A Vison for Managing Oregon's Groundwater and Surface Water Conjunctively and Sustainably

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Water Resource Science

Why are we having water supply issues?

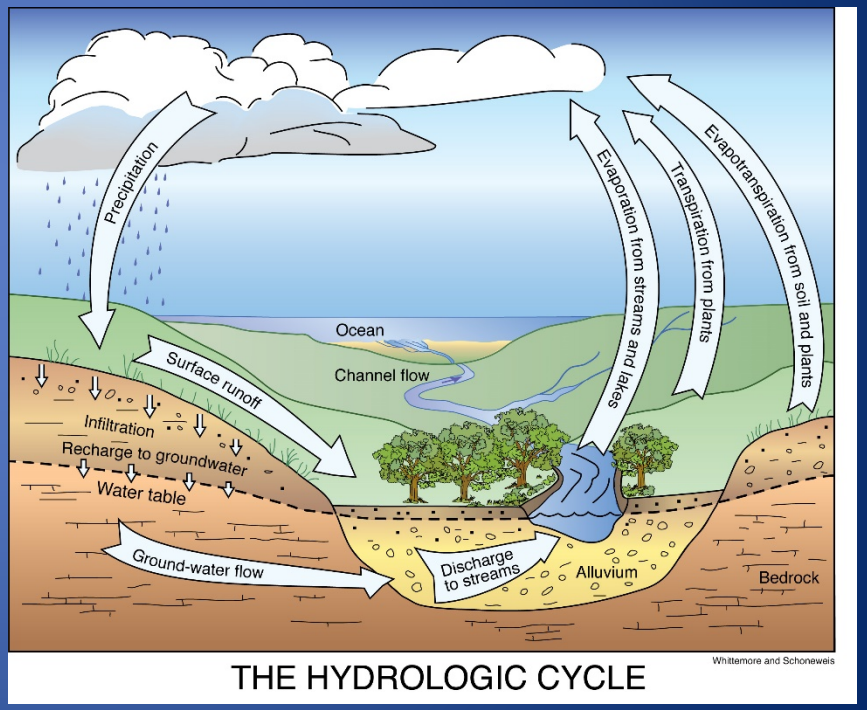
- Lost some of our natural recharge
- Comingling Wells
- In some cases using more water from an aquifer than is currently recharged naturally
- Need to manage groundwater and surface water systems conjunctively at the local watershed/basin level.
- Use Watershed Council or Water Management District (WMD) for “Integrated Place-Based Planning”
- WMD based on experience in Kansas (Started 1976)

Hydrologic Cycle

Today

- Recharge water is moved to streams and oceans faster.
  - Ditches along roads
  - Impervious surfaces
  - Straightening stream channels
  - Drain tiles
  - Loss of floodplains
  - Loss of beaver dams

Natural Hydrologic Cycle



How Do We Make Surface Water and Groundwater Sustainable?

- Manage them at the watershed/basin level using a local Watershed Council or Water Management District (WMD)
- Managed aquifer recharge (MAR) projects by the WMD offsets loss of recharge
- Repair critical commingling wells
- Everyone conserves water including municipalities, industry, and agriculture
- Agriculture, nurseries, etc. implement best management practices to conserve water
- Proper rangeland and forest management for recharge
- Beaver dams

Managed Aquifer Recharge (MAR)

- Is a way to capture and store lost recharge (excess water) in the winter
- Water can be used for the following:
  - Recover declining aquifers
  - Store water for drought use
  - Allow groundwater rights for junior surface water holders to leave surface water in the stream later in the summer
  - Allow groundwater rights for remaining prime farm land in some basins

What is MAR?

- **Aquifer Storage and Recovery (ASR)**
- **Artificial Recharge (AR)**

Can also include:

- **Beaver Dams**
- **Forest Management for recharge**
- **Rangeland Management (does not mean fencing)**

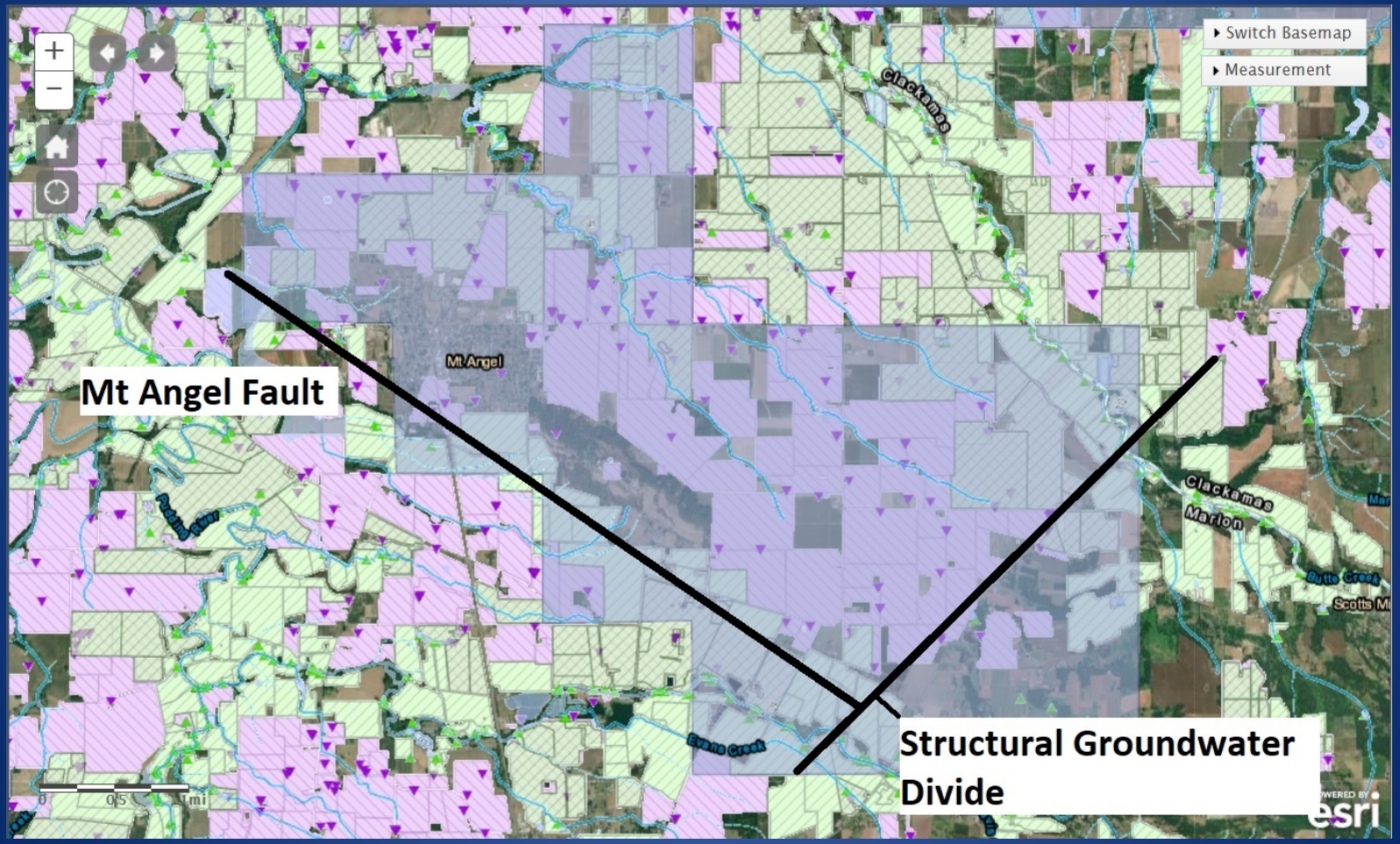
Aquifer Storage and Recovery (OAR 650-350-0010)

- Take water that meets drinking water standards from surface water, shallow aquifer, or treated wastewater
- Inject water down a well into a deeper aquifer system for storage
- Can generate electricity while injecting water
- Pump the water out through the injection well or other nearby wells

Artificial Recharge (OAR 650-350-0110)

- Taking surface water or runoff from impervious surfaces and allowing to infiltrate through the ground where soils are permeable
- Recharges shallow aquifers used for ASR
- Recharges shallow aquifers that discharge into streams during the summer
- Offsets groundwater pumping impacts on surface water

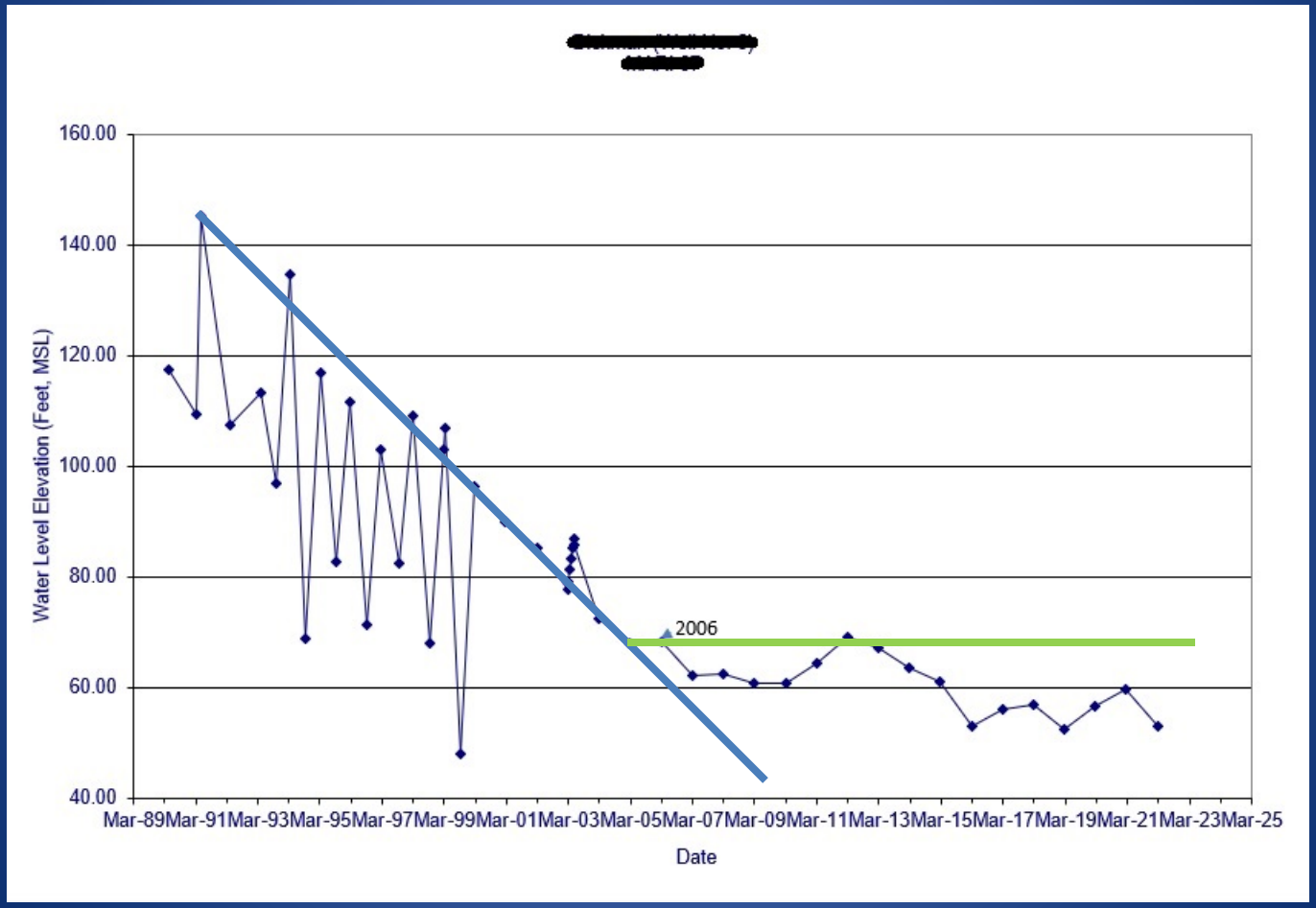
Mt. Angel GWLA Example



Area Managed By

- Pudding River Watershed Council (Surface Water)
- Oregon Water Resources Department (Groundwater, Surface Water)
- East Valley Water District (Local farmers)
  - Have spent considerable amounts of grant and farmers' money trying to find a place to build an above-ground reservoir
  - Plan was to build a reservoir on Drift Creek to store 12,000 acre feet of water
  - Some of the stored water will be lost to evaporation in the summer
  - Court decision will not allow reservoir to be built
  - Fish habitat above the proposed dam was considered low quality

Water Level Decline From Commingling, Mt. Angel, OR



Imagine This

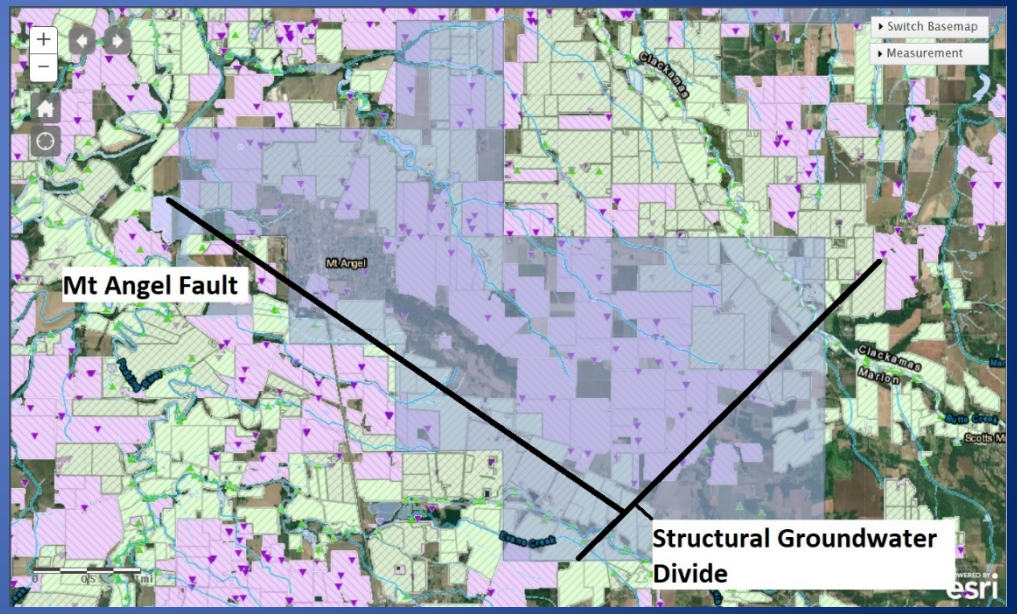
- The Pudding River Watershed Council is expanded and becomes a Water Management District
- Has the ability to pick the best areas for AR and ASR for each impacted aquifer and manages those projects
- Establishes beavers and beaver dams where they were historically present to store precipitation higher in the watershed
- Works with forest land management for water recharge and healthy ecosystem
- District is responsible for measuring water levels and other data gathering for MAR projects.
- East Valley Water District can still operate within the Water Management District if it chooses

MAR in Mt. Angel with a WMD

AR and ASR

- Use AR to recharge the shallow alluvial aquifer used for ASR
- AR is where soils are suitable for recharge near ASR source wells
- ASR injection wells in each aquifer block identified by seasonal water levels
- Manage drain tiles for storage and water quality

AR and ASR Locations



How Much Water is Needed?

- Approximately 1,321 acre-ft of stored water to cover remaining approximate 880 acres of prime farmland with groundwater rights
- Approximately 87.5 acre-ft of stored water would be needed to cover the 87.5 acres of junior surface water rights that are regulated off to protect instream rights. Allows use of surface water when available, then switch to groundwater leaving more surface water in stream for fish and wildlife in the summer
- 1,409 gpm needed to inject for 181 days (ASR cycle)

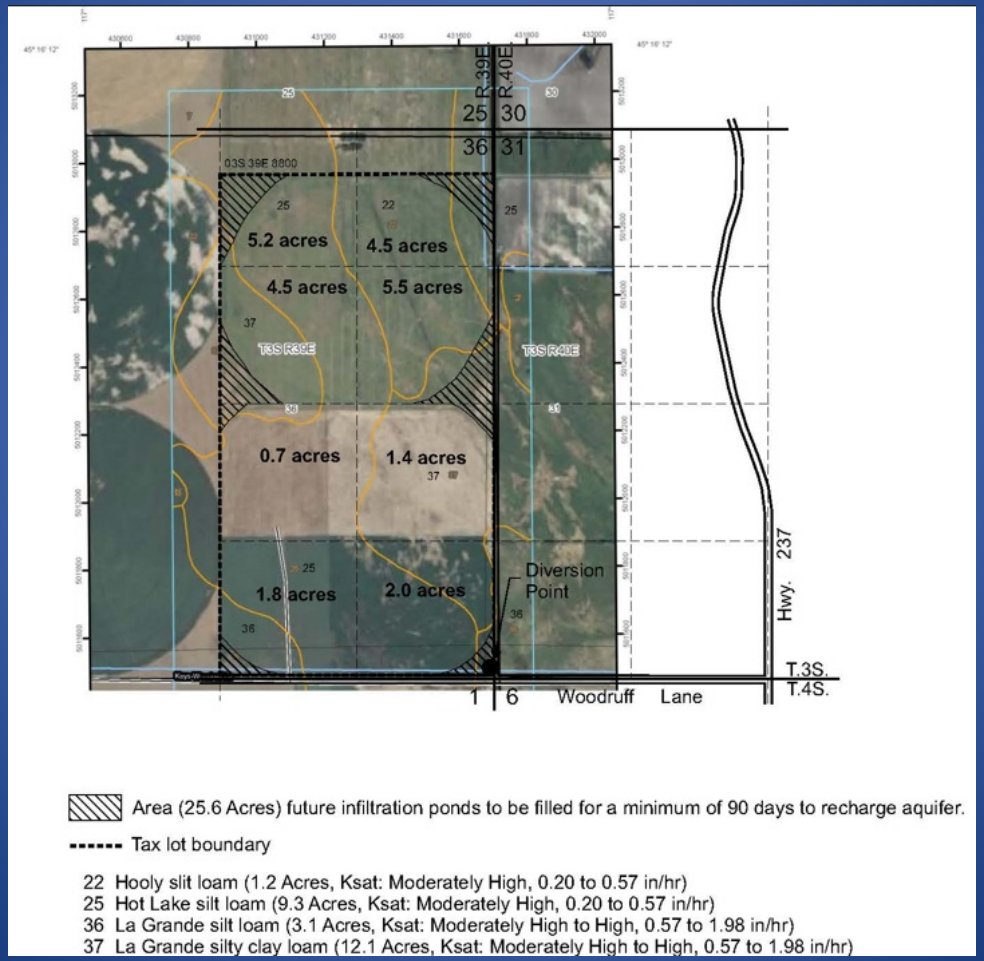
Other Areas in the State

- Grande Ronde Basin
- Klamath Basin

Grande Ronde Basin

- Mitigation plan developed to offset presumptive impact on Scenic Waterway from consumptive use from irrigation
- Mitigation plan: Recharge 153.68 acre feet (386 gpm over 90 days) was accepted, then denied
- Denial based on the following:
  - Grand Ronde Model Watershed Council is not permanent
  - Ground will freeze and water will not infiltrate
- Idaho's AR Eastern Snake Plain project recharges an average of 250,000 acre feet/year

Mitigation to Offset Impact on Scenic Waterway Using AR



Klamath Basin

- Use AR and ASR to stabilize groundwater levels after checking for comingling wells
- Use AR and ASR to recharge extra groundwater during wet years to store water for dry years
- AR and ASR also allows farmers to switch to groundwater to leave more water in streams at key times
- Use beavers and other best management practices to store, recharge and save water

Let's Not Forget Beavers

Prepared for SOIL CONSERVATION

December 22, 1941

BEAVER ON TRIAL

by Paul W. Schaffer 1/

The judge took his place at the bench. He spoke, "I find the defendant -- not guilty!".

The true defendants of the case were not in court to hear their acquittal, but when word of the court's decision reached the wilds of the State of Oregon in the late evening, it might be presumed that the nocturnal silence of the wilderness exploded with the thunderous report of thousands of beaver tails slapping the dark waters of their ponds in celebration. It was the beavers who had been on

Beavers on Trial

- 1941 Law suit regarding beaver dams on one farm in Harney County, Oregon
- Farm had beaver dams and pastures were sub-irrigated by the high water table
- Farmer was gone for a period of time and someone killed the beavers
- Series of large storm events washed out the beaver dams and the stream started eroding downward

Beaver Dam Lawsuit cont'd

- Stream eroded down to the point where it could no longer be driven across and the grass started dying
- Farmer started pumping water from the stream to irrigate because water table had dropped significantly
- Farmer worked with Fish and Wildlife to bring beavers back
- Beavers worked hard and built dams. Sediment was trapped behind the dams

Beaver Dam Lawsuit cont'd

- Water table started rising behind dams as the stream filled again with sediment
- System recovered and grass was again sub-irrigated
- Neighbor downstream sued and wanted beavers removed claiming the water was being captured upstream denying him the water he should have
- In reality, there was more water available in late summer and neighbor needed beavers

Beavers Found Not Guilty

- Lesson: Beaver dams hold more water in the subsurface during the winter and slowly release it in the summer
- Lesson: Beaver dams reduce stream erosion during high flows and trap sediment
- Fish and beavers co-evolved

Can Beavers Save Salmon?

This Vision is Consistent with Oregon's Integrated Water Resources Strategy (IWRS) and Place-Based Integrated Water Resource Planning

Questions?