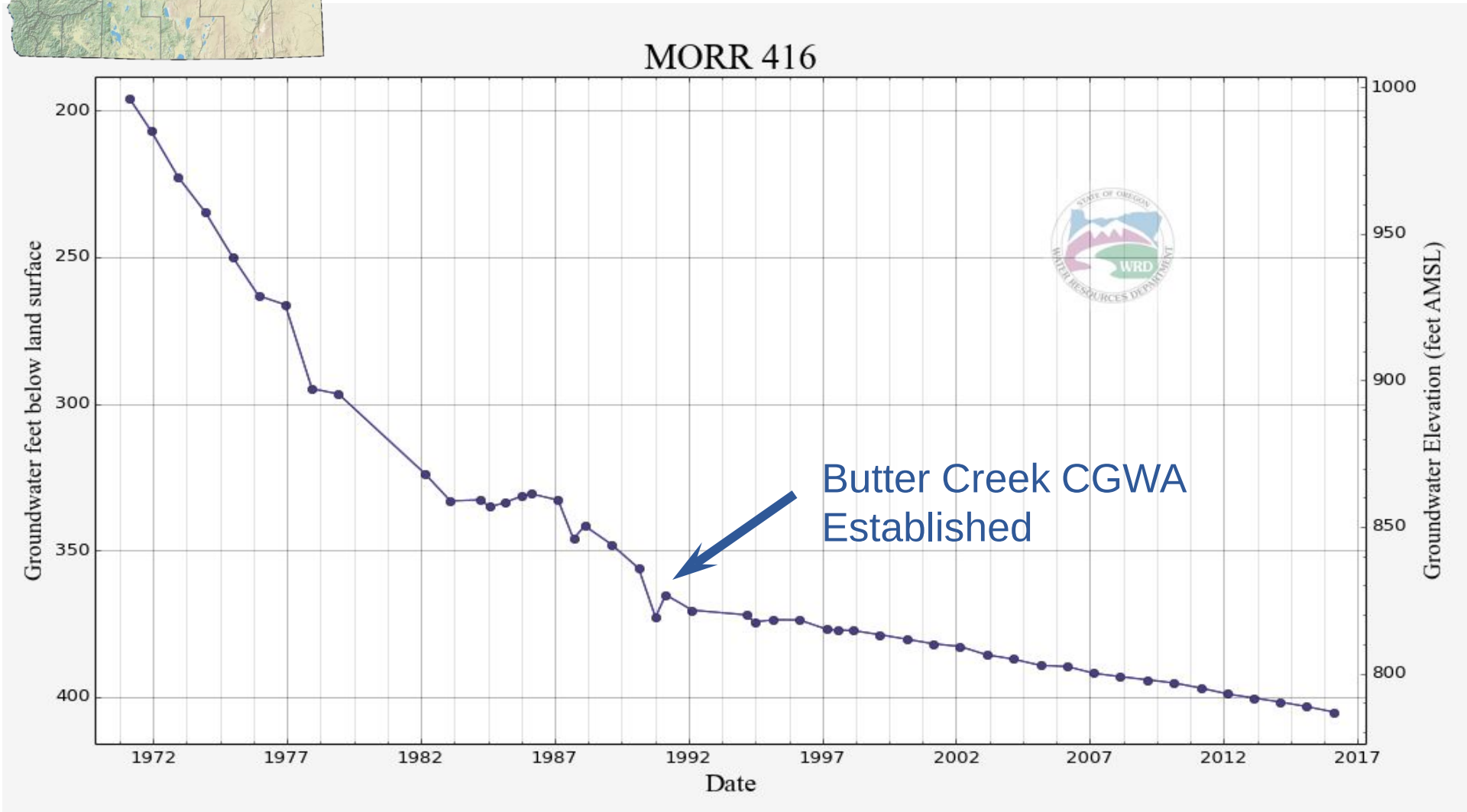
Changing Trends Over Time



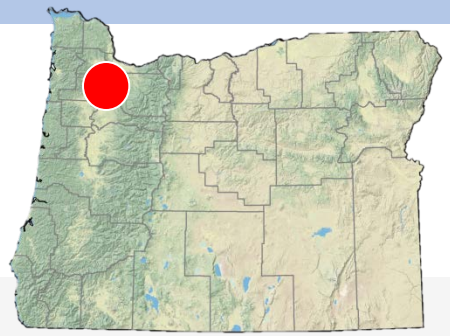


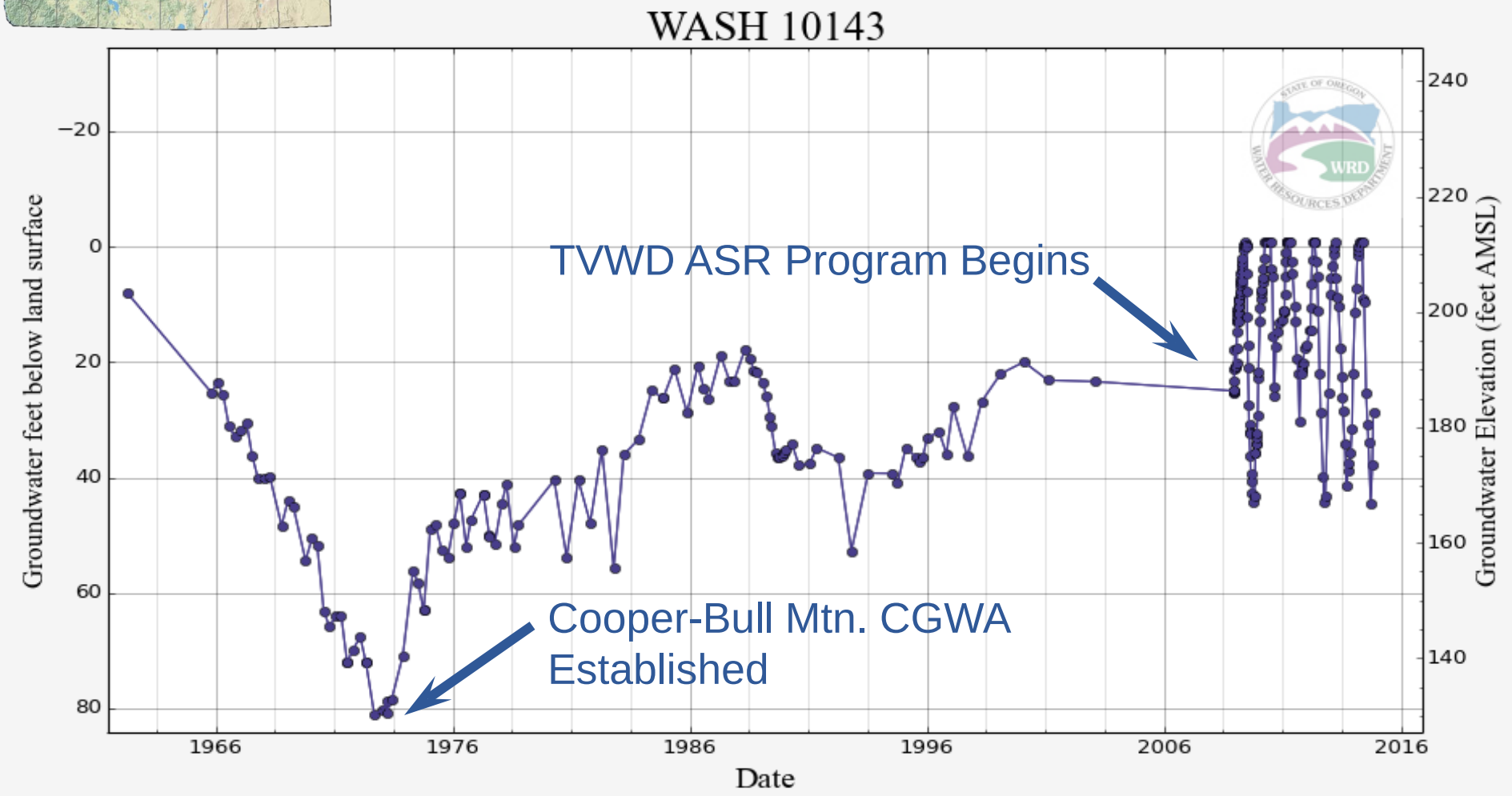
Capacity of the Resource



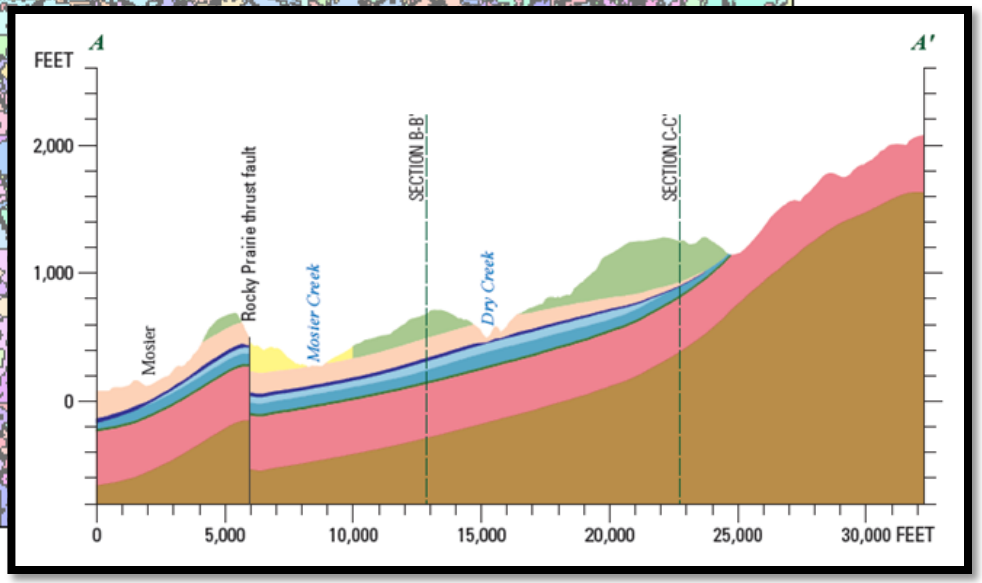


Effects of CGWA and ASR

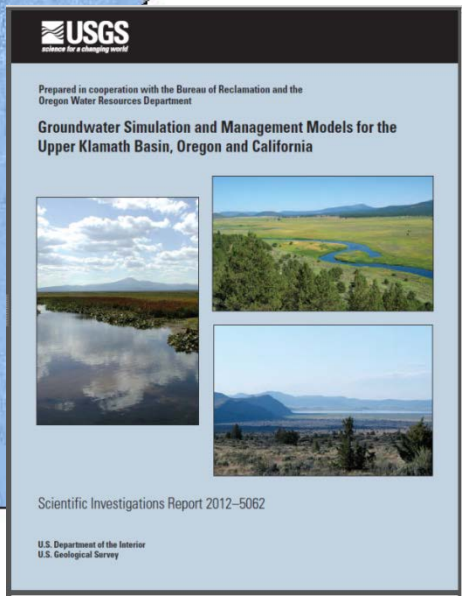




Oregon Geologic Compilation Map

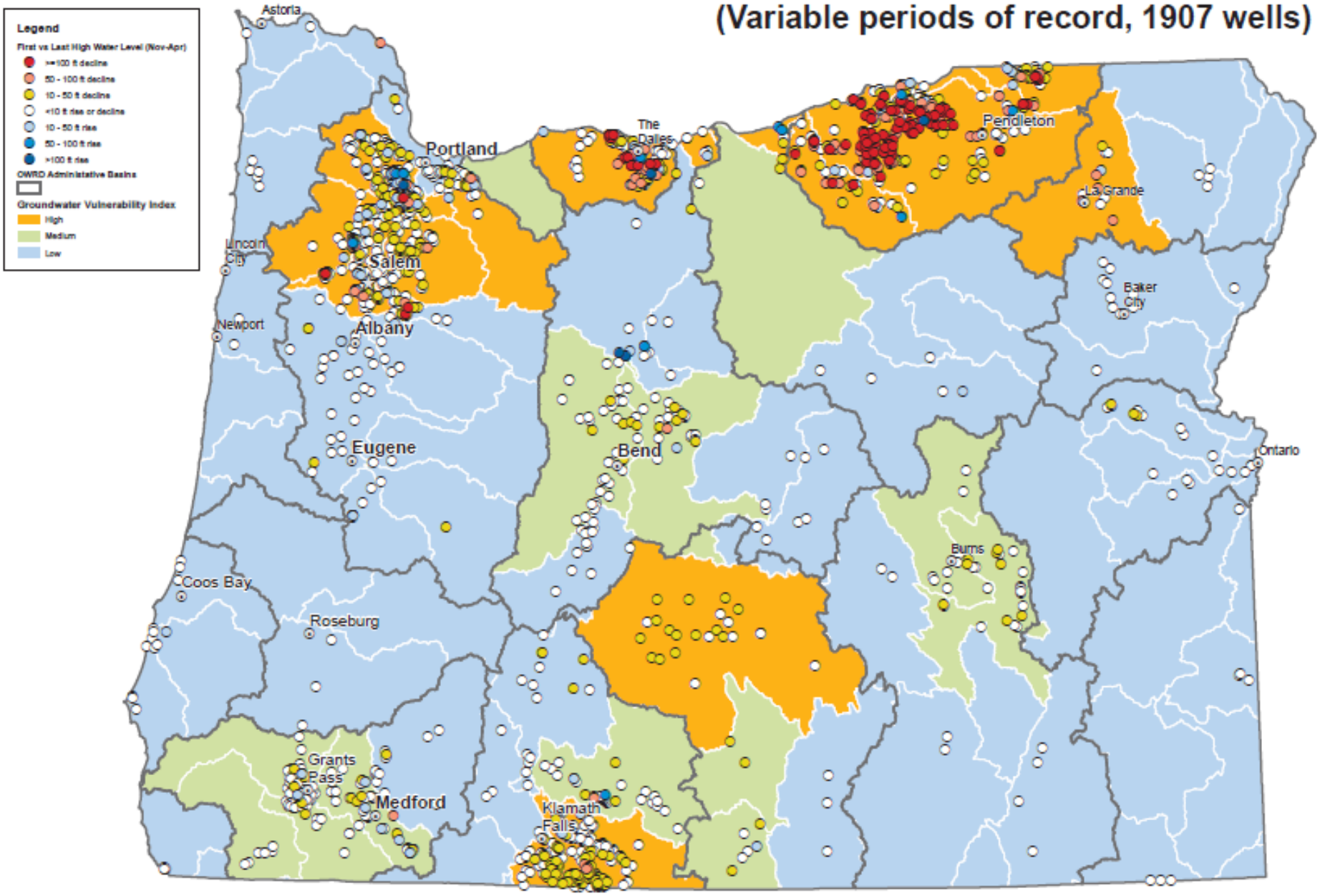


Areas with Groundwater Reports



Groundwater Resources

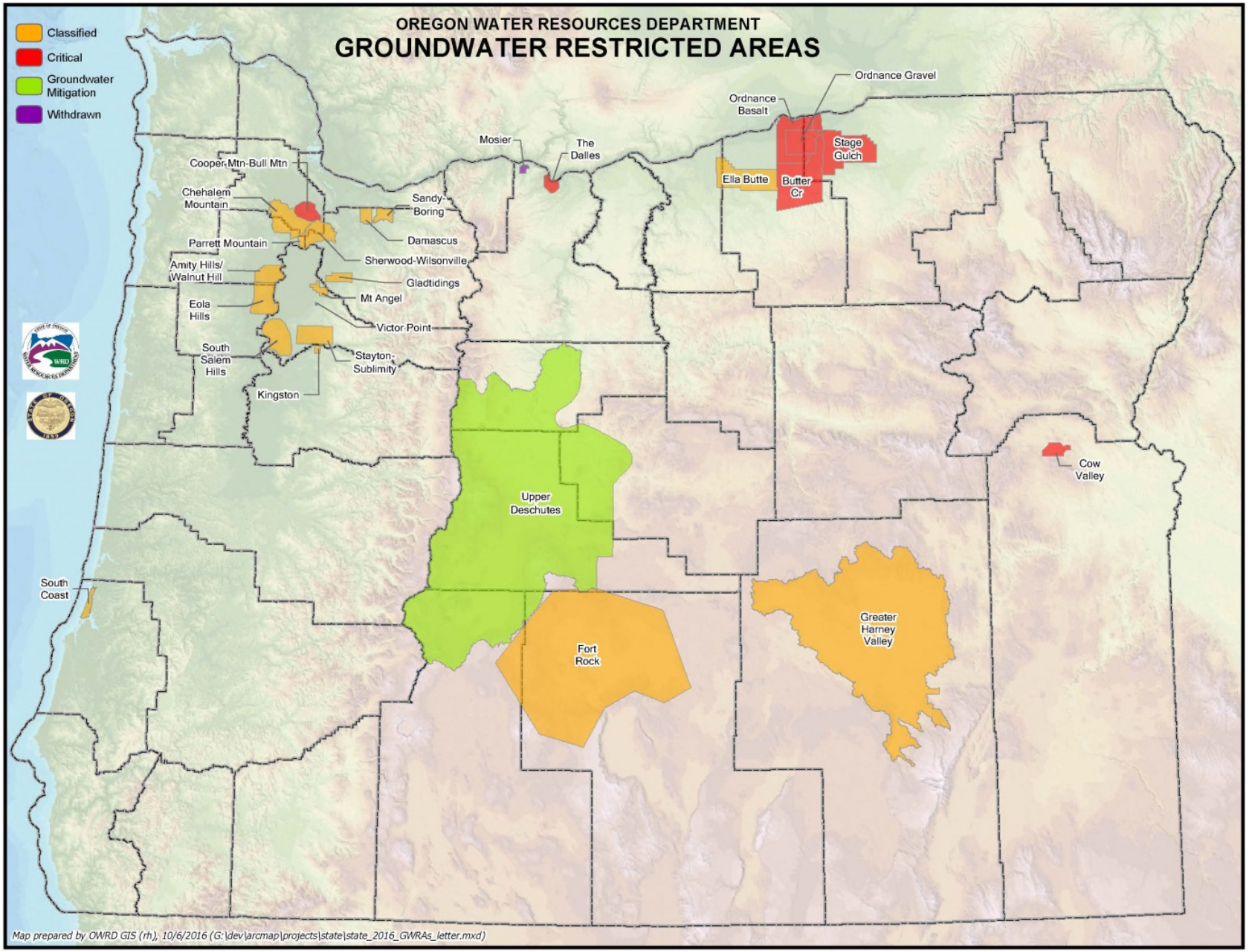
Groundwater Availability



Groundwater Area Restrictions

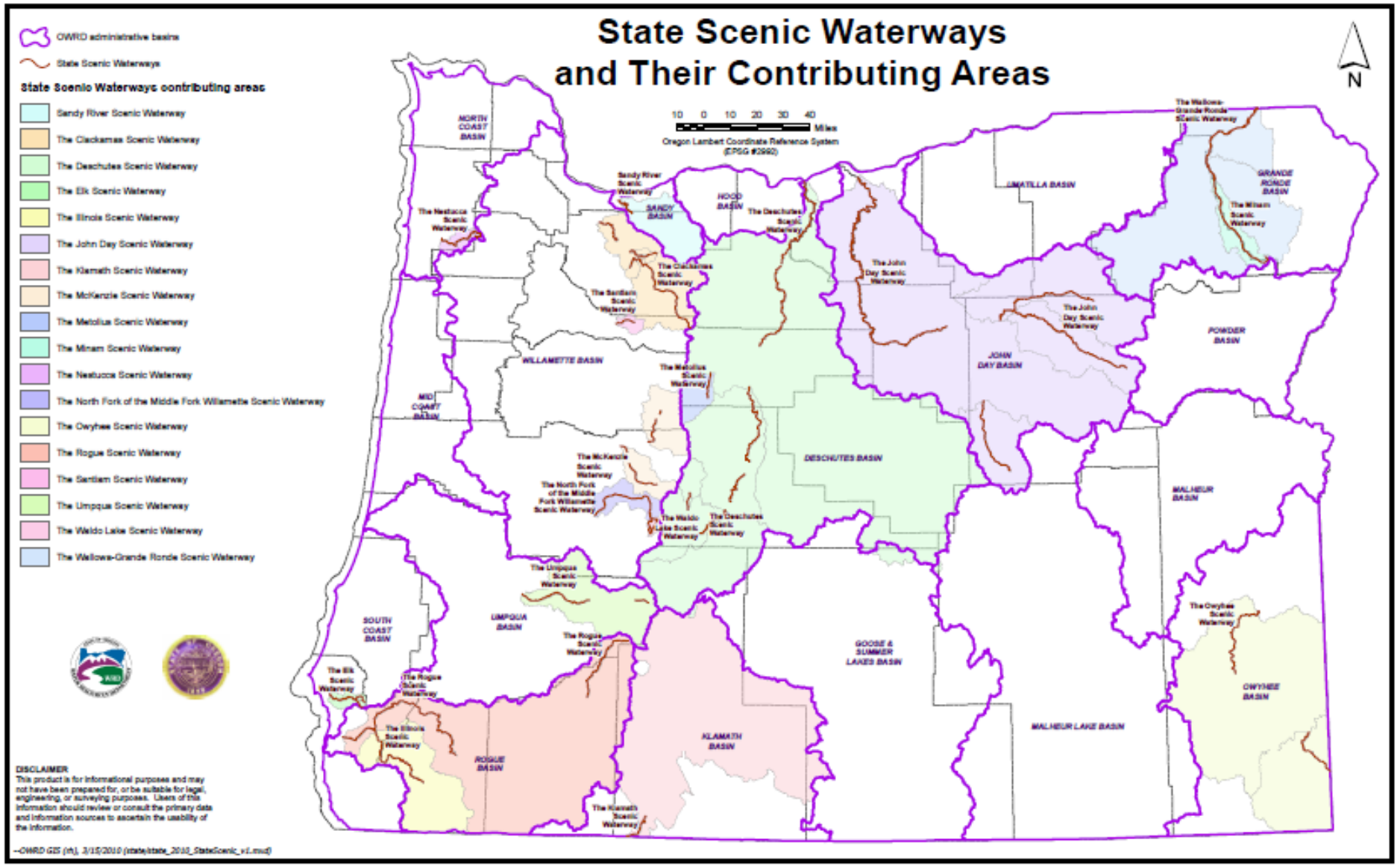
Management Tool	What It Does
Serious Water Management Problem Area	Requires measuring devices and water use reporting; provides technical data
Classification of Water	Designates approved uses of water
Withdrawal of Water	Withdraws groundwater; no or classified new rights
Groundwater Mitigation Area	Requires mitigation for new uses; may limit new uses
Critical Groundwater Area	May require measuring devises; may reduce and redistribute groundwater use

Groundwater Restricted Areas



Surface Water Availability

State Scenic Waterways



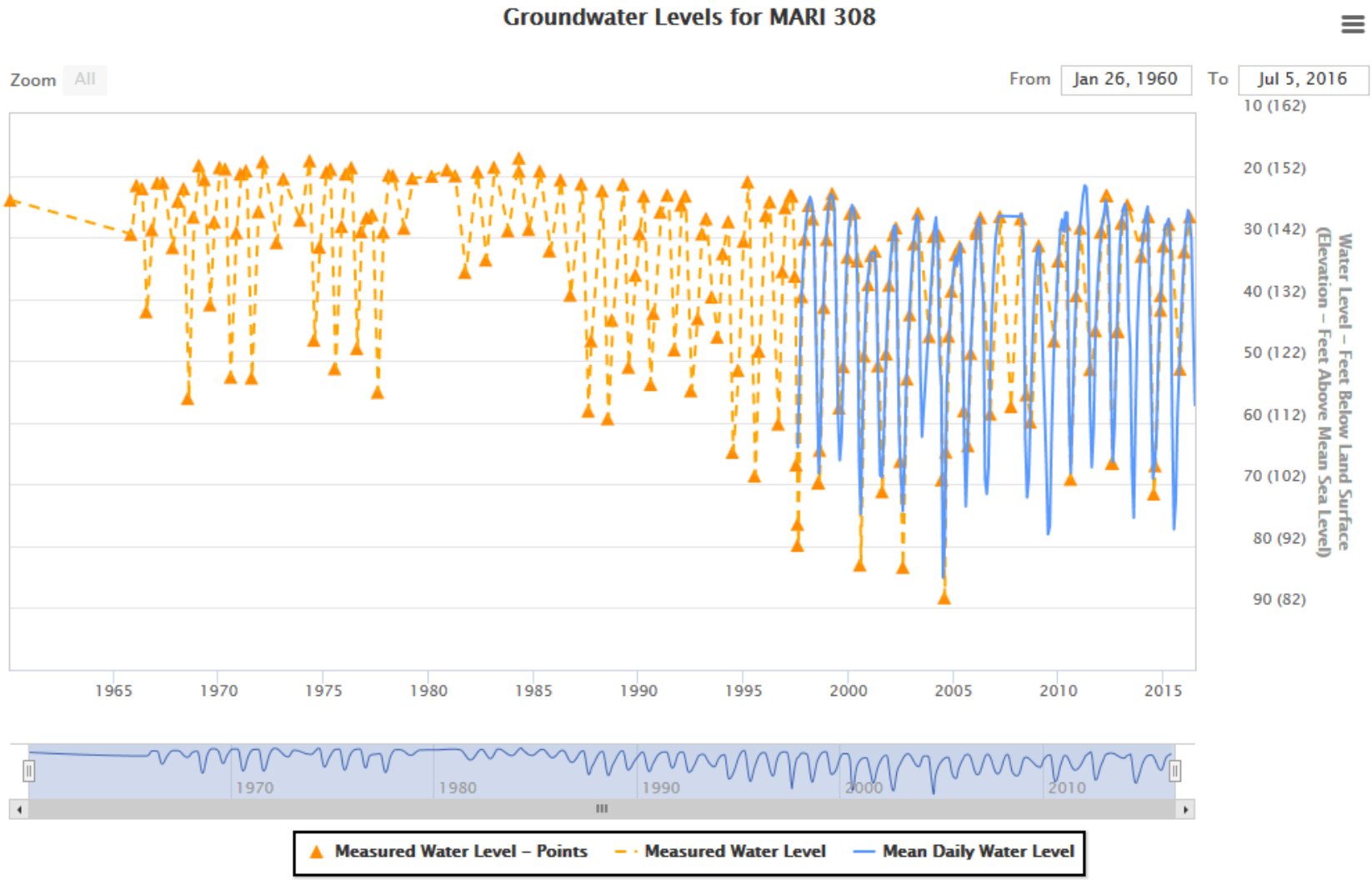
Recent Accomplishments

Recent Legislative Support

- **2013**
  - NRS-2 Hydrogeologists (2 FTE)
  - Observation Well Funds ($395k/biennium)
  - Groundwater Tool Funds ($98k/biennium)
  - Study Funds (increased to $375k/biennium)
- **2015**
  - NRS-5 Chief Data Scientist (0.5 FTE)
  - Mosier Well Repair Funds ($1M, one time)
- **2016**
  - NRS-4 Hydrologist (1 FTE, GW Studies)
  - Harney Study Funds ($575k, one time)

Increased Field Data Collection

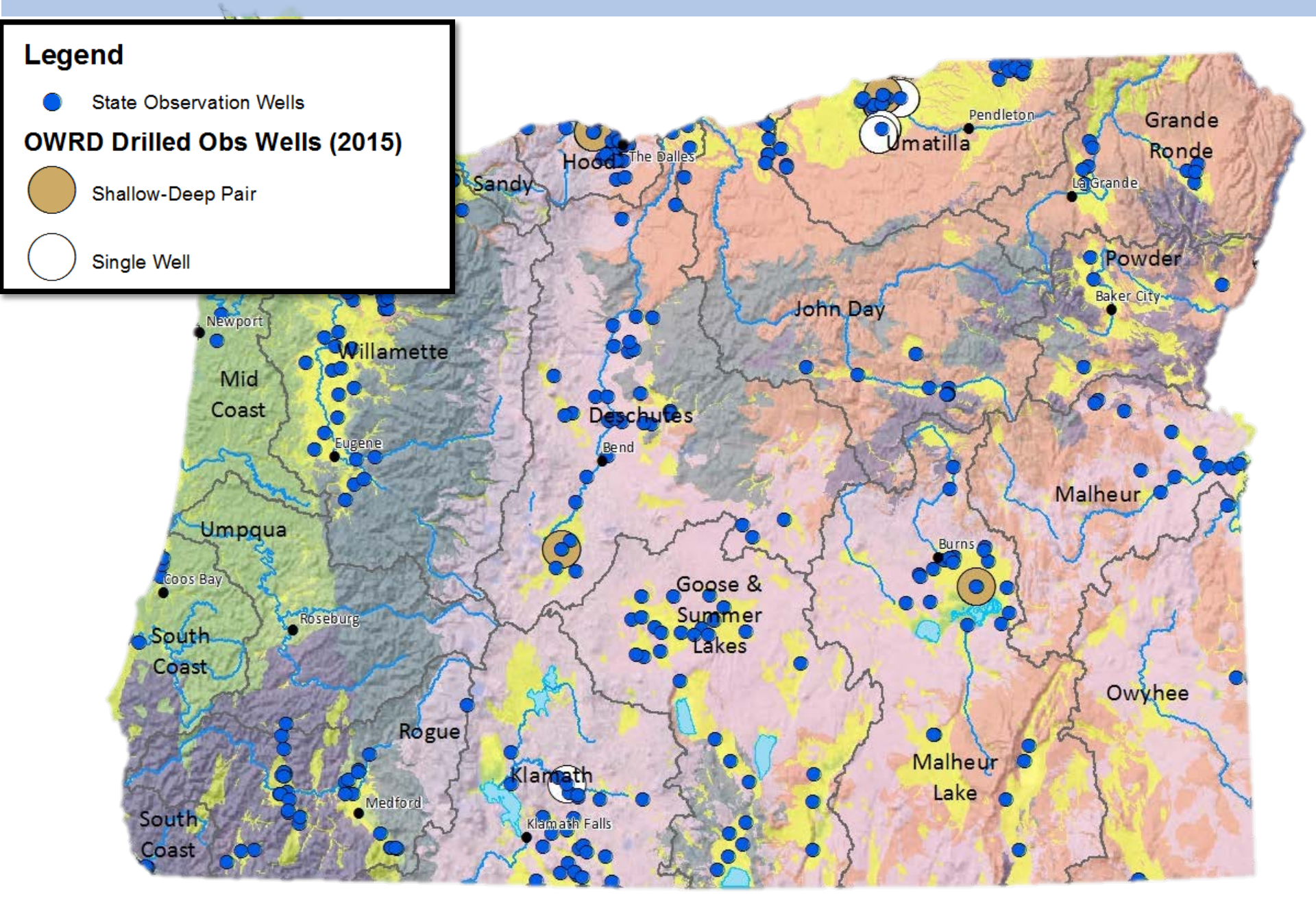
Web-based Data Availability



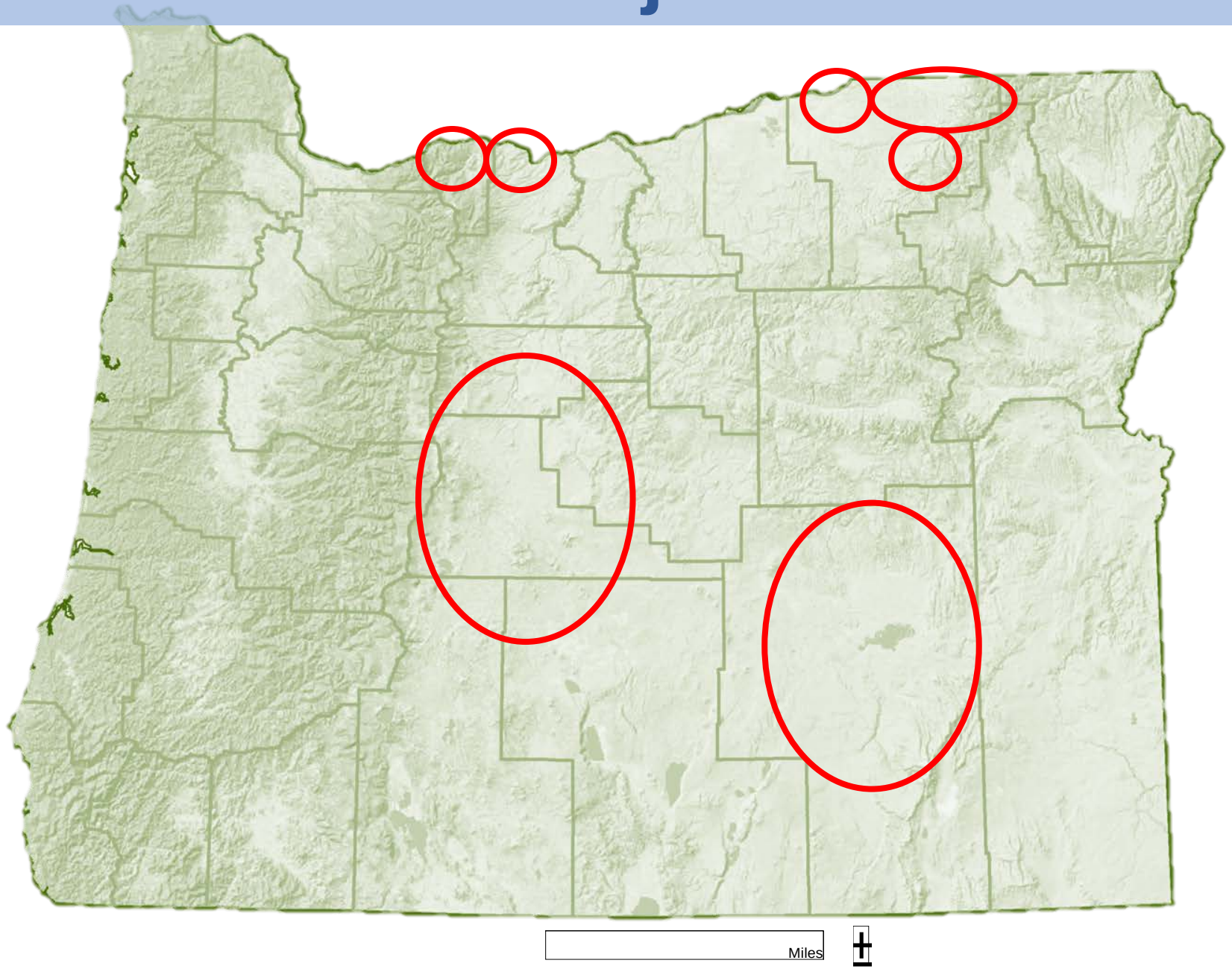
Source: Oregon Water Resources

Dedicated Observation Wells

Dedicated Obs Well Locations



Current Project Areas



2017 GW Policy Option Packages

- **Basin Study Package**
  - Additional GW and SW Staff
  - Additional USGS Co-op Funds
  - Additional Obs Well Drilling Funds
- **Well Inspector Package**
  - Keep skilled inspectors
- **NRS-1 Data Assistant (0.5 FTE for GW)**
  - Pump test program administration

Thank You

Unnamed Spring,
Metolius River near Canyon Creek