# Groundwater-Level Monitoring in Oregon







#### December 6, 2016

Karl Wozniak, Hydrogeologist Groundwater Section Oregon Water Resources Department

#### **Monitoring Network Goals**

Monitor all major aquifers in the state Monitor all parts of GW flow system Up-gradient vs down-gradient Background conditions vs impacted areas Provide high-quality data for Evaluating current & future GW supplies Evaluating impacts of GW withdrawals on SW supplies Making informed policy decisions

#### Major Drainage Basins & Climate



## State Observation Well Network 380 Wells



## Other Observation Well Networks 700 Wells



## Continuous Recorders 88 Wells



#### Uses of Monitoring Network Data

- Evaluate sustainability of GW withdrawals
  - Seasonal
  - Long term
- Evaluate whether GW is available for new proposed uses
- Evaluate impacts of GW withdrawals on SW
  - Senior SW users
  - Instream flows
- Evaluate local GW supply issues

# **Transboundary Issues**



# Klamath Basin Transboundary Issues



# Klamath Basin Transboundary Issues



#### Groundwater Management Example Columbia Plateau Basaltic-Rock Aquifer



**Oregon NGWMN Participation History** □ October 1, 2015 – 1 Year Contract Select representative wells Classify wells per NGWMN scheme Build data portals ■ Discrete water levels ■ Recorder water levels ■ Lithology ■ Well construction September 30, 2016 ■ 279 wells in network Portals up & running

Step 1: Determine existing NGWMN network in Oregon

- USGS Oregon Science Center 68 wells
  - Klamath basin 50 wells
  - Willamette basin 15 wells
  - Deschutes basin 2 wells
  - Rogue basin 1 well



Step 2: Classify current OWRD obs wells

- Frequency of measurements (qtly, annual, continuous)
- Length of record
- USGS Principal Aquifer



 Observation Wells

 Discrete Msmts

 1 - 5

 6-20

 21-100

 101-250

 >250



Step 3: Create mass water-level plots by sub-basin & principal aquifer

- Select representative Trend wells
- Select representative Surveillance wells
- Classify wells by subnetwork
  - Background conditions
  - Suspected changes
  - Documented changes
- Evaluate baseline condition (< 5 yrs vs > 5 yrs)

#### Willamette Lowland Basin-Fill Aquifers Near Salem







#### Pacific Northwest Volcanic Rock Aquifers Near Salem







Step 4: Review selections using all criteria Principal aquifer Spatial distribution in basin/sub-basin ■ Trend wells ■ Surveillance wells Frequency of record Length of record Quality of record ■ Likelihood of future site access

## OWRD NGWMN Site Status 279 sites (109 trend, 166 surveillance)



#### **Data Collection Methods**

- **Written Procedures** (major modification in process)
- Periodic training
- Minimum data elements
- Standard field forms & techniques
- Periodic calibration of equipment
- Post-processing of continuous data to correct for drift and offsets
- QA/QC procedures for data entry & review
  Archived field forms

#### Additional Data on OWRD Web Site

■ Water-level data (>250,000 discrete msmts) On-line hydrographs for all observation wells  $\square \sim 1100$  current wells  $\blacksquare > 3300$  historic wells ■ Table or map-based selection options <u>Well log database (508,399 records)</u> Scanned images ■ Tabular data

Groundwater studies & publications

#### Additional Data on OWRD Web Site

#### National Ground-Water Monitoring Network

045/01W-05CDC				
SUMMARY	WELL LOG	WATER LEVELS		
Agency			Oregon Water Resources Department	STATE OF OREGON
Site Name			04S/01W-05CDC	
Site #			MARI0000308	
Site Type			WELL	
Lat/Long(WG584)			45.2463,-122.8404	
Well Depth			120 ft	WRD &
Local Aquifer Name			Willamette Aquifer	PAR OF
National Aquifer Name			Willamette Lowland basin-fill aquifers	OURCES DEL
Aquifer Type			CONFINED	
Water Level Network			Surveillance - Documented Changes	
Water Quality Network			-	
Additional info			link	
				-

### Additional Data on OWRD Web Site



#### Future NGWMN Project Plans

Application for 2017-2018 Funding Support persistent data services ■ Maintain web services ■ Routine updates to site information Fill data gaps ■ GPS locations (63 sites) ■ Lithology (169 sites) ■ Well construction (262) ■ Continuous water-level records (70 wells) ■ Well drilling?

# Questions?



