



Harney Basin GW Study Update



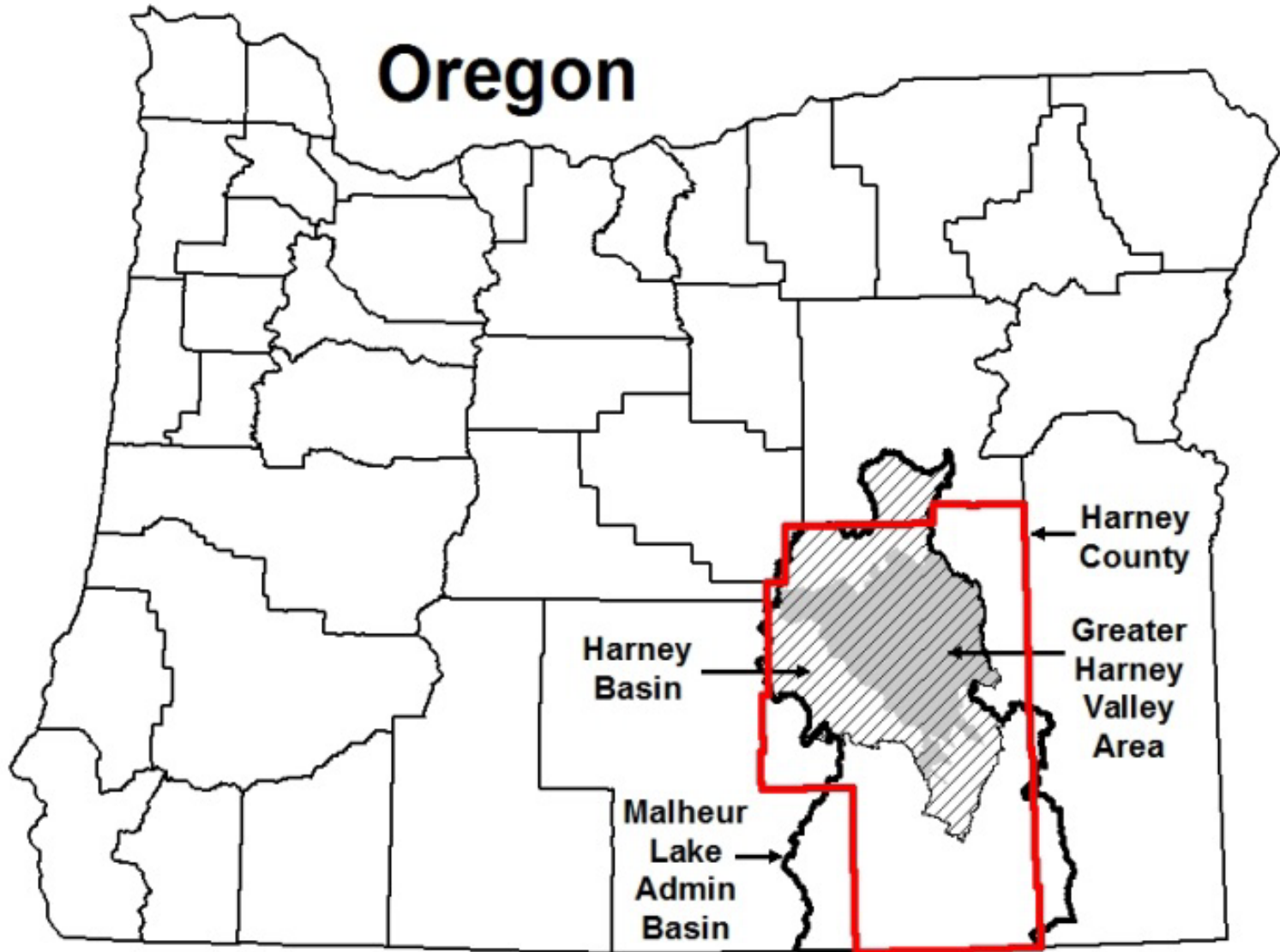
Oregon Water Resources Commission
June 14, 2018

Justin Iverson, Groundwater Section Manager

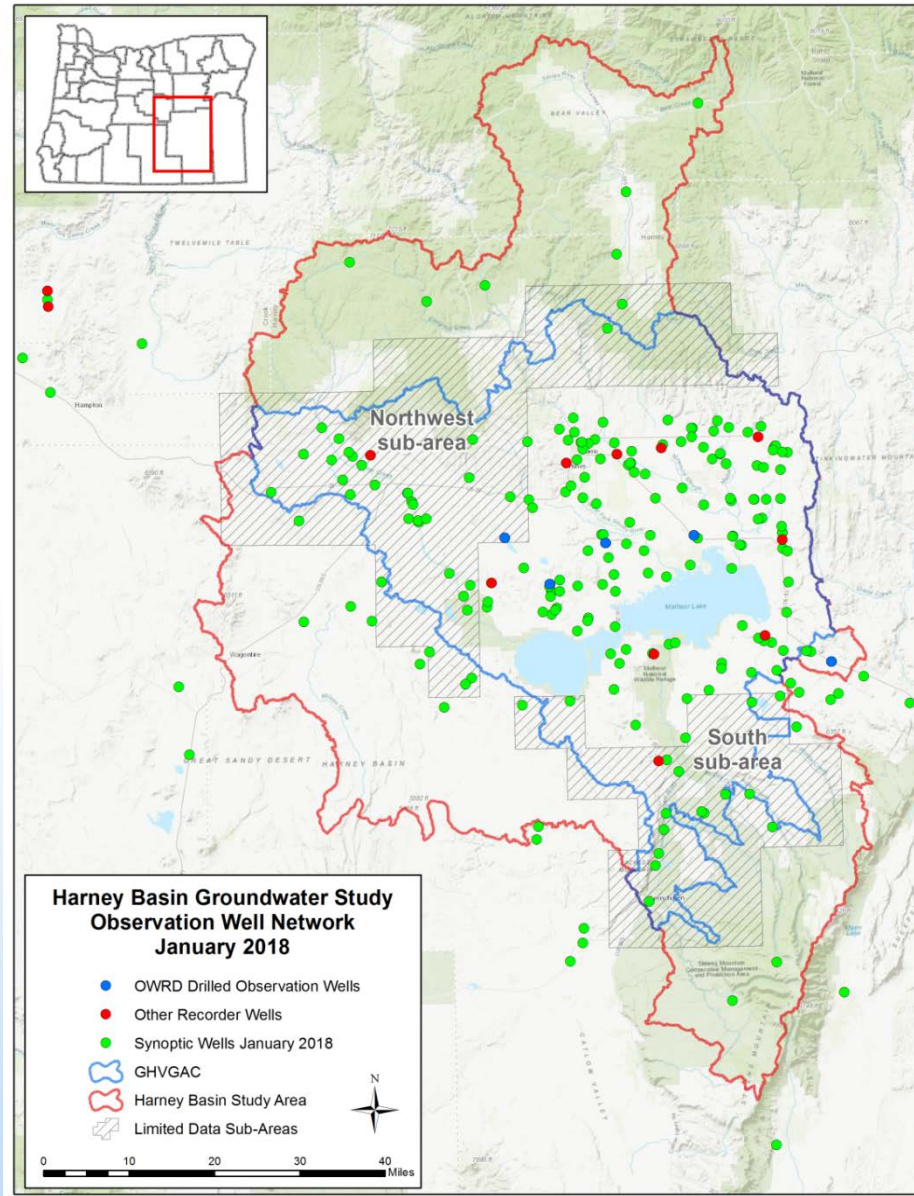
Overveiw

- Background
 - Events leading to rule revisions designating the Greater Harney Valley Groundwater Area of Concern (GHVGAC)
- **Groundwater Study Update**
 - **Progress on the cooperative groundwater basin study encompassing the GHVGAC**
- Community Involvement
 - Mark Owens, Brenda Smith, and Angie Ketcher will present

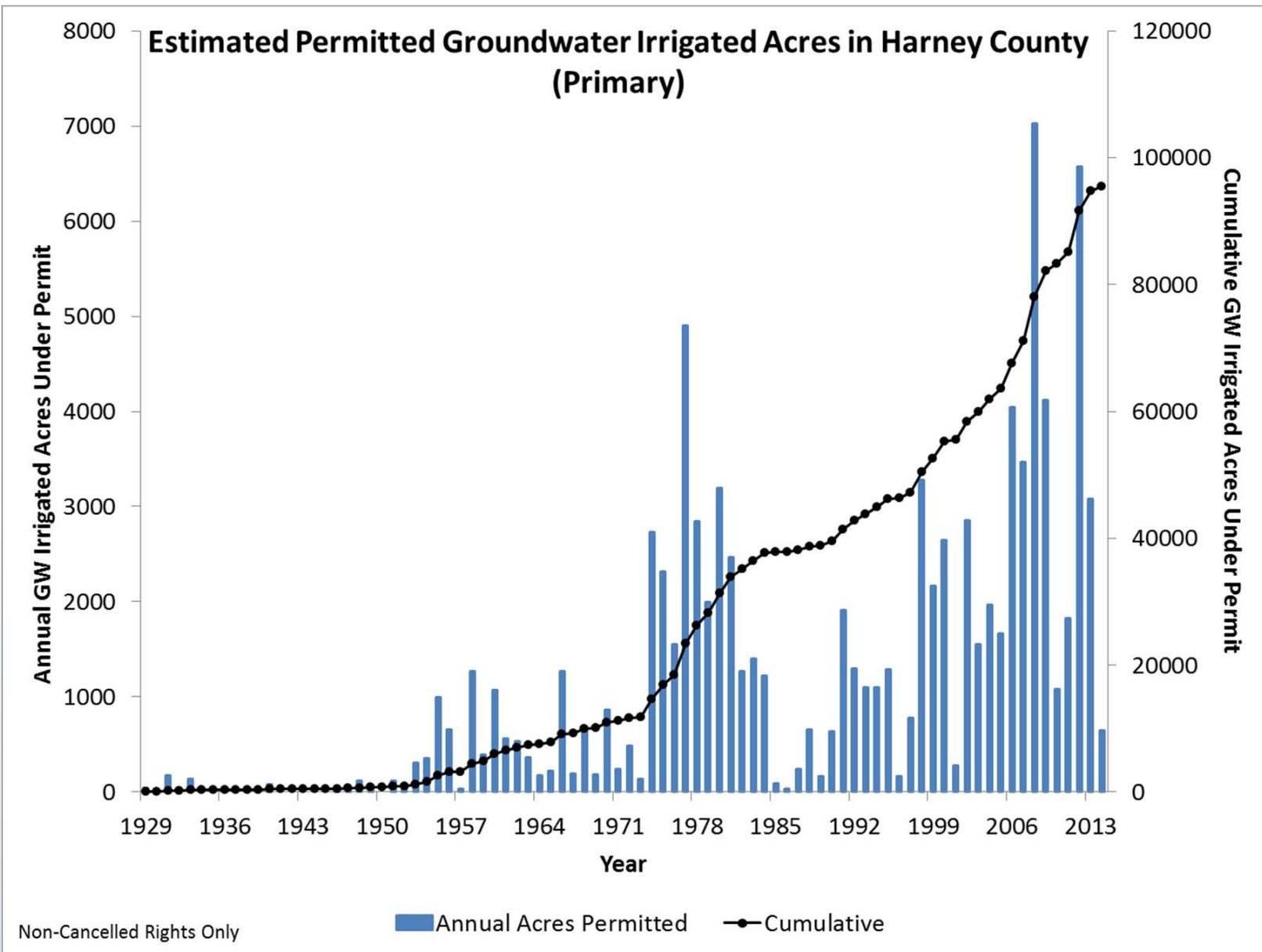
Background – Geographic Setting



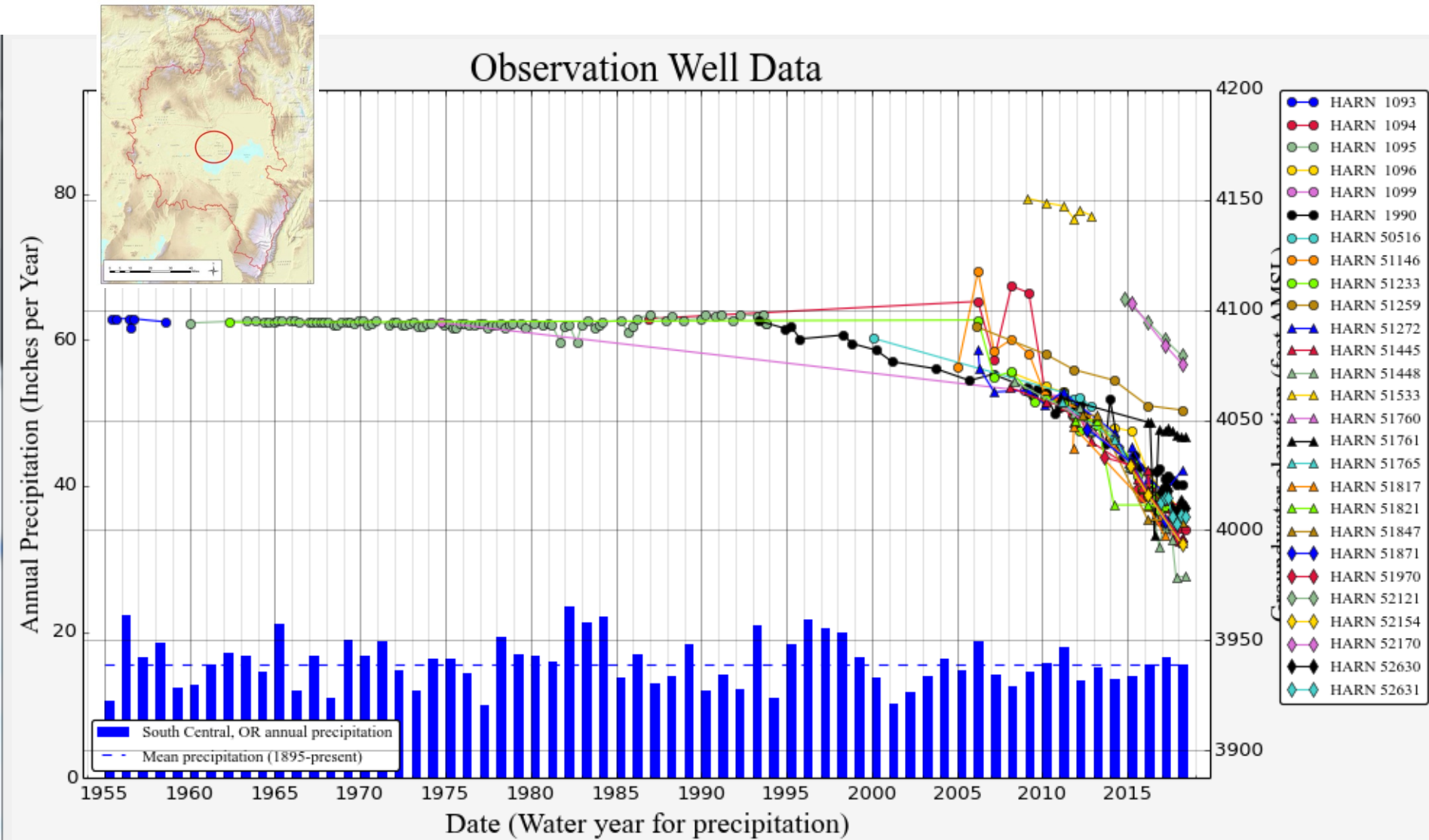
Background – Area of Interest



Background – Permit Development



Background – Water Level Trends

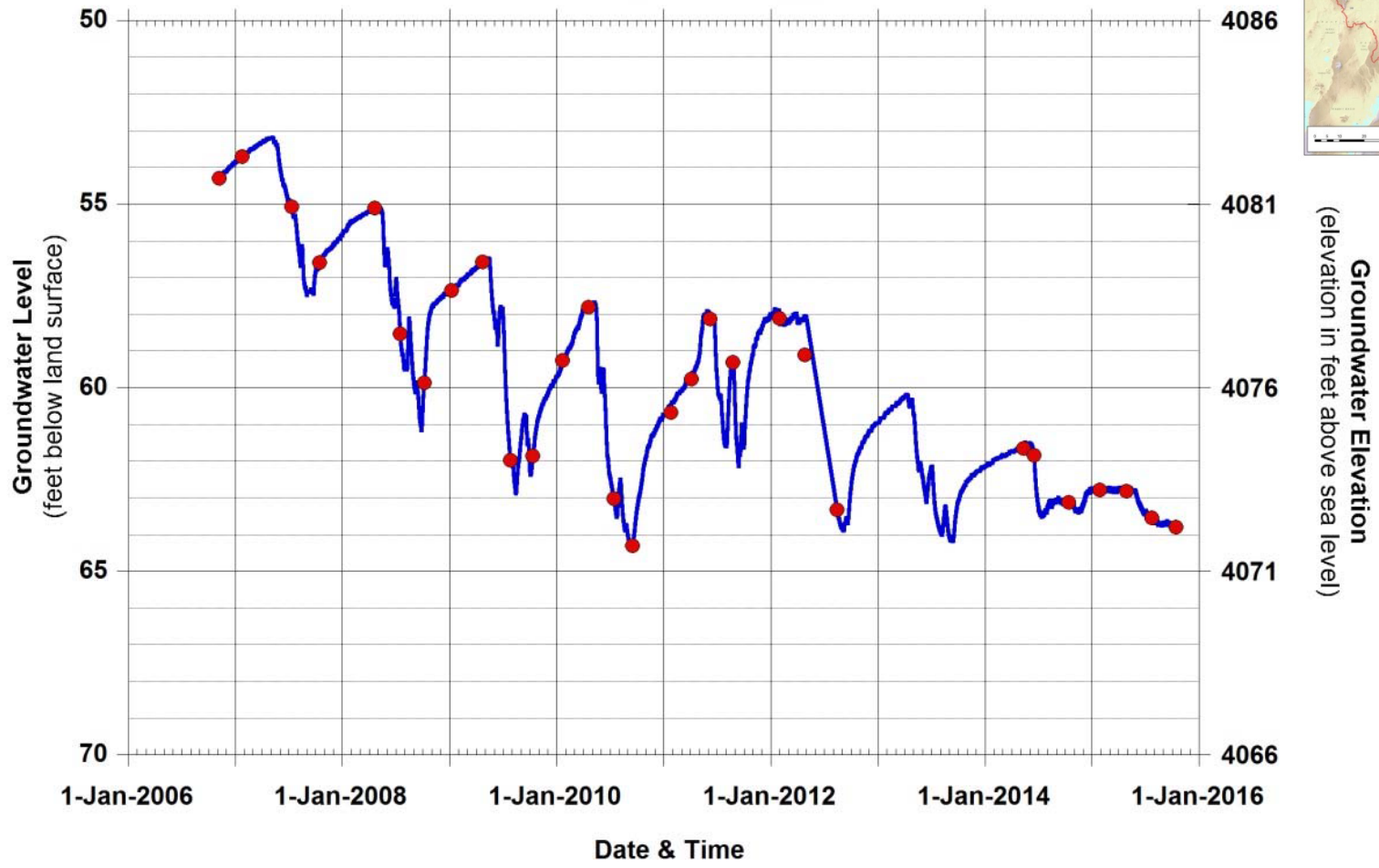


Background – Water Level Trends

Well Depth = 160 ft
Casing Depth = 40 ft
Seal Depth = 20 ft
Aquifer = Gravel Layers in Clay & Sand

HARN 1245
Mims Recorder Well
T25S/R34E-sec 06 bbb
Harney Valley
(Crane Vicinity)

— Recorder Data
● Manual Data



Background - Rulemaking

- Division 512 rules established the Greater Harney Valley Groundwater Area of Concern (GHVGAC) in the Malheur Lake Basin Program in April 2016
- Rules intended to:
 - Protect existing groundwater users
 - Allow pending applications to become permits
 - Gather additional information with a basin-wide groundwater study
 - Convene a local Groundwater Study Advisory Committee

Groundwater Basin Study

Study objectives:

- Develop a commonly accepted and accurate understanding of the hydrologic system in the Harney Basin.
- Plan and conduct the Study in coordination with a local Groundwater Study Advisory Committee.

Groundwater Basin Study

Harney Basin Study Supported by:

- 2013 Legislature provided ongoing groundwater study funds \$375k/biennium
- 2016 Legislature provided a one-time funding package to support the Harney Basin Study
 - NRS-4 Hydrogeologist (1 FTE, GW Studies)
 - Harney Study Funds (\$575k, one time)
- USGS cooperative water program federal matching funds

Groundwater Basin Study

OWRD Staff:

TSD:

- Jerry Grondin
- Darrick Boschmann
- Halley Barnett
- Phil Marcy
- Aurora Bouchier

- Jordan Beamer
- Mellony Hoskinson

FSD:

- Jonathan La Marche
- JR Johnson
- Dally Swindlehurst
- Scott Ceciliani

DO:

- Harmony Burrigh

Groundwater Basin Study

Study Cooperators:

- Oregon Water Resources Department (OWRD)
- United States Geological Survey (USGS)
- Local involvement through the Groundwater Study Advisory Committee
- Oregon Department of Geology and Mineral Industries (DOGAMI)

Groundwater Basin Study

Complimentary Studies:

- UNR-Desert Research Institute / NASA-ROSES remote sensing of evapotranspiration study
- DEQ groundwater quality survey
- TNC groundwater dependent ecosystem study
- PSU geologic mapping masters theses (in coordination with DOGAMI and USGS EdMAP program)

Groundwater Basin Study

Technical Objectives:

- Gather and assess existing data
- Collect new data required to better define the hydrogeologic system
- Develop a detailed water budget
- Develop an improved conceptual model of the Harney Basin groundwater-flow system

GW Study – Existing Data

- USGS & OWRD Databases, Published Studies, Driller's Logs, Private Data...

UNITED STATES DEPARTMENT OF THE INTERIOR
 Harold L. Ickes, Secretary
 GEOLOGICAL SURVEY
 W. C. Mendenhall, Director


Water-Supply Paper 841

GEOLOGY AND GROUND-WATER RESOURCES
 OF THE
 HARNEY BASIN, OREGON

BY
 A. M. PIPER, T. W. ROBINSON, AND
 C. F. PARK, Jr.

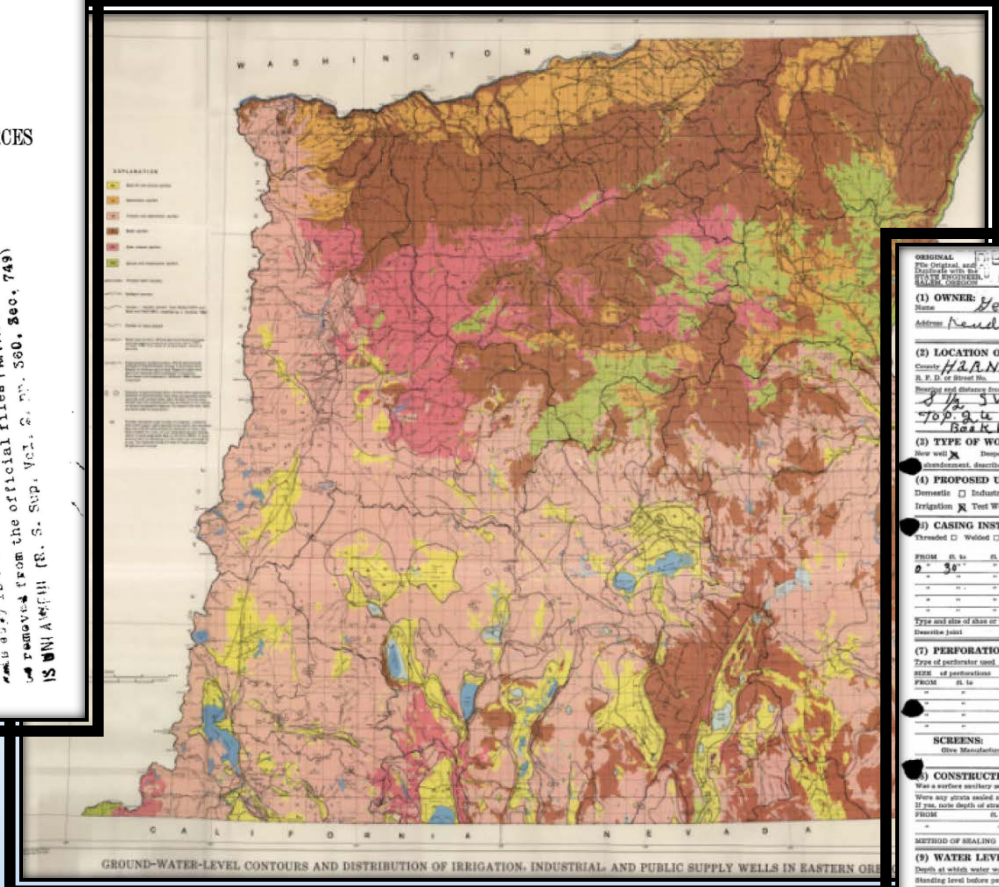
WITH A STATEMENT ON
 PRECIPITATION AND TREE GROWTH
 BY L. T. JESSUP

Prepared in cooperation with the
 OREGON AGRICULTURAL EXPERIMENT STATION
 W. A. Schoenfeld, Director
 DEPARTMENT OF SOILS
 W. L. Powers, Head



UNITED STATES
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RECEIVED WATER WELL DRILLERS REPORT

Do Not State Well No. 2675-34N(2)
 STATE OF OREGON 4708 State Permit No. 91,932

DATE RECEIVED AUG 28 1956

(1) OWNER: George H. Magick
 Name Neudrich, Idaho
 Address Neudrich, Idaho

(2) LOCATION OF WELL:
 County HRARNEY Section number, if any 2
 R. E. S. or Range 3
 Range and distance from section or subdivision corner 8 1/2 SW 1/4 SEC 34
TOP OF R.R. 27
BACK TO R. 27 98 ACRES

(3) TYPE OF WORK (check):
 New well Deepening Reconditioning Abandon
 abandonment, describe method and procedure in Item 11

(4) PROPOSED USE (check):
 Domestic Industrial Municipal Irrigation Test Well Other

(5) CASING INSTALLED:
 Threaded Welded

(6) EQUIPMENT:
 Rotary
 Cable
 Dug Well

If gravel packed

DEPTH	TO	FROM	TO	FROM	TO	FROM	TO
ft.	in.	ft.	in.	ft.	in.	ft.	in.
0	30	14	102				
8	19						
19	36						
26	27						
29	31						
31	57						
37	65						
43	78						
78	81						

(7) PERFORATIONS:
 Type of perforator used _____
 SIZE of perforations _____
 POSITION _____

(8) CONSTRUCTION:
 Was a surface machinery used and protected? Yes No To what depth _____
 How was surface machinery supported? Not supported On _____
 If on, name depth of struts _____
 POSITION _____

(9) WATER LEVELS:
 Depth at which water was first found _____
 Standing level before perforating _____
 Standing level after perforating _____
 Log Accepted by: _____
 (Signed) George H. Mendenhall Aug 27 1956

(10) WELL TESTS: OBSERVATION WELLS
 Was a pump test made? Yes No. If yes, by whom? CRANE DILLING CO
 Yield _____ gal./min. with _____ ft. draw down after _____ hrs.
 Artesian flow _____ g.p.m.
 Shut-in pressure _____ lb. per square inch.
 Actual test _____ g.p.m. with _____ ft. drawdown.
 Temperature of water _____ °F. Was a chemical analysis made? Yes No
 Was electric log made of well? Yes No

(11) WELL LOG:
 Diameter of well _____ ft. Depth of completed well _____ ft.
 Total depth 81 ft. Depth of completed well _____ ft.
 Description: Describe by color, character, size of material and structure and show thickness of layers and the level and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

0 - 8 - SILT
 8 - 19 - YELLOW CLAY
 19 - 36 - BLUE CLAY
 26 - 27 - SANDY ROCK
 29 - 31 - GRAVEL
 31 - 57 - GRAVEL
 37 - 65 - GRAVEL
 43 - 78 - RAVE SAND
 78 - 81 - GRAVEL

(12) SCREENS:
 Give Manufacturer's Name, Model No. and size _____

(13) STATEMENT:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME CRANE DILLING CO
 (Person, Firm, or Corporation) (Typed or printed)
 Address CRANE OREGON
 Driller's well number _____
 (Signed) Joseph H. Crane
 License No. 124 Dated 6/12 1956

Checked statement at well site _____
 Well started MARK 15 1956 Completed JUNE 6 1956

GW Study – New Data

	Year	2017	2016	2014
Total Wells Field-Located		567	335	51
Total Water-Level Synoptic Wells		236	189	-
Total Water-Level Quarterly Wells		118	108	23
Spring Water Level Synoptic Measurements		213	149	-
Fall Water Level Synoptic Measurements		242	180	-
Total Water Levels Measured per Year (by OWRD staff)		689	672	78
Continuous Recorder Instruments Installed		21	13	2
New Observation Wells Constructed		9	8	-

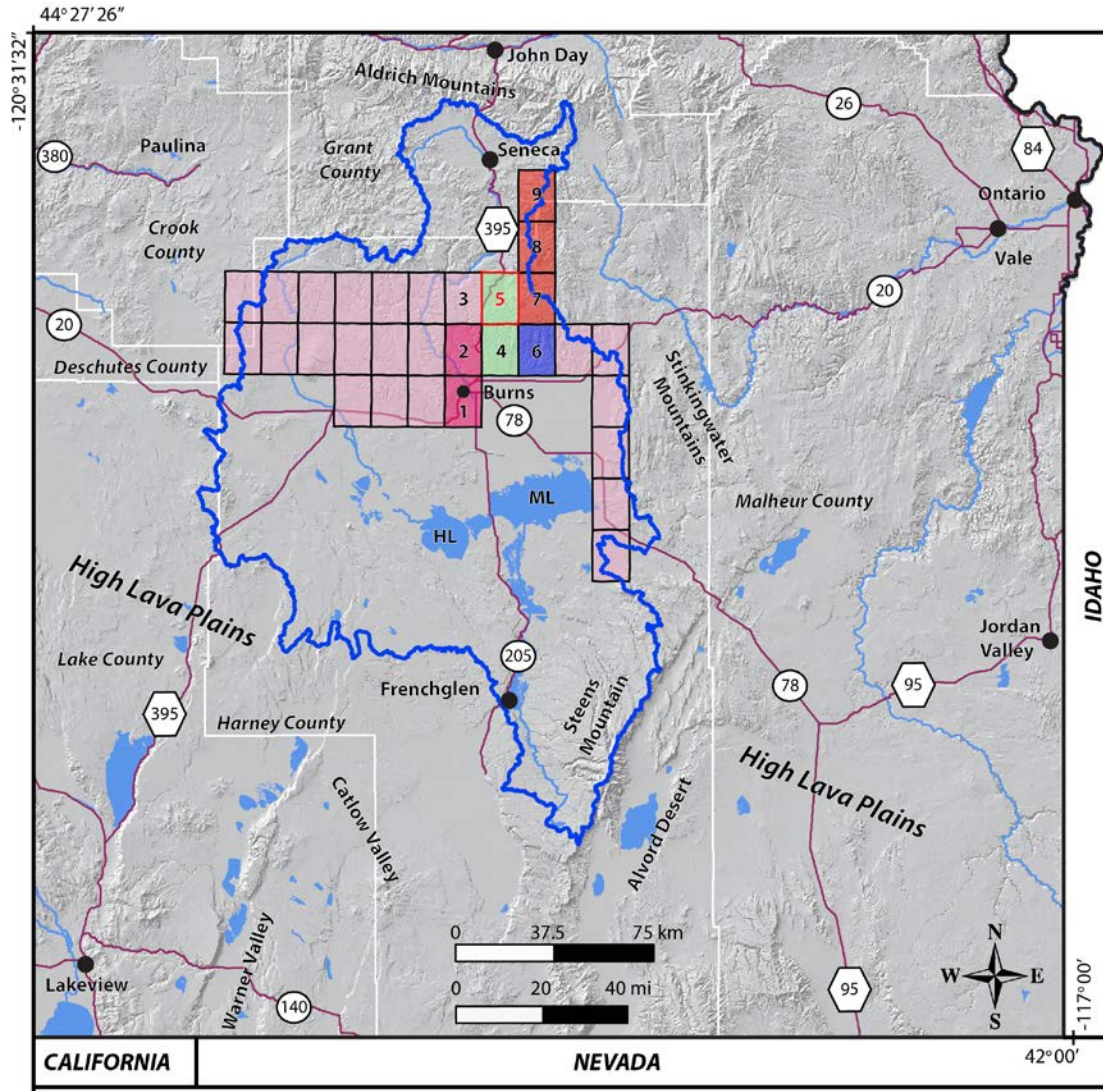
GW Study – New Data

- Water Level data from Greatly Expanded Observation Well Network



GW Study – New Data

- DOGAMI / PSU Detailed Geologic Mapping



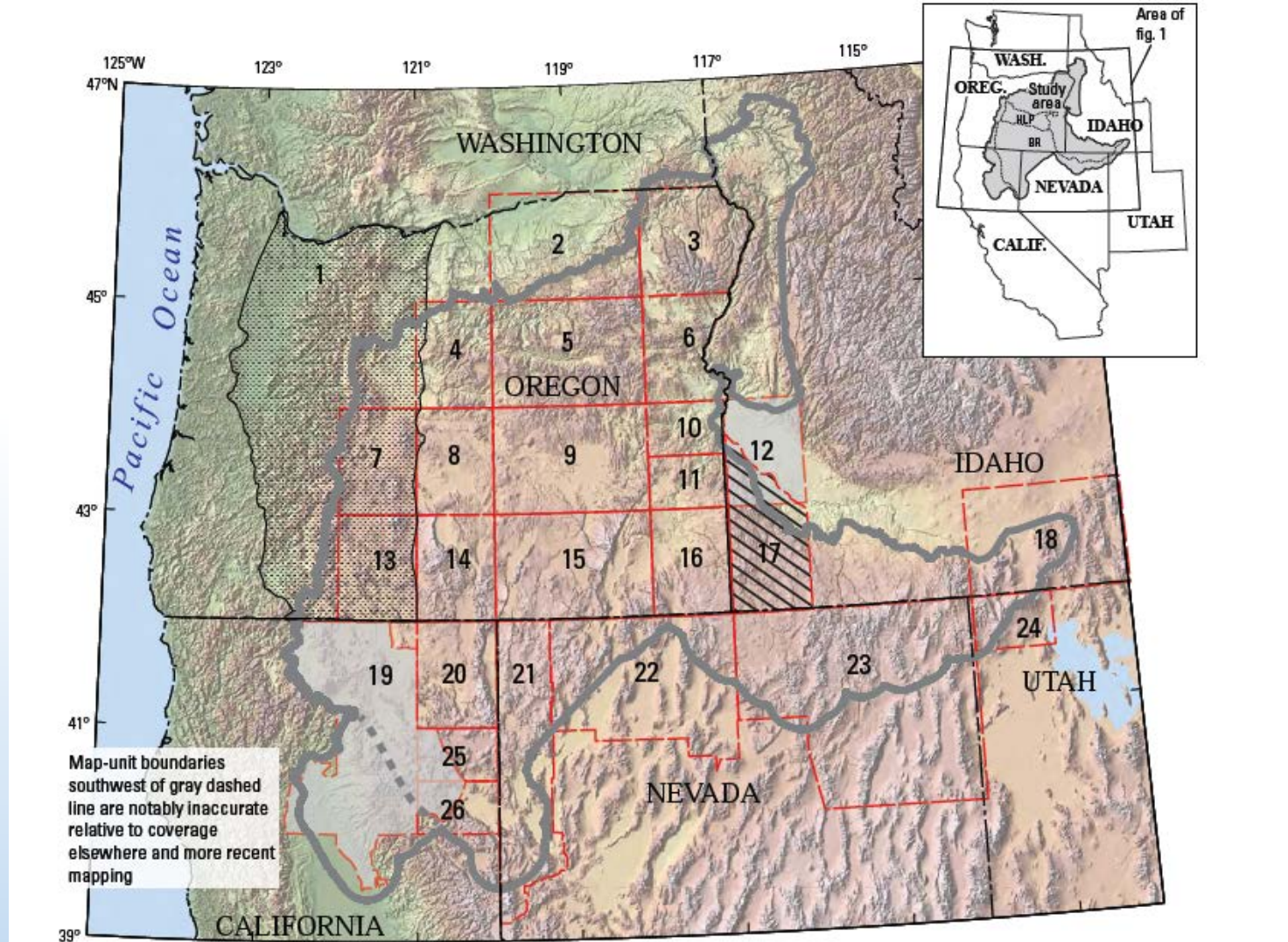
LEGEND

- City
- * Geographic location or landmark

- FY2018 DOGAMI STATEMAP Proposed
- FY 2017 DOGAMI STATEMAP
- FY 2016 STATEMAP Completed
- FY 2016/2017 EdMap Project Areas (PSU)
- Future DOGAMI geologic mapping targets
- Stream centerline
- Boundary of the Harney hydrologic basin
- Highway 78 State 95 Federal

GW Study – New Data

- USGS Compilation Geologic Mapping



GW Study – New Data

- Drilled 9 Observation Wells at 5 sites to date, plus cleaned and retrofitted 4 more.



GW Study – New Data

- Core Samples and Cuttings Analysis



GW Study – New Data

- Stable Isotope and Aqueous Geochemistry



GW Study – New Data

- Seepage Runs (Surface Water Gain/Loss)



GW Study – New Data

- Two Eddy Covariance Stations Installed

Native Vegetation Site:

<https://www.wrcc.dri.edu/cgi-bin/rawMAIN.pl?orolwn>



Alfalfa Center Pivot Site:

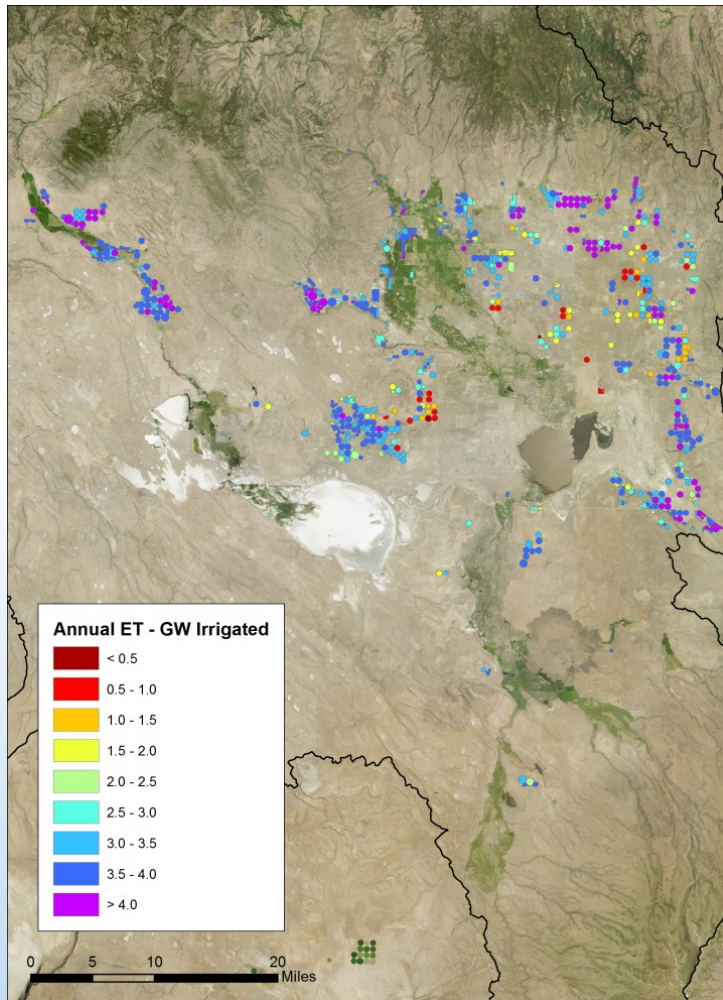
<https://wrcc.dri.edu/cgi-bin/rawMAIN.pl?orocrn>



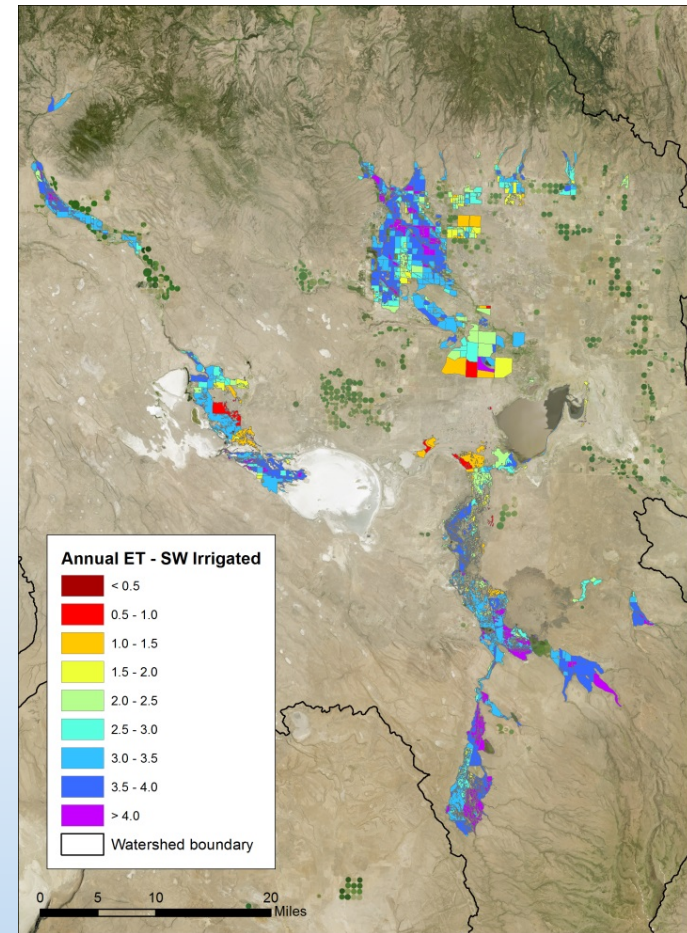
GW Study – New Analysis

- Field Averaged Annual Total ET (ft) - 2016

Groundwater Irrigated Fields

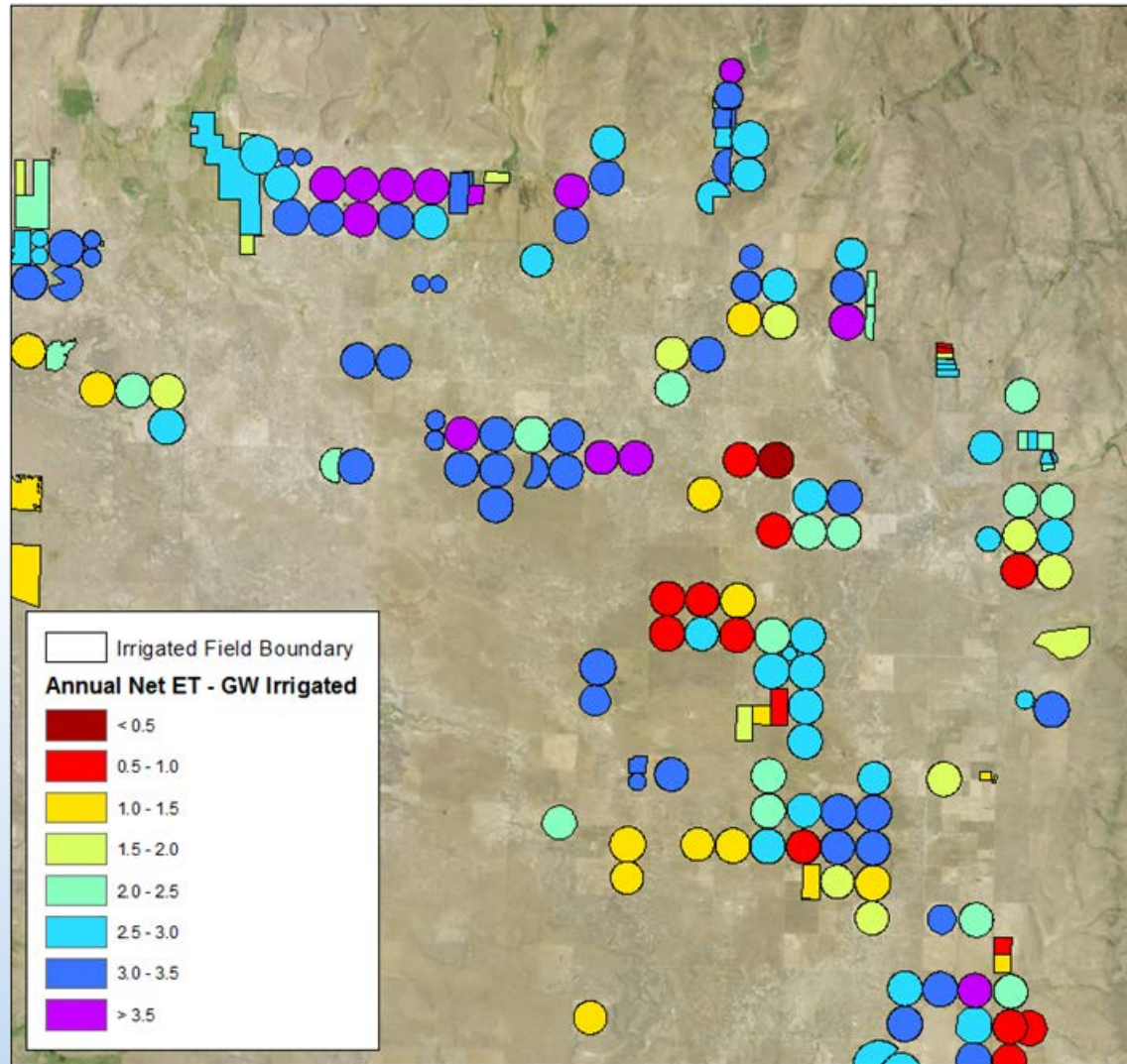


Surface Water Irrigated Fields
+ Refuge



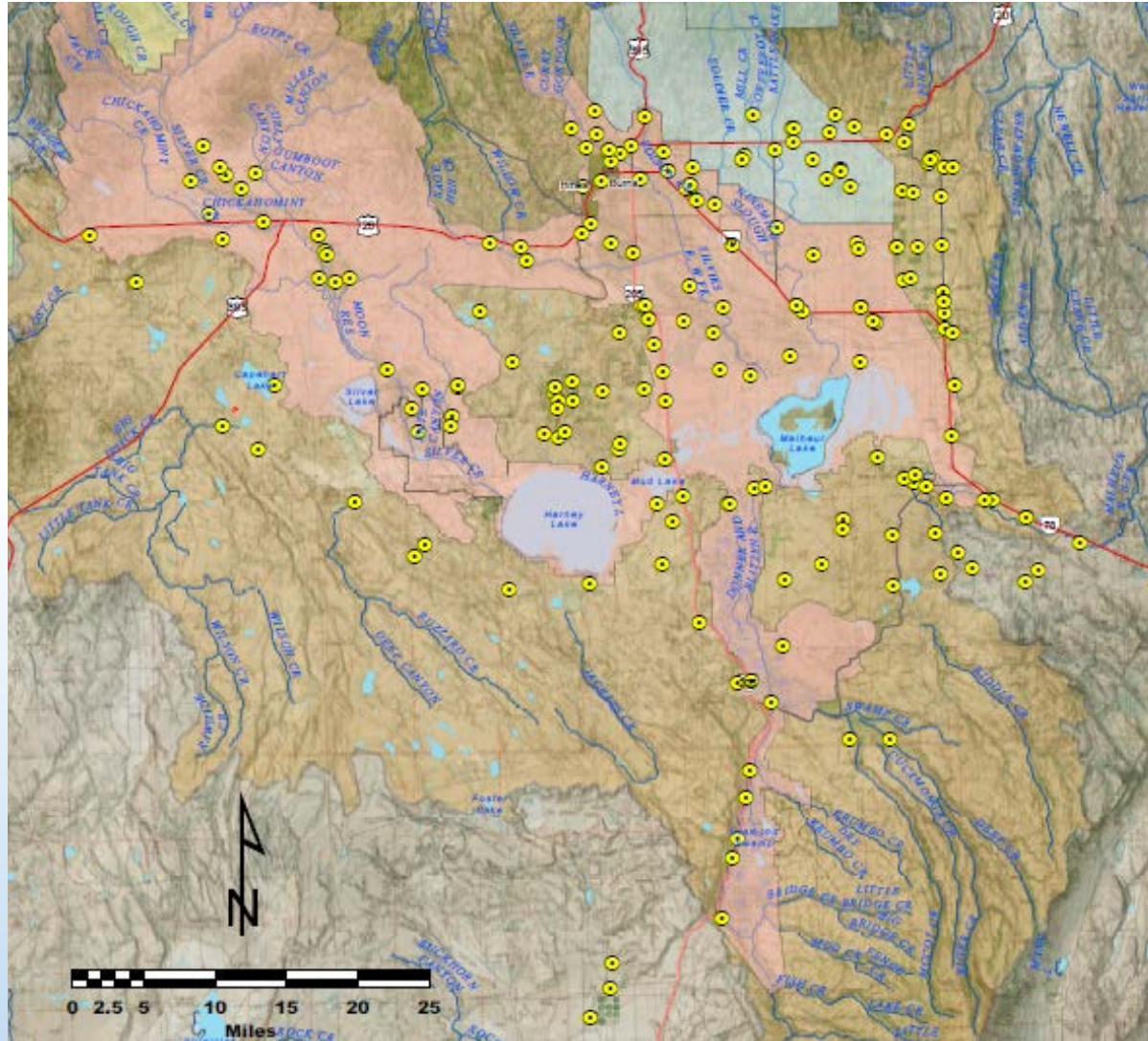
GW Study – New Analysis

- Field Averaged Annual Total ET (ft) - 2016



GW Study – Additional Data

- LiDAR and Obs. Well Elevation Survey



GW Study – Next Steps

- Transitioning from data collection to data analysis – final report by 2020

		CY 2016		CY 2017				CY 2018				CY 2019				CY 2020				CY 2021							
		FY 16		FY 17				FY 18				FY 19				FY 20				FY 21							
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Hydrologic Budget																											
Estimate GW discharge to wells (transient)	OWRD																										
Estimate GW use	OWRD																										
Link GW use to wells	OWRD																										
Link wells to hydrogeologic units	Both																										
Assign water use to wells	OWRD																										
Determine period of use	OWRD																										
Estimate GW discharge to streams	USGS																										
Seepage runs	Both																										
Hydrograph analysis	USGS																										
Evaluate alternate potential methods of estimating discharge to streams	Both																										
Estimate GW discharge to springs, lakes, wetlands	USGS																										
Compile existing data	USGS																										
Collect new measurements	Both																										
Estimate ET loss	USGS																										
Recharge (transient)	USGS																										
Review literature	USGS																										
Determine appropriate approach (SWB, PRMS, mass-balance, water-level response)	USGS																										
Implement recharge analysis	USGS																										
From precipitation	USGS																										
From irrigation	USGS																										
From surface water (streams, canals)	USGS																										
Determine mountain front recharge component	USGS																										
Evaluate possible interbasin flow	USGS																										
Write report to synthesize understanding of groundwater-flow system	Both																										