



Critical Groundwater Area Update



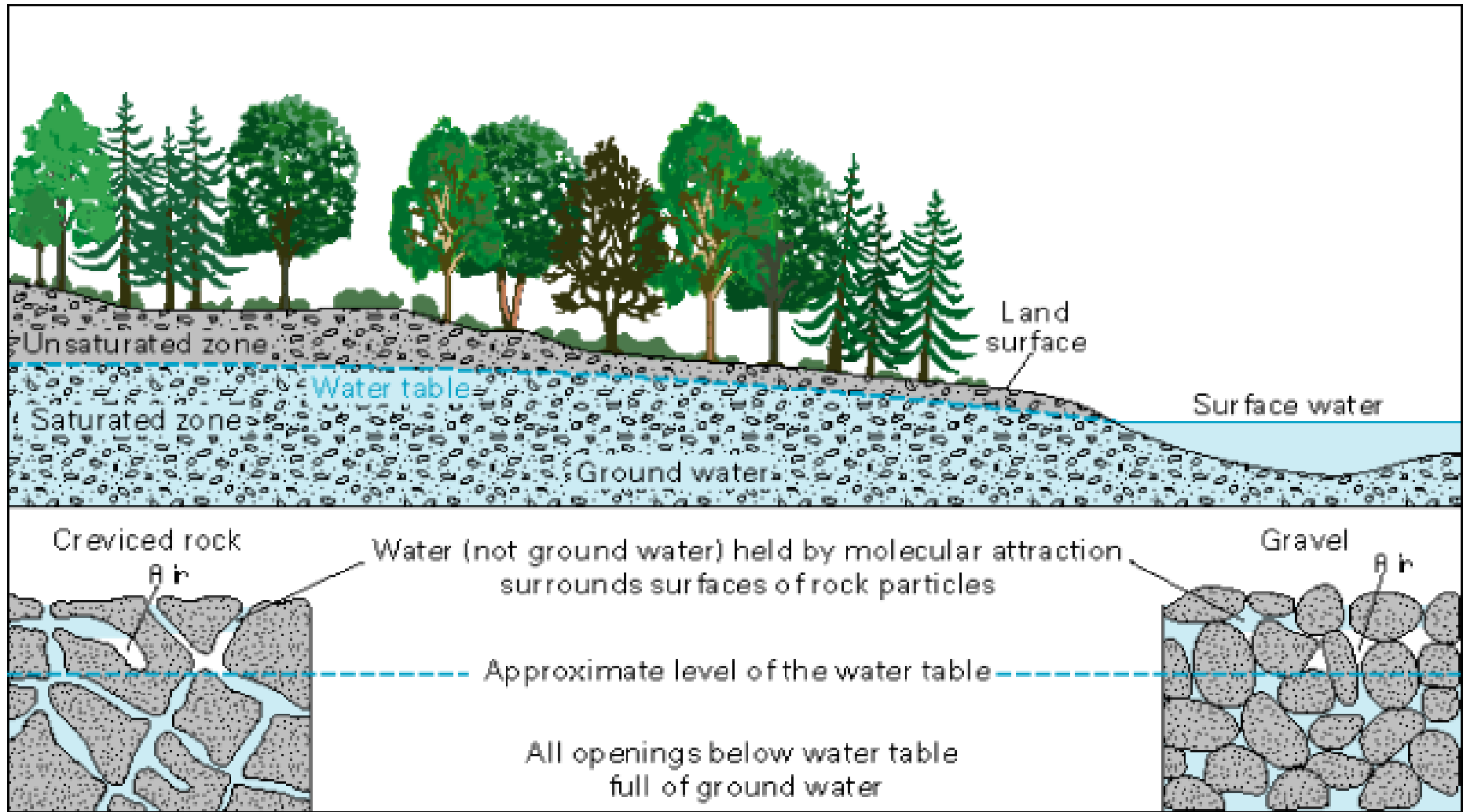
Oregon Water Resources Commission
March 15, 2018

Justin Iverson, Groundwater Section Manager
Brenda Bateman, Technical Services Division Administrator

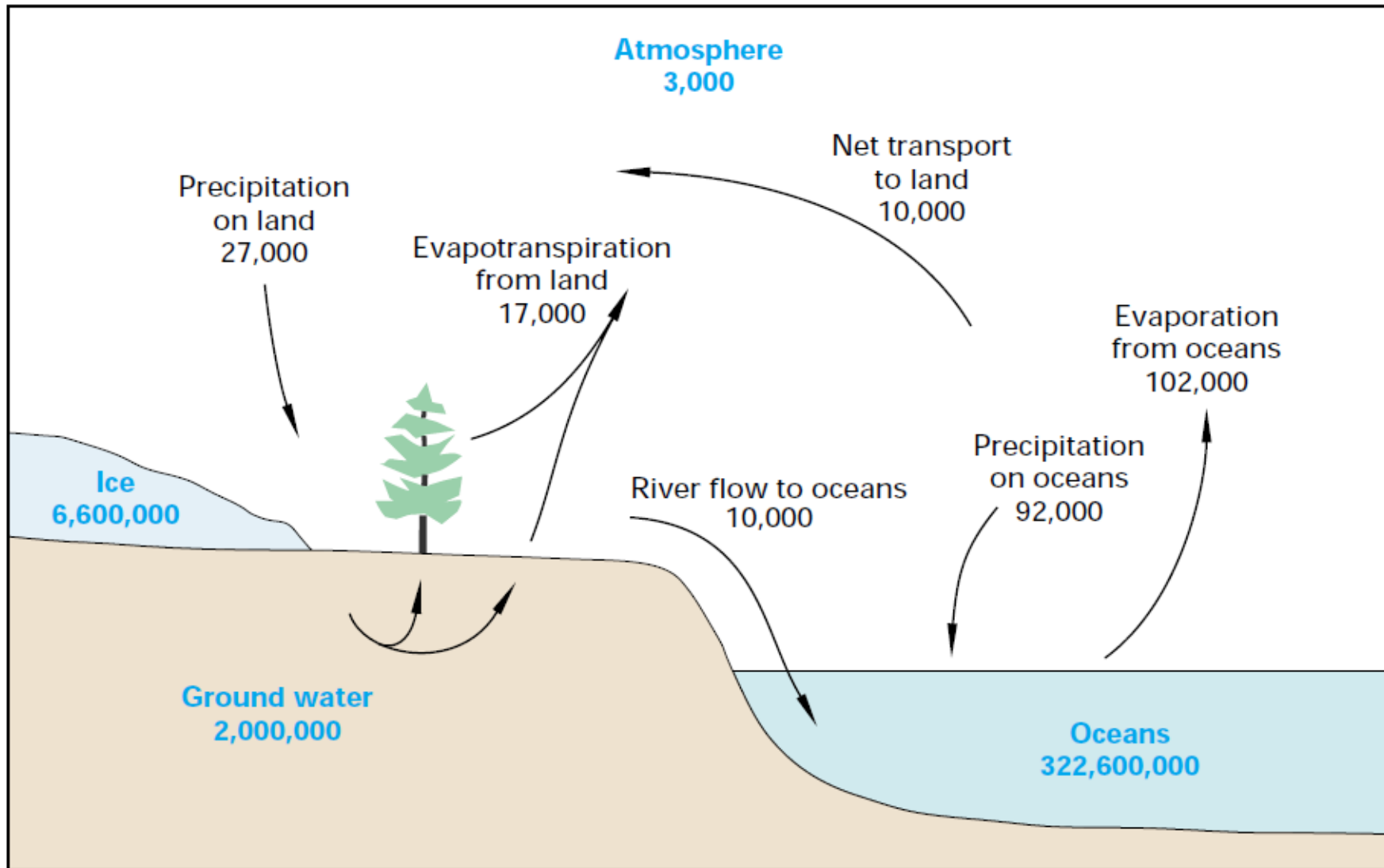
Critical Groundwater Area Update

- Groundwater Primer
- CGWAs in general
 - Periodic review of effectiveness
 - CRB - an aquifer that's prone to designation
- Three examples:
 - Cow Valley
 - Cooper – Bull Mountain
 - Butter Creek

What is Groundwater?



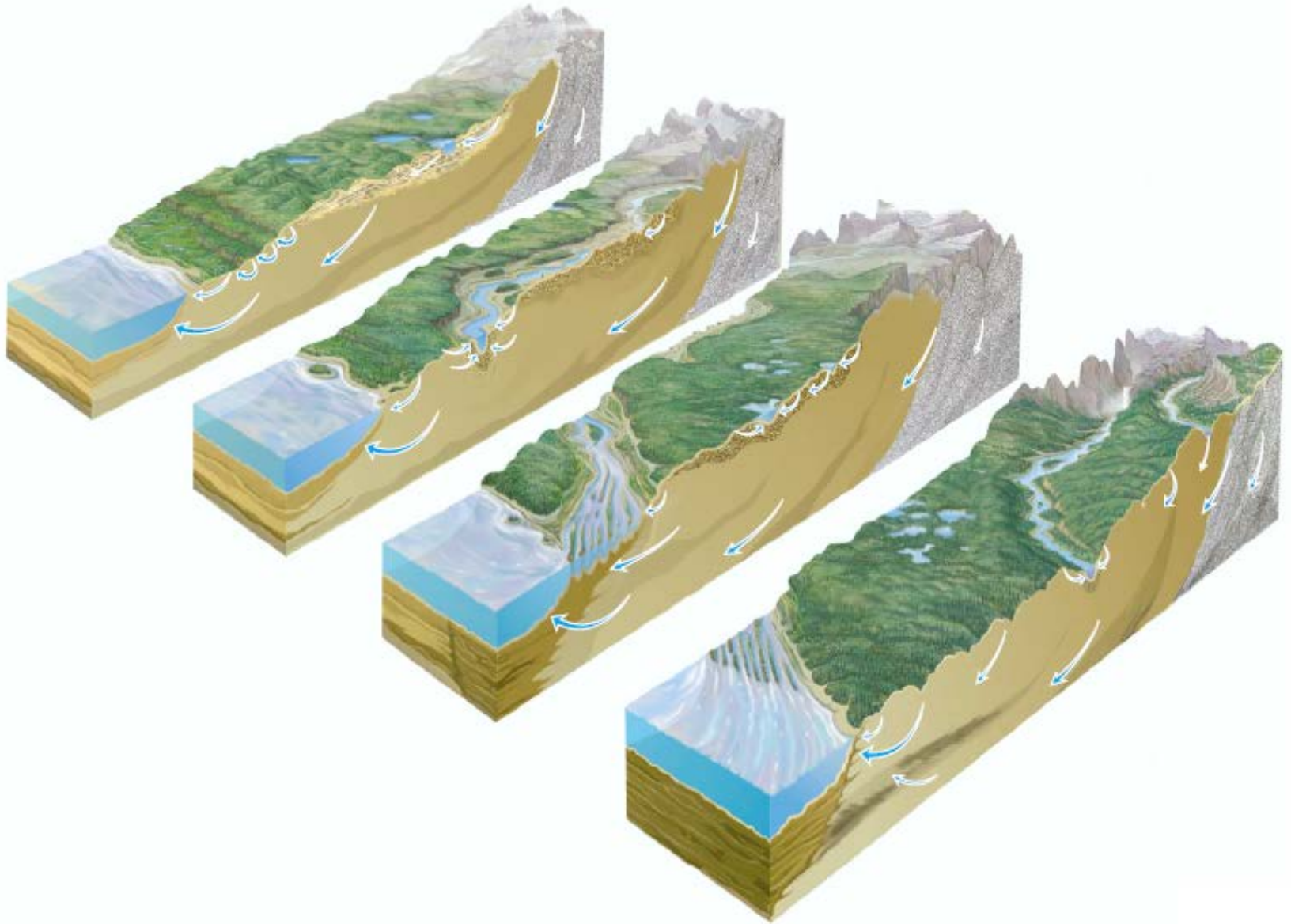
Groundwater in the Water Cycle



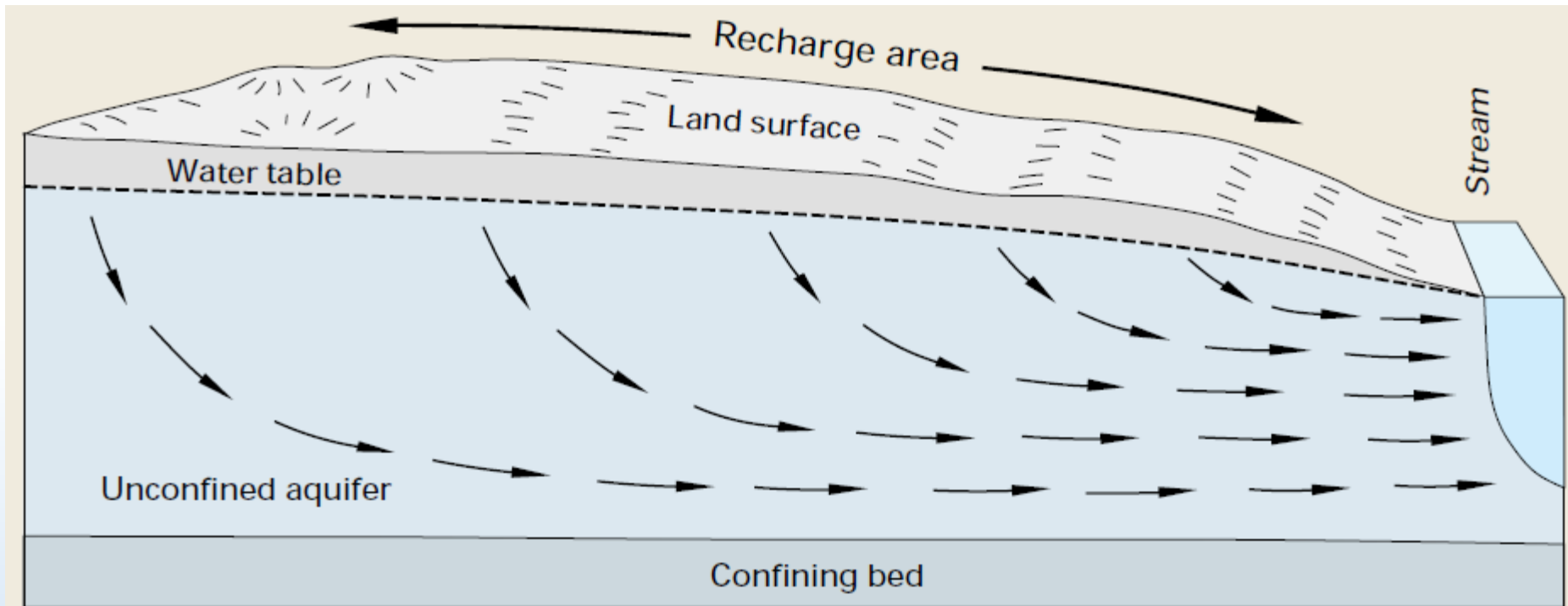
Pools are in cubic miles

Fluxes are in cubic miles per year

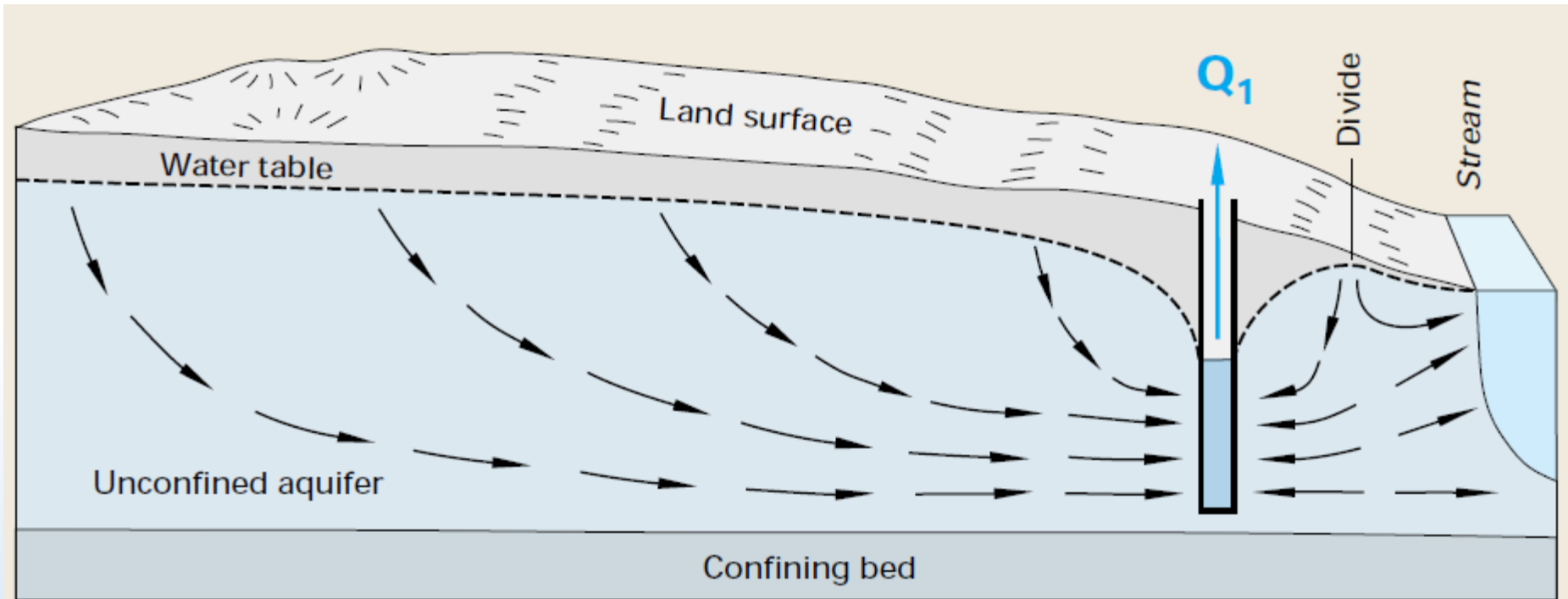
Groundwater Flow Paths



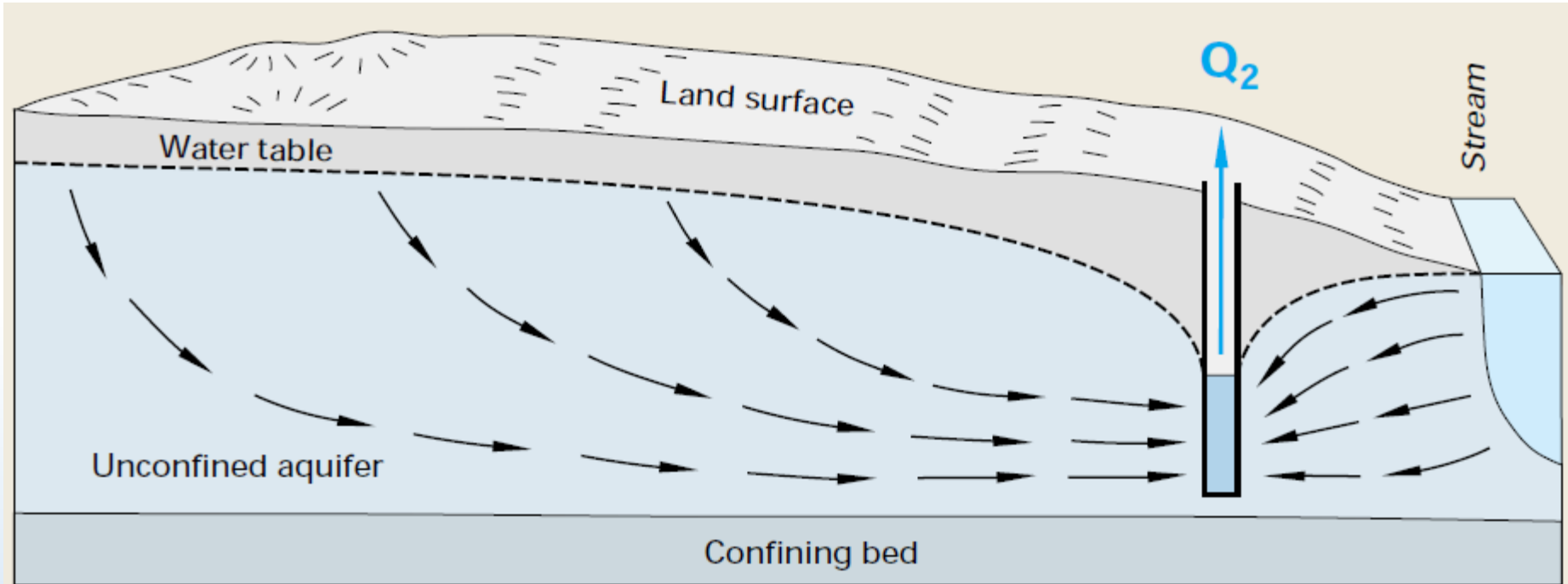
Groundwater Discharge



Groundwater Capture



Streamflow Capture



The Source of Water to Wells

Theis, 1940

Groundwater pumping is a new discharge superimposed on a previously stable system and must be balanced by:

- Increased recharge
- Decreased discharge
- Loss of storage
- Or a combination of these

Critical Groundwater Areas in General



Legislative Groundwater Policy

Groundwater Act of 1955 - ORS 537.525 (9)

Groundwater use shall be controlled in the event of declining groundwater levels (and a long list of other potential impairments)

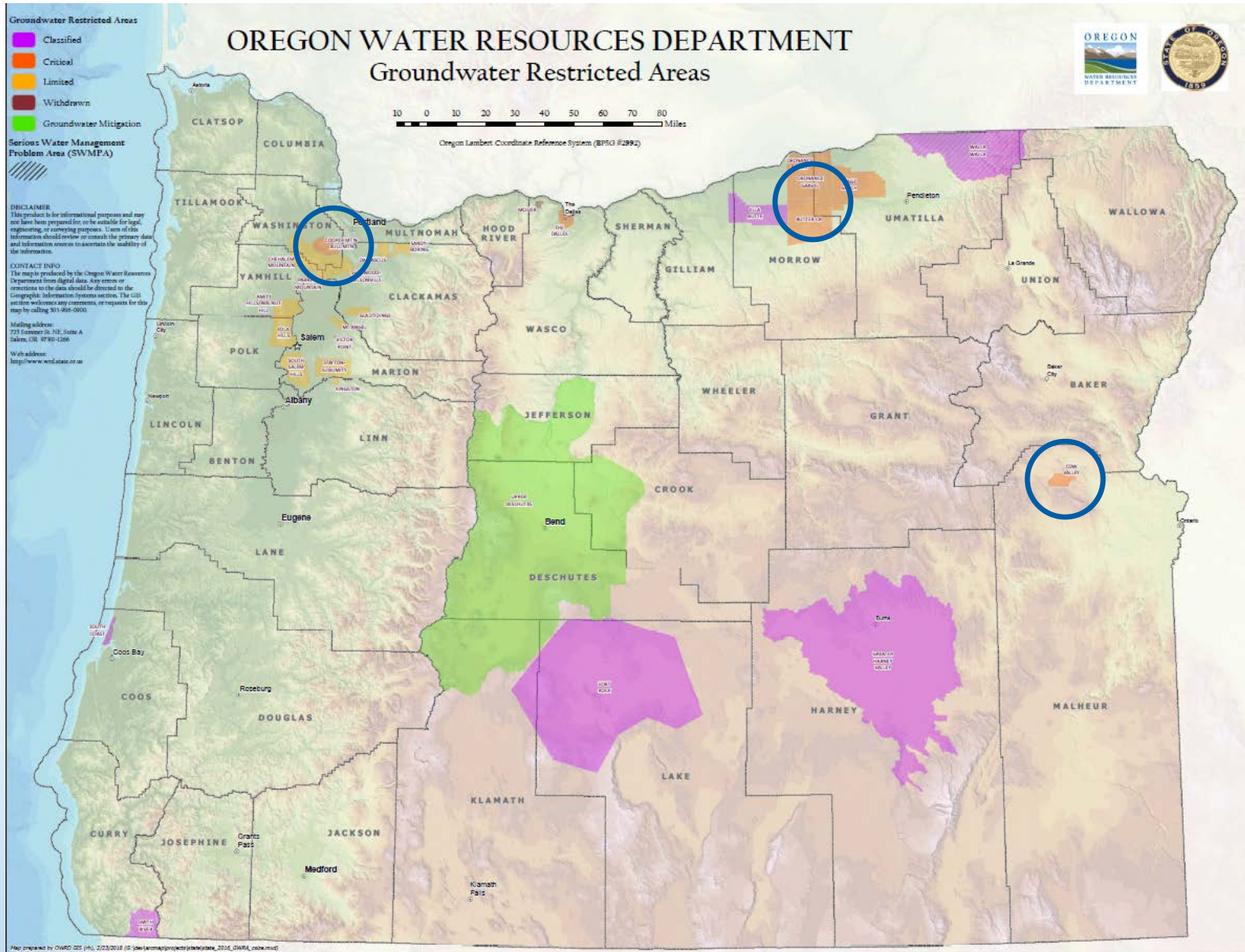
Preference is given to voluntary agreements by the groundwater users, which must be reviewed and approved by the Commission

The Commission shall take action when such voluntary joint action is not taken or is ineffective (CGWA is a tool to do this)

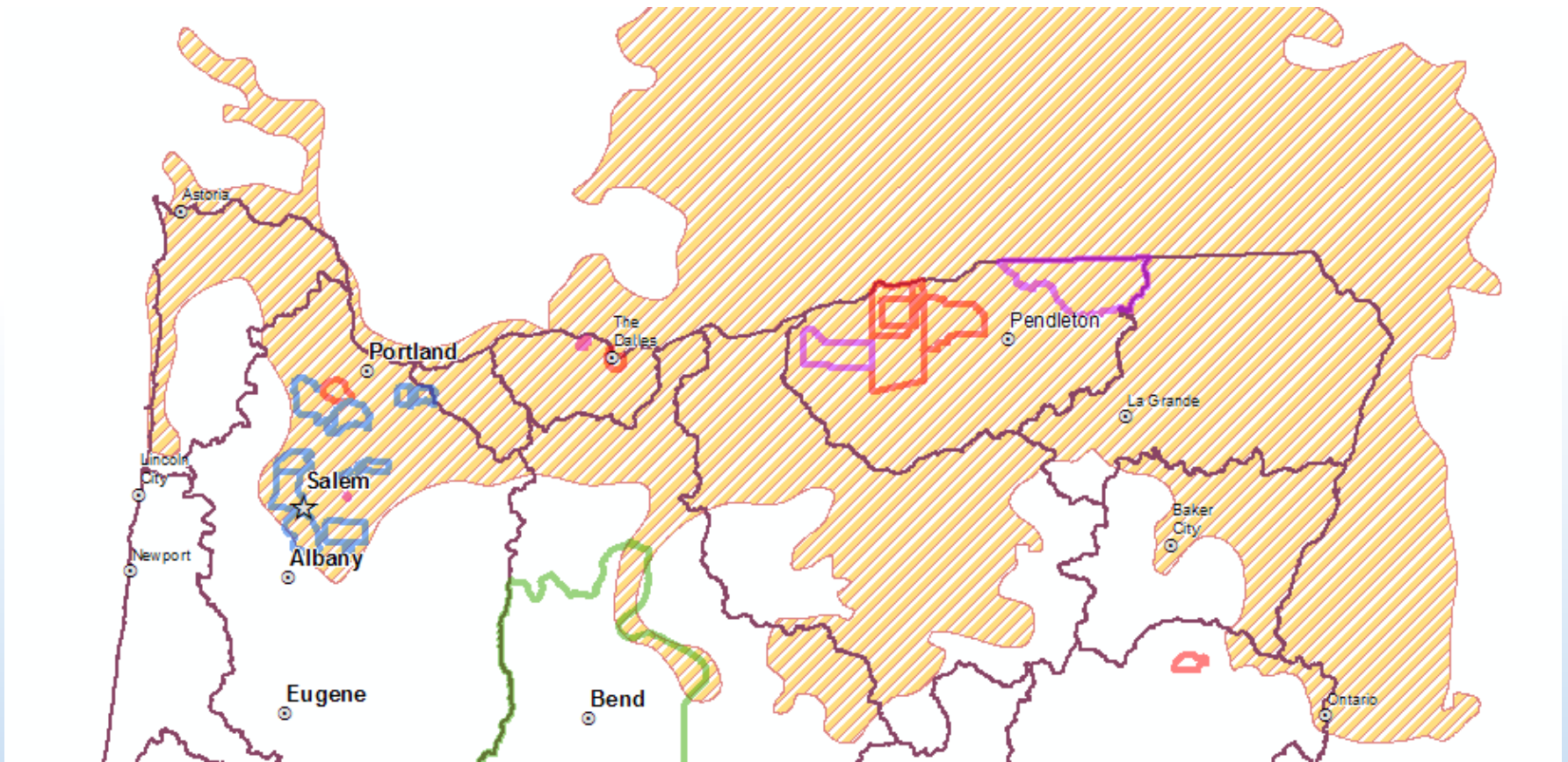
Types of Groundwater Restricted Areas

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 devices; may reduce and redistribute groundwater use

Groundwater Restricted Areas

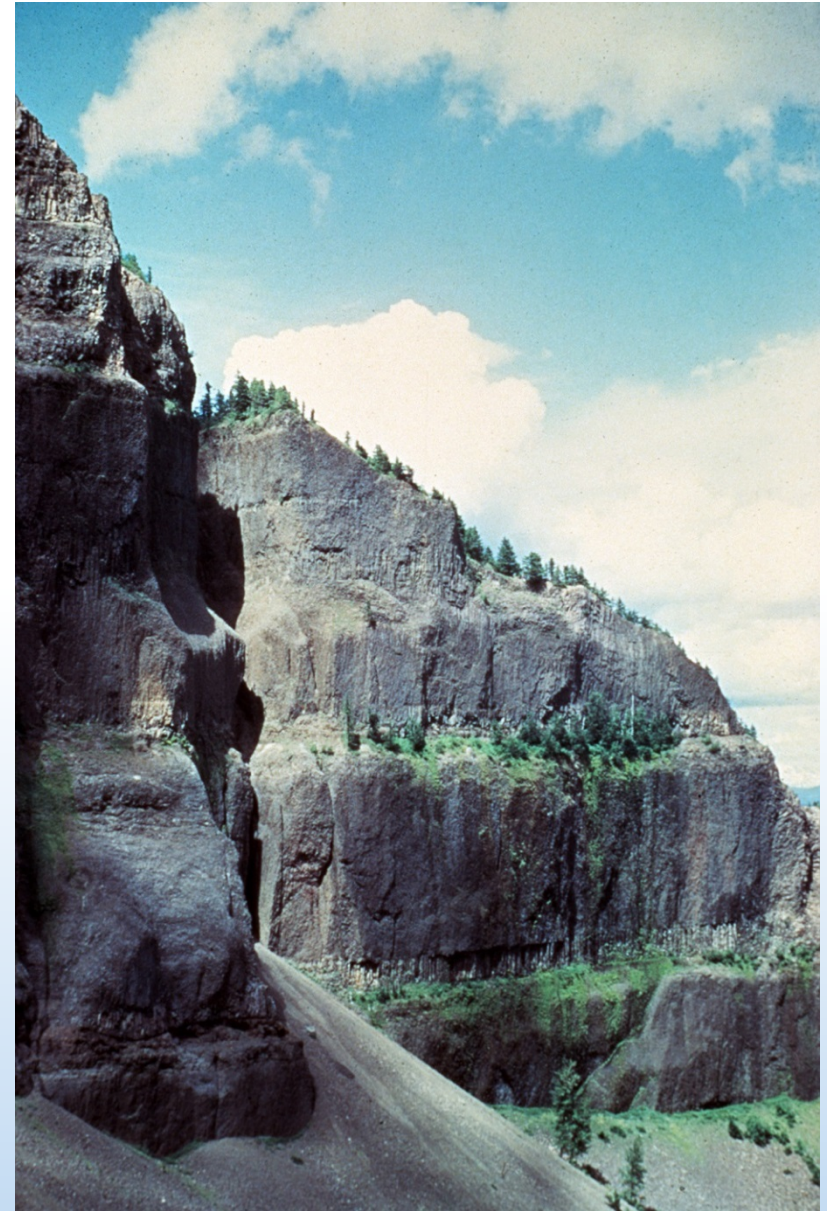
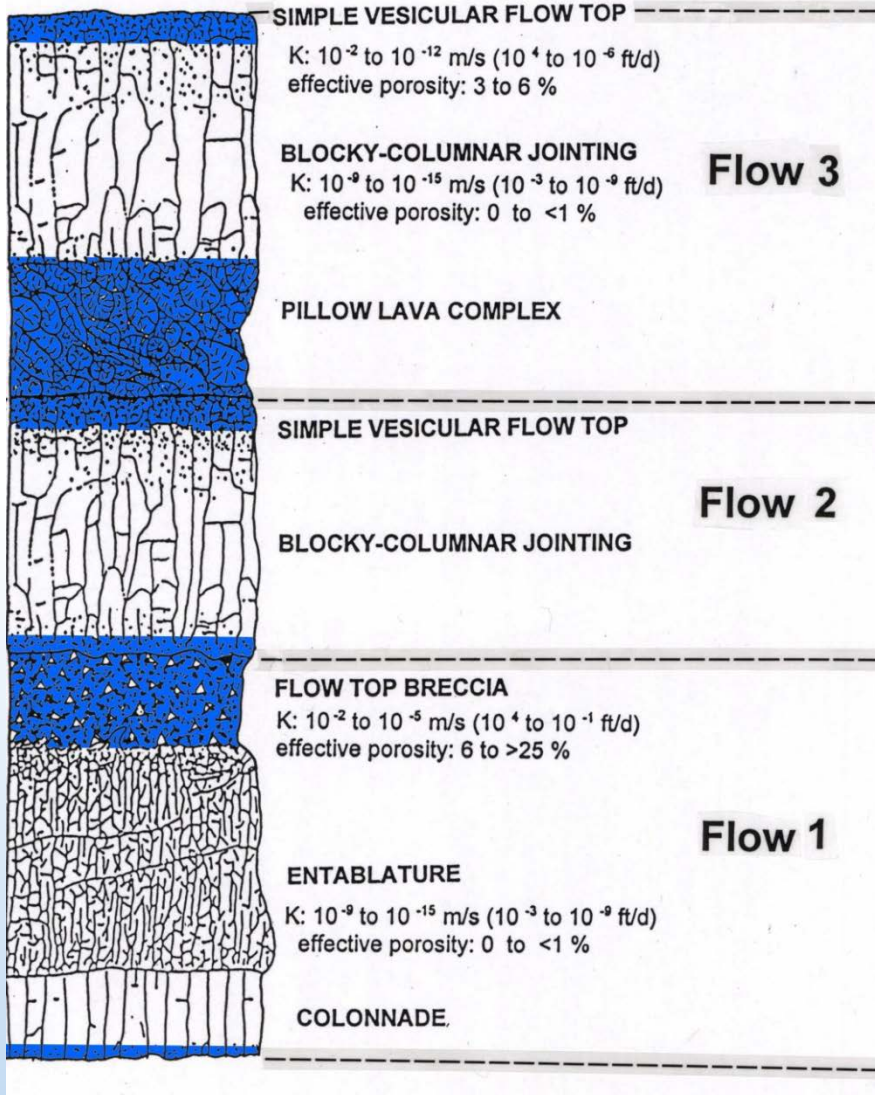


Groundwater Restricted Areas and Columbia River Basalt (an aquifer prone to designation)



Columbia River Basalt

SHEET FLOWS



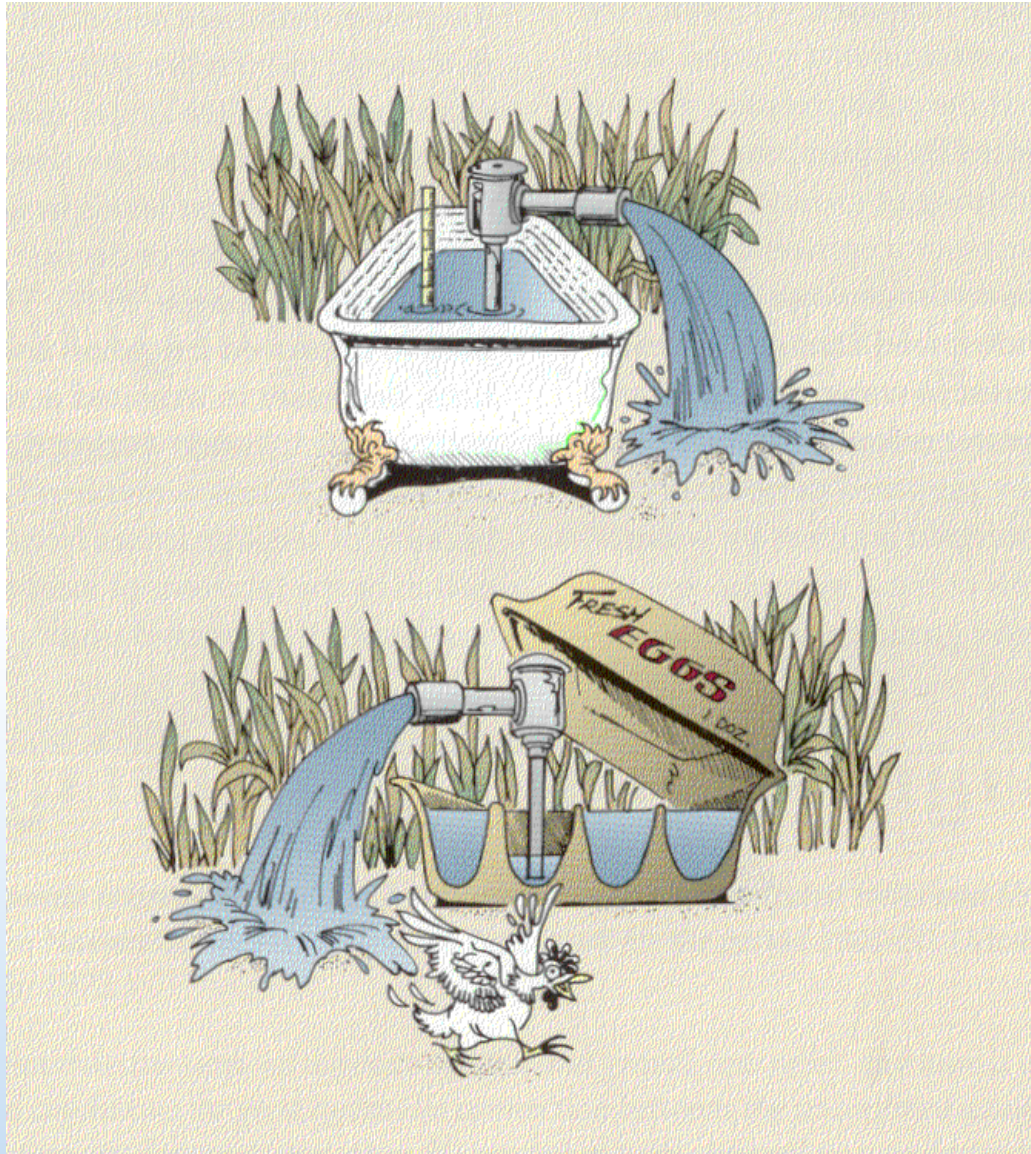
Columbia River Basalt

CRB wells often produce at high rates, 100s to 1000s of gpm

CRB has a relatively small storage capacity limited to the interflow zones, which make up a small (<10%) portion of total rock volume

Interflow zones can be compartmentalized by faults and folds, further limiting the storage capacity of a particular compartment...

CRB Compartmentalization



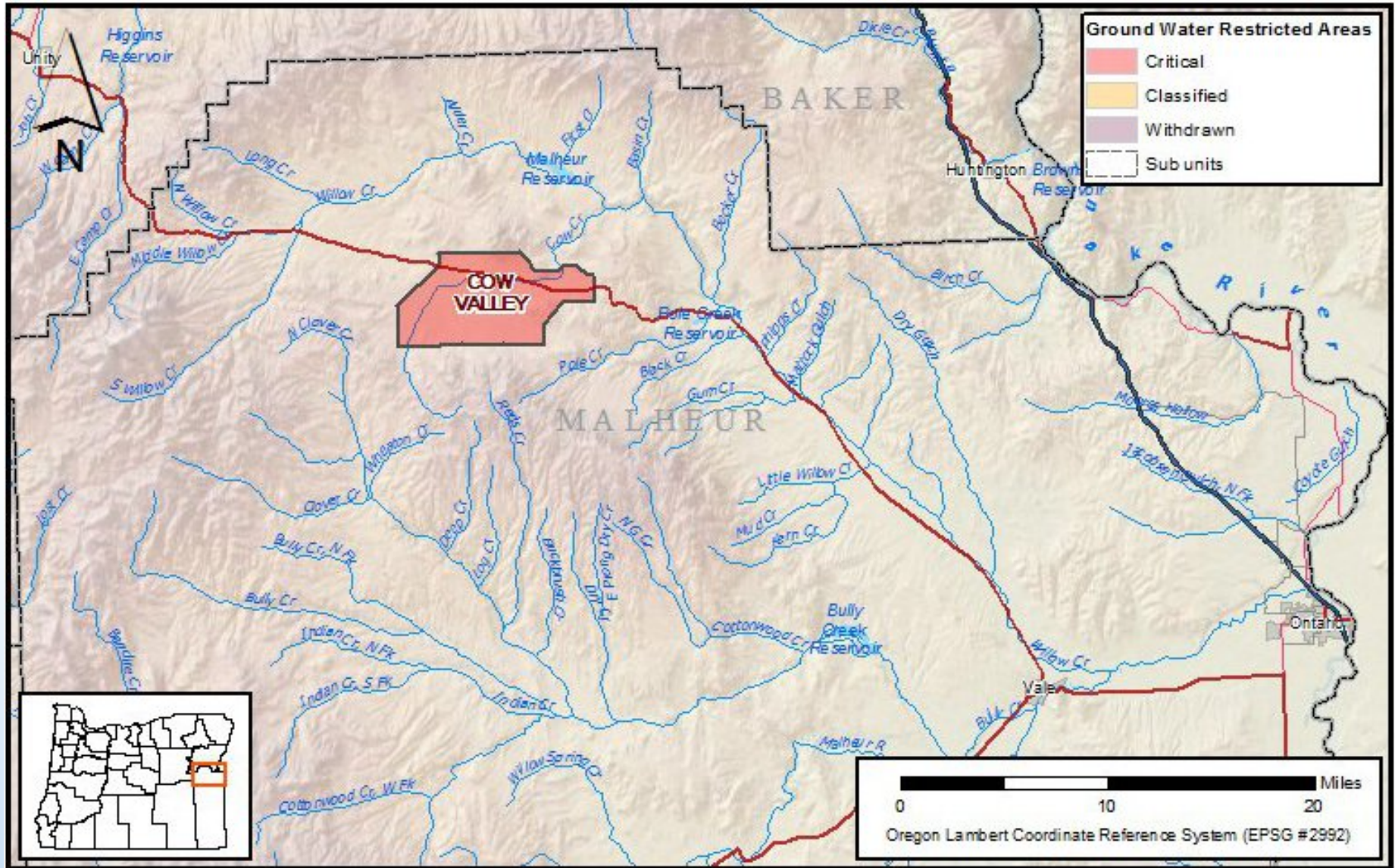
Willamette,
Deschutes,
Klamath...

Columbia River
Basalt

Three CGWA Examples

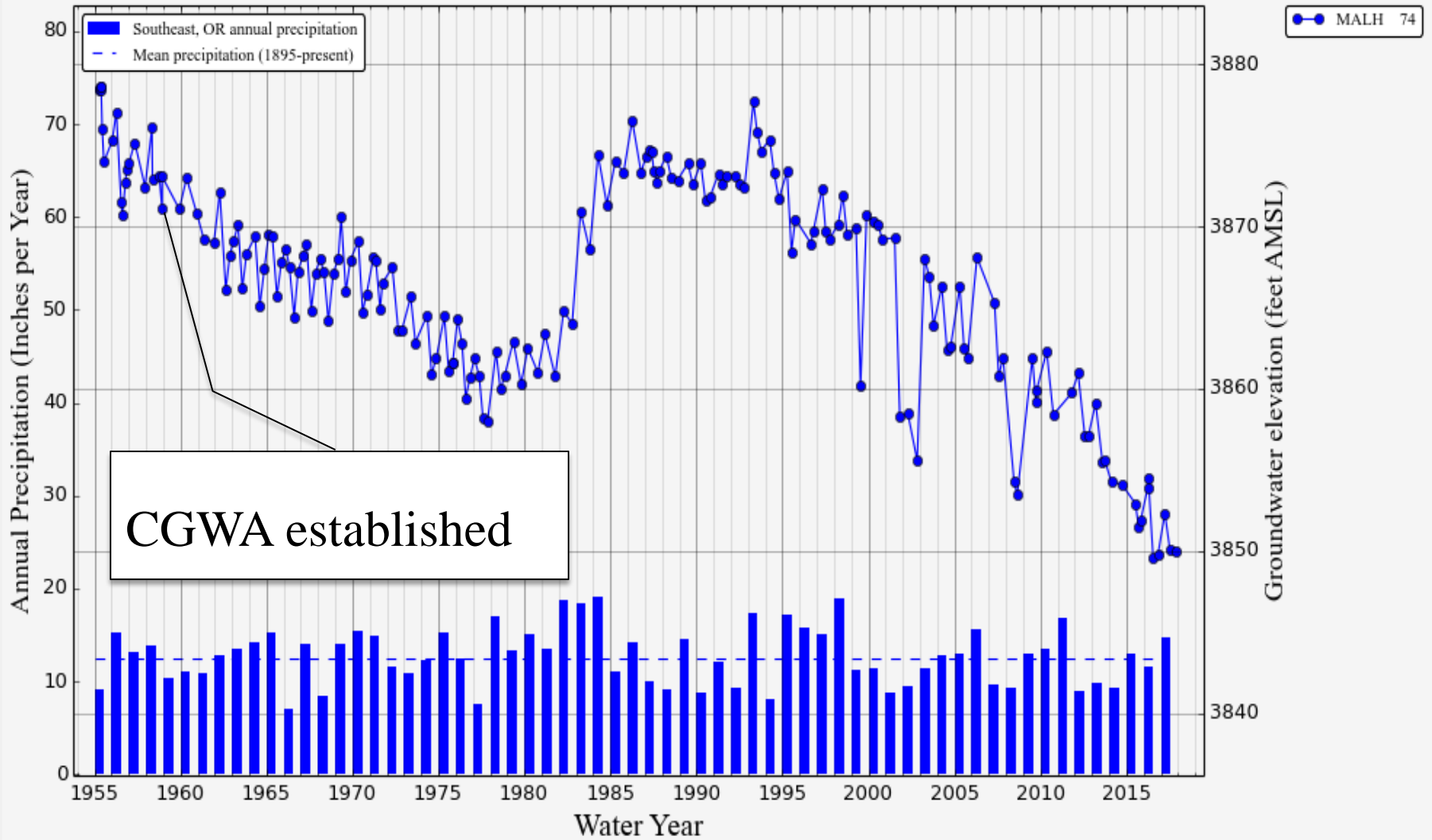


Cow Valley CGWA

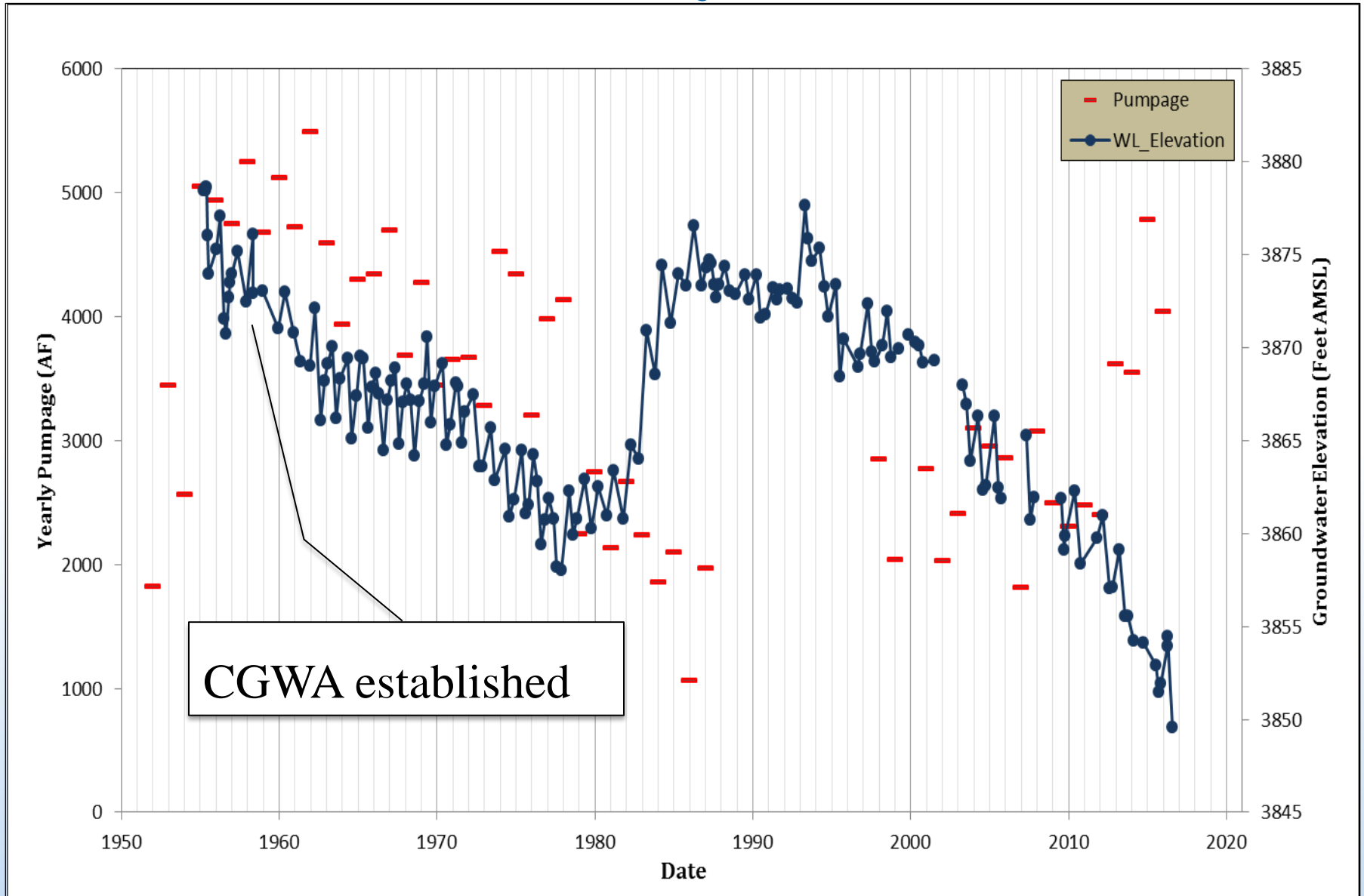


Cow Valley CGWA

Observation Well Data



Cow Valley CGWA

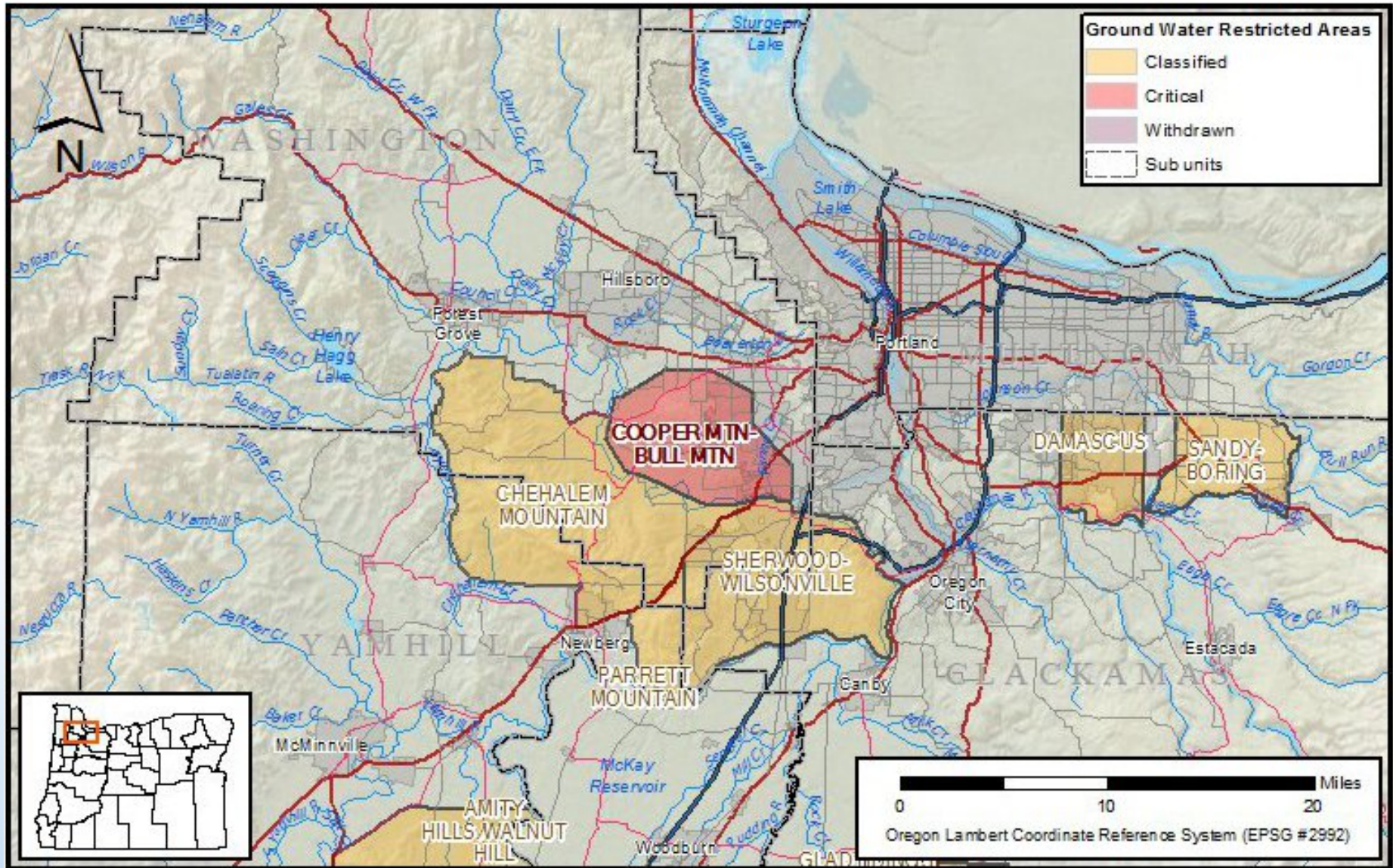


Cow Valley CGWA Summary

Currently all authorized water rights are owned by a single user, senior to all other users (including exempt users) in the valley

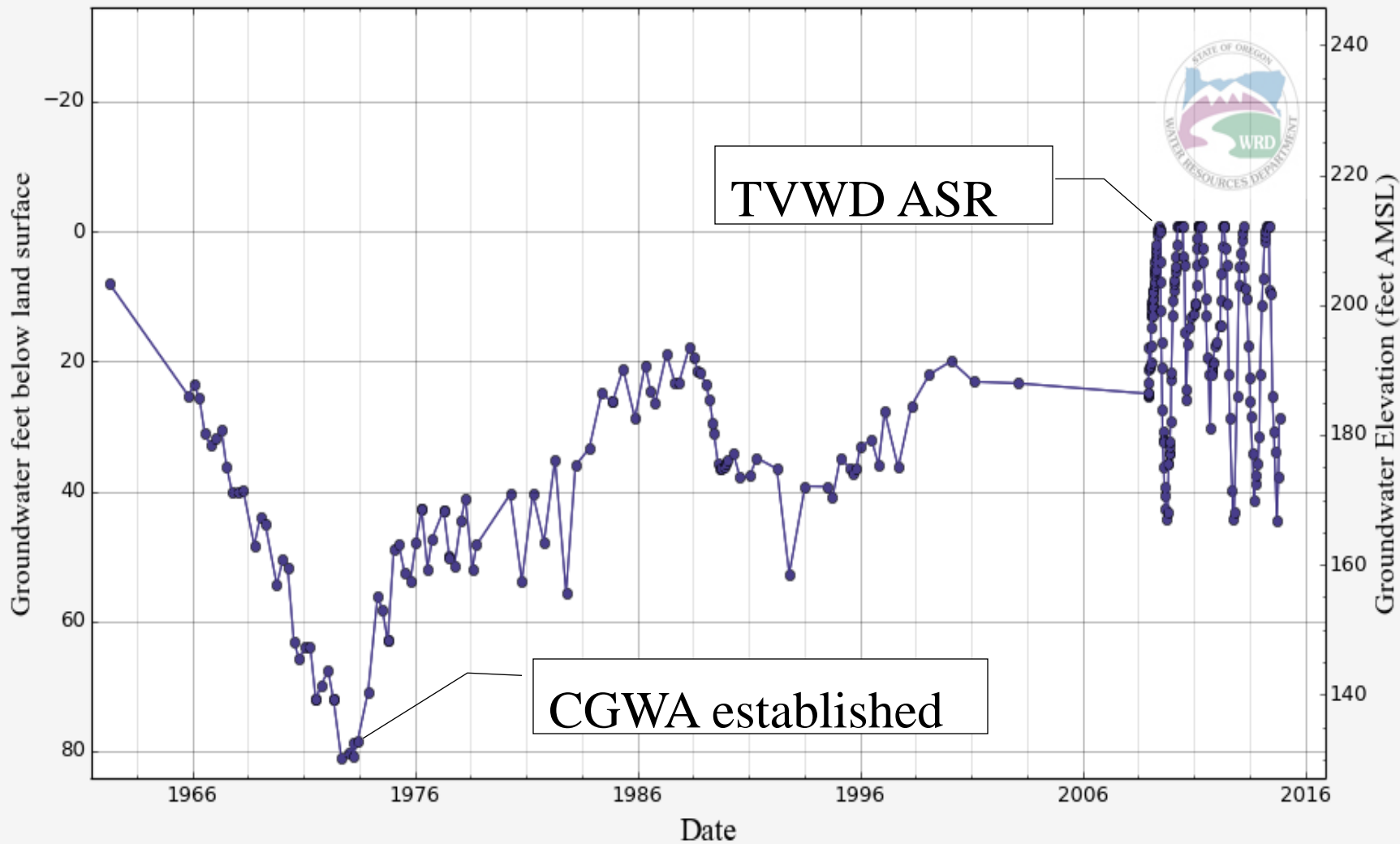
Groundwater level declines likely to continue to at approximately 1 foot per year

Cooper-Bull Mountain CGWA



Cooper-Bull Mountain CGWA

WASH 10143



Cooper-Bull Mountain CGWA

	Water Rights	Near Max. Annual Use	CGWA Restriction	ASR Recovery
Date:	pre-1970	1970	1974-76	Present
Beaverton	500	310	240	430
Tigard	1490	530	350	100
TVWD*	890	430	220	250
Totals	2870	1270	800	780
% Estimated Sust. Yield	304%	134%	85%	83%

Round volumes presented in millions of gallons (MG) on an annual basis

*Wolf Lodge Water District and other TVWD predecessors in 1970s

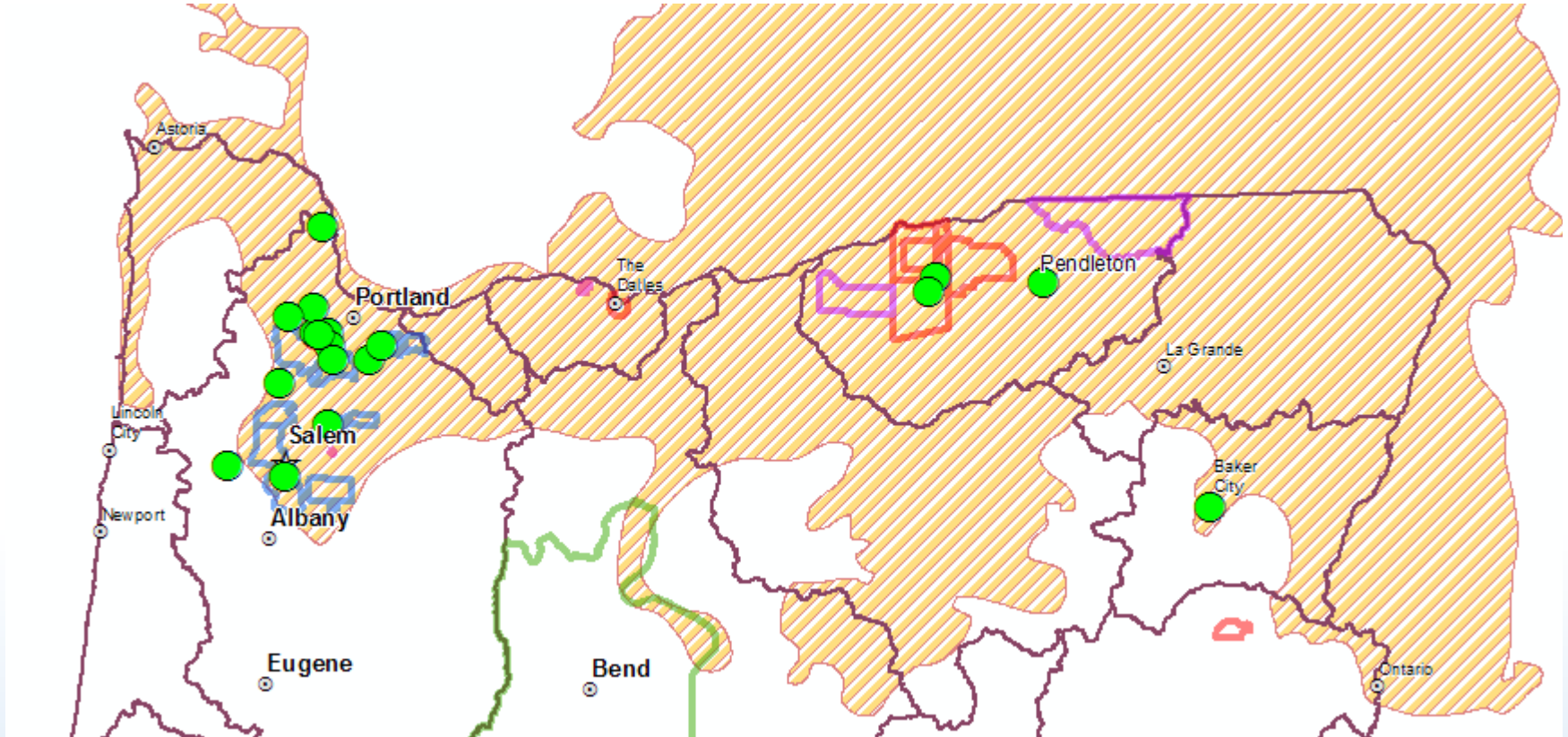
Cooper Bull Mountain CGWA Summary

Authorized water rights are in excess of sustainable yield, but are largely unused

Large municipal users have developed alternate surface water supplies

Aquifer Storage and Recovery projects have restored winter water levels to artesian conditions

ASR and Critical Groundwater Areas



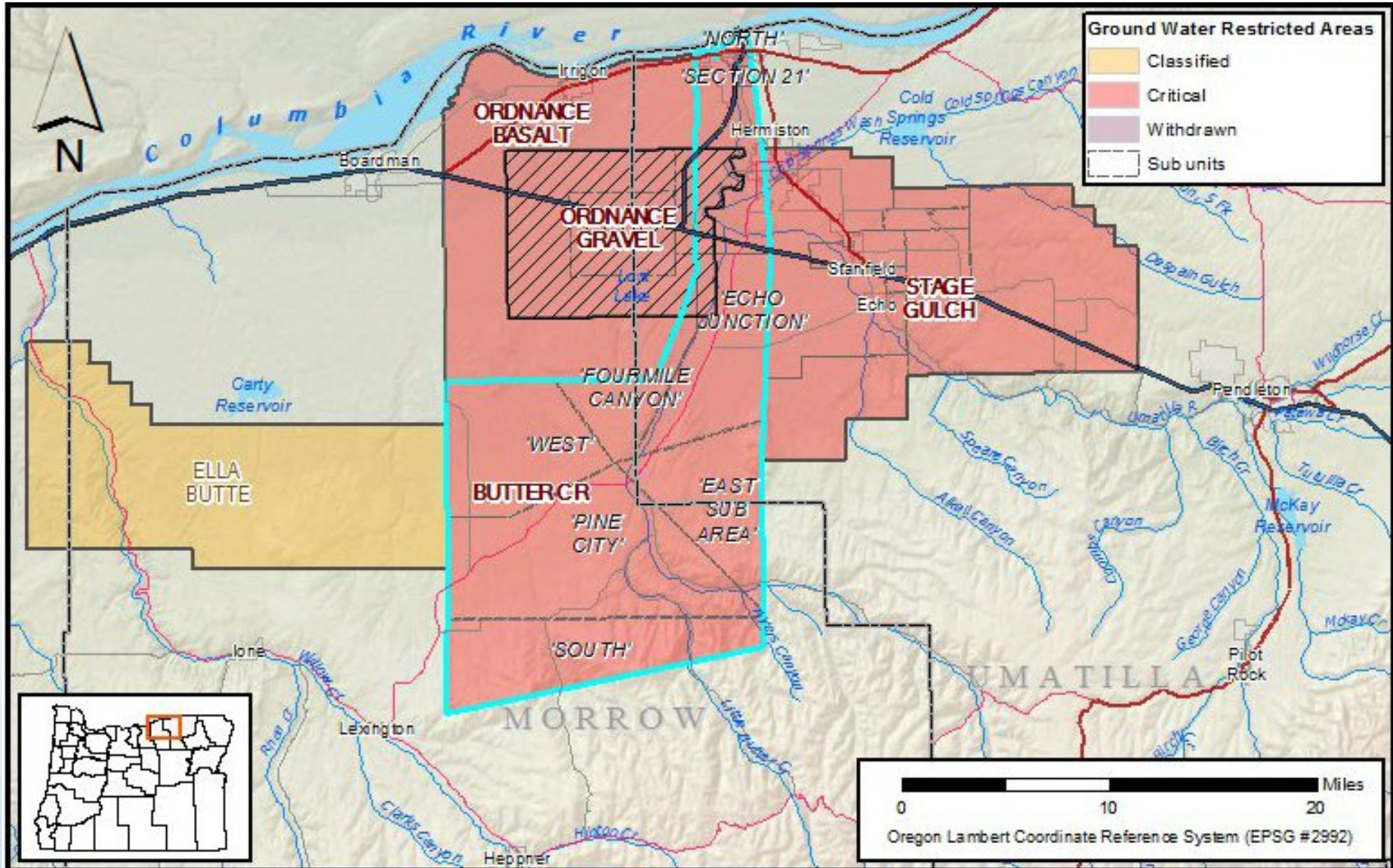
CRB CGWAs have positive attributes for ASR:

High Transmissivity: High rates of recharge and recovery

Water Quality: Low aquifer reactivity

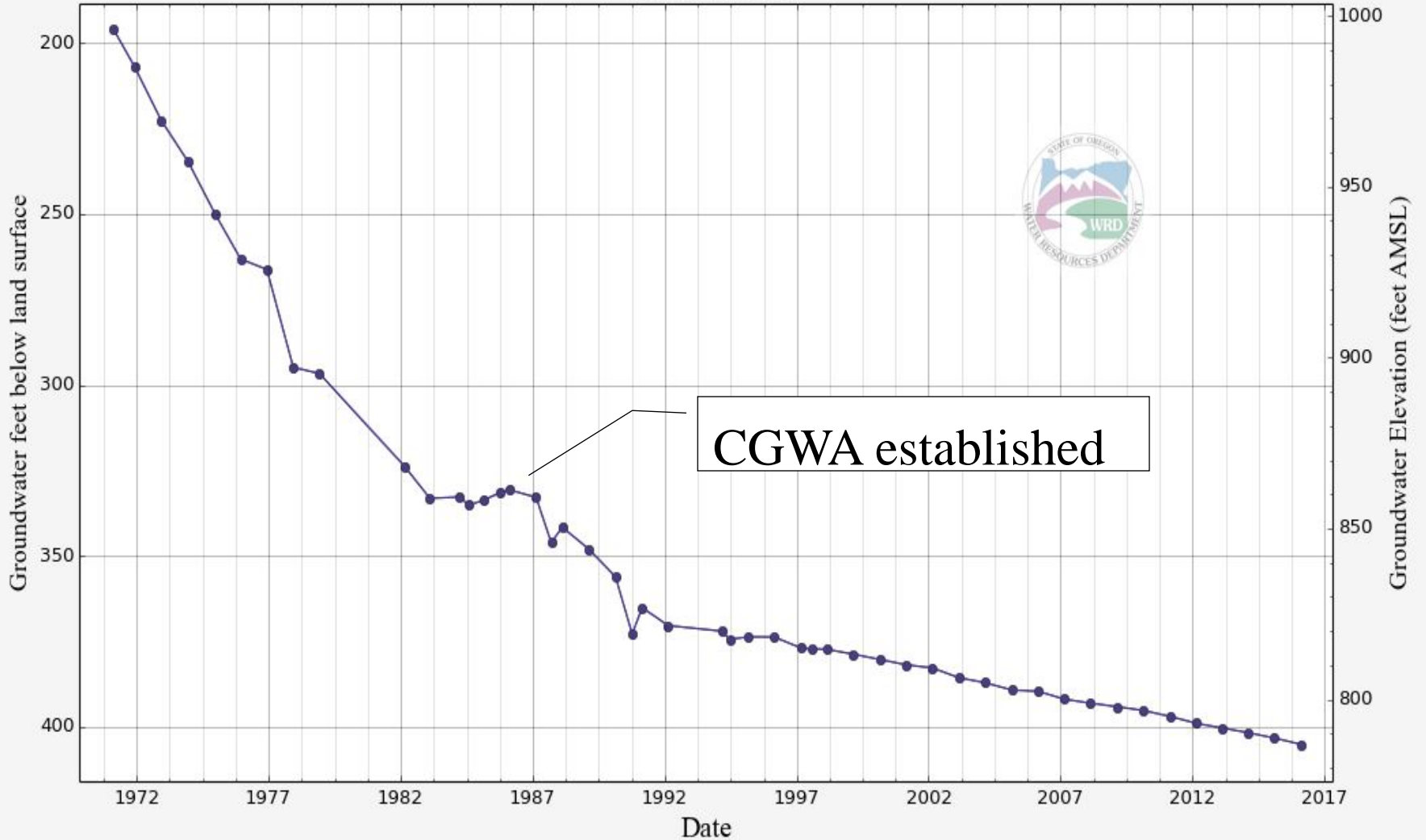
Storage Space: overdraft = available storage

Butter Creek CGWA



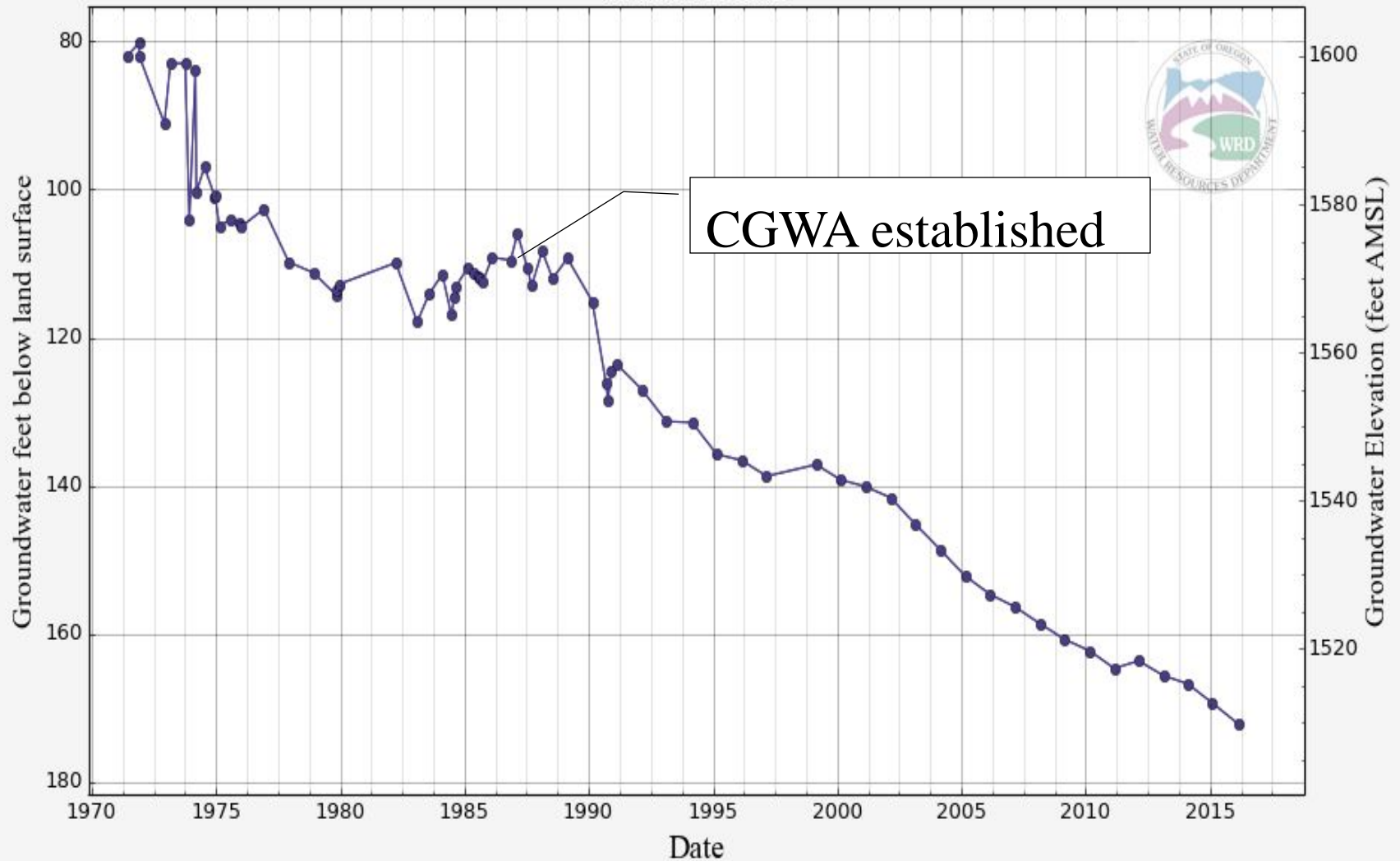
Butter Creek CGWA – Pine City Subarea

MORR 416

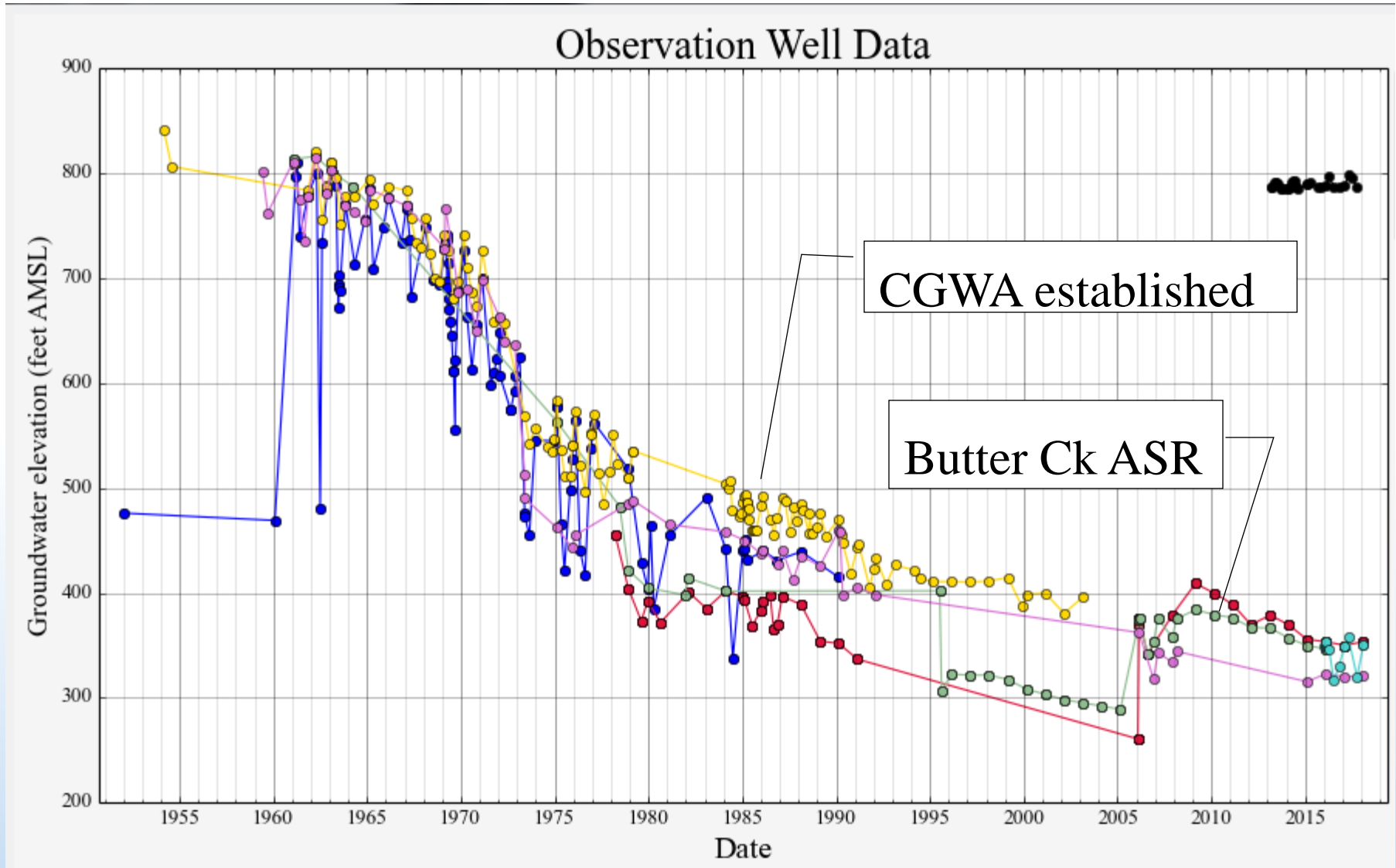


Butter Creek CGWA – South Subarea

MORR 441



Butter Creek CGWA – Echo Jct Subarea



Butter Creek CGWA Summary

Managed with annual allocation of “SAY” totaling 14,378 acre-feet to senior users*

~63,000 AF of junior water rights that are not able to be exercised are still on the books

Groundwater level declines likely to continue until/unless SAY is re-evaluated

*SAY allocation requires approximately 0.5 FTE (4% of total groundwater section FTE) to administer each year

Summary of 2018 CGWA Review

Positive CGWA outcomes to date are associated with the availability of alternate water sources, coupled with significant artificial recharge projects.

Recommend the Department:

- Maintain existing CGWA controls
- Re-evaluate controls in areas where groundwater levels continue to decline, as resources allow
- In the future:
 - encourage voluntary agreements, with CGWA backstop
 - build adaptive management into future CGWA rules to meet specified water level trend benchmarks

OREGON



WATER RESOURCES
DEPARTMENT

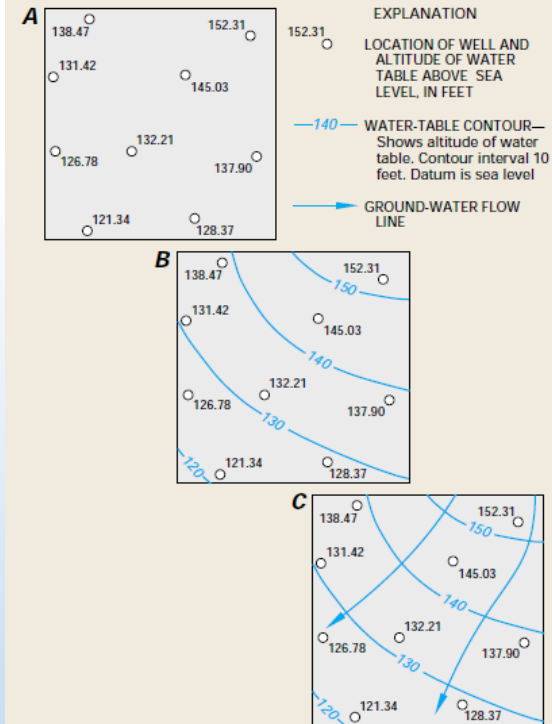
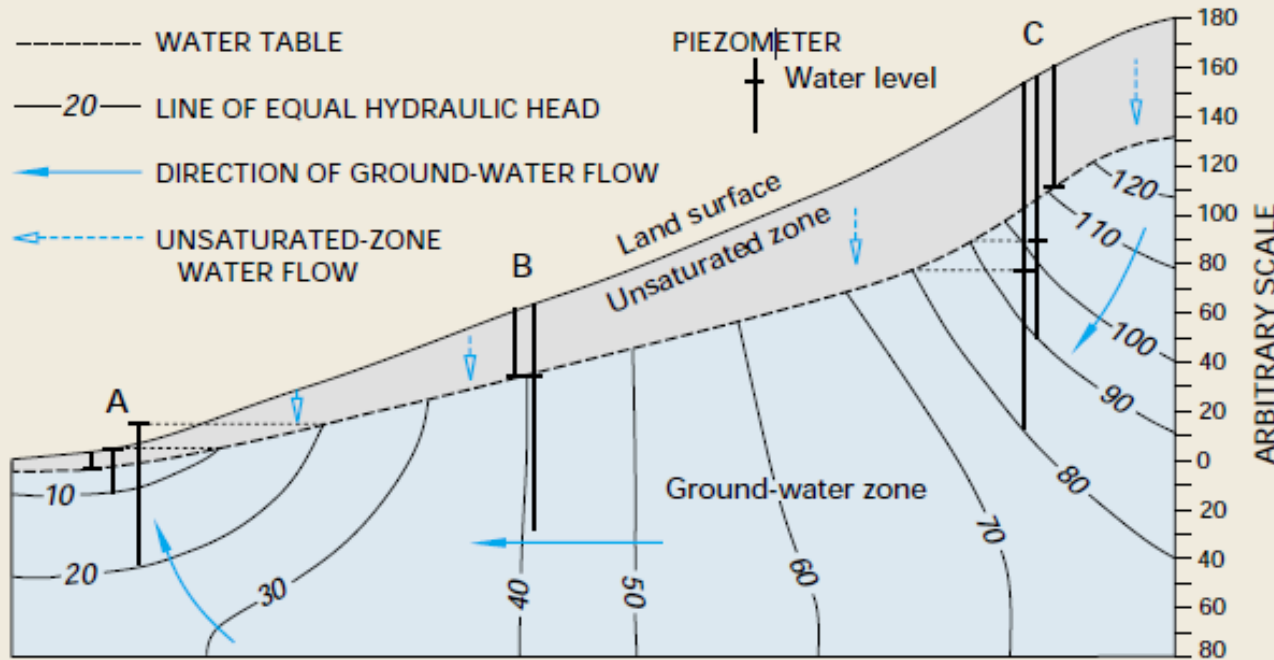
“Head” Gradient Drives Groundwater Flow



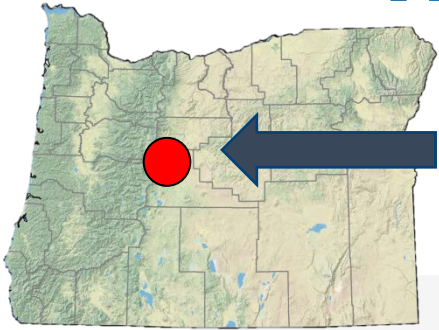
KARIM D. GHANTOUS/CREATIVE COMMONS

EXPLANATION

- WATER TABLE
- 20— LINE OF EQUAL HYDRAULIC HEAD
- ← DIRECTION OF GROUND-WATER FLOW
- ← UNSATURATED-ZONE WATER FLOW



Anatomy of a Hydrograph



Well Location

Well Log ID

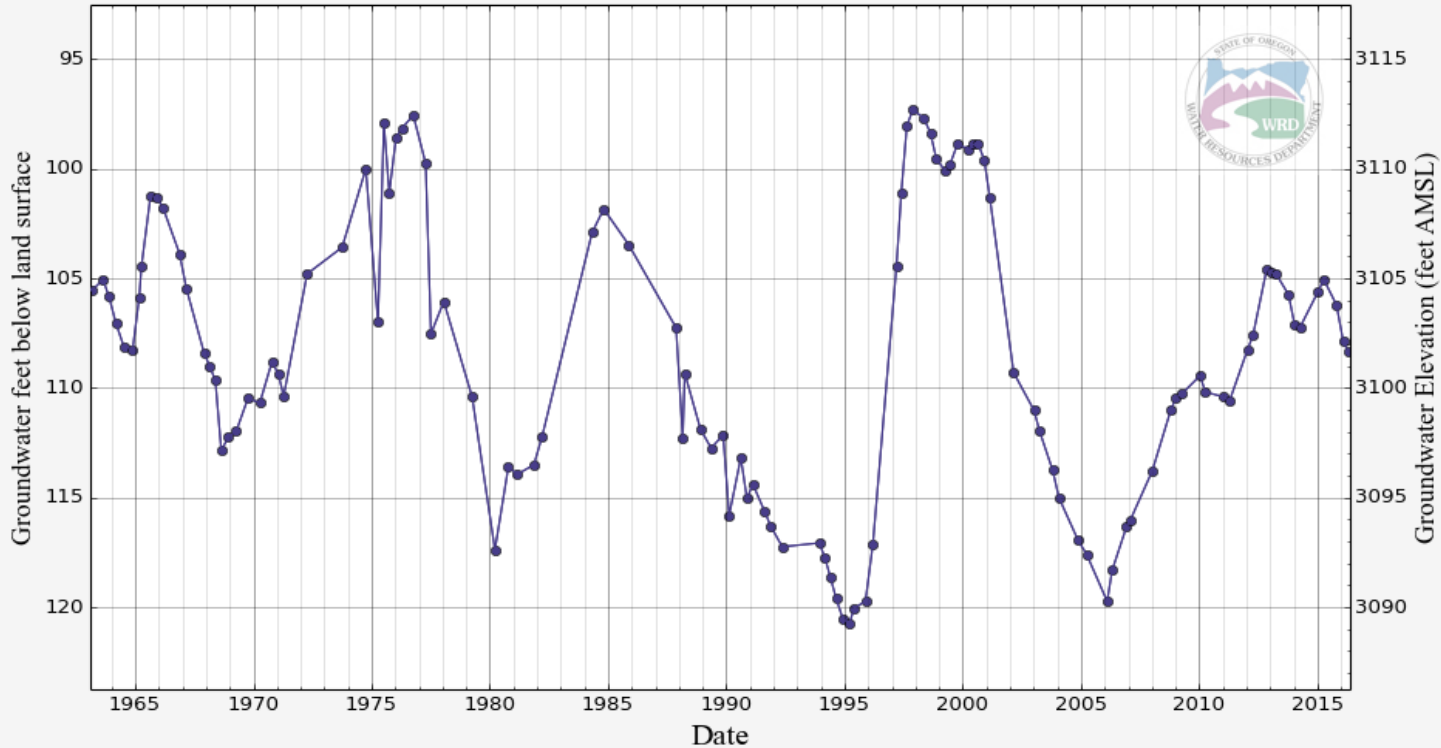
Feet above sea level

DESC 3016

95



120

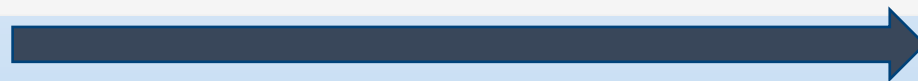


3115



3090

1965



2016

Increasing Time

Feet below land surface