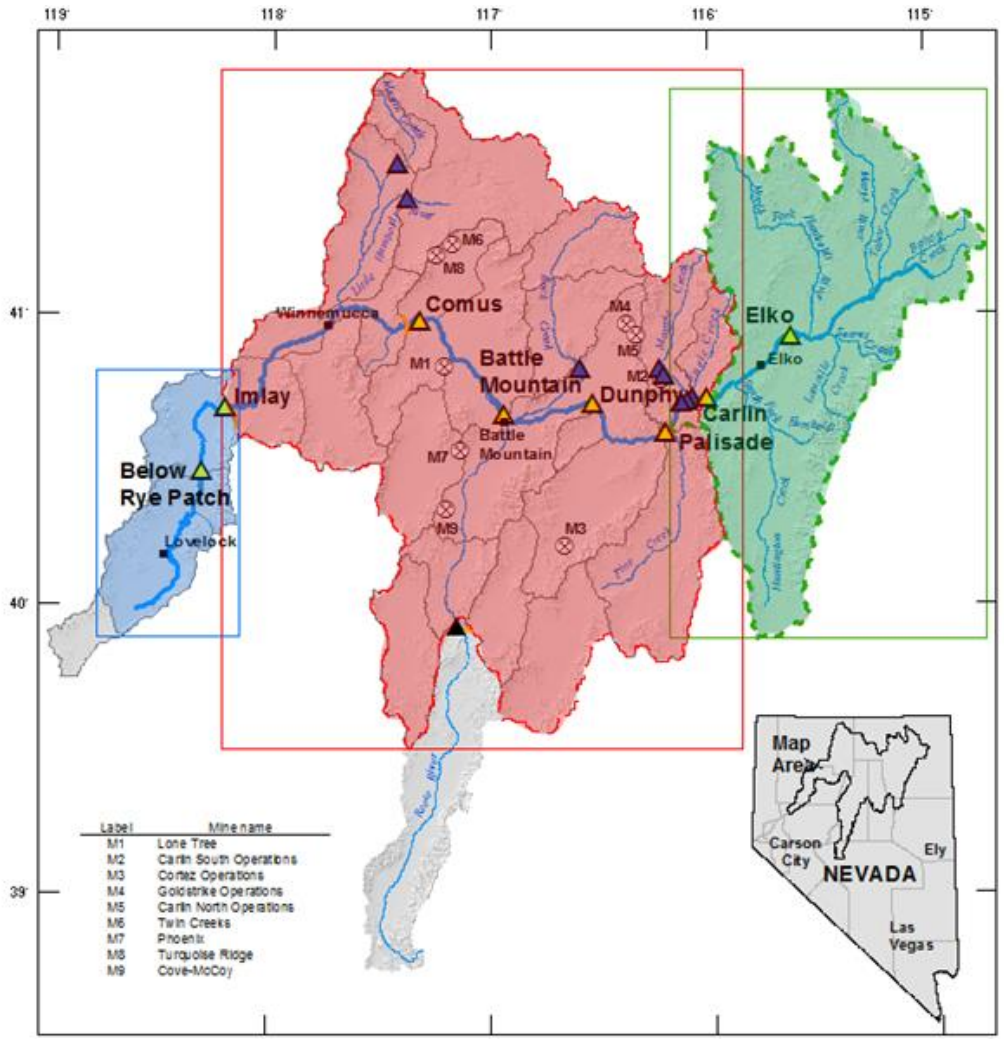


NEVADA DIVISION OF WATER RESOURCES

Nevada Department of CONSERVATION & NATURAL RESOURCES

Water Issues in the Humboldt River Basin - NDWR Perspective

Nevada Water Resources Assoc. Fall Symposium

September 20, 2022 Reno NV

Kip Allander & Jon Benedict

Hydrogeologists

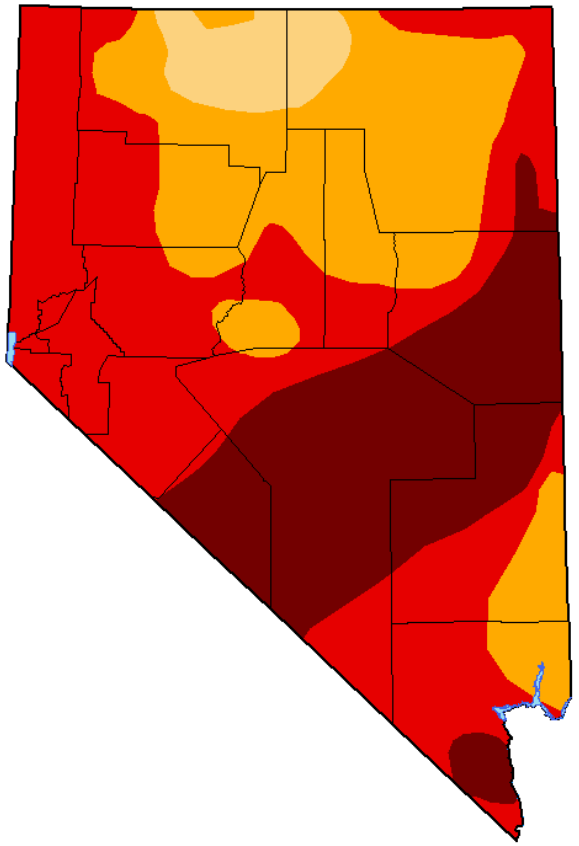
Water Issues in the Humboldt River Basin from DWR Perspective - Outline

- Intro and other NDWR updates
- Water resource conditions and status
- Capture model study update
- Implementation of Order 1329
- Moving forward with Conjunctive Management Framework

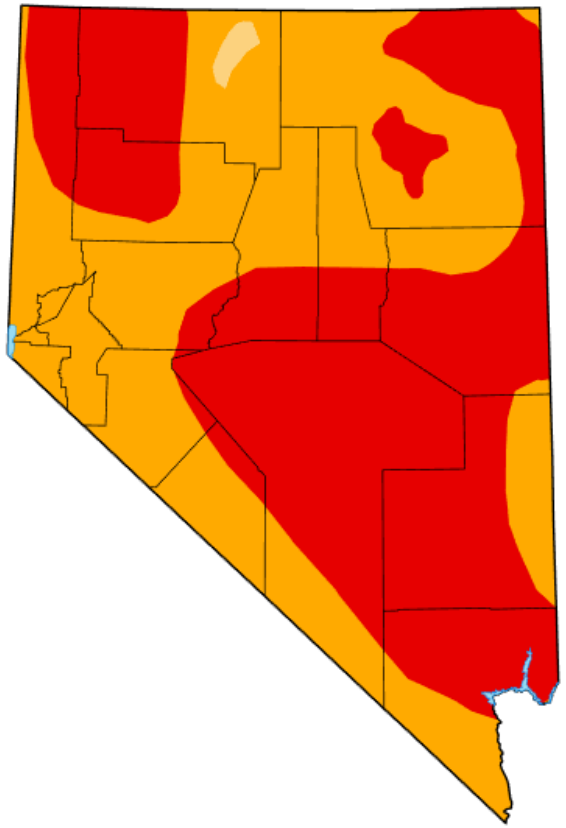
Repairs at South Fork Dam nearing completion

U.S. Drought Monitor - Nevada

Sept 7, 2021



Sept 8, 2022



Map released: Thurs. September 8, 2022

Data valid: September 6, 2022 at 8 a.m. EDT

Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

Authors

United States and Puerto Rico Author(s):
David Simeral, Western Regional Climate Center

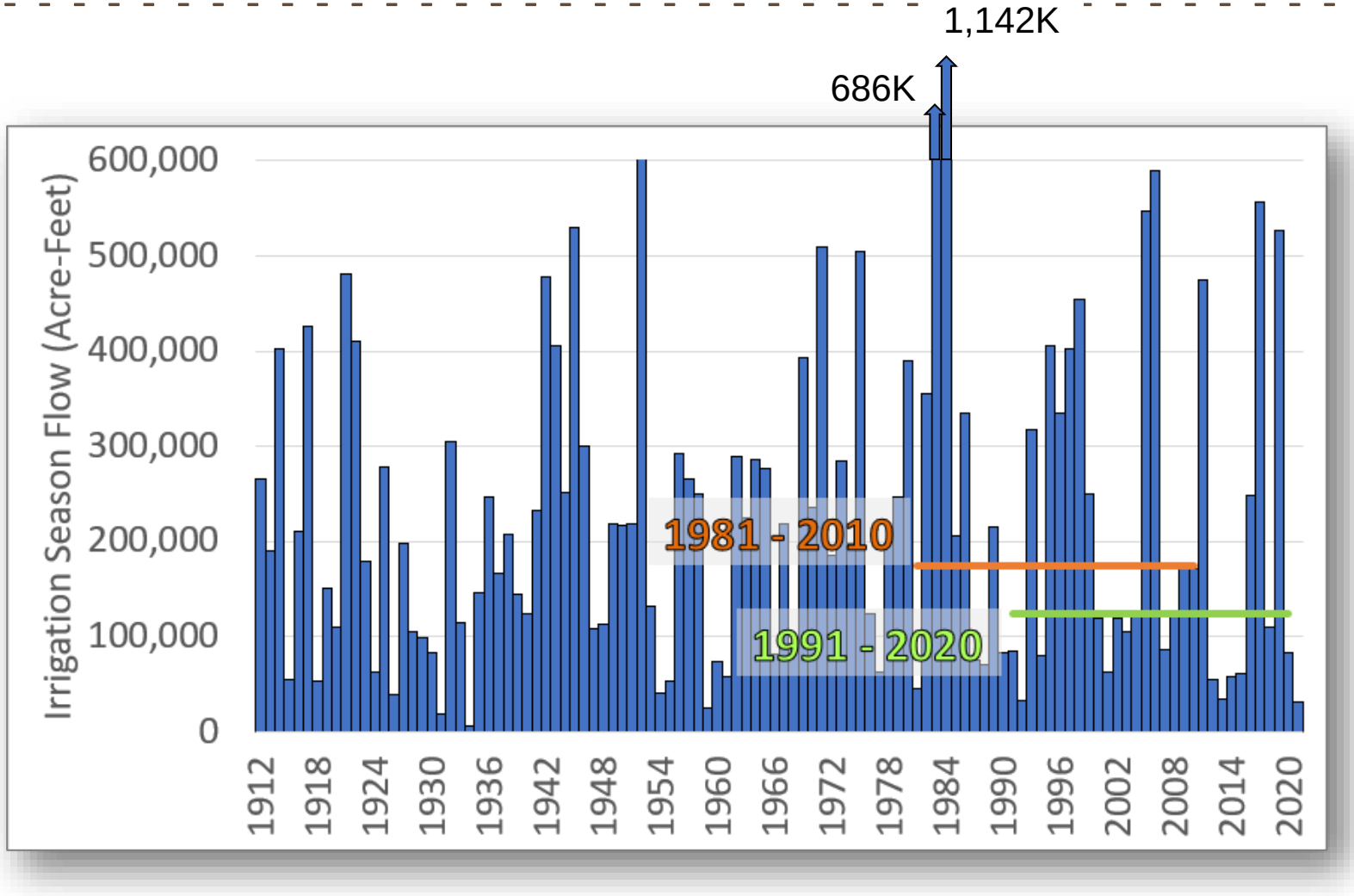
Pacific Islands and Virgin Islands Author(s):
Curtis Riganti, National Drought Mitigation Center

The Drought Monitor focuses on broad-scale conditions.

https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?NV

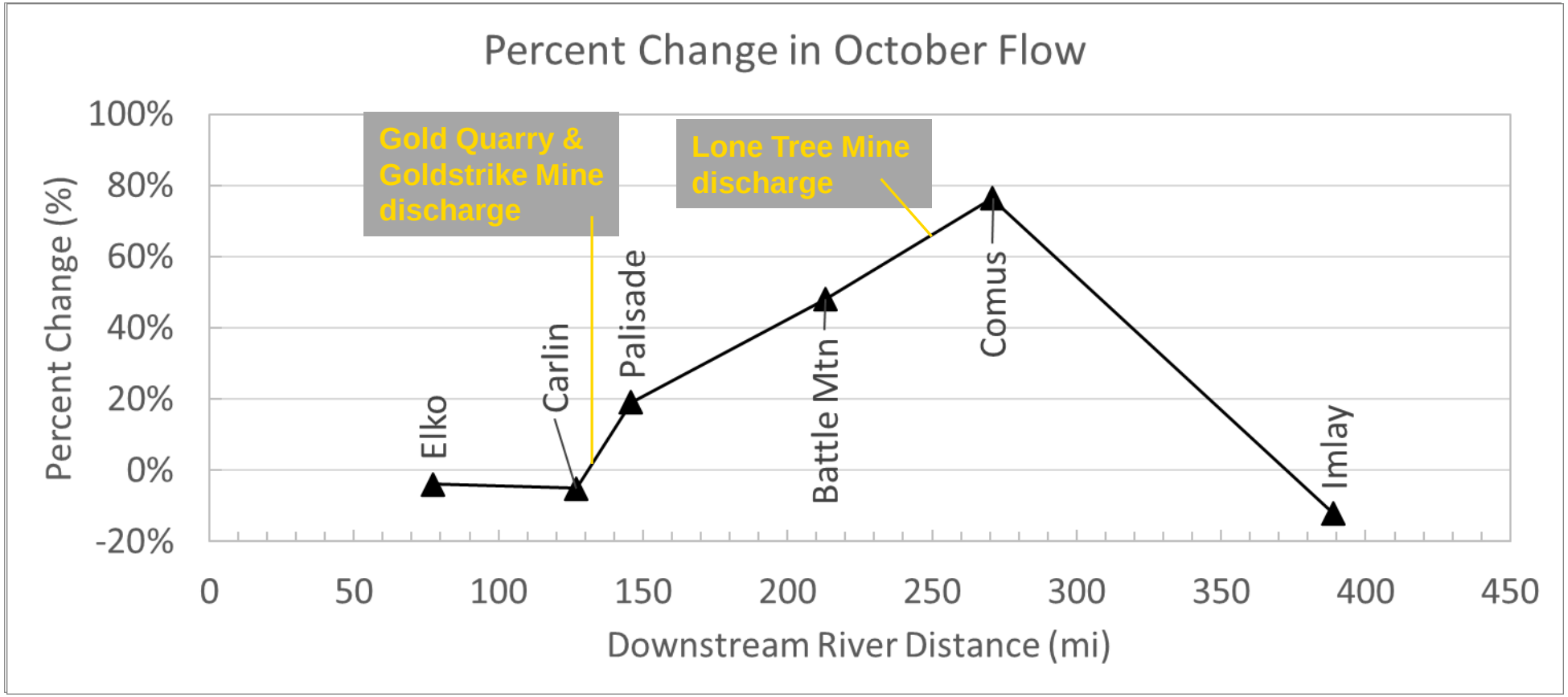
Irrigation Season Flow at Palisade

50,000 acre-feet less median flow during 1991 – 2020 period than during 1981 – 2010 period.



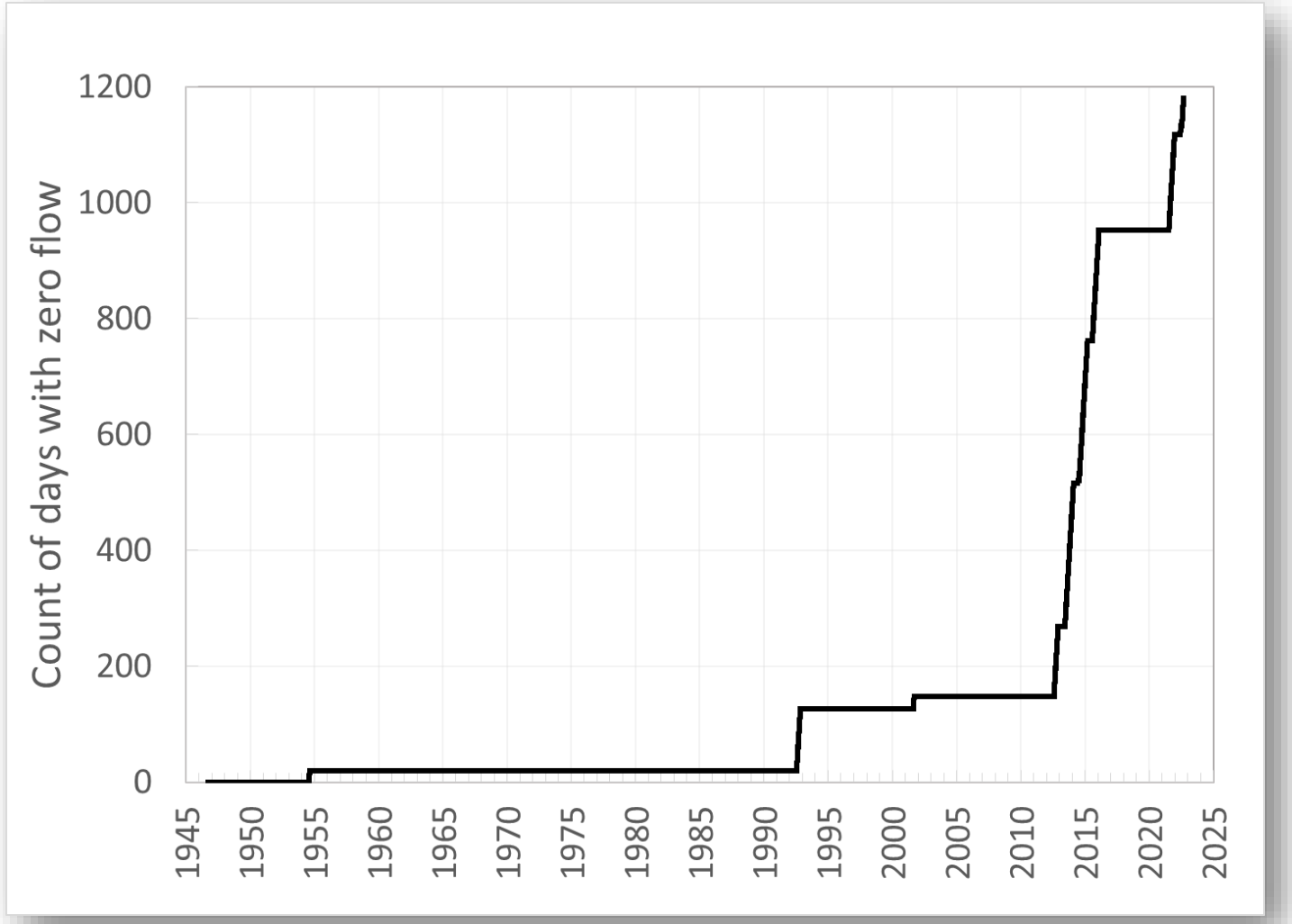
October Baseflows along main stem comparing periods

1945 – 1980 & 1992 – 2021



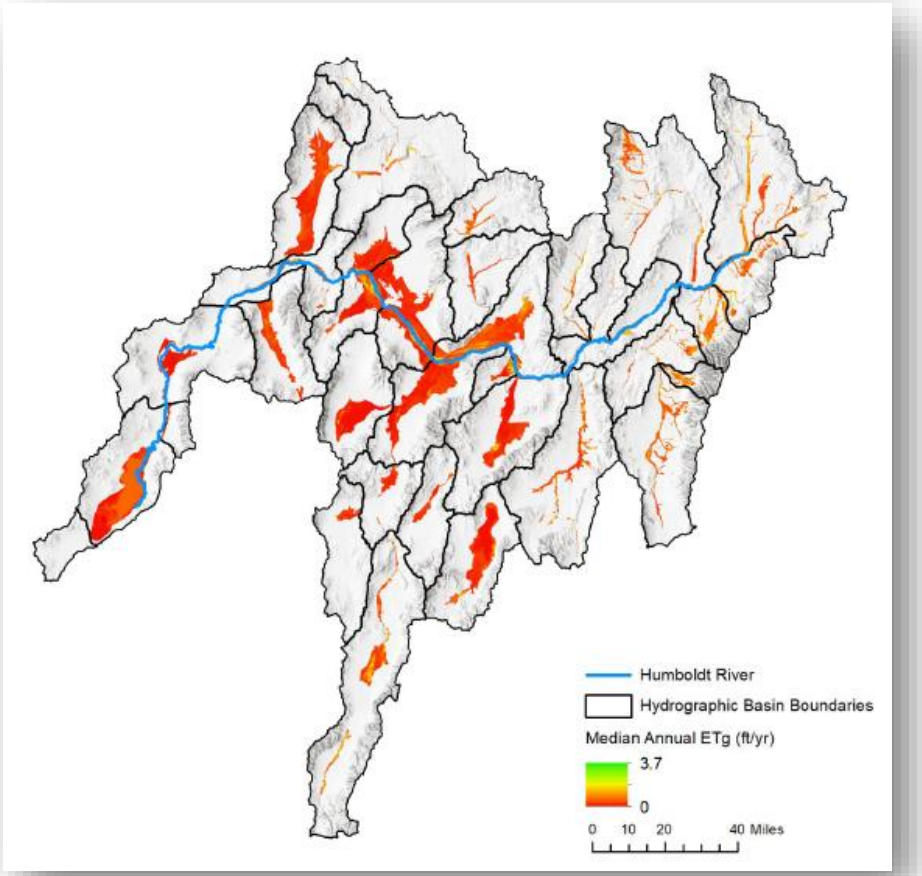
Imlay Gage - Cumulative zero flow days since 1945

Humboldt River at Imlay is increasingly intermittent during drought periods.

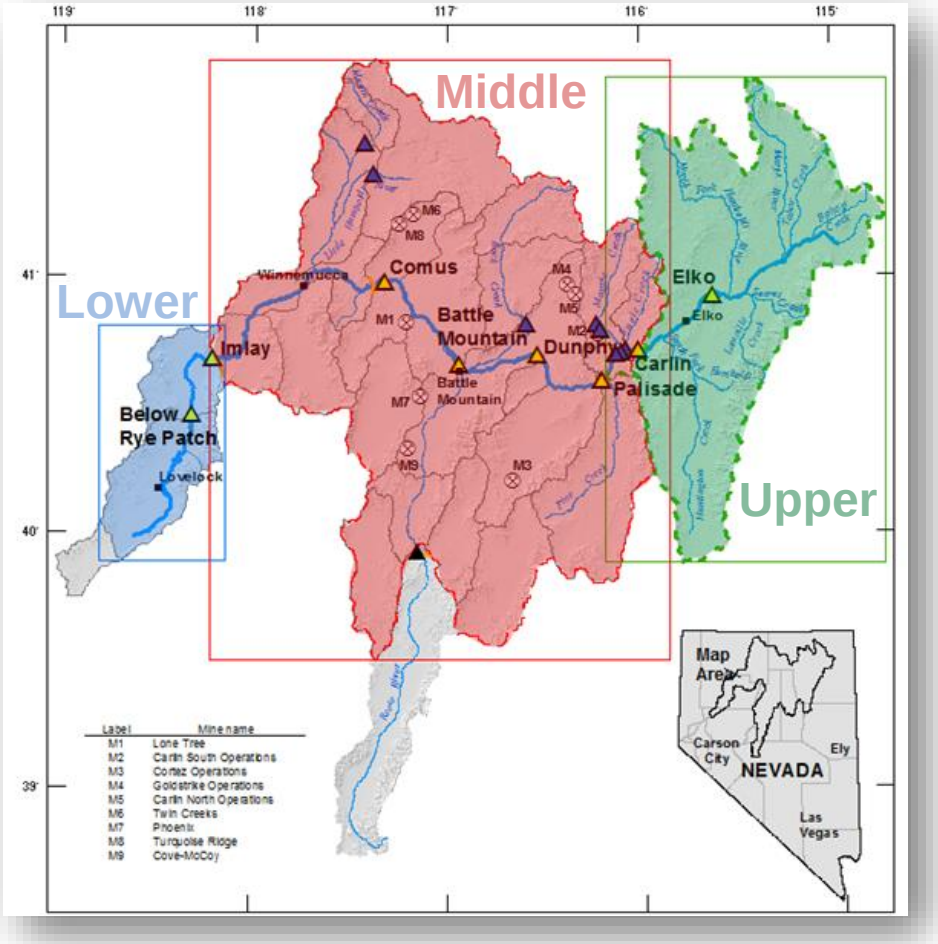


Capture Model Study Update

Regional Evapotranspiration Study



Capture Studies



*** Model results are provisional and subject to change***

Groundwater Discharge via Evapotranspiration

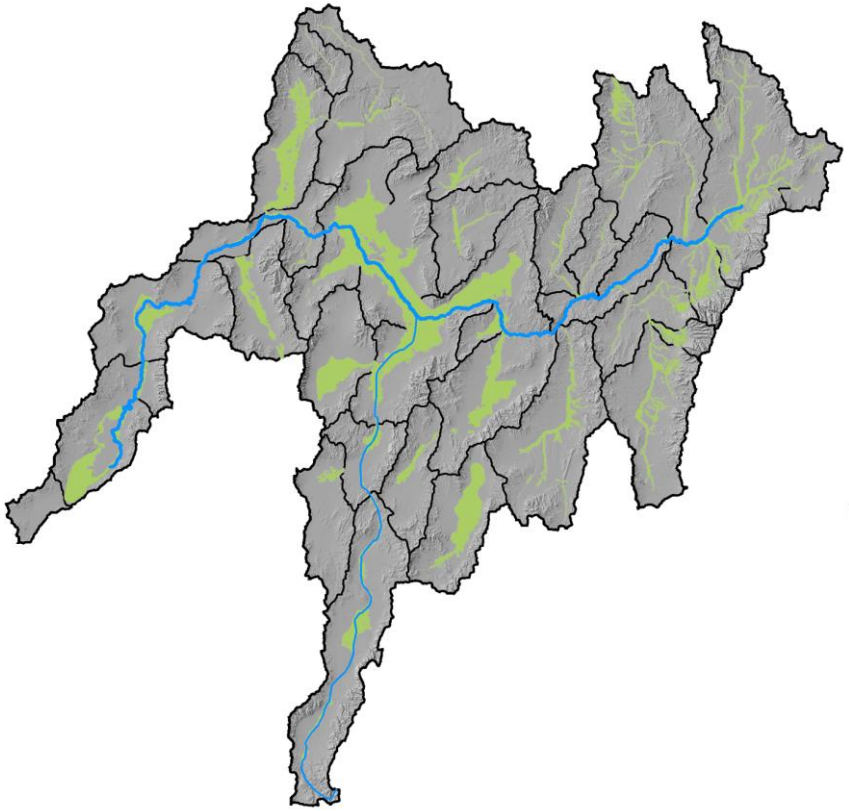
Paradise Valley, NV

Justin Huntington, Research Professor, Hydrology

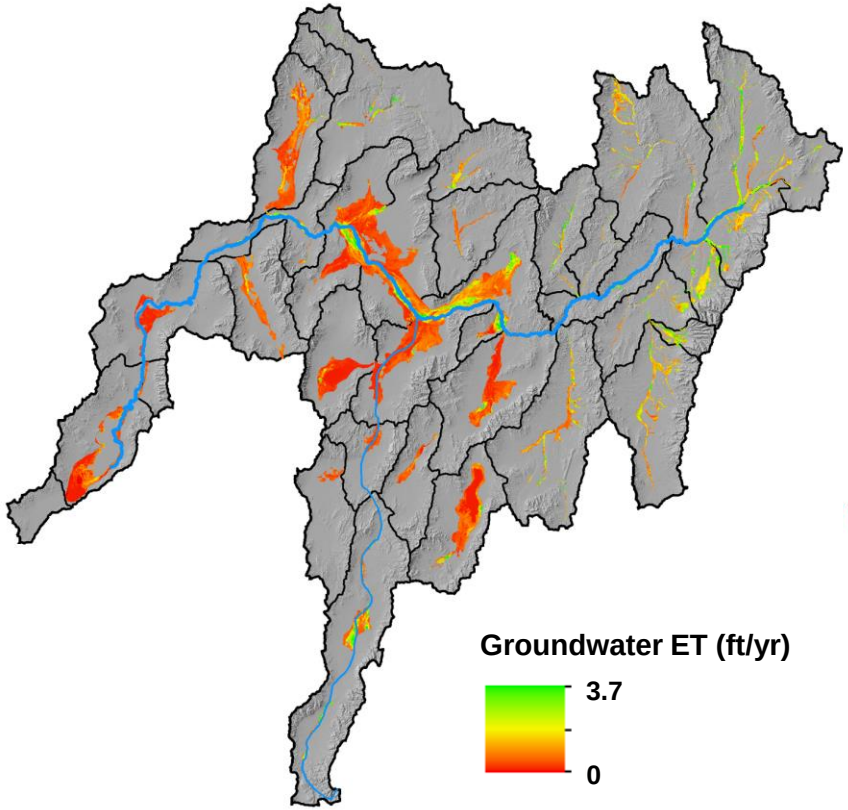
DRI
Desert Research Institute

Evapotranspiration Discharge

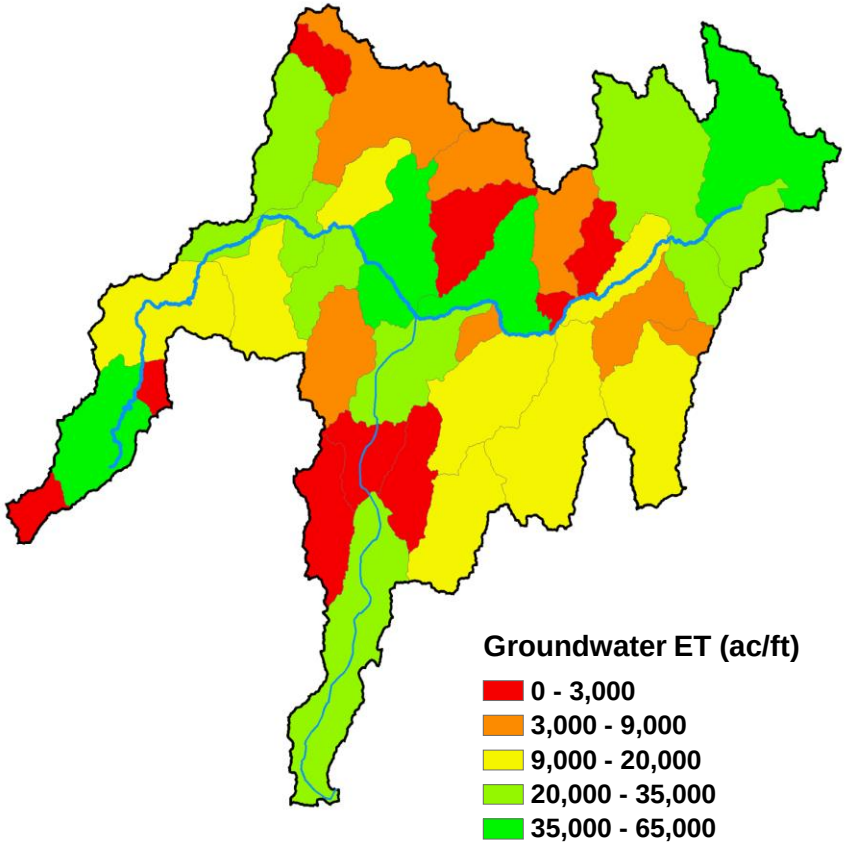
Potential areas of GW discharge



Groundwater ET



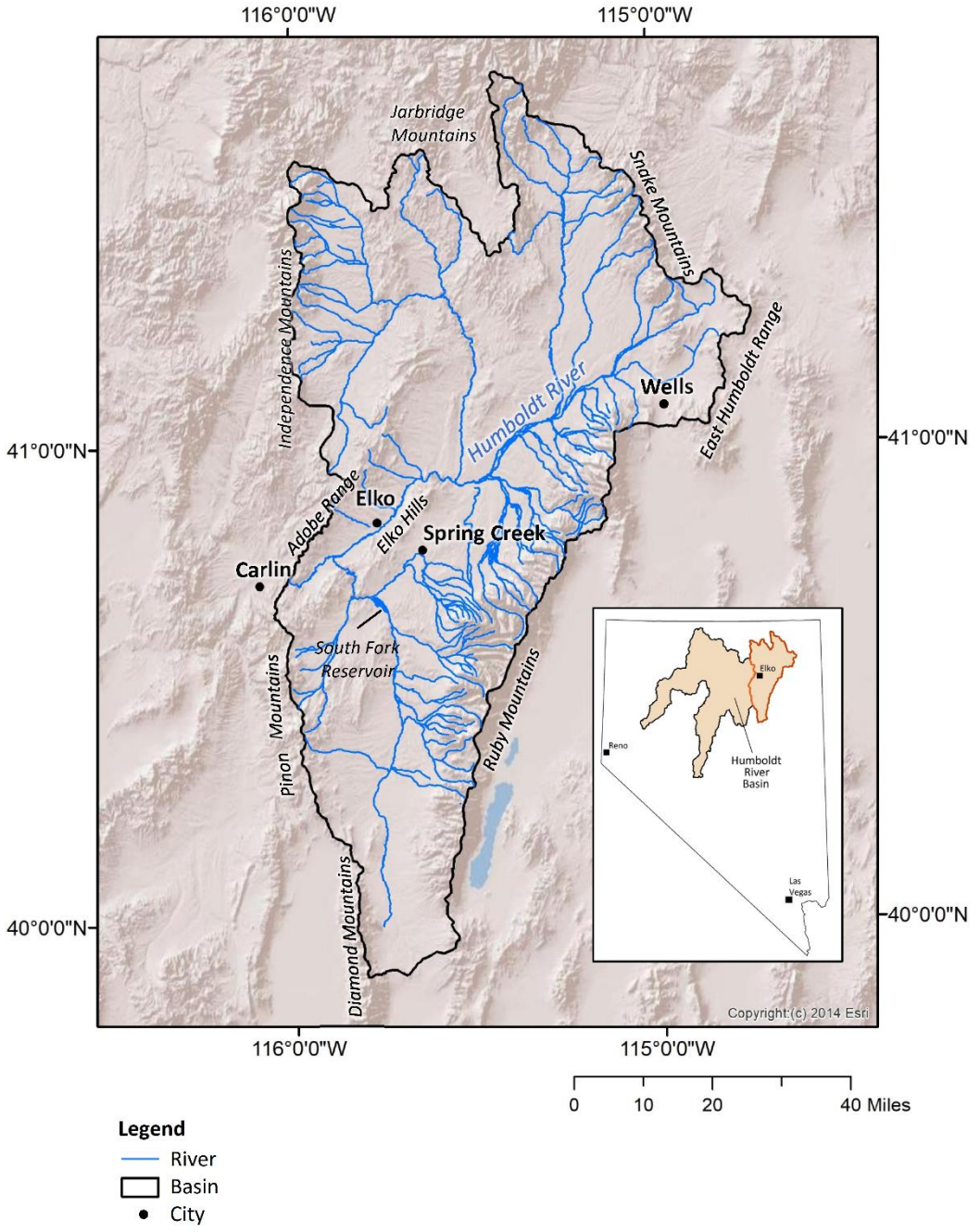
Groundwater ET



Upper Humboldt River Capture Model

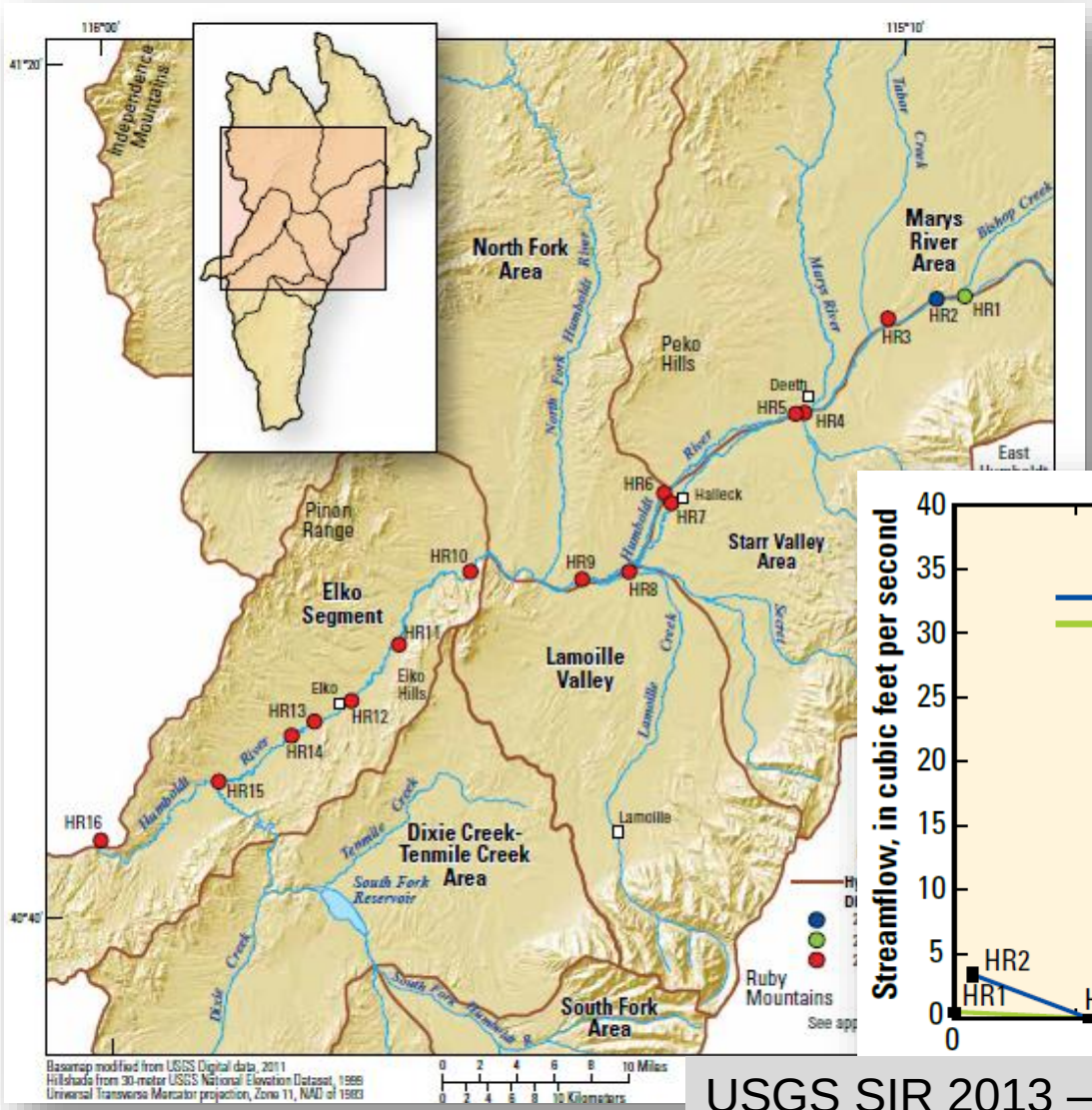
Rosemary Carroll

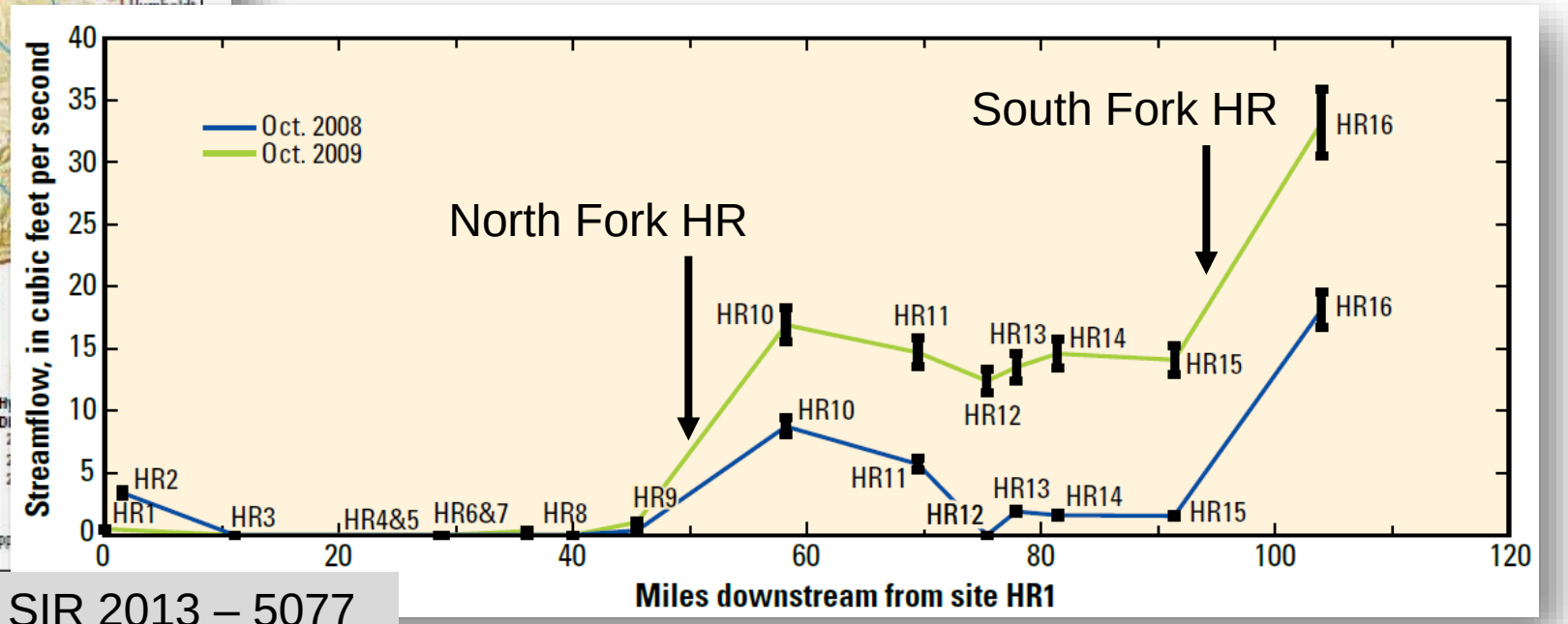
Desert Research Institute



Significant Finding

Baseflow of the Upper Humboldt River during late season (October) is mainly supported by North and South Fork Humboldt River Tributaries





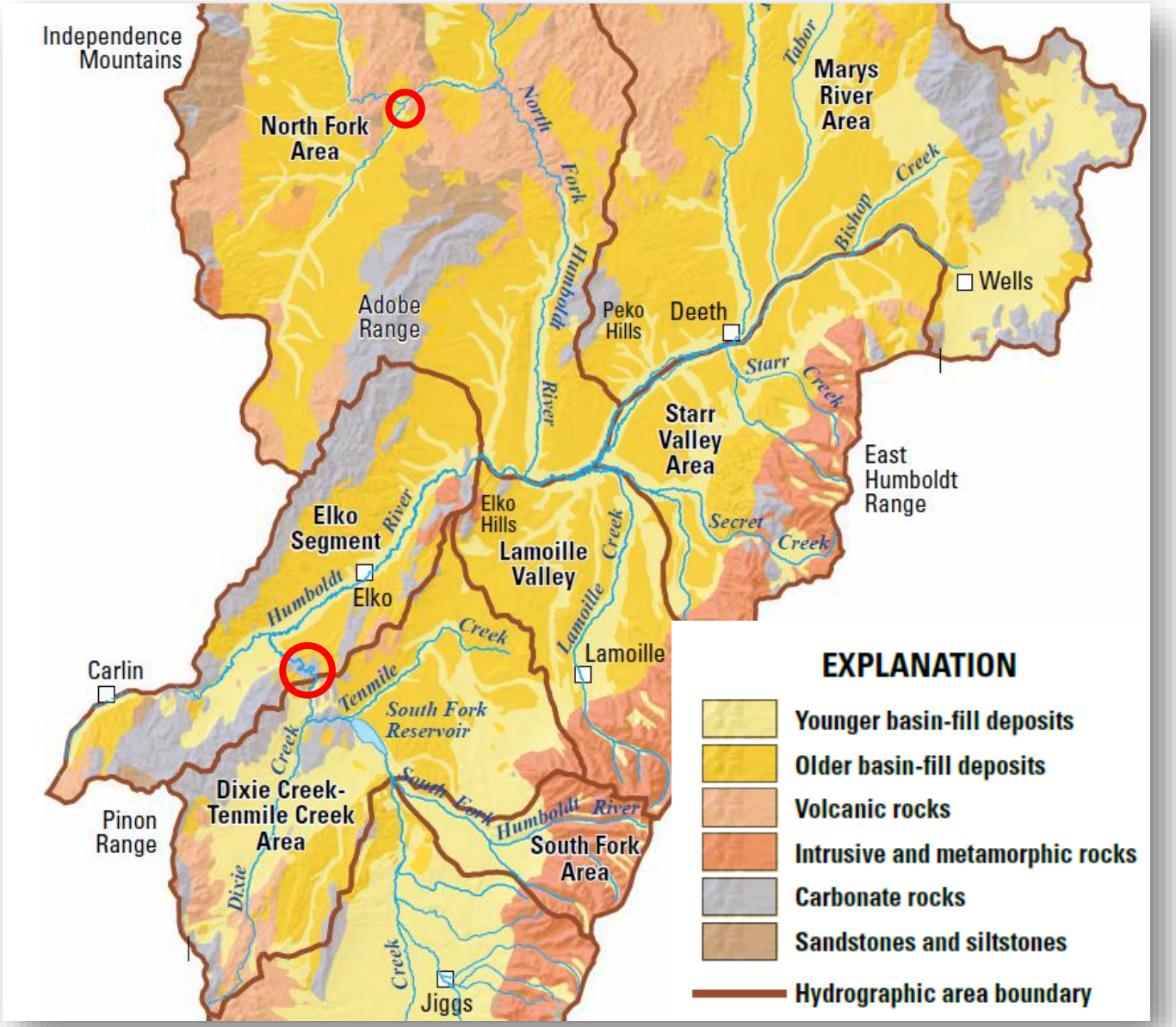
USGS SIR 2013 – 5077

Significant Finding (continued)

Baseflow of the Upper Humboldt River during late season (October) appears to be largely originating from Carbonate Rock aquifer.

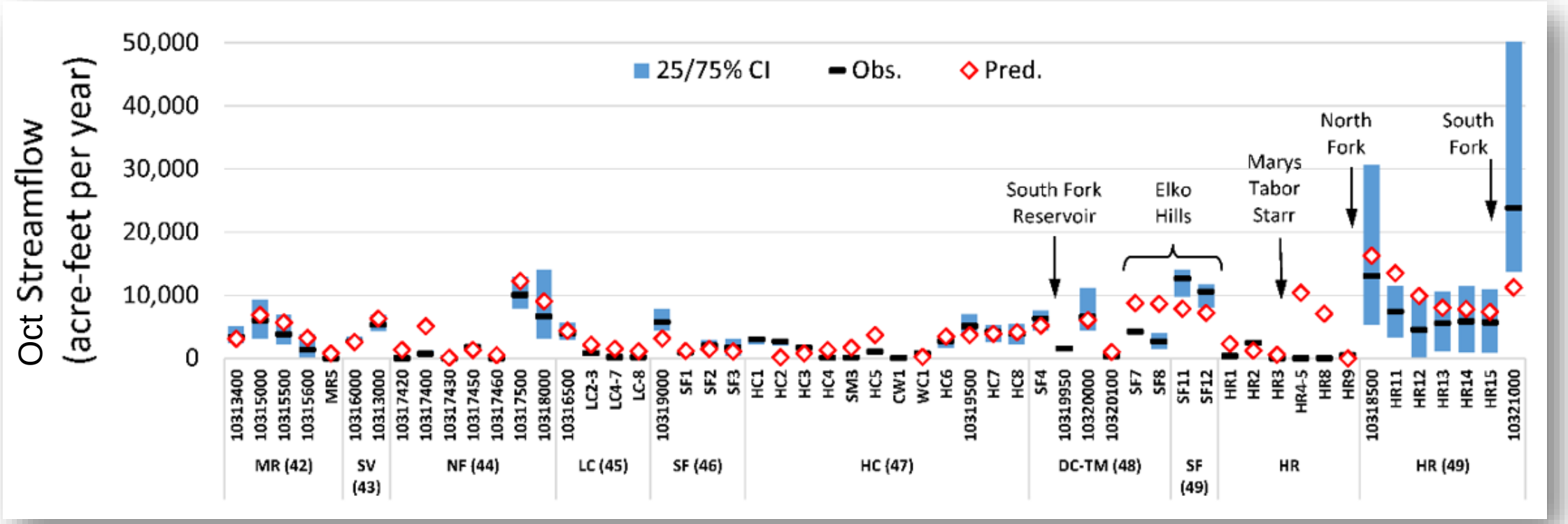
This is a significant revision to conceptual understanding of Upper Humboldt Flow system.

USGS SIR 2013 – 5077

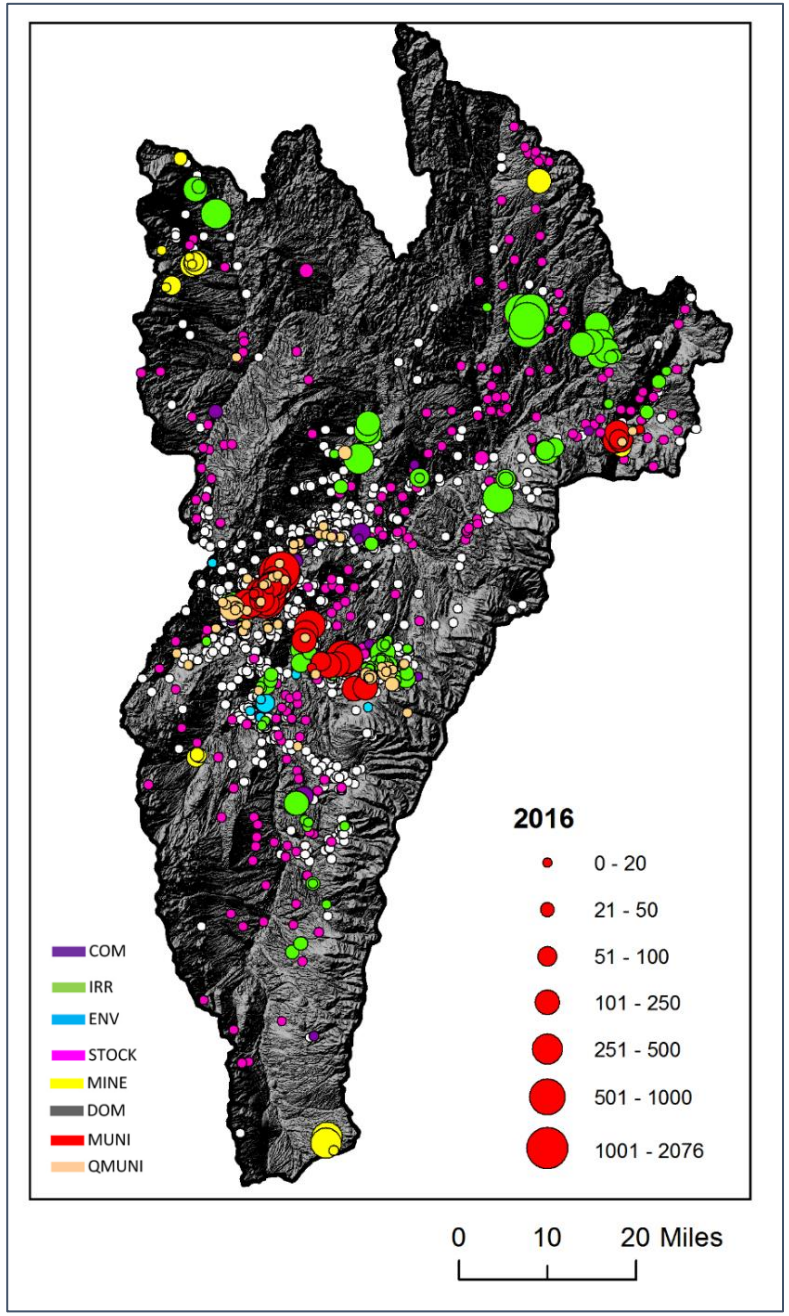


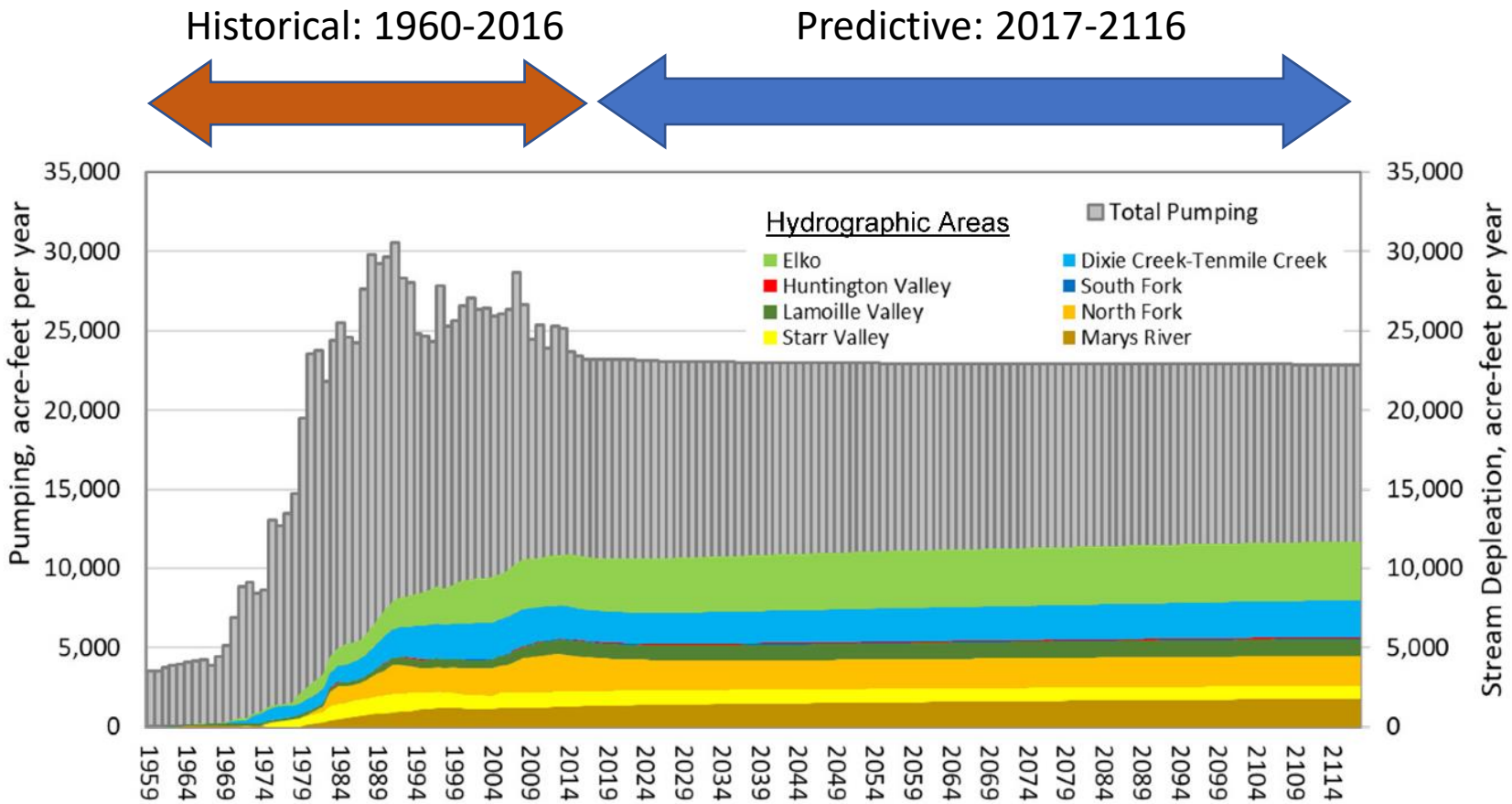
Implications

Model framework, design, and calibration assumed October flow sourced from alluvial aquifer system.



Estimated Historical and Predicted Stream Capture for Upper Humboldt River





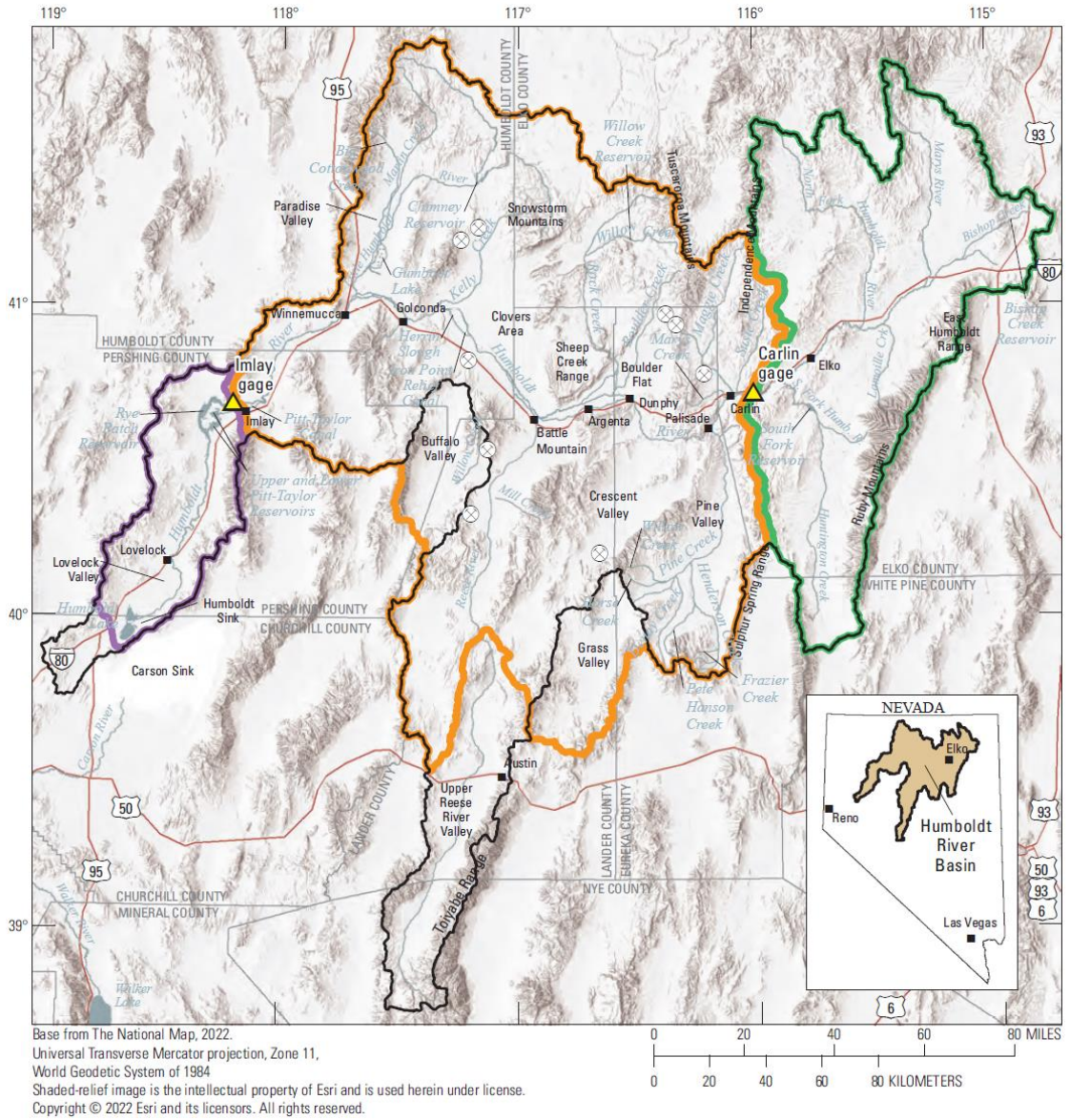
Greater uncertainty associated with capture estimates due to revision of conceptual model.

Middle Humboldt Capture Model

Middle Humboldt Team:

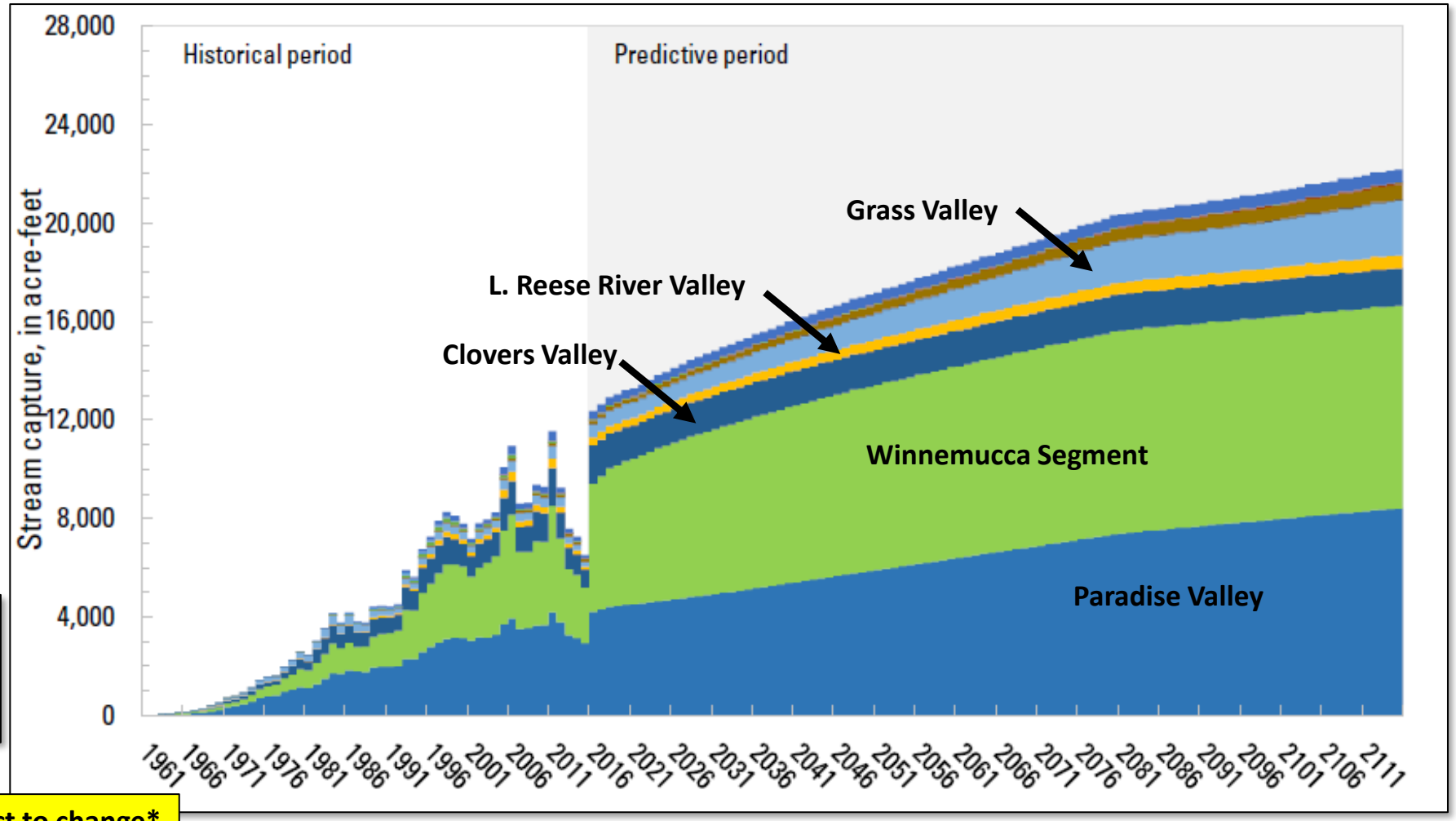
Kyle Davis, William Eldridge
USGS, Nevada Water Science Center

Kip Allander, NDWR



All model results are provisional and subject to change

Stream Capture: From Non-Mining Pumping

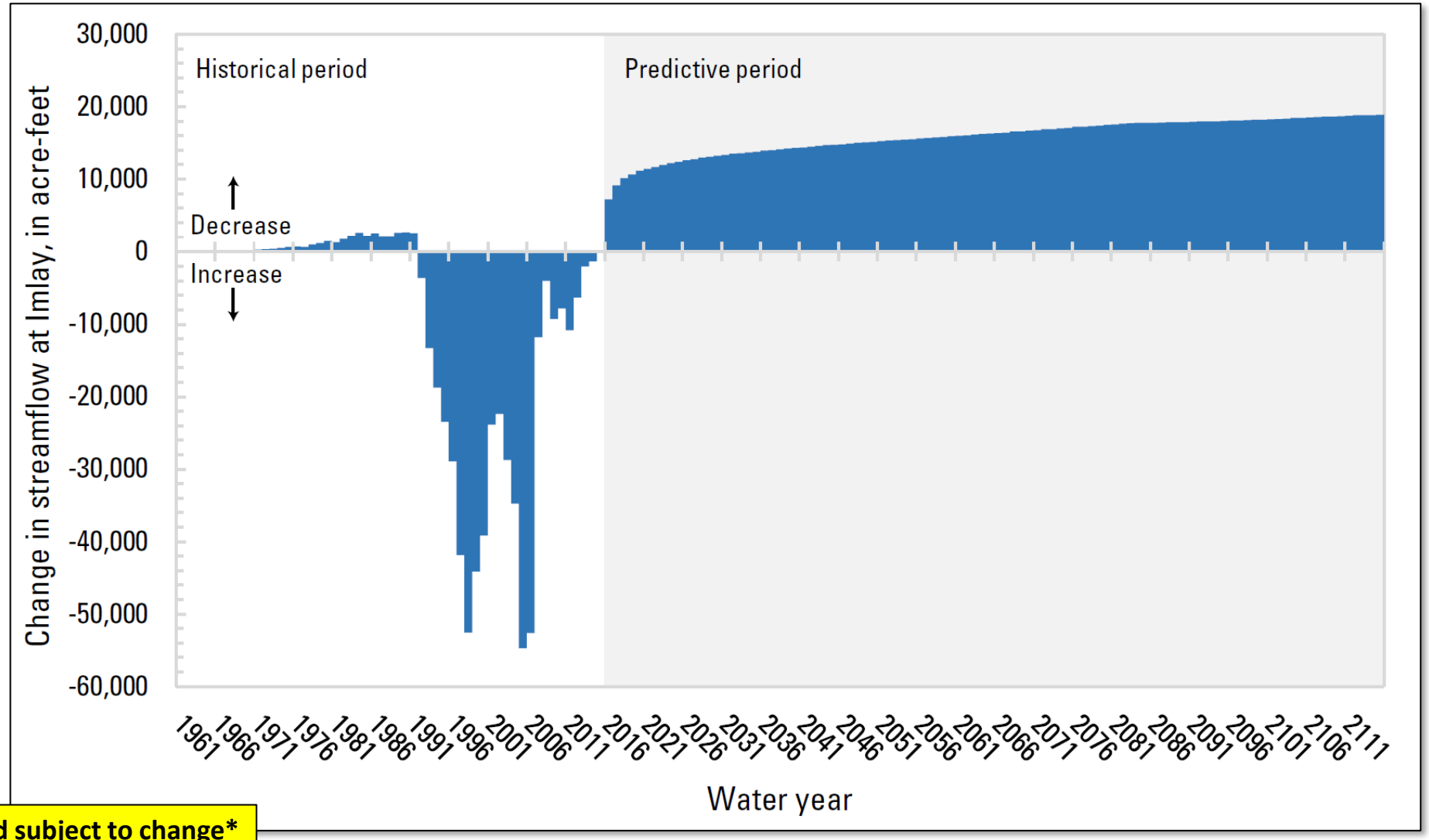


Explanation

- HA069 Paradise
- HA059 Lower Reese
- HA067 Little Humboldt
- HA061 Boulder Flat
- HA060 Whirlwind
- HA070 Winnemucca
- HA071 Grass Valley
- HA065 Pumpernickel
- HA054 Crescent Valley
- HA064 Clovers Area
- HA066 Kelley Creek
- HA058 Middle Reese
- HA057 Anetlope Valley

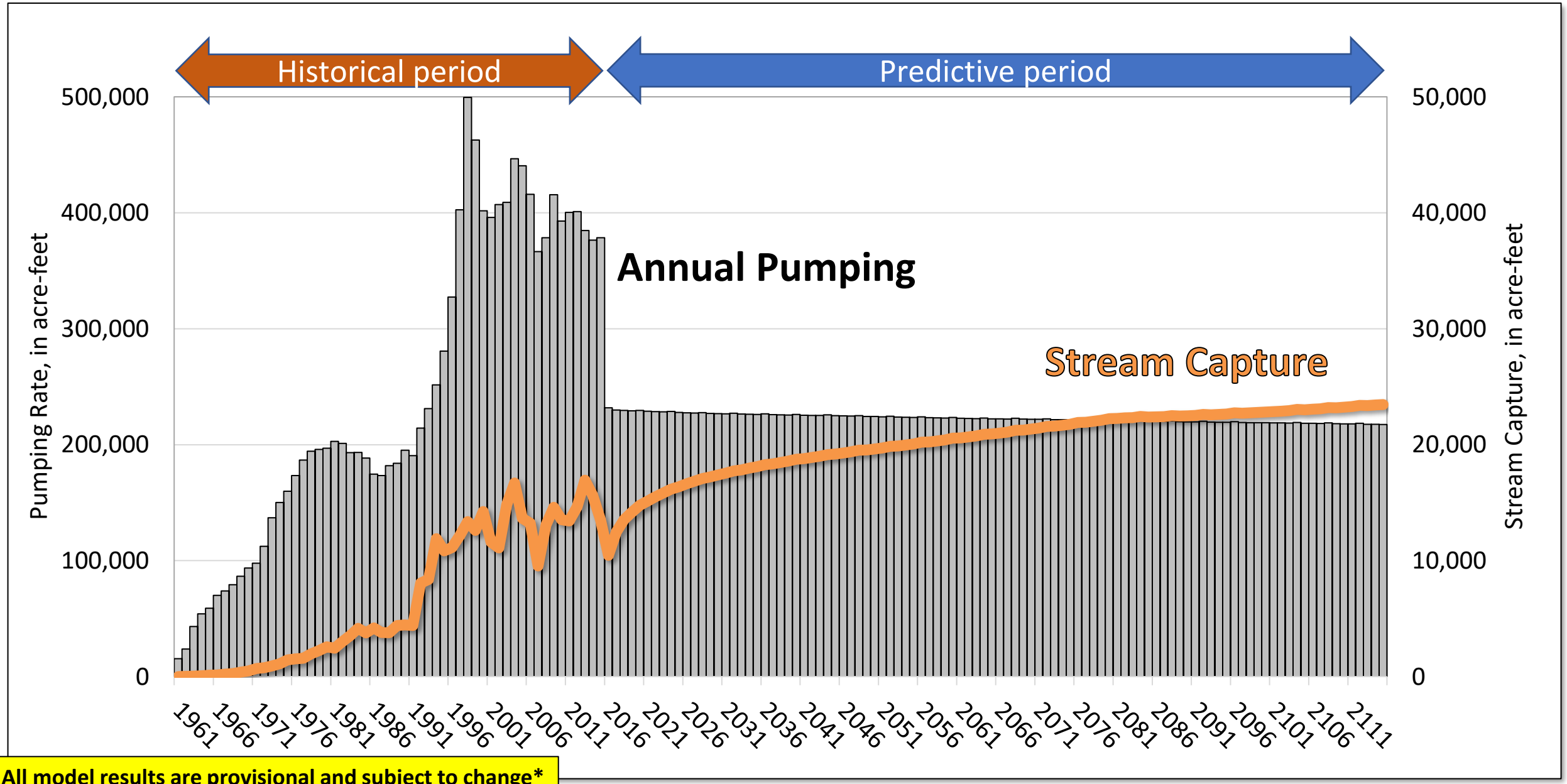
All model results are provisional and subject to change

Change in Streamflow at Imlay: Mining Operations and All Other Pumping



All model results are provisional and subject to change

Groundwater Pumping and Stream Capture



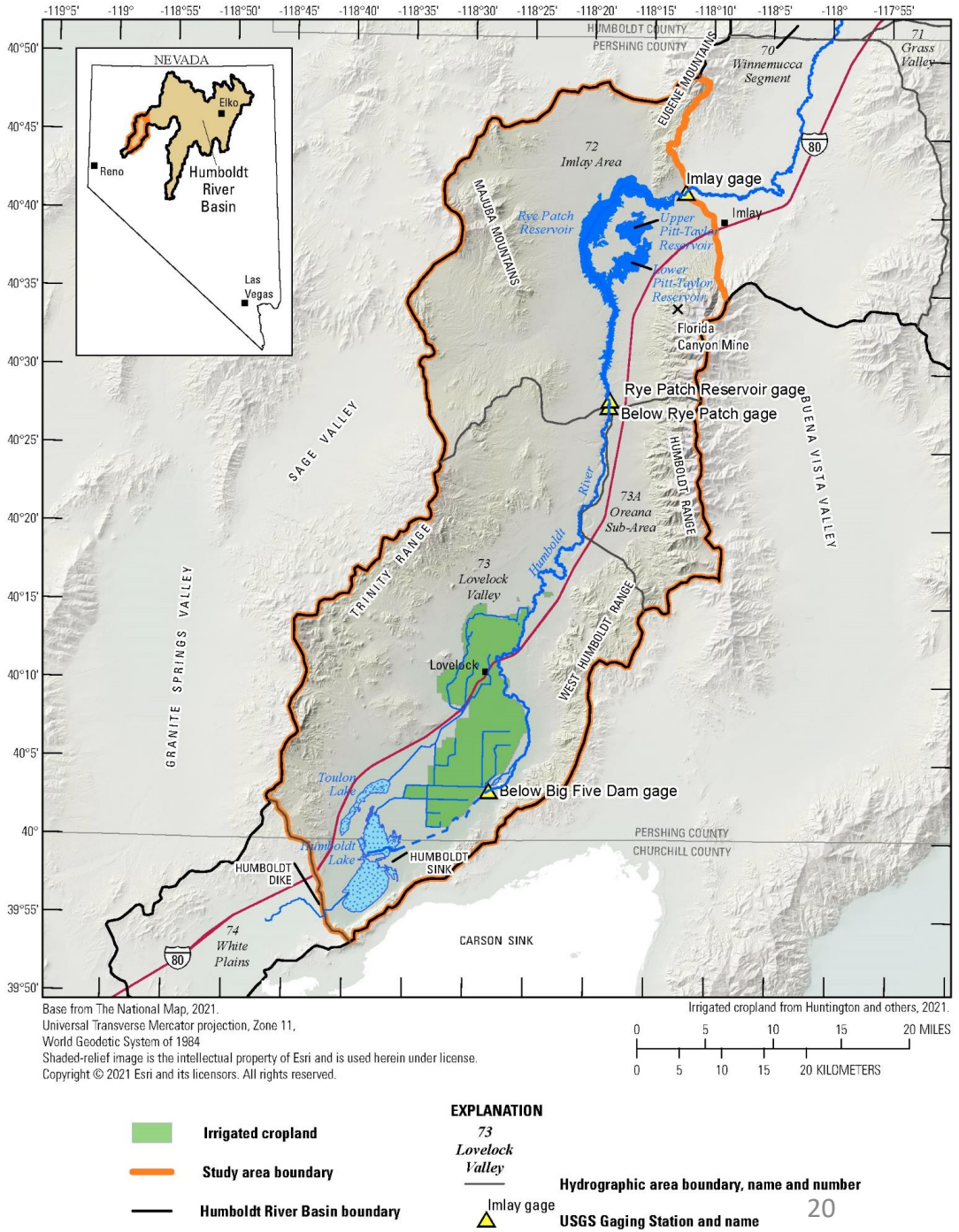
All model results are provisional and subject to change

Lower Humboldt Capture Model

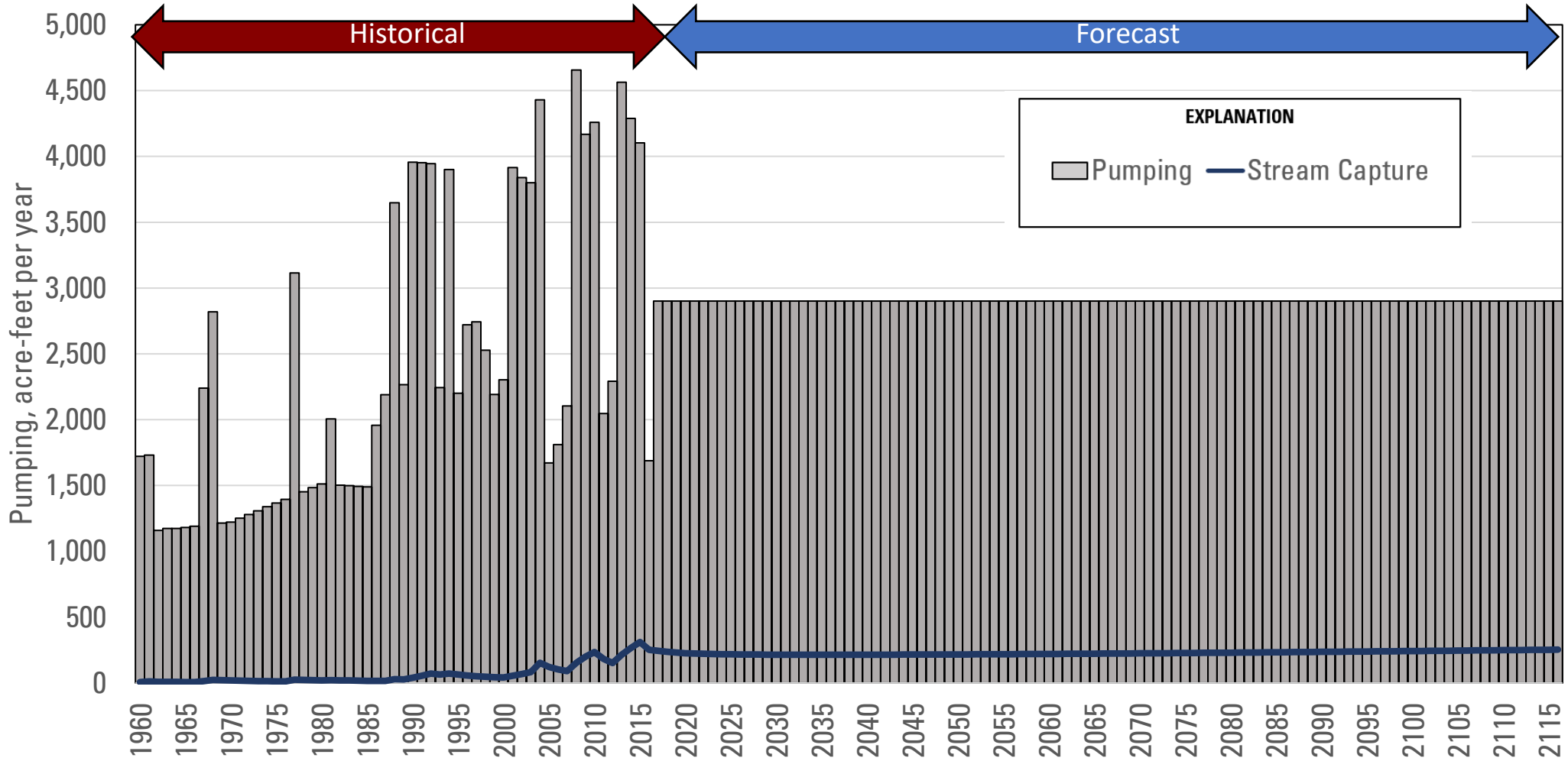
Cara Nadler, USGS

Suzan Rybarski,

Desert Research Institute



Estimated Historical and Predicted Stream Capture for Lower Humboldt River



*** Model results are provisional and subject to change***

Humboldt Capture study progress summary

Product	Status	Web Address or Target completion date
GW discharge from Humboldt with Tabular and GIS Data sets	Completed	https://www.dri.edu/humboldt-etg
Upper Humboldt & Model	Addressing Final Review	End of 2022
Middle Humboldt & Model	Technical review	1st quarter of 2023
Lower Humboldt & Model	Editorial review	End of 2022
Lower Humboldt Aquifer Test	Completed	https://doi.org/10.3133/ofr20191133
Humboldt Capture Query Tool	Mostly Complete	1st quarter of 2023
Supporting Data Sets & Products	Mostly Complete	Summarized on next slide

Humboldt Published Data Products

Damar, N.A., 2018, Geospatial Data for the Northern Nevada Rift: U.S. Geological Survey data release, https://doi.org/10.5066/F7SN0869 (Bulletin 2218 2-km pre-cenozoic basement)

Hess, G.W., Plume, R.W., and Arthur, J.M., 2018, River Channel Cross-Sections, Middle Humboldt River, North-Central Nevada: U.S. Geological Survey data release, https://doi.org/10.5066/F73X85WM (WRIR 2001-4231)

Medina, R.L., 2021, Geospatial data for Gumboot Lake extents from the report Effects of ground-water development on the water regimen of Paradise Valley, Humboldt County, Nevada, 1949-1968 and Hydrologic Reconnaissance of the Tributary Areas: U.S. Geological Survey data release, https://doi.org/10.5066/P9LH1B95

Nadler, C.A., Supplemental data for analysis of aquifer framework and hydraulic properties of Lovelock Valley, Lovelock, NV: U.S. Geological Survey data release, https://doi.org/10.5066/P9LIL7PZ.

Smith, J.L., Warmath, Eric, and Medina, R.L., 2017, Groundwater discharge areas for the 14 hydrographic areas in the middle Humboldt River Basin, north-central Nevada: U.S. Geological Survey data release, https://doi.org/10.5066/F72805TT (WRIR 2000-4168: Groundwater discharge areas.)

Smith, J.L., Welborn, T.L., and Medina, R.L., 2017, Evapotranspiration units and potential areas of groundwater discharge delineated July 20–24, 2009 in the upper Humboldt River Basin, northeastern Nevada: U.S. Geological Survey data release, https://doi.org/10.5066/F7668BN7 (SIR 2013-5077).

Plume, R.W., and Medina, R.L., 2019, Data for the report Hydrogeologic framework and ground-water levels, 1982 and 1996, middle Humboldt River basin, north-central Nevada (U.S. Geological Survey Water-Resources Investigations Report 98-4209): U.S. Geological Survey data release, https://doi.org/10.5066/P9NPZTOT

Ponce, D.A., and Damar, N.A., 2017, Depth to pre-Cenozoic bedrock in northern Nevada: U.S. Geological Survey data release, https://doi.org/10.5066/F75B01DD (Bulletin 2218 2-km pre-cenozoic basement)

Prudic, D.E., Herman, M.E., and Medina, R.L., 2020, Data for the report Ground-water flow and simulated effects of development in Paradise Valley, a basin tributary to the Humboldt River in Humboldt County, Nevada (U.S. Geological Survey Professional Paper 1409-F): U.S. Geological Survey data release, https://doi.org/10.5066/P9ZJBQF2

Welborn, T.L., and Medina, R.L., 2017, Depth-to-water area polygons, isopleths showing mean annual runoff, 1912-1963, and water-level altitude contours for the Humboldt River Basin, Nevada: U.S. Geological Survey data release, https://dx.doi.org/10.5066/F7XW4GXC (Bulletin 32 datasets: water levels, water level altitude, isopleths of mean annual runoff.)

Order 1329 Overview*

Acknowledges that groundwater pumping is causing stream capture that results in conflict.

New appropriations or water right changes that would increase capture from fully appropriated sources are not being approved.

All applications reviewed and assessed for stream capture.

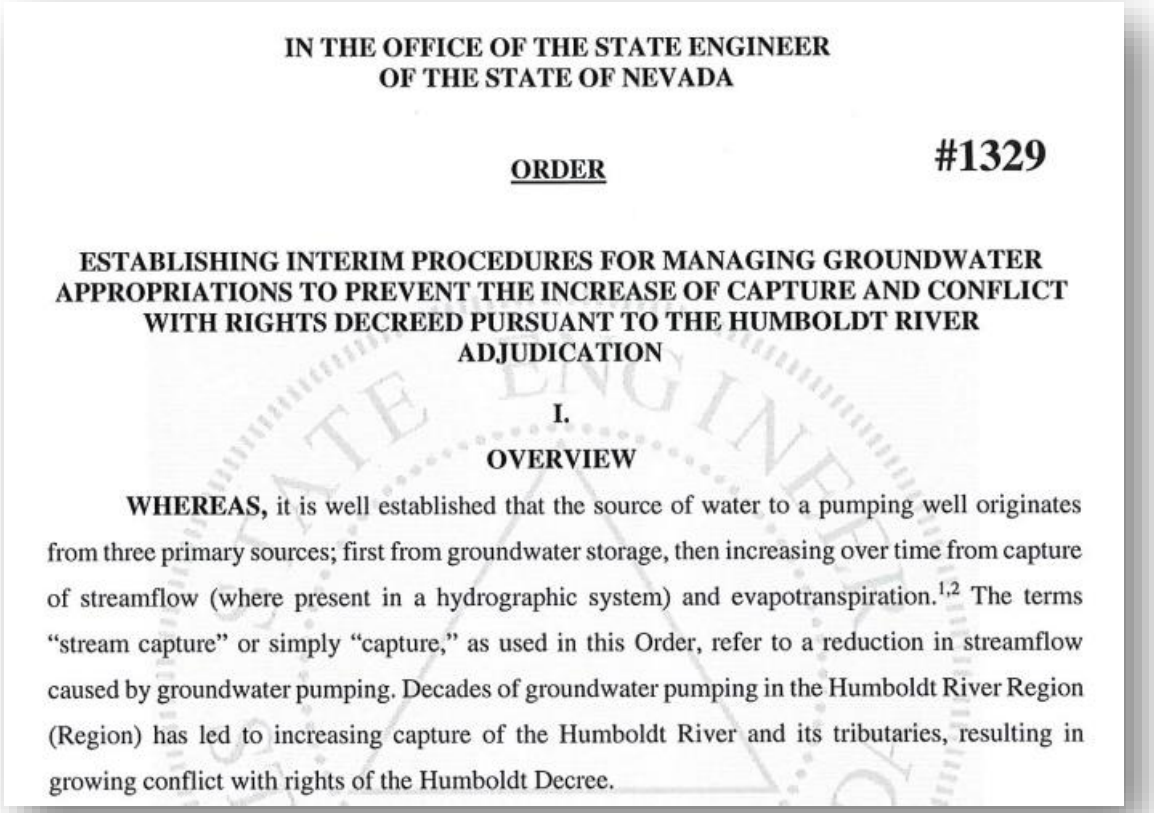
Capture is permissible if it can be offset by:

- Replacement surface water
- Withdrawn groundwater right with existing capture.

Establishes interim thresholds for capture offset.

Establishes goal of using Capture Studies for future capture management.

Articulates intent to establish public process to develop capture management framework.



IN THE OFFICE OF THE STATE ENGINEER
OF THE STATE OF NEVADA

ORDER #1329

ESTABLISHING INTERIM PROCEDURES FOR MANAGING GROUNDWATER APPROPRIATIONS TO PREVENT THE INCREASE OF CAPTURE AND CONFLICT WITH RIGHTS DECREED PURSUANT TO THE HUMBOLDT RIVER ADJUDICATION

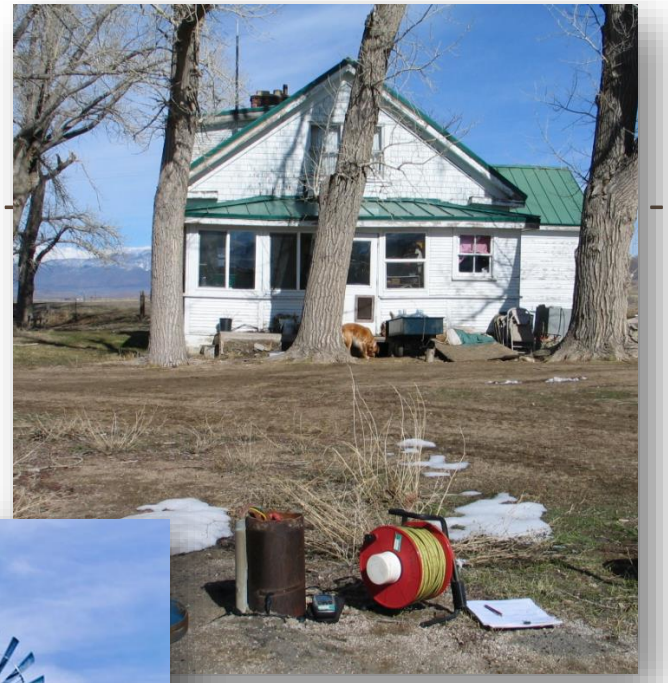
I.

OVERVIEW

WHEREAS, it is well established that the source of water to a pumping well originates from three primary sources; first from groundwater storage, then increasing over time from capture of streamflow (where present in a hydrographic system) and evapotranspiration.[1,2] The terms "stream capture" or simply "capture," as used in this Order, refer to a reduction in streamflow caused by groundwater pumping. Decades of groundwater pumping in the Humboldt River Region (Region) has led to increasing capture of the Humboldt River and its tributaries, resulting in growing conflict with rights of the Humboldt Decree.

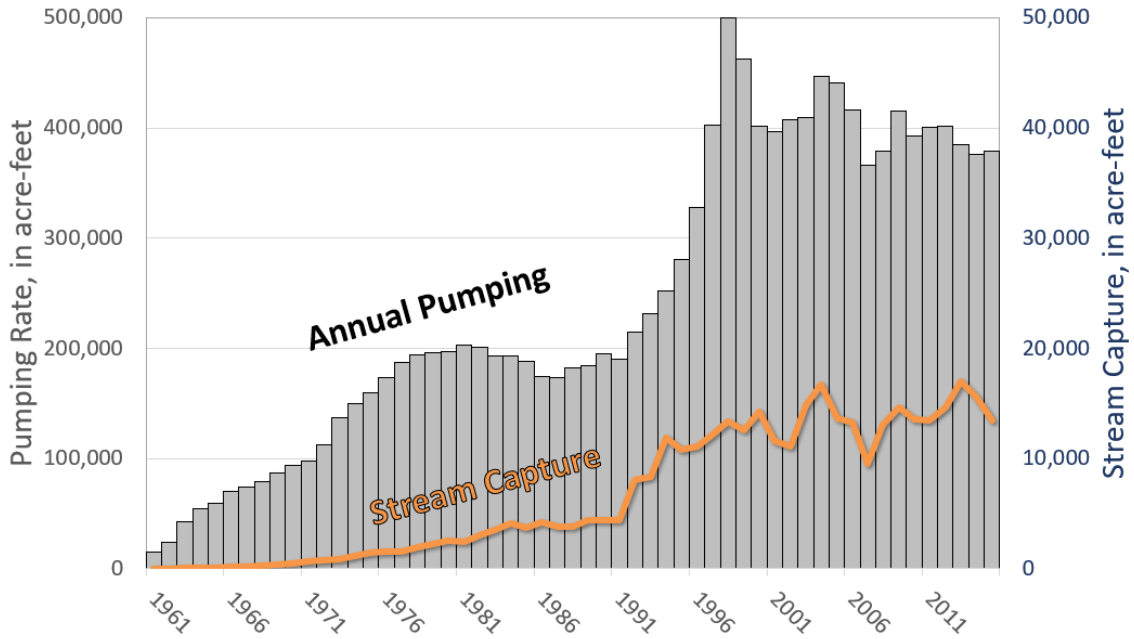
* Due to current litigation status, discussion and questions are constrained to content within Order 1329

Order 1329 Does Not:



Predetermine the final capture management framework.

Apply to domestic well use or minor stock water use.



Provisional estimated Historical Capture for middle Humboldt River Basin*

Technical Aspects

Objective:
Utilize existing SW or GW right to avoid increasing capture that would otherwise cause conflict

Interim Thresholds:

- **Evaluation Threshold**

  >10% capture after 50 years

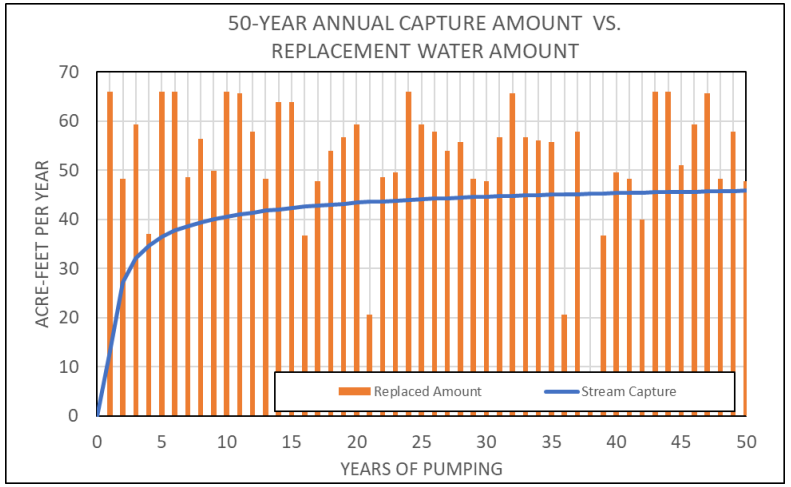
- **Long-term Threshold (50-yr Rule)**

  must offset cumulative capture in 50 yrs

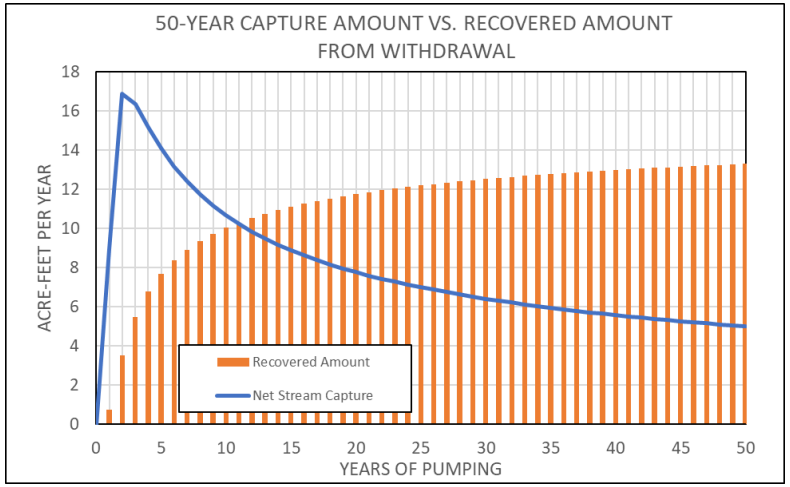
- **Annual Threshold (80% Rule)**

  Must offset annual capture in 80% of yrs

Replacement by SW Right



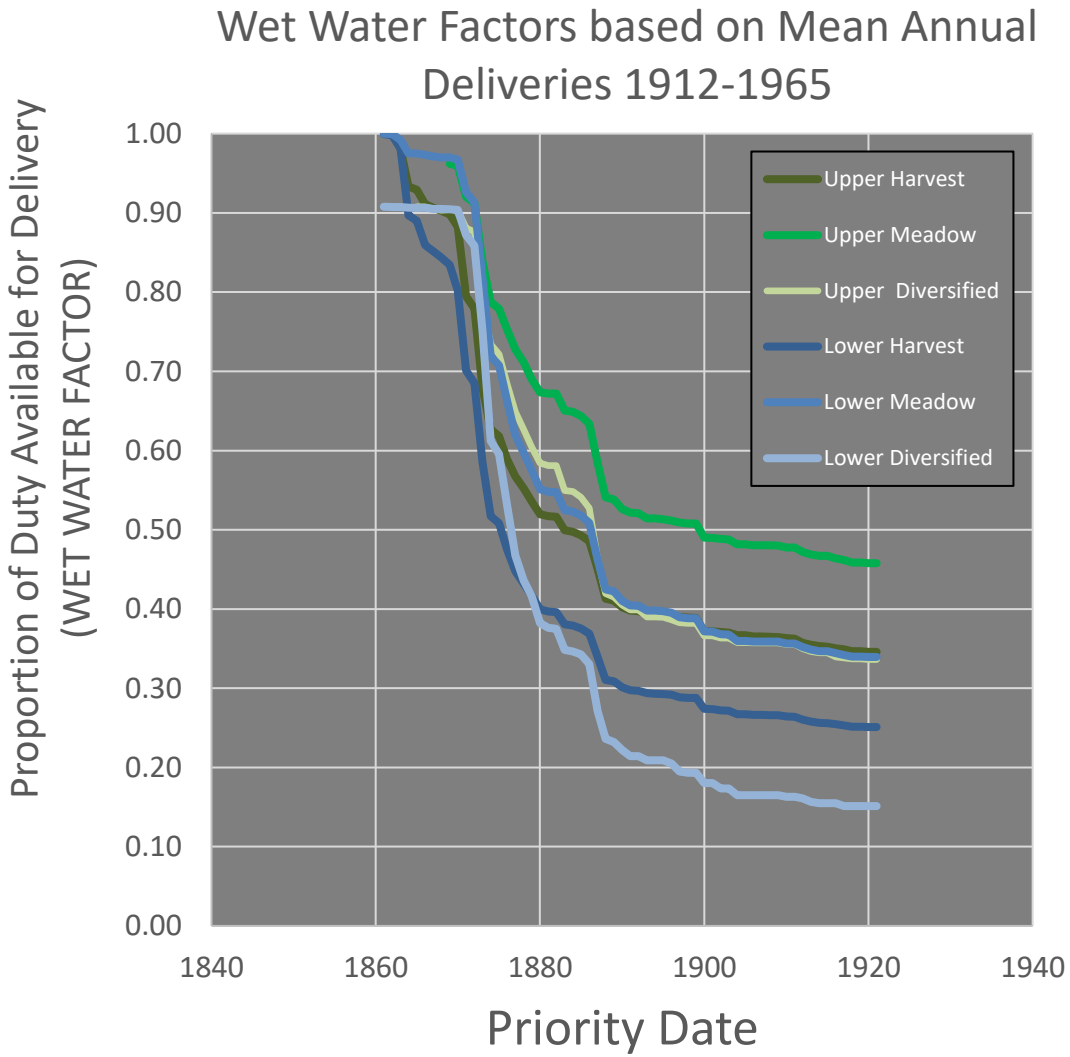
GW Right Withdrawal



Determination of surface water availability for replacement ("Wet Water")

WET WATER FACTORS BASED ON 1912-1965 FLOW PALISADE GAGE						
Priority	Upper			Lower		
	Upper Harvest	Upper Meadow	Upper Diversified	Lower Harvest	Lower Meadow	Lower Diversified
1861				1.000	1.000	0.908
1862	0.999			0.998	1.000	0.907
1863	0.981			0.982	0.992	0.907
1864	0.933			0.897	0.975	0.907
1865	0.929		0.908	0.890	0.975	0.906
1866	0.911		0.907	0.859	0.973	0.906
1867	0.907		0.905	0.852	0.971	0.905
1868	0.903		0.903	0.844	0.970	0.905
1869	0.898	0.962	0.904	0.834	0.970	0.905
1870	0.882	0.959	0.903	0.802	0.967	0.904
1871	0.795	0.920	0.881	0.701	0.926	0.872
1872	0.779	0.912	0.876	0.685	0.913	0.859
1873	0.680	0.839	0.791	0.586	0.818	0.752
1874	0.627	0.788	0.734	0.517	0.719	0.612
1875	0.618	0.779	0.722	0.509	0.708	0.595
1876	0.589	0.753	0.685	0.475	0.663	0.531
1877	0.567	0.728	0.649	0.448	0.619	0.467
1878	0.553	0.711	0.627	0.432	0.597	0.436
1879	0.536	0.690	0.605	0.417	0.575	0.416
1880	0.520	0.674	0.584	0.400	0.551	0.382
1881	0.517	0.672	0.581	0.397	0.548	0.376
1882	0.516	0.672	0.581	0.396	0.547	0.375

Provisional*

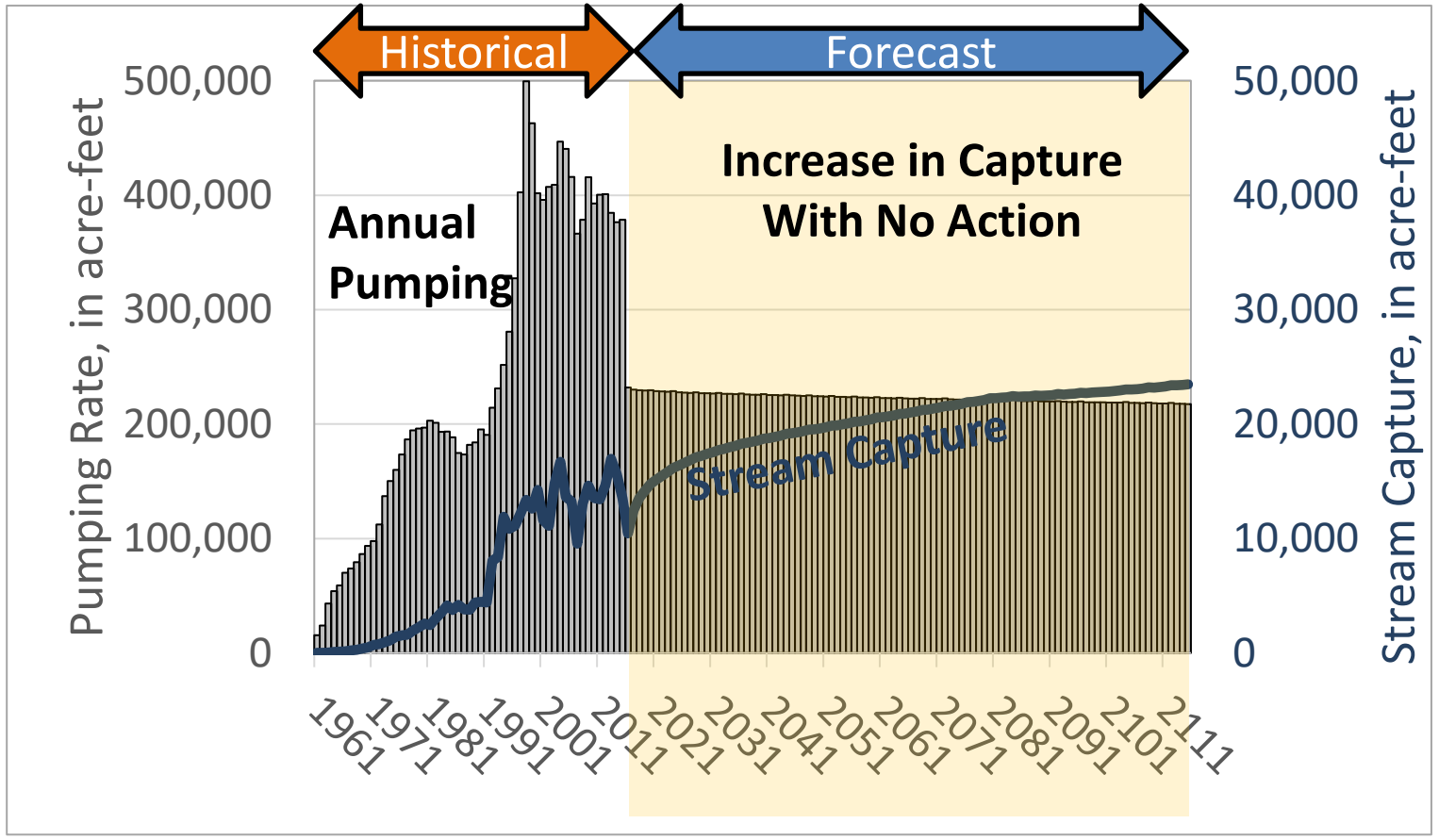


EXEMPTIONS

- Applications whose proposed PODs cause <10% capture over a 50-year period
- Applications whose proposed PODs cause < 5 afy capture during 50-year period
- Change applications whose proposed PODs cause same or less capture than existing PODs
- Temporary change applications to provide for multiple PODs from Mining, Milling, and Dewatering operations (Centralized POD)

Where are we going from here?

Develop capture management framework with Stakeholders for managing existing capture.



Provisional estimated Historical and Forecasted Capture for middle Humboldt River Basin*

Examples of potential future strategies

- Curtailment in capture threshold areas
- Offset credit for artificial recharge
- Enhanced storage through ASR
- Conservation funds to purchase water rights with greatest conflict
- Private party agreements to resolve conflict
- Withdrawal/abandonment of committed rights

Questions?

Contact

Kip Allander, Hydrogeologist
Phone: 775-684-2853
Email: kallander@water.nv.gov