

NEVADA DIVISION OF  
**WATER RESOURCES**

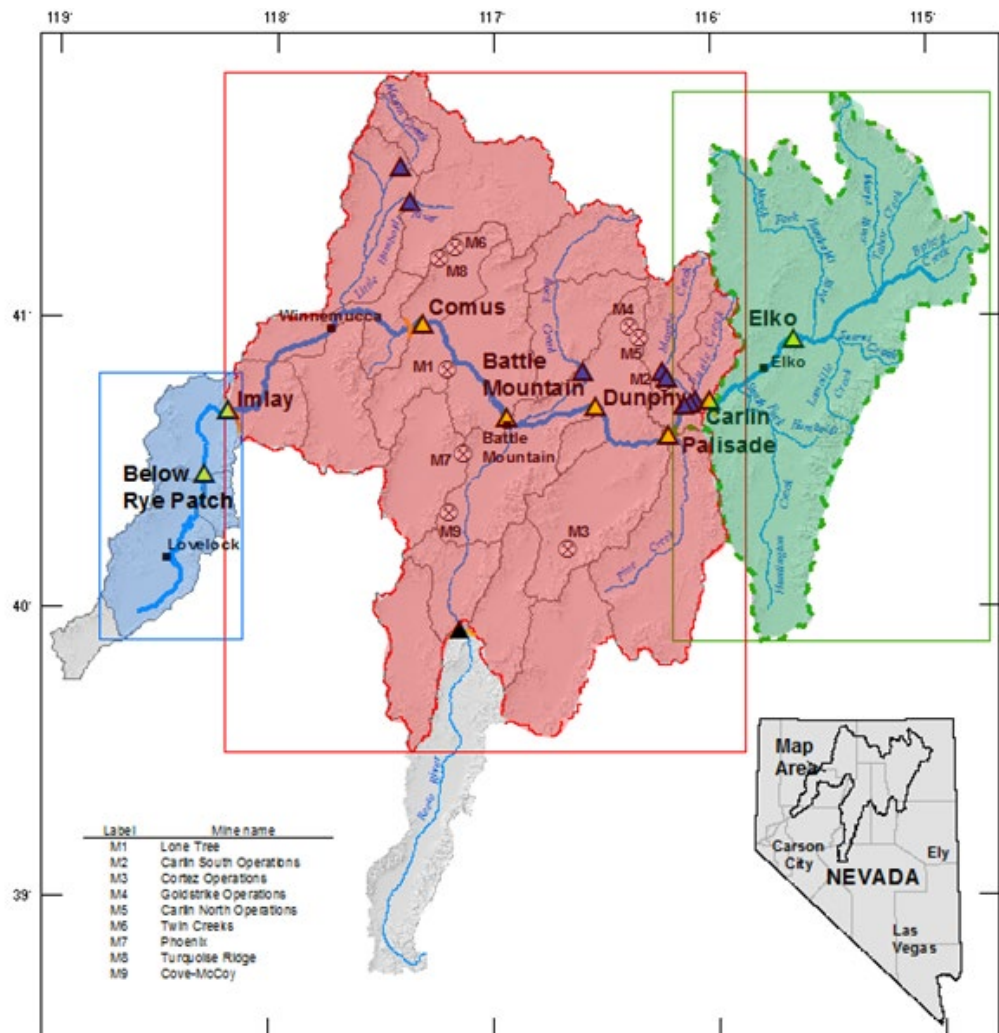


Nevada Department of  
**CONSERVATION &  
NATURAL RESOURCES**

# Humboldt River Region Water Management Informational update

Carson City and Virtual

March 28, 2023



NDWR

# OUTLINE

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- Overview of Needs and Purpose (**Adam Sullivan**, State Engineer)
- 2023 Water Supply (**Levi Kryder**, Chief, Hydrology Section)
- Model Report Status and Timelines (**Jon Benedict**, Hydrogeologist)
- What do we know from the models? (**Jon Benedict**, Hydrogeologist)
- Example uses of the models (**Kip Allander**, Hydrogeologist)
- Process for Developing Conjunctive Management Framework (**Adam Sullivan**, State Engineer)
- Q&A (**All**)

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# OVERVIEW OF NEEDS AND PURPOSE

# PASSING OF THE WADING ROD – HUMBOLDT SUPERVISORY WATER COMMISSIONER

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**Kirk Owsley**



After 30 years of service to the Humboldt system - Kirk Owsley is retiring March 30<sup>th</sup>

Humboldt Supervisory Water Commissioner since 2016.

Landon takes over on March 31<sup>st</sup>

**Landon Harris**

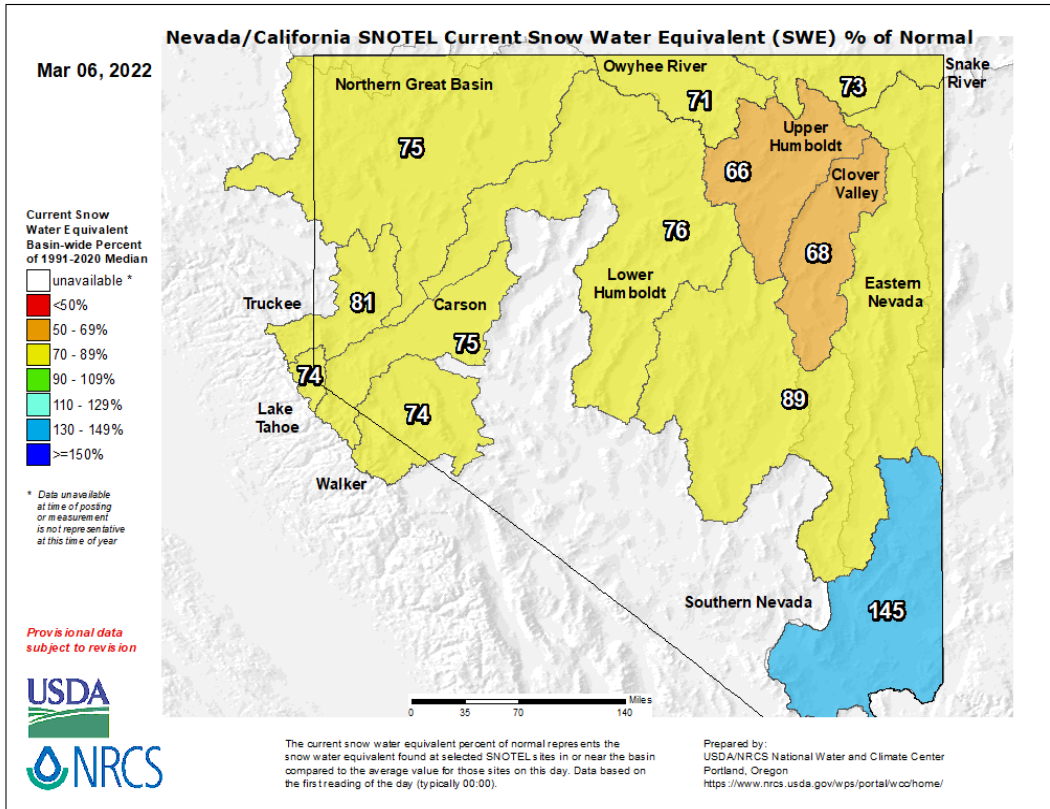


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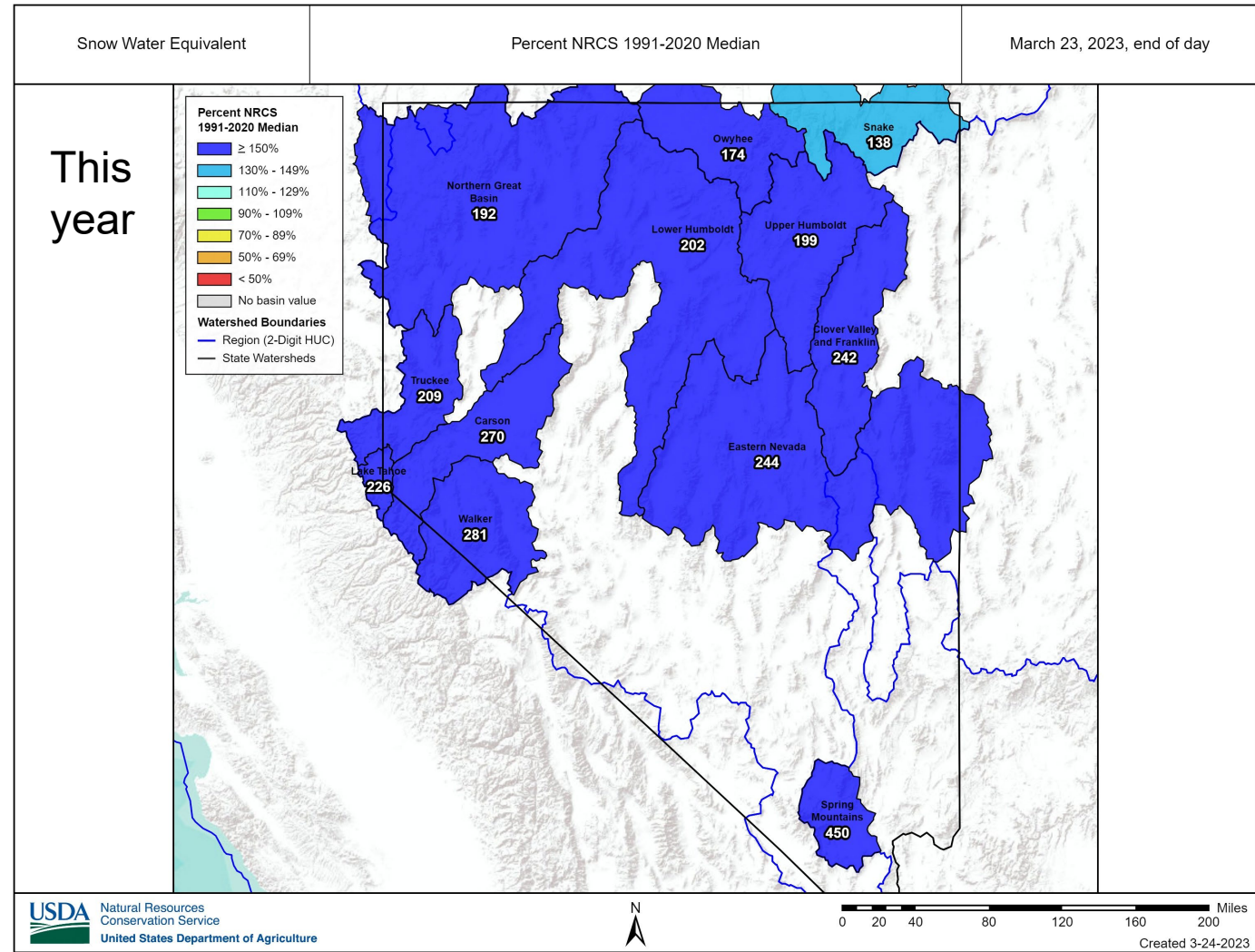
# 2023 WATER SUPPLY

# HUMBOLDT RIVER BASIN SNOW WATER EQUIVALENT – 3/23/2023

Last year



This year



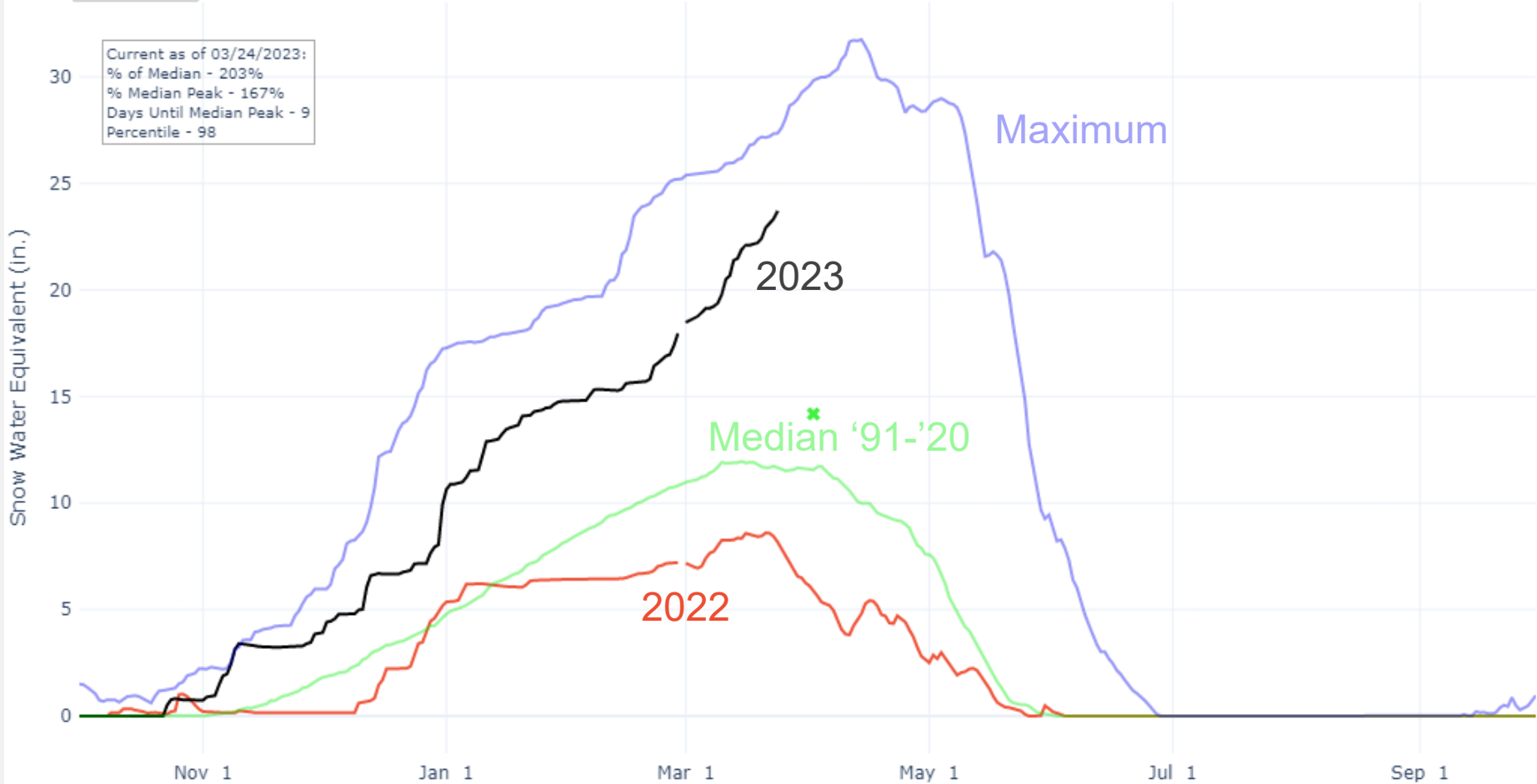
# SNOW WATER EQUIVALENT IN UPPER HUMBOLDT

Reset Range

[Link to data: CSV / JSON](#)

Station List

Current as of 03/24/2023:  
 % of Median - 203%  
 % Median Peak - 167%  
 Days Until Median Peak - 9  
 Percentile - 98

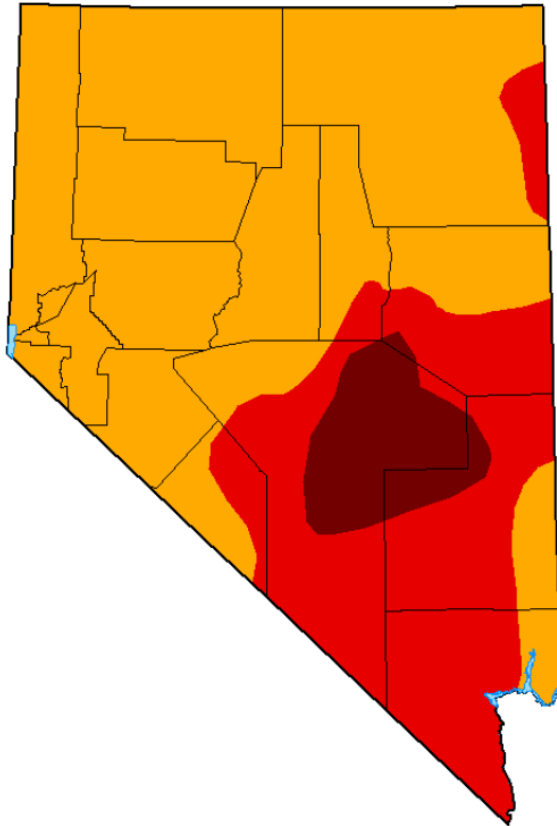


- ✱ Median Peak SWE
- Max
- - - Median (POR)
- Median ('91-'20)
- Min
- Stats. Shading
- 2023 (10 sites)
- 2022 (10 sites)
- 2021 (10 sites)
- 2020 (10 sites)
- 2019 (10 sites)
- 2018 (10 sites)
- 2017 (10 sites)
- 2016 (10 sites)
- 2015 (10 sites)
- 2014 (10 sites)
- 2013 (9 sites)
- 2012 (9 sites)
- 2011 (9 sites)
- 2010 (9 sites)
- 2009 (9 sites)
- 2008 (9 sites)
- 2007 (9 sites)
- 2006 (9 sites)
- 2005 (9 sites)
- 2004 (9 sites)

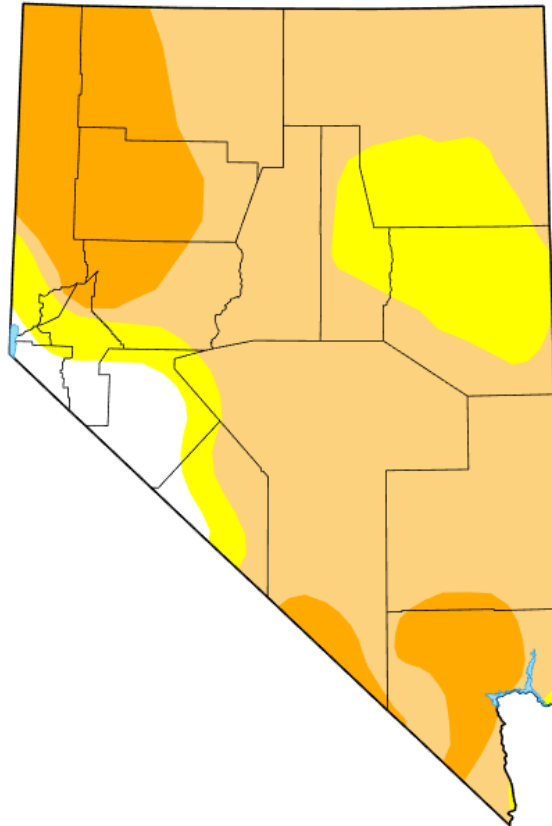


# U.S. DROUGHT MONITOR - NEVADA

Mar 22, 2022



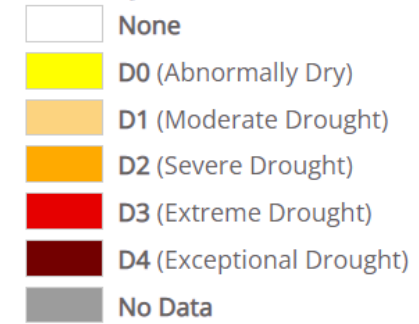
Mar 23, 2023



Map released: Thurs. March 23, 2023

Data valid: March 21, 2023 at 8 a.m. EDT

## Intensity



## Authors

United States and Puerto Rico Author(s):

**Curtis Riganti**, National Drought Mitigation Center

Pacific Islands and Virgin Islands Author(s):

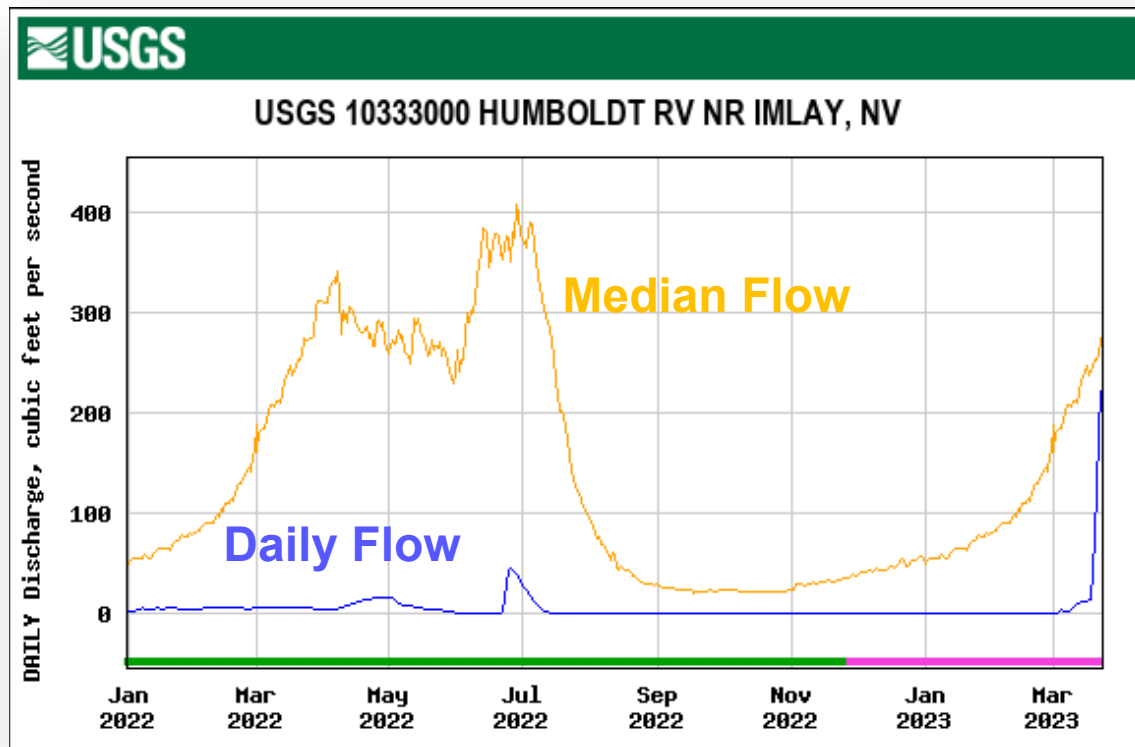
**Ahira Sanchez-Lugo**, NOAA/NCEI

*The Drought Monitor focuses on broad-scale conditions.*

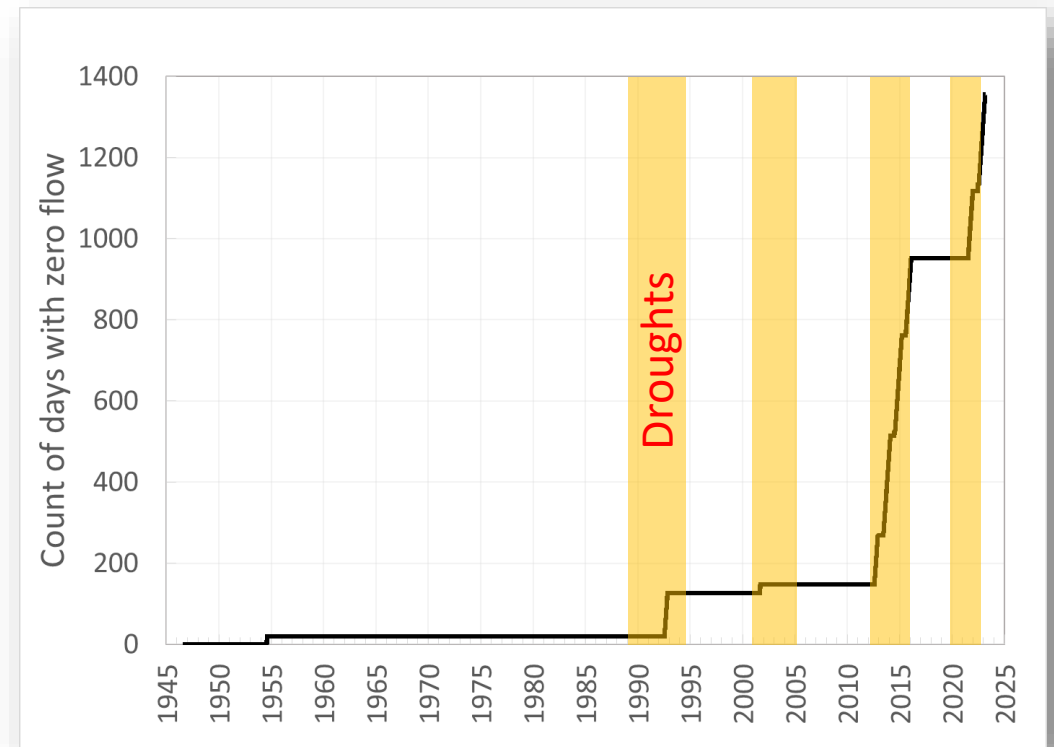


# HUMBOLDT RIVER AT IMLAY GAGE

Flow at Imlay arrived on Mar 2<sup>nd</sup>.  
Expected to flow remainder of  
irrigation season



Imlay is increasingly intermittent  
during drought periods

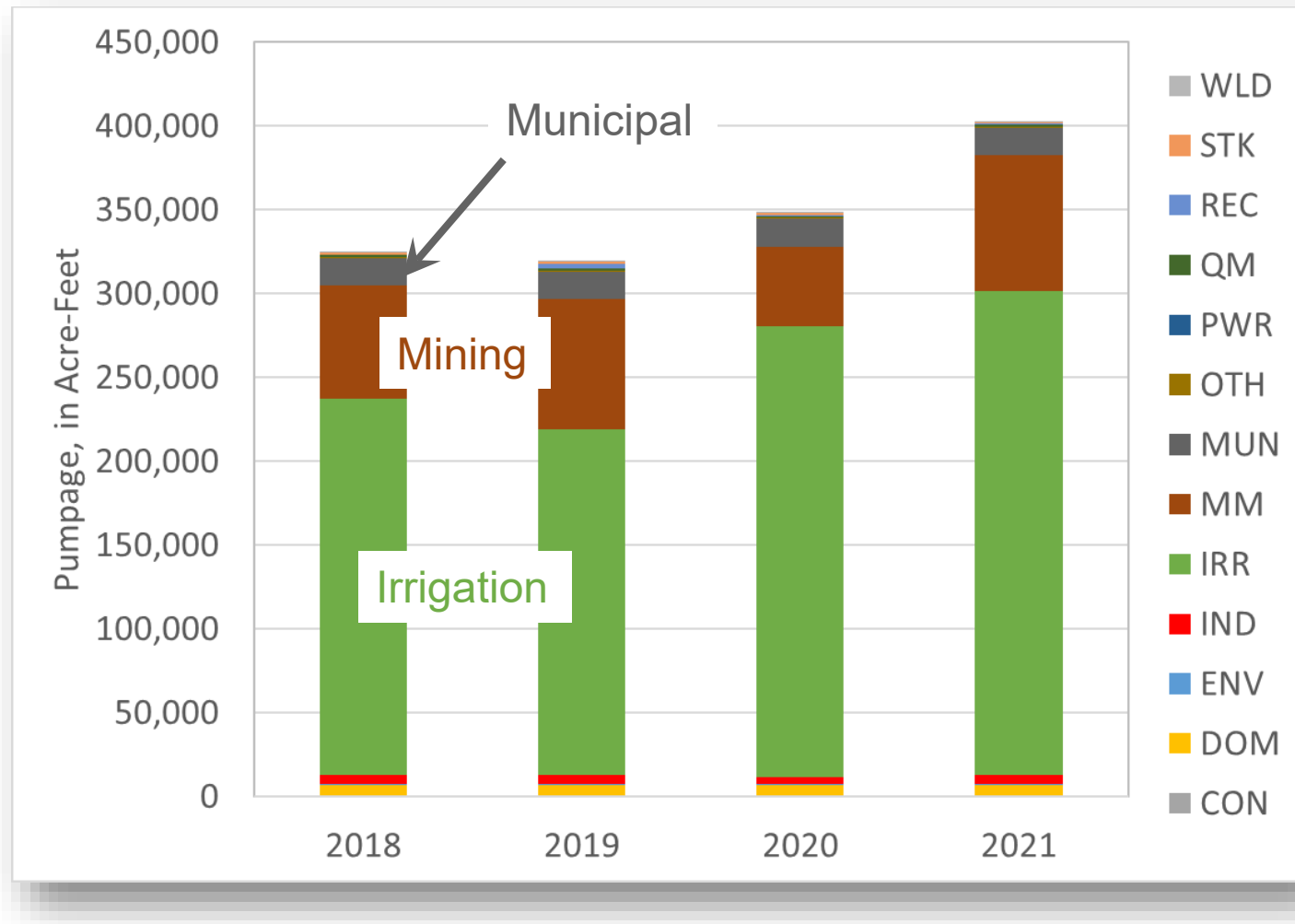


# END OF FEB 2023: NRCS RESERVOIR STORAGE COMPARISON

Rye Patch Reservoir			
Current		Last Year	
KAF	% of Capacity	KAF	% of Capacity
9.5	5	9.2	5

Lahontan Reservoir			
Current		Last Year	
KAF	% of Capacity	KAF	% of Capacity
130	42	107.3	34

# PRELIMINARY PUMPAGE 2018 – 2021

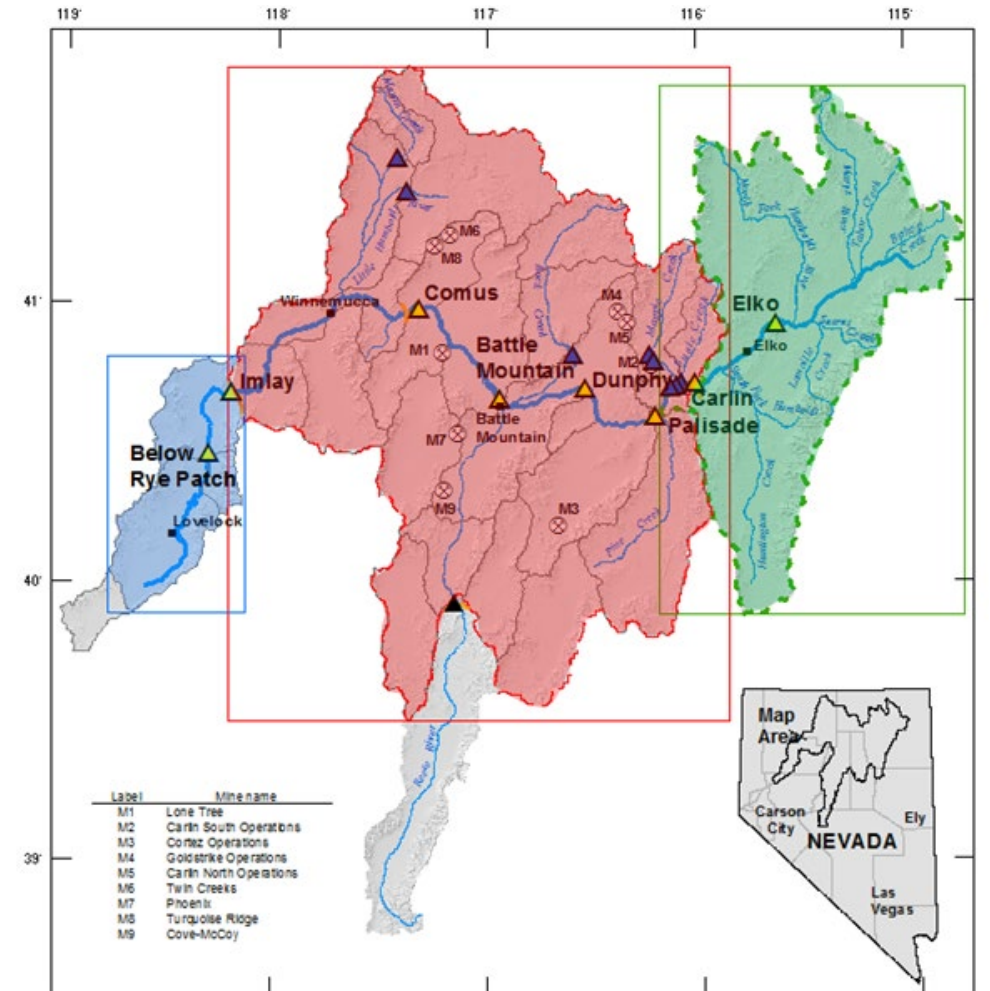


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# **MODEL REPORT STATUS & TIMELINES**

# MODEL REPORT STATUS & TIMELINES

- Upper
  - DRI
  - Headwaters to Carlin Gage
- Middle
  - USGS
  - Carlin to Imlay Gage
- Lower
  - USGS/DRI
  - Imlay to Humboldt Sink



# MODEL REPORT STATUS & TIMELINES

**UPPER** ←

Peer Review

DWR Review

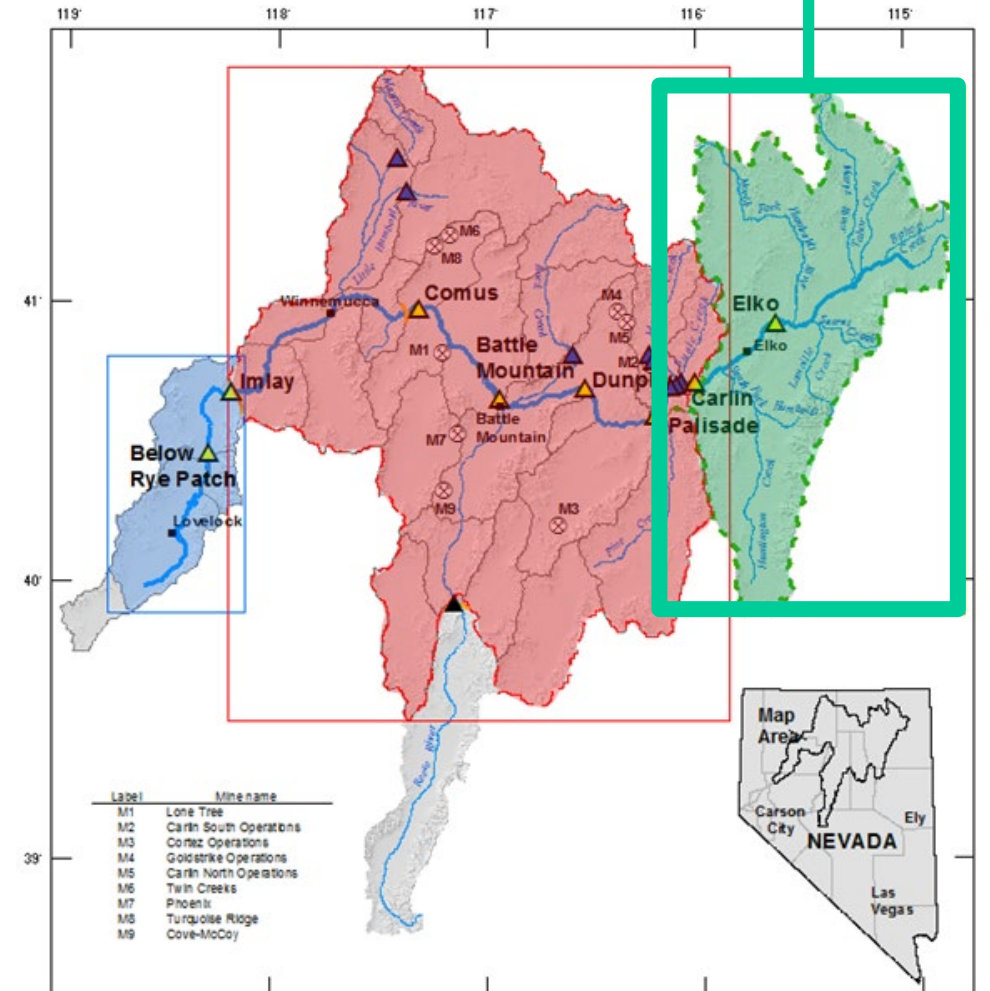
Final Author Edits



**APRIL-MAY**

Completion

**JUNE**



# MODEL REPORT STATUS & TIMELINES

## MIDDLE ←

Peer Review



**MAY**

DWR Review

**JUNE-JULY**

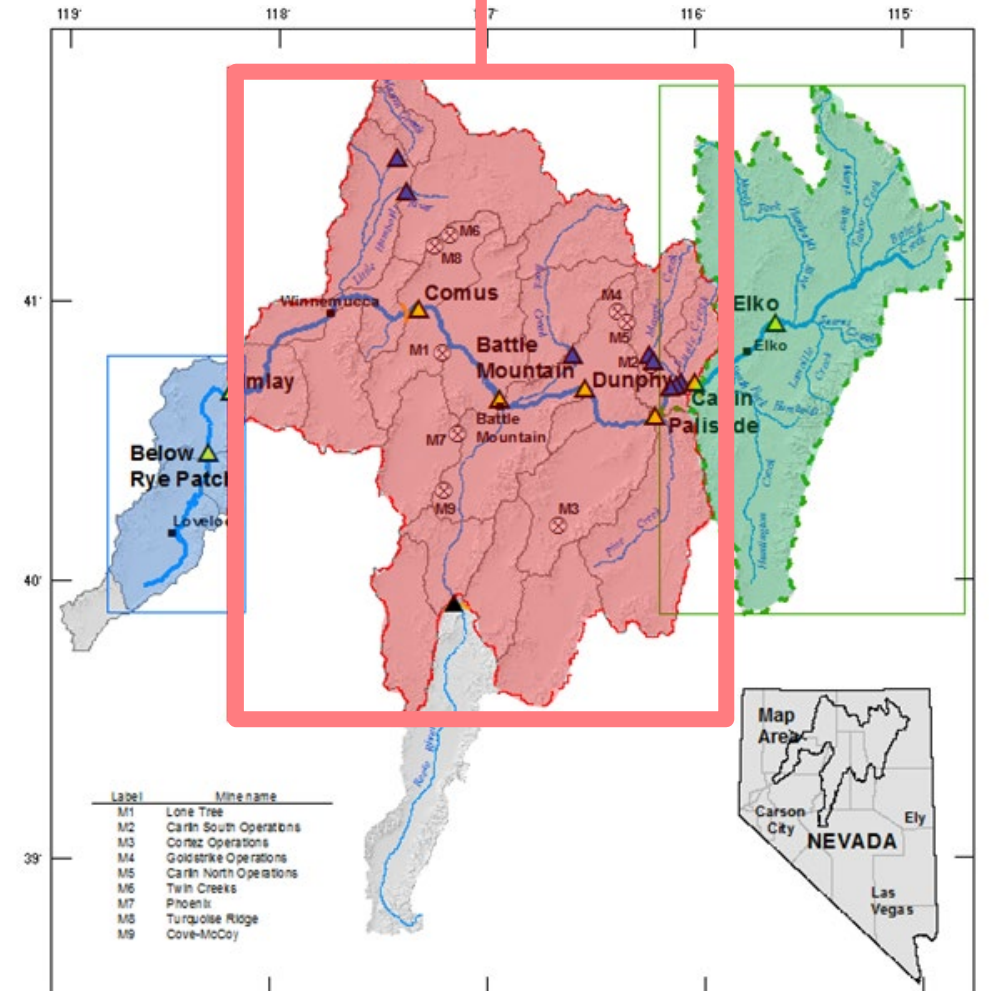
Final Author Edits

**AUG - SEPT**

Standards Review

Completion

**OCTOBER**



# MODEL REPORT STATUS & TIMELINES

**LOWER** ←

Peer Review



DWR Review



Final Author Edits

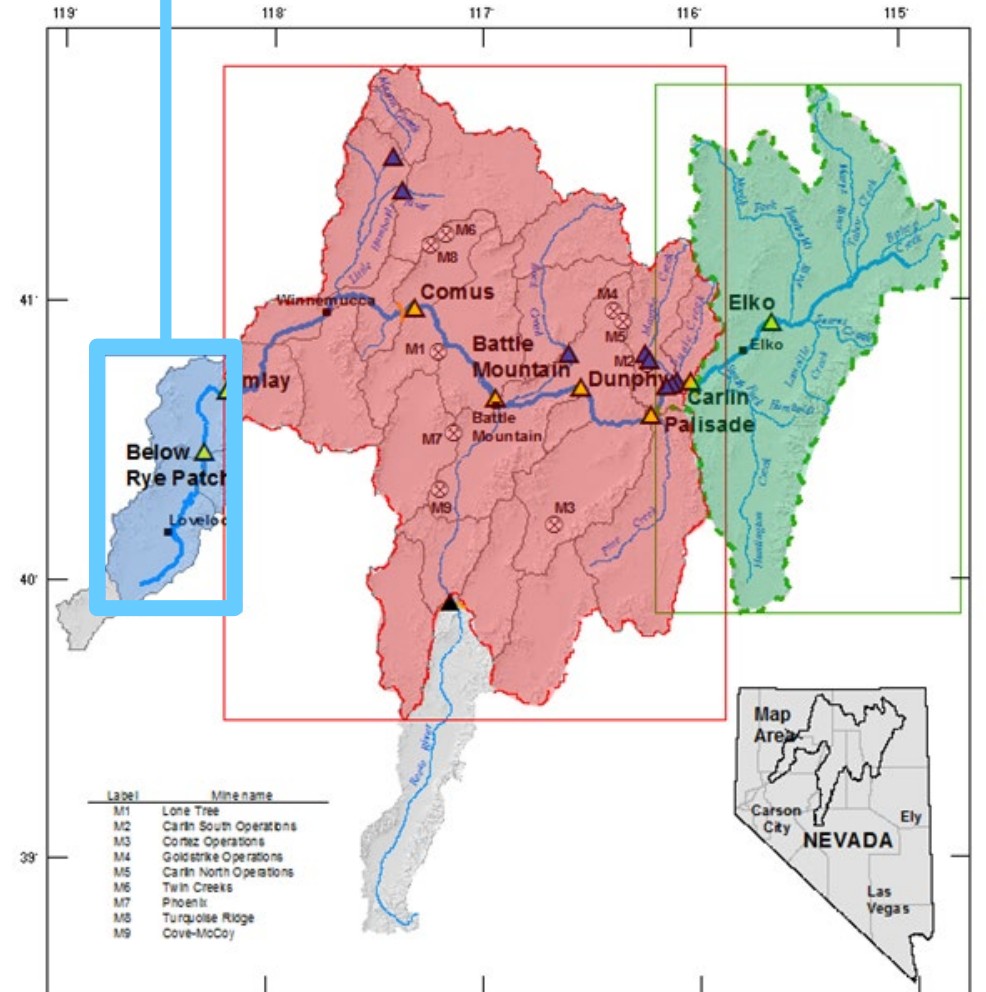


Standards Review

**APRIL - MAY**

**Completion**

**JUNE**





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# WHAT DO WE KNOW FROM THE MODELS?

# MODEL PRODUCTS

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## COMPONENTS

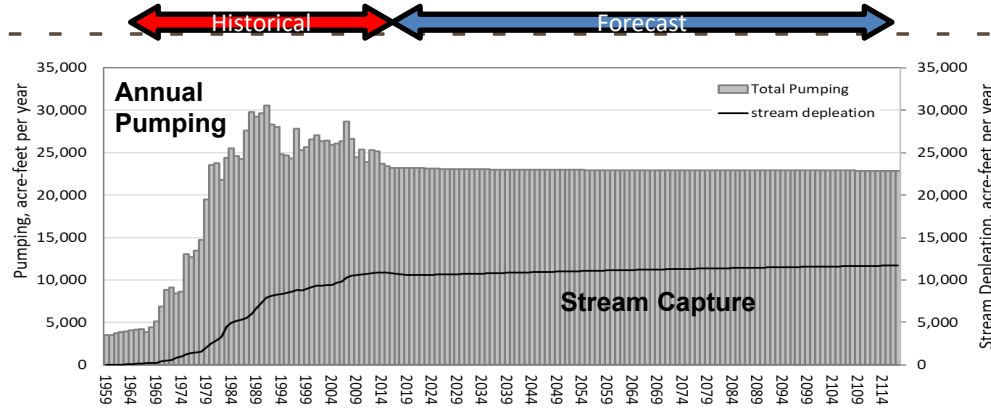
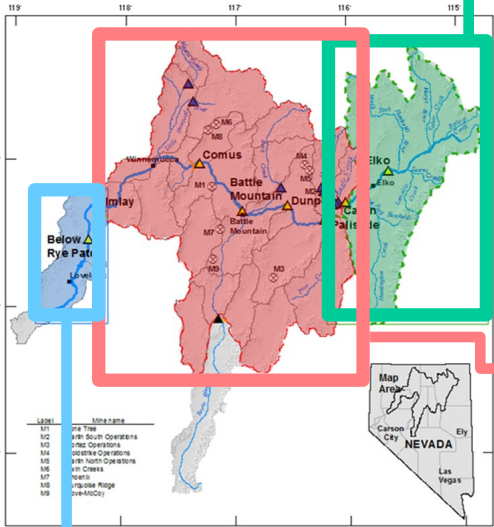
CAPTURE QUANTITY  
STREAM/AQUIFER CONNECTION  
SITE-SPECIFIC INFORMATION  
MANAGEMENT TOOL

## PRODUCTS

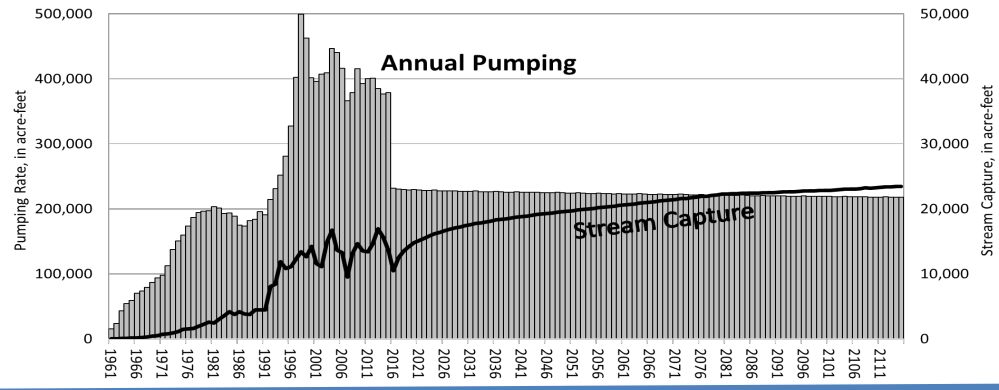
- REGIONAL CAPTURE PLOTS
- CAPTURE MAPS
- CAPTURE QUERY TOOL
- SCENARIO EVALUATION

**\*All model results are provisional and subject to change\***

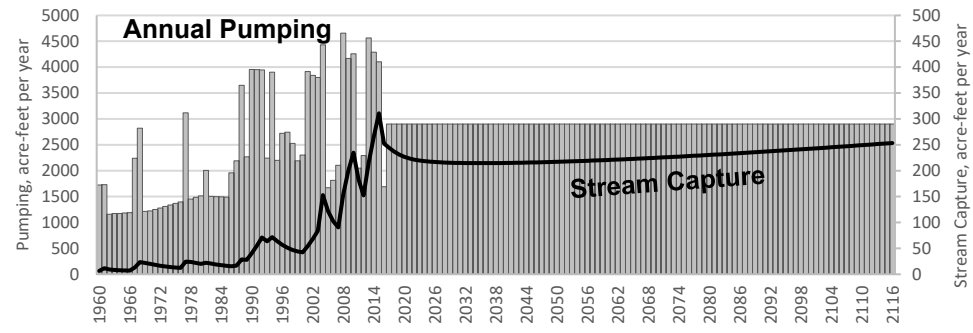
# CAPTURE QUANTITY: HISTORICAL AND FORECASTED CAPTURE AMOUNTS



2015 Pumping = 23,500 afy  
 2015 Capture = 10,800 afy  
 100-year Forecasted = 11,800 afy  
 46% Pumped water is stream capture

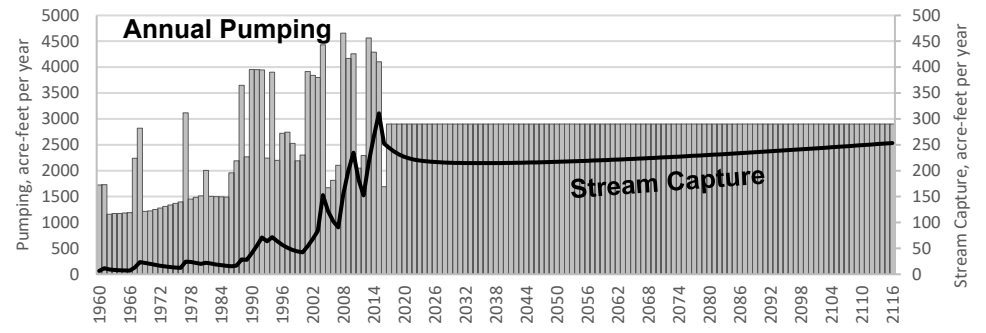
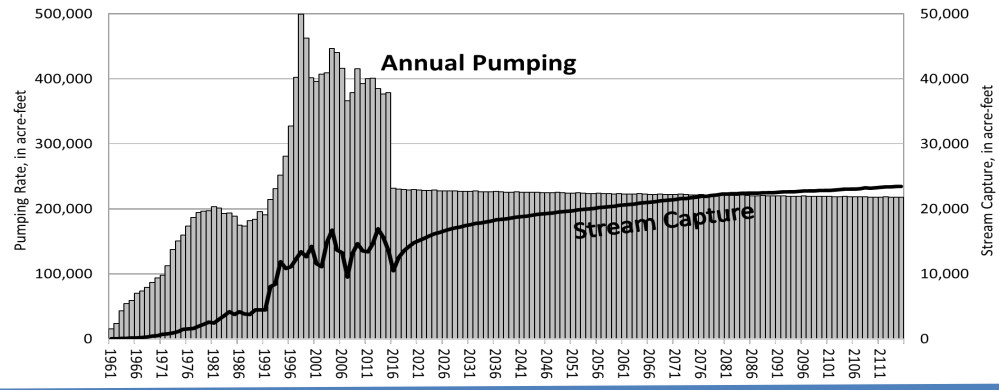
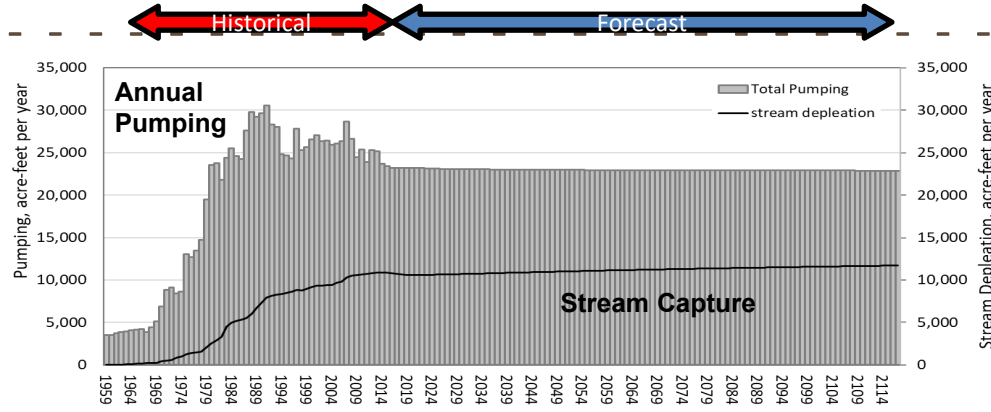
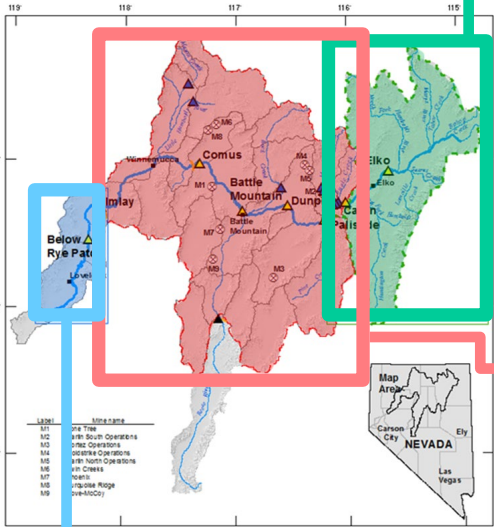


2015 Pumping = 378,500 afy  
 2015 Capture = 13,500 afy  
 100-year Forecasted = 23,500 afy  
 4% Pumped water is stream capture



2015 Pumping = 1,700 afy  
 2015 Capture = 250 afy  
 100-year Forecasted = 250 afy  
 15% Pumped water is stream capture

# CAPTURE QUANTITY: HISTORICAL AND FORECASTED CAPTURE AMOUNTS



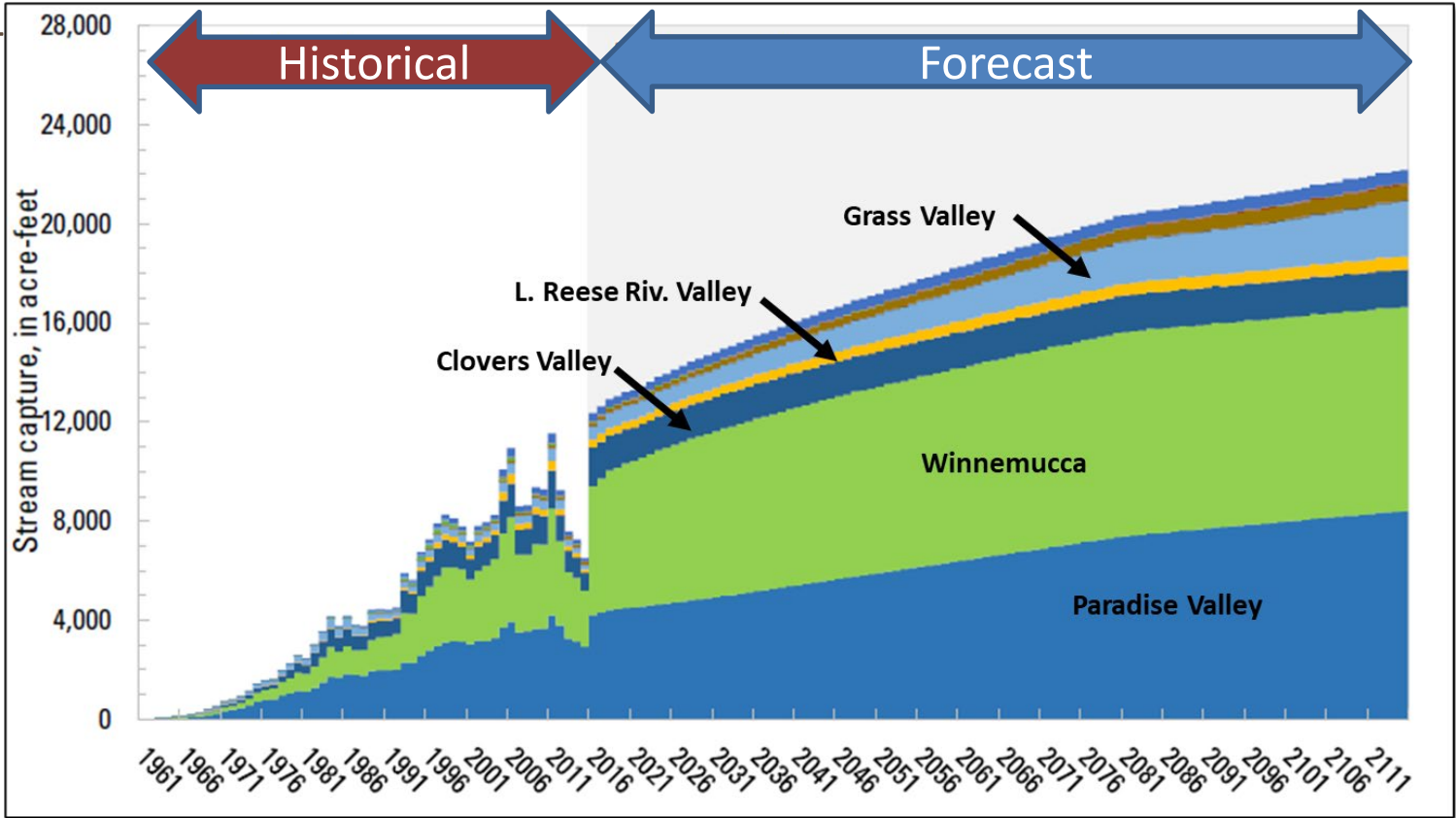
**REGIONWIDE**

**2015 CAPTURE:**  
**24,600 AFY**

**2015 PUMPING:**  
**400,000 AFY**

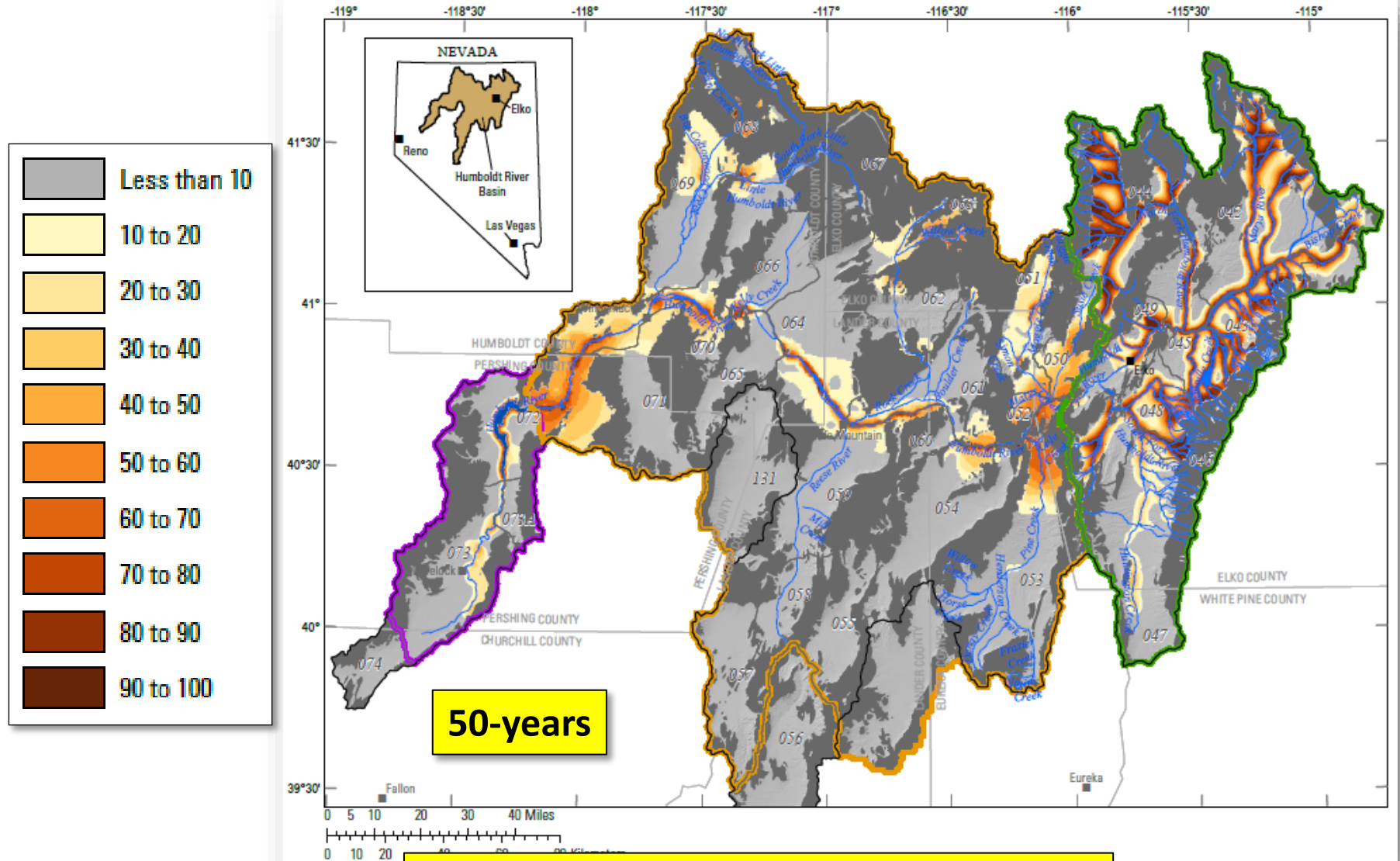
**6% PUMPED WATER IS CAPTURE**

# CAPTURE QUANTITY: HISTORICAL AND FORECASTED CAPTURE AMOUNTS

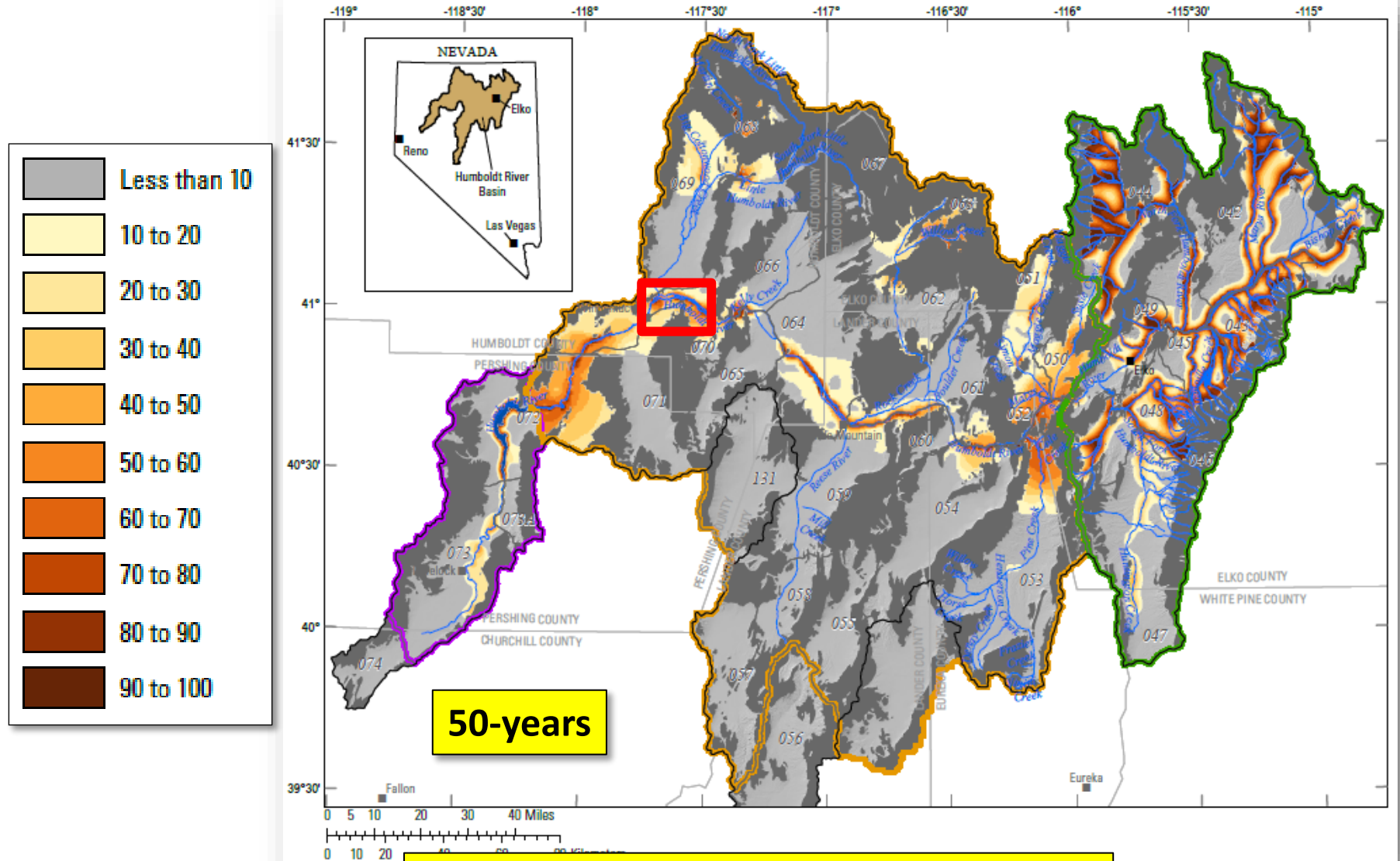


Explanation		
HA069 Paradise	HA070 Winnemucca	HA064 Clovers Area
HA059 Lower Reese	HA071 Grass Valley	HA066 Kelley Creek
HA067 Little Humboldt	HA065 Pumpnickel	HA058 Middle Reese
HA061 Boulder Flat	HA054 Crescent Valley	HA057 Anetlope Valley
HA060 Whirlwind		

# STREAM/AQUIFER CONNECTION: CAPTURE MAPS



# STREAM/AQUIFER CONNECTION: CAPTURE MAPS



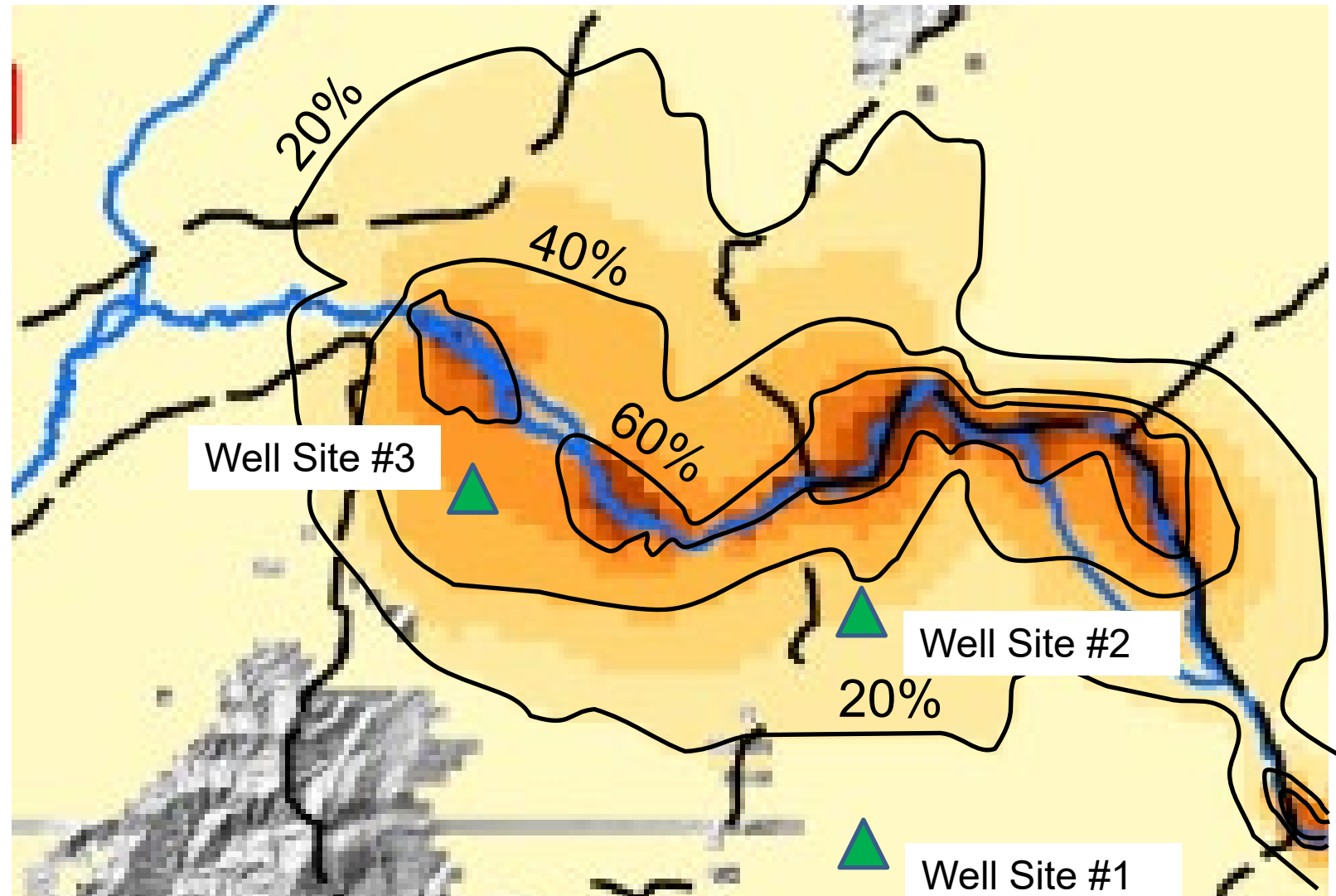
# STREAM/AQUIFER CONNECTION: CAPTURE MAPS

## EXAMPLE:

CAPTURE AFTER 50-YR OF PUMPING

- #1 15% capture
- #2 30% capture
- #3 50% capture

USEFUL TOOL TO UNDERSTAND WHERE POTENTIAL FOR CAPTURE IS GREATER OR LESSER





# SITE-SPECIFIC INFORMATION: CAPTURE QUERY TOOL

### Humboldt Capture Query Tool

**Legend**

- Study Area
- Hydrographic Area
- Humboldt River Basin
- No Data

**Step 1: Select Location**

Select a location by either clicking within the study area on the map, or by entering the coordinates below:

Latitude (decimal degrees):  
  
example: 40.635409

Longitude (decimal degrees):  
 Locate  
example: -116.944957

**Step 2: Select Depth**

The maximum depth in feet for this location is:  
3997

Depth below surface:  
  
example: 500

**Step 3: Select Years**

Number of years pumping (1-100):  
  
 33 years

Results

### Humboldt Capture Query Tool Results

After **33** years of pumping at location **40.838561, -117.170752**, at a depth of **25 feet** below land surface, groundwater is derived from the following sources:

**Summary** | All Years

Years of Pumping	Streamflow Depletion	Salvaged ET	Storage Change	Drain Capture
1	0.0%	0.8%	99.2%	0.0%
5	0.3%	8.3%	91.3%	0.0%
10	1.4%	19.2%	79.5%	0.0%
20	3.9%	36.2%	59.9%	0.0%
25	4.8%	42.1%	53.1%	0.0%
33	6.0%	49.9%	44.1%	0.0%
50	7.6%	61.4%	31.0%	0.0%
75	9.0%	70.6%	20.4%	0.0%
100	10.0%	75.2%	14.9%	0.0%

## NEXT STEPS: MODELS AS TOOLS

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How can models be used to investigate viability of potential solutions to help manage the capture problem?

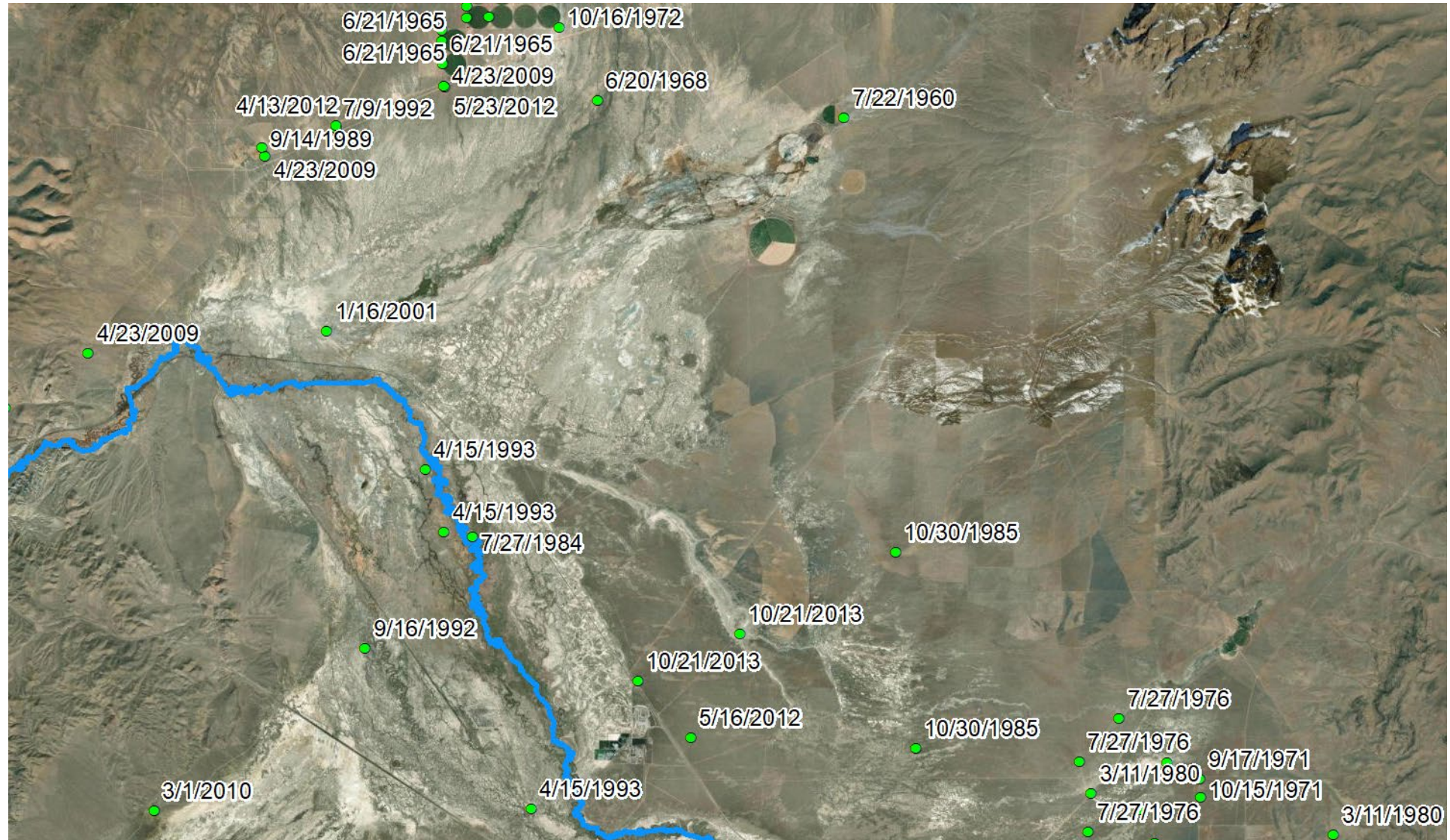


Photo of infiltration basin used for recharge of excess surface water

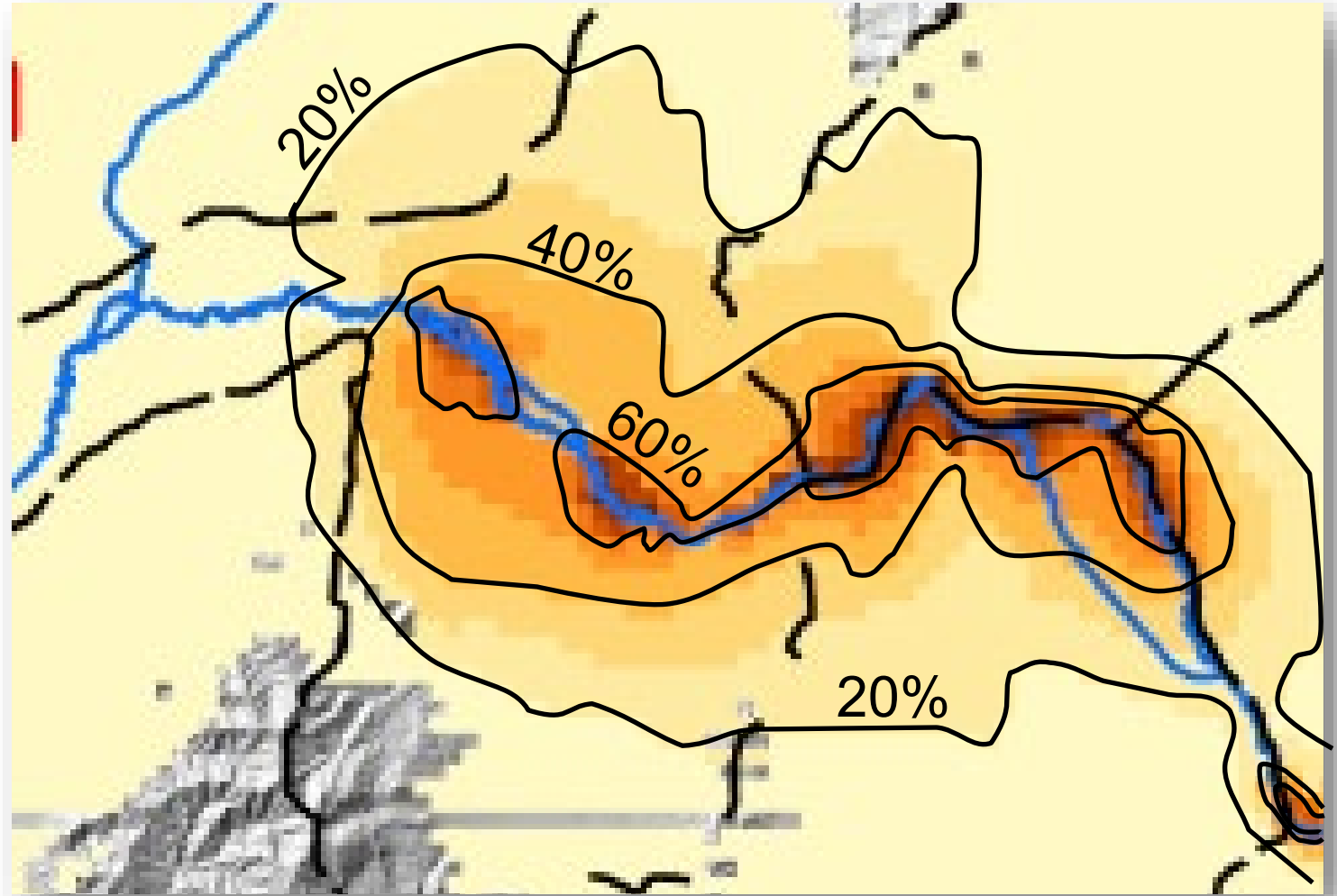
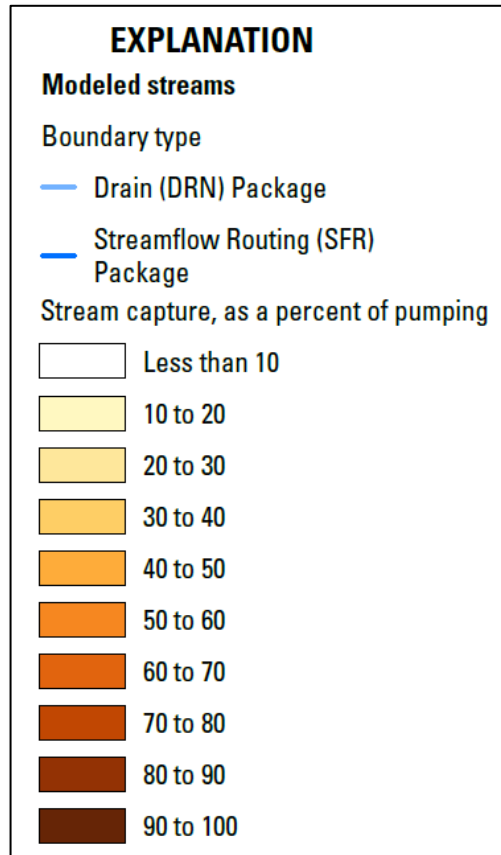
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# **EXAMPLE USES OF THE MODELS TO EVALUATE CONJUNCTIVE MANAGEMENT CONCEPTS**

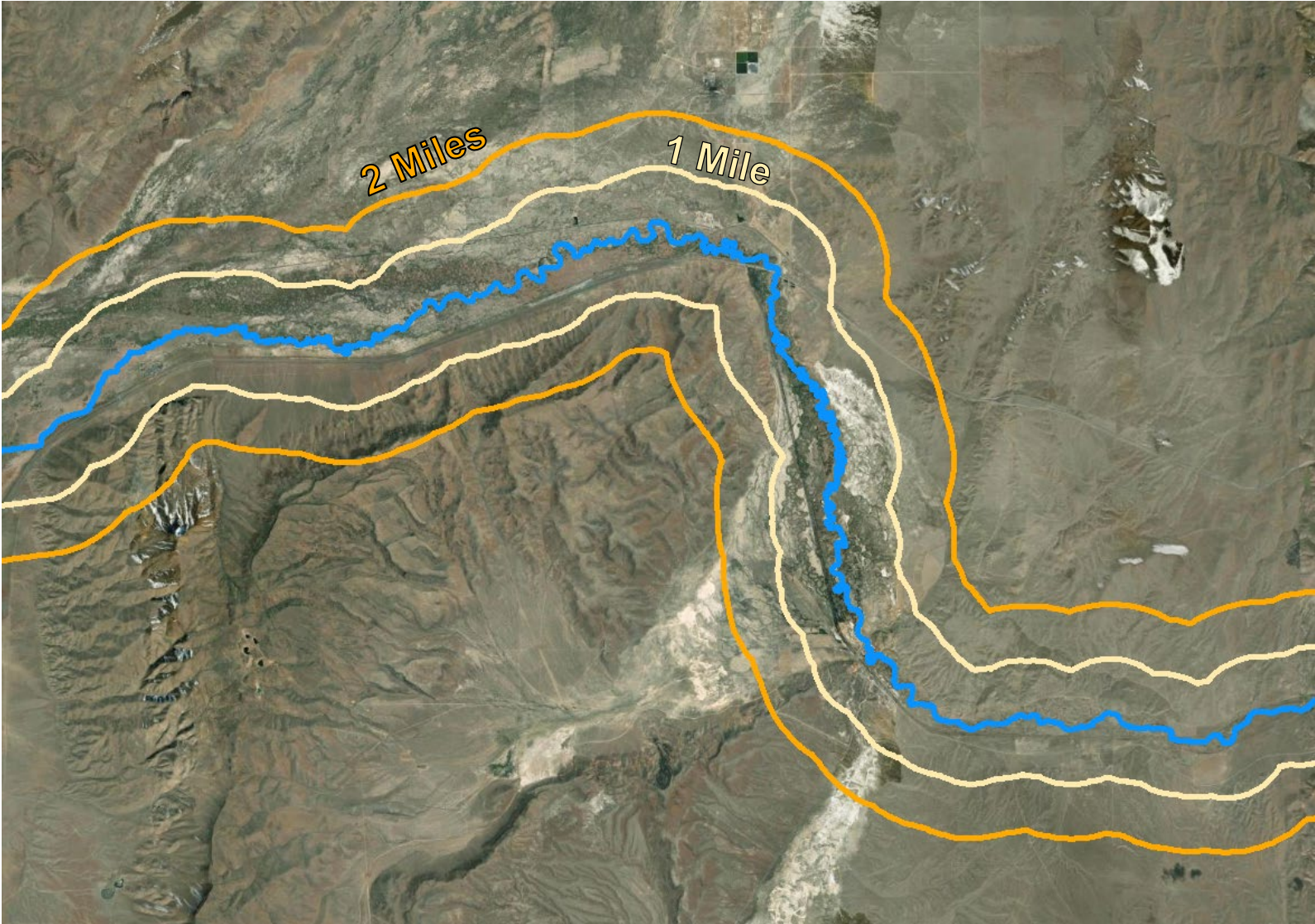
# EVALUATE CURTAILMENT OPTIONS BASED ON PRIORITY



# EVALUATE CURTAILMENT OPTIONS BASED ON CAPTURE THRESHOLDS



# EVALUATE CURTAILMENT OPTIONS BASED ON DISTANCE THRESHOLDS



# EVALUATE ARTIFICIAL STORAGE AND RECHARGE (ASR) OPPORTUNITIES

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- Identify locations for ASR
  - Sufficient unsaturated zone
  - Permeability
  - Proximity to River/Streams
- Magnitude and Timing of recharge getting to stream.

## Limitations:

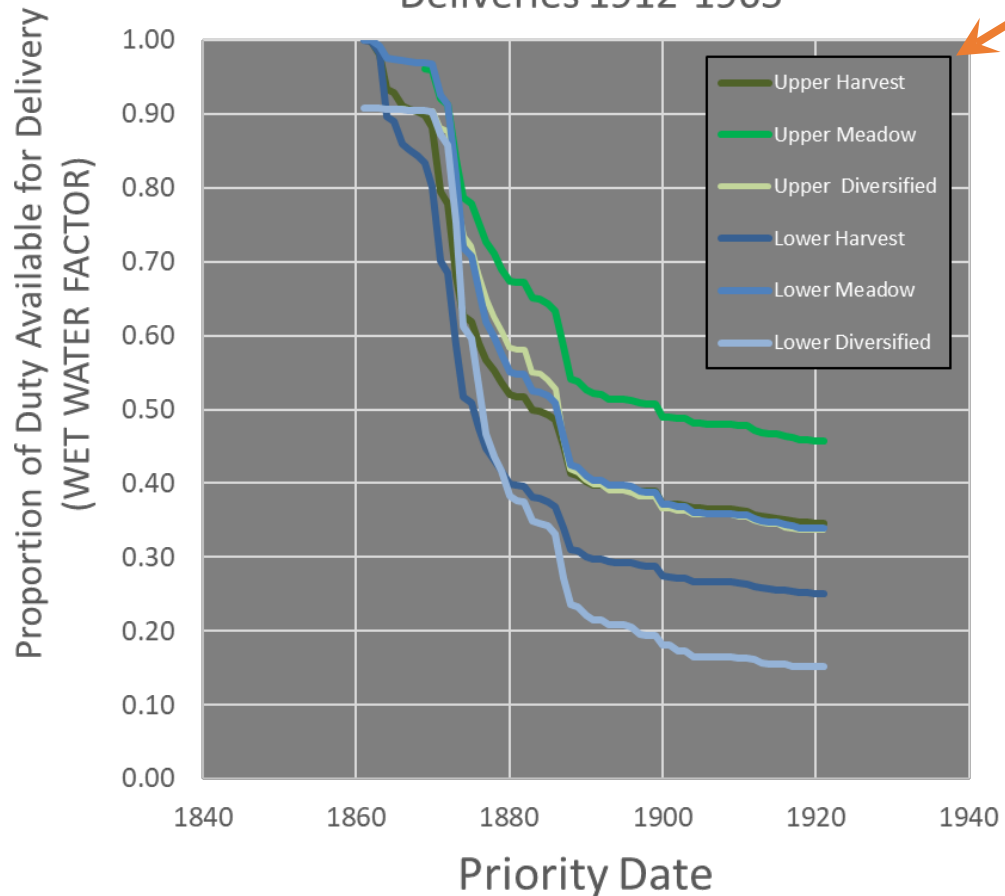
- Quantity and frequency of water available for ASR.



Photo of infiltration basin used for recharge of excess surface water

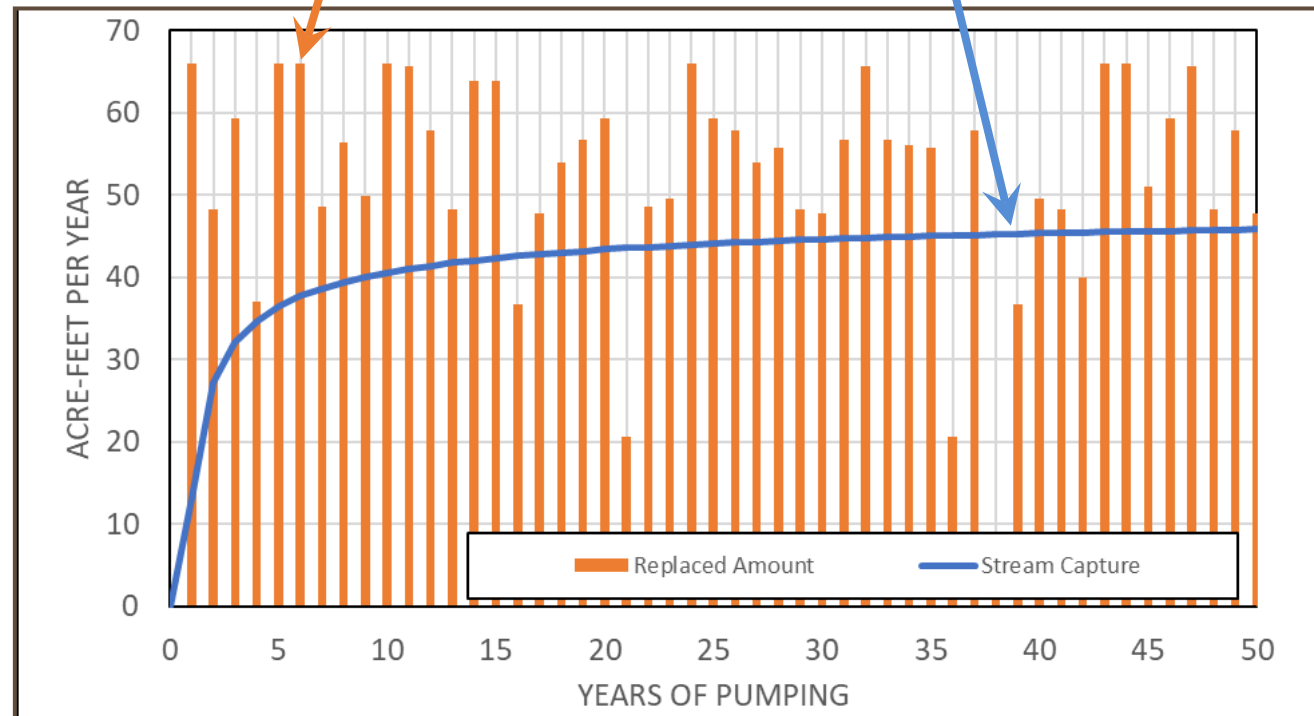
# EVALUATE CAPTURE OFFSETS USING DECREE WATER RIGHTS

Wet Water Factors based on Mean Annual Deliveries 1912-1965



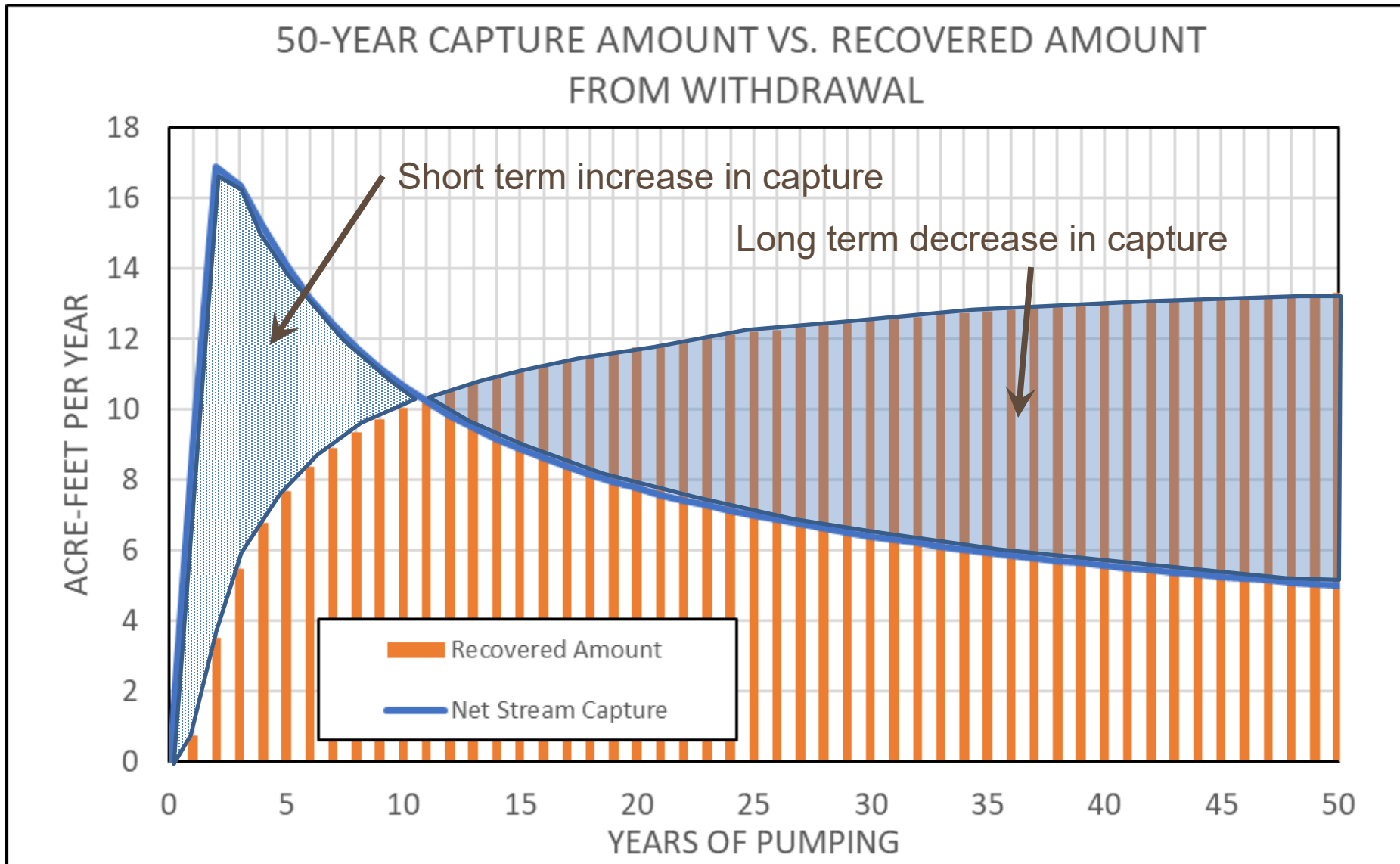
Replacement value of Decree determined outside of models

Capture determined from models





# EVALUATE CAPTURE OFFSETS BY MOVING OR RELINQUISHING OTHER GW RIGHT(S)



# EVALUATION OF CONSERVATION CONCEPTS

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## SOME OF THE MODEL LIMITATIONS

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- Direct economic impact
- Effect of capture assessments
- Impacts from some mountain locations
- Some connected tributaries

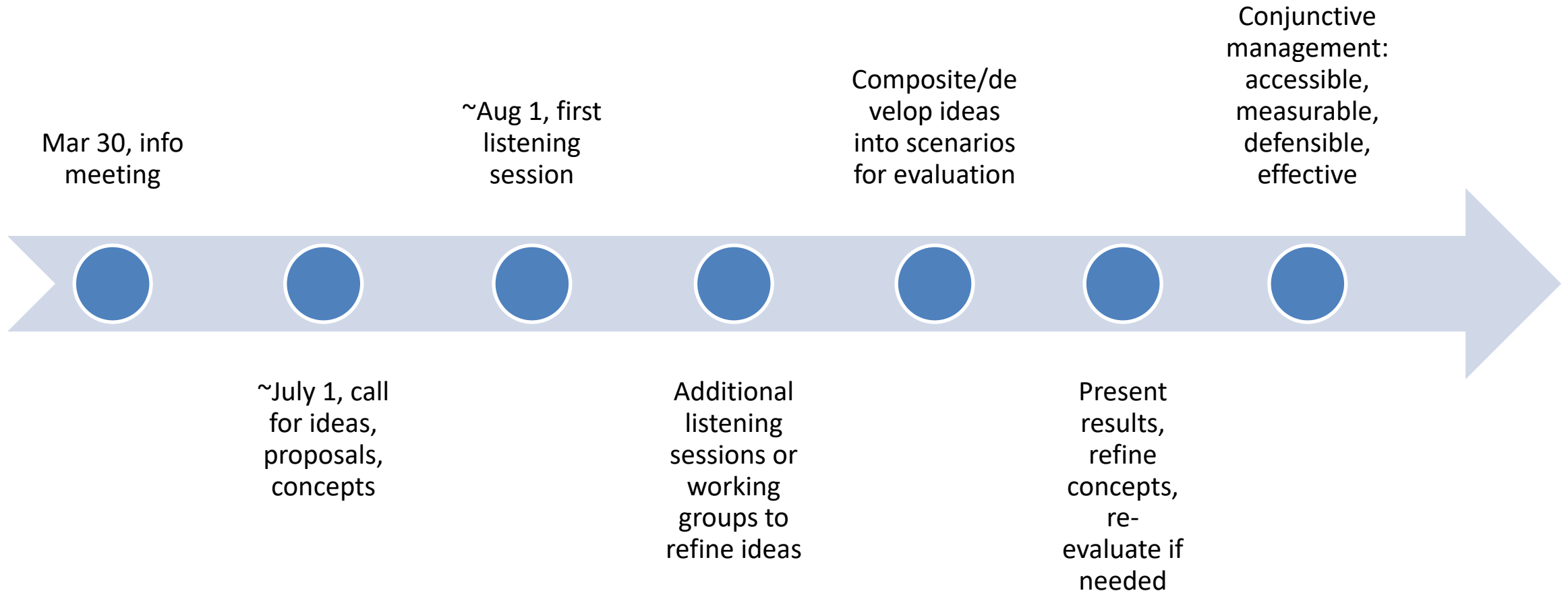


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# **PROCESS FOR DEVELOPING CONJUNCTIVE MANAGEMENT FRAMEWORK**

# TIMELINE/PROCESS

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Questions?



# Contact

Phone: 775-684-2800