Nevada Division of
Water Resources

Humboldt River Stakeholder Working Group Meeting

Opening Remarks

September 23, 2025

Presented by

Adam Sullivan, State Engineer

Nevada Department of CONSERVATION & NATURAL RESOURCES

NEVADA DIVISION OF WATER RESOURCES

PUBLIC OUTREACH Q&A – TOPICS (JUNE 2025)

Curtailment & Enforcement

- What is 'capture' and how is it used?
- Will all groundwater users be curtailed?
- Is curtailment complete or partial?
- When will curtailment happen?
- Will transferred uses be considered?
- Why is curtailment being considered now?

Offsets & Water Rights

- Can curtailment be avoided through offsets?
- How would offsets work in practice?
- Are decree rights used as offsets permanently lost?
- Can unused rights be used as offsets?
- Can offset rights be restored for surface use?

Modeling & Technical Data

- How is capture calculated?
- Were local well logs included?
- Why don’t all stream gages show depletion?
- Will individual water rights be reviewed separately?

Offset Market & Management

- Will the state create or operate a water market?
- What if the offset market fails?
- Can offsets be traded across regions?

Domestic, Supplemental & Conservation Use

- Will domestic and stock wells be curtailed?
- Can land dried for offset have a domestic well later?
- Is supplemental groundwater use included?
- How is over-allocation of decree water managed?
- Can conservation measures count as mitigation?

HUMBOLDT RIVER STAKEHOLDER WORKING GROUP

SEPTEMBER 23, 2025

CONSERVANCY – ECONOMICS SUBGROUP UPDATE

CONSIDERATIONS

Federal Programs (NRCS/FSA)

Accurate Ownership Records of Decreed Rights

Similar Efforts/Programs in Other States

Economic Considerations – Implementation of Offsets and Conservancy/Districts

Public Outreach Framework

ACTIONS

*Federal Programs – CRP programs available through FSA. NRCS has several programs available for individuals and groups.

*Deed/Ownership - **NDWR** digitizing records. Assistance to owners to update records.

*Economic Considerations - Anticipating the options and simplifying offset procedures.

*Public Outreach Framework – Accurate public information is necessary to advance conservation opportunities, funding, management of offsets, coordination efforts, etc.

NEXT MEETING

- Week of November 17
- Continued Economic Evalautation
- Offsets – Other Western State Examples
- Management/Coordination of Offsets – Options for individuals vs. local districts
- Conservancy/District - Timing, process, and pros/cons

Update on Economic Analysis to Support Conjunctive Management in the Humboldt River Basin

Michael H. Taylor, Andrew Ayers, and Thomas Bridges-Lyman

HRSWG – Elko, Nevada

23 September 2025

Market-Based Approach

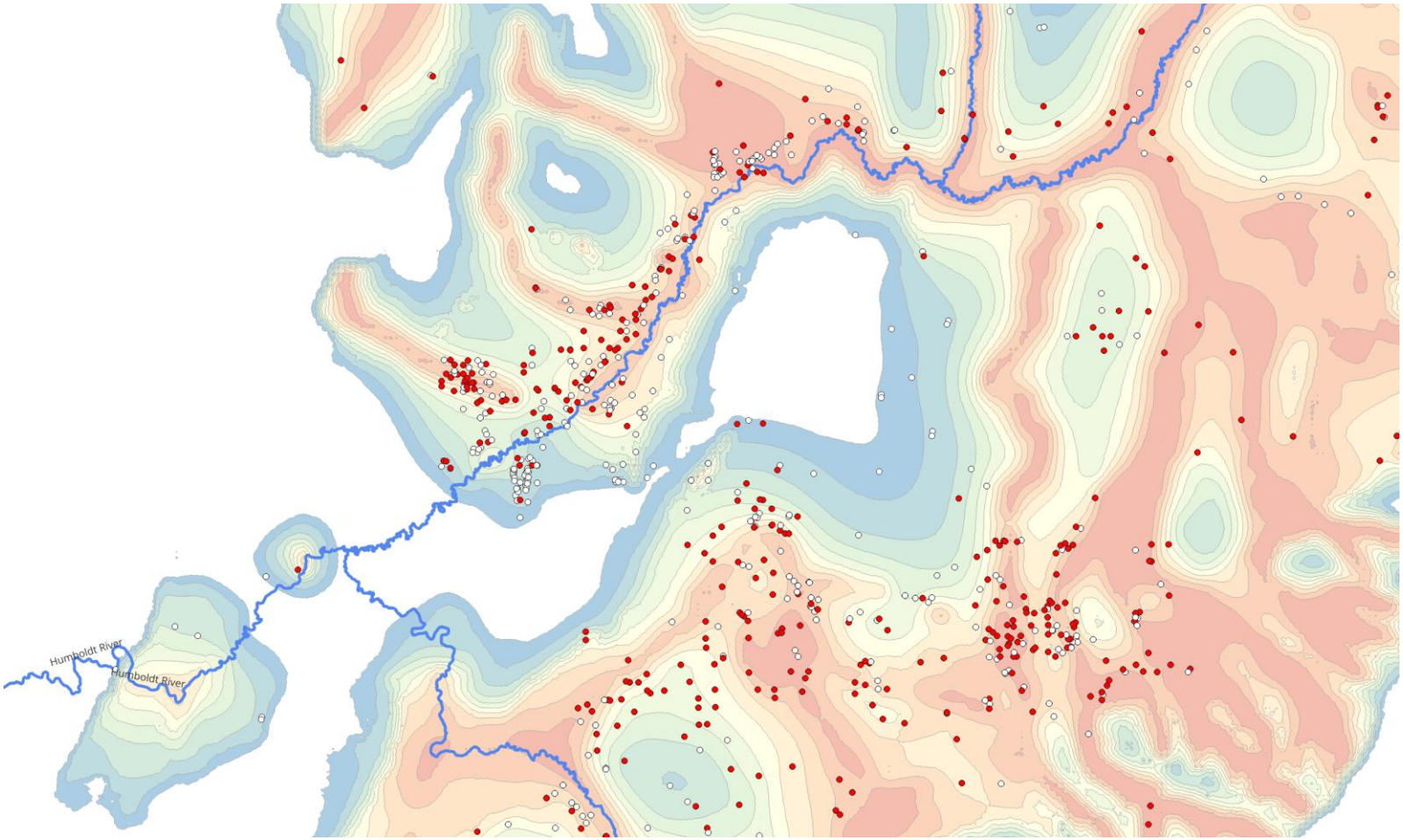
- **Tradable Offsets in the Humboldt**
  - Groundwater pumpers are required to purchase *offsets* that **fairly compensate** surface water users for losses resulting from groundwater pumping and the associated capture of surface water.
  - Offsets **do not** replace groundwater capture in timing, volume, and location.
  - Offsets would be permanent: the additional water would have to be available in perpetuity to offset on-going groundwater capture
  - Groundwater pumpers who hold offsets would be able to pump their full duty in both wet and dry years
  - Offsets could be bought and sold, and potentially leased, contingent on approval by the Division of Water Resources

Advantages

- **Advantages of Offsets**
  - Groundwater Pumpers
    - Creates incentive to shift pumping to lower conflict wells
    - Groundwater pumpers who are using water most profitably will remain in operation; Less profitable groundwater rights will be retired
  - Surface Water Diverters
    - Current decree rights will become more valuable (increased demand)
    - Less profitable decree rights will be sold
  - Offset Prices
    - Prices are determined by voluntary trade in the market

Demand – Groundwater Rights Inventory

- Identify groundwater rights via NDWR Points of Diversion (POD)
  - Filter POD for source type “groundwater” within the capture management zone (CMZ)
- Identify offset obligation for each groundwater user
  - Offset obligation = capture rate x duty
  - Capture rates determined by
    - For Lower Humboldt and Upper Humboldt*, modeled 100-year capture contours
    - For Middle Humboldt, modeled 100-year capture contours when available, or buffers around Humboldt River based on contour widths from LH model
  - Exclude rights where:
    - Capture rate is less than 5%
    - Offset obligation falls under a minimum threshold (e.g., 2 AF)


Humboldt River
Humboldt River

Demand – Groundwater Pumping

- Unused/Underused Groundwater
  - Many groundwater rightsholders do not pump their full duty each year
  - Currently working with NDWR to get estimates of recent pumping history for groundwater rights in the CMZ
  - Our assumption will be that unused groundwater rights or unused portions of groundwater rights will be voluntarily retired under the offset scheme

Supply – Surface Water Rights

- Decree Digitization
  - We have created an inventory of surface water rights from Bartlett and Edwards Decrees
  - Digitize tables in Bartlett and Edwards Decrees using optical character recognition (OCR) via open-source program *tesseract*
  - Currently finishing quality control
- Decree Data
  - Priority year
  - Season of use
  - Duty
  - Public Land Survey System (PLSS) location of use

Supply – Surface Water Rights

Claimant—**BERGMAN AND BERGMAN.**
Source—**Humboldt River.**
Ditch—**Southwest Ditch; Lovelock and Borland Slough.**

Priority	Culture Acres: Harvest	Meadow Pasture	Diversified Pasture	Location: Subdivision	Sec.	Tp.	R.	Length of Season	Duty of Water: C. F. S.	Acre Feet
1873	100.00	.....	.....	N½	34	27	31	3-15– 9-15	.813	300.00
1873	33.70	.....	.....	N½	34	27	31	3-15– 9-15	.274	101.10
1873	79.40	.....	.....	W½SW¼	34	27	31	3-15– 9-15	.646	238.20
1873	47.60	.....	.....	E½,SW¼,W½SE¼&S½NE¼	34	27	31	3-15– 9-15	.387	142.80
1873	.....	.....	3.55	NE¼NE¼	34	27	31	3-15– 6-13	.029	5.33
1873	.....	.....	108.10	E½NW¼&W½NE¼	34	27	31	3-15– 6-13	.879	162.15
1873	.....	.....	213.10	E½,E½SW¼	34	27	31	3-15– 6-13	1.733	319.65
1883	52.30	.....	.....	NW¼	3	26	31	3-15– 9-15	.425	156.90
1883	.....	.....	315.75	W½NE¼	3	26	31	3-15– 6-13	2.567	473.63
1883	49.15	.....	.....	S½SE¼	33	27	31	3-15– 9-15	.499	147.45
1883	48.00	.....	.....	SE¼	33	27	31	3-15– 9-15	.390	144.00
1883	38.90	.....	.....	SE¼&SW¼	33	27	31	3-15– 9-15	.316	116.70
1883	25.95	.....	.....	SE¼SW¼	33	27	31	3-15– 9-15	.211	77.85
1883	.....	22.00	.....	NW¼SW¼	33	27	31	3-15– 6-13	.179	33.00
1883	.....	10.21	.....	SW¼	33	27	31	3-15– 6-13	.083	15.30
1883	.....	14.95	.....	SW¼SW¼	33	27	31	3-15– 6-13	.123	22.48
1883	.....	.....	51.10	S½	33	27	31	3-15– 6-13	.415	76.65
1883	.....	.....	3.95	SW¼SE¼	33	27	31	3-15– 6-13	.032	5.93
1880	60.00	.....	.....	SE¼	32	27	31	3-15– 9-15	.488	180.00
1883	20.00	.....	.....	SE¼	32	27	31	3-15– 9-15	.163	60.00
1883	139.80	.....	.....	SE¼,S½NE¼,SW¼	32	27	31	3-15– 9-15	1.137	419.40
1883	59.75	.....	.....	N½	5	26	31	3-15– 9-15	.486	179.25
1883	33.00	.....	.....	NE¼	5	26	31	3-15– 9-15	.268	99.00
1883	47.95	.....	.....	E½E½	5	26	31	3-15– 9-15	.390	143.85
1920	105.00	.....	.....		5	26	31	3-15– 9-15		
1873	78.65	.....	.....	NE¼	4	26	31	3-15– 9-15	.639	235.95
1873	81.35	.....	.....	S½	4	26	31	3-15– 9-15	.661	244.05
1873	119.95	.....	.....	S½	4	26	31	3-15– 9-15	.975	359.85
1873	128.20	.....	.....	N½	4	26	31	3-15– 9-15	1.042	384.60
1873	77.45	.....	.....	W½NW¼	4	26	31	3-15– 9-15	.630	232.35
1873	.....	.....	38.90	NE¼SE¼	4	26	31	3-15– 9-15	.316	58.35
1873	.....	.....	17.70	SE¼SE¼	4	26	31	3-15– 6-13	.144	26.55
1873	.....	.....	11.00	NE¼NE¼	4	26	31	3-15– 6-13	.089	16.50

Supply – Surface Water Rights

THE BARTLETT DECREE 11
appropriators or claimants of the waters of the Humboldt River stream system,
for use by or through the Old Channel dam and ditch, is changed, modified,
found and fixed as of November, 1888.

9
1find from the oral and documentary evidence submitted that the exception
filed to the Final Order of Determination by claimant Bergman & Bergman has
been sustained by the testimony, in so far as said exception pertains to the year
of priority, and that the findings in reference to the claim of Bergman & Berg-
man are as follows, to wit
Claimant——BERGMAN AND BERGMAN.
Source——Humboldt River.
Ditch——Southwest Ditch; Lovelock and Borland Slough.
_CULTURE ACRES—— —DUTY OF WATER——
Pri- Meadow Diversified p___L.OC APIO N—— Length Acre
ority Harvest Pasture Pasture Subdivision Sec. Tpop. R. of Season C.F.S. Feet
1873 100.00 _____ _____- N½ 34 27 531 3-15- 9-15 .813 300.00
1873 33.70 ___ N½ 34 27 31 3-15- 9-15 .274 101:10
1873 79.40 ____ ._ W½SW¼ 34 27 31 3-15- 9-15 .646 238.20
1873 47.60 _____- E½,SW¼.W½SE¼½S½NE¼ 34 27 31 3-15- 9-15 .387 142.80
1873 _____ _____ 3.55 NE¼NE¼ 34 27 31 3-15- 6-13 .029 5.33
1873 _ D7 10810 E½W¼W¼NE¼ 34 27 31 3-15- 6-13 .879 162.15
1873 __. 213:10 E½ E½SW¼ 34 27 31 3-15- 6-13 1.733 219.65
1883 52.35 _____ _.. NW¼ 3 26 31 3-15- 9-15 .425 156.90
1883 __... _____ 3715.75 W½NE¼ 3 26 31 3-15- 6-13 2.567 473.63
1883 49.15 _____ _____. S½SE¼ 33 27 31 3-15- 9-15 .499 147.45
1883 48.00 _____ _____. SE¼ 33 27 31 3-15- 9-15 .390 144.00
1883 28.90 _____ _____- SE¼&SW¼ 33 27 31 3-15- 9-15 .316 116.70
1883 25.95 _____ _____ SE¼SW¼ 33 27 31 3-15- 9-15 .211 77.85
1883 _____.. 2.00 _____. NW¼SW¼ 33 27 31 3-15- 6-13 .179 33.00
1883 _____ 10.21 SW¼ 33 27 31 3-15- 6-13 .053 15.30
1883 __ 14.95 ___. SW¼SW¼ 533 27 31 3-15- 6-13 .123 22.48
1883 _____ _____ 1.10 S½ 33 27 31 3-15- 6-13 .415 76.65
1883 _____ 3.95 SW¼SE½¼ 33 27 31 3-15- 6-13 .032 5.93
1880 50.00 _____ _____. SE¼ 32 27 31 3-15- 9-15 .488 1580.00
1883 20.00 _____ SE¼ 32 27 31 3-15- 9-15 .163 60.00
1883 139.80 ____ SE½½S8½NE¼SW¼ 32 27 31 3-15- 9-15 1.137 419.40
1883 59.75 _____ _____ N½ 5 26 31 3-15- 9-15 .486 179.25
1883 33.00 _____ _____- NE¼ 5 26 531 3-15- 9-15 .268 99.00
1883 47.95 _____ _ E½E½ 5 26 31 3-15- 9-15 .390 143.85
1920 105.00 _____ _____- 5 26 31 3-15- 9-15
1873 78-65 _____ _____] NE¼ 4 26 31 3-15- 9-15 .639 235.95
1873 81.35 _____ _____. S5 4 26 31 3-15- 9-15 .661 244.05
1873 119.95 _____ _____ S½ 4 26 31 3-15- 9-15 .975 359.85
1873 128.20 _____ _____ N½ 4 26 531 3-15- 9-15 1.042 384.60
1873 77.45 _____ _____.. W½NW¼ 4 26 31 3-15- 9-15 .630 232.35
1873 _____. ___ 738.90 NE½SE½ 4 26 31 3-15- 9-15 .316 58.35
1873 ____ 7 17.70 SE¼SE¼ 4 26 31 3-15- 6-13 .144 26.55
1873 _____ __ 11.00 NE¼NE¼ 4 26 31 3-15- 6-13 .089 16.50

Supply – Surface Water Rights

	PageNumber	Claimant	Source	Ditch	Priority Year	HarvAcres	MeadAcres	DivAcres	QtrQtr	Sec	Town	Range	SeasStart
1	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1873	100.00	_____	_____–	N½	34	27	531	3–15—
2	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1873	79.40	___	._	W½SW¼	34	27	31	3–15—
3	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1873	_____	_____	3.55	NE¼NE¼	34	27	31	3–15—
4	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1873	_	D7	10810	E½W¼W½NE¼	34	27	31	3–15—
5	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1873	__.	213:10	E½	E½SW¼	34	27	31	3–15—
6	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	52.35	_____	_..	NW¼	3	26	31	3–15—
7	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	__...	_____	3715.75	W½NE¼	3	26	31	3–15—
8	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	49.15	____	_____.	S½SE¼	33	27	31	3–15—
9	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	48.00	_____	_____.	SE¼	33	27	31	3–15—
10	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	28.90	_____	_____–	SE¼&SW¼	33	27	31	3–15—
11	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	25.95	_____	_____	SE¼SW¼	33	27	31	3–15—
12	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	_____..	2.00	_____.	NW¼SW¼	33	27	31	3–15—
13	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	__	14.95	__.	SW¼SW¼	533	27	31	3–15—
14	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	_____	_____	1.10	S½	33	27	31	3–15—
15	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1880	50.00	_____	_____.	SE¼	32	27	31	3–15—
16	11	BERGMAN AND BERGMAN	HUMBOLDT RIVER	SOUTHWEST DITCH; LOVELOCK AND BORLAND SLOUGH	1883	59.75	_____	_____	N½	5	26	31	3–15—

Supply – Surface Water: Permits

- Changes to Degree Rights
  - Assume that any changes to place or manner of use required a new permit/application that appears in the hydrographic abstract data
  - All other decreed rights are assumed to be used in agriculture in the original location
- Unused Decree
  - Working with NDWR to determine how many decree rights that are currently not being used could be available for offsets
- Additional Surface Rights
  - Identify additional surface water rights from NDWR Hydrographic Abstract using Region Name, Source Type, Source Description, and Application Status (i.e., active rights only)
  - Hydrographic Abstract data provide duty, location, and manner of use

Supply – Offset Volume

- Wet Water Volumes
  - Each degree right will be assigned a “wet water” factor that determines its offset volume
  - Wet water corresponds to the volume historically delivered by a decree right in 80% of years
  - Using wet water factors means that while offsets will **NOT** exactly replace well capture in **timing** and **volume**, they will provide more water over the irrigation season in 4 out of 5 years
- Consumptive Use
  - Only the consumptive use portion of a water right will count towards offset volume

Supply – Wet Water Volumes

UPPER HUMBOLDT DISTRICT DECREE RIGHTS				
PRIORITY DATE		HARVEST	MEADOW	DIVERSIFIED
		cfs	cfs	cfs
1865		0.5		
1875		0.5		
TOTAL:		1.0		

	HARVEST				
DUTY af	HISTORICALLY DELIVERED afa	HISTORICAL WETNESS %	OFFSET VALUE afa	WETNESS FACTOR %	
121.99	113.37	92.9%	107.90	88.5%	
121.99	75.41	61.8%	53.16	43.6%	
243.97	188.78	77.4%	161.06	66.0%	

LOWER HUMBOLDT DISTRICT DECREE RIGHTS				
PRIORITY DATE		HARVEST	MEADOW	DIVERSIFIED
		cfs	cfs	cfs
1865		0.5		
1875		0.5		
TOTAL:		1.0		

	HARVEST				
DUTY af	HISTORICALLY DELIVERED afa	HISTORICAL WETNESS %	OFFSET VALUE afa	WETNESS FACTOR %	
183.47	163.29	89.0%	141.62	77.2%	
183.47	93.30	50.9%	59.70	32.5%	
366.95	256.59	69.9%	201.33	54.9%	

Geographic Extent of the Market

- "No-Harm" Zone
  - "No-harm" zone is defined as any reach of the river where is always possible to physically deliver water to any decree rights that is in priority
  - Offsets can be traded freely in the "no-harm zone"
- Humboldt Decree
  - For offsets generated from decree rights upstream of the Palisades gauge, the Humboldt Decree will ensure that the unused water is available to surface water diverters that are in priority both upstream and downstream of the gauge
  - For offsets from below Palisades, the Decree will be updated to ensure that the unused water is available to be diverted
- Location
  - Under these assumptions, while the offsets will not replace captured water at the precise location of the well, they will, operating through the Decree, ensure that surface water diverters in priority are served as if this were the case

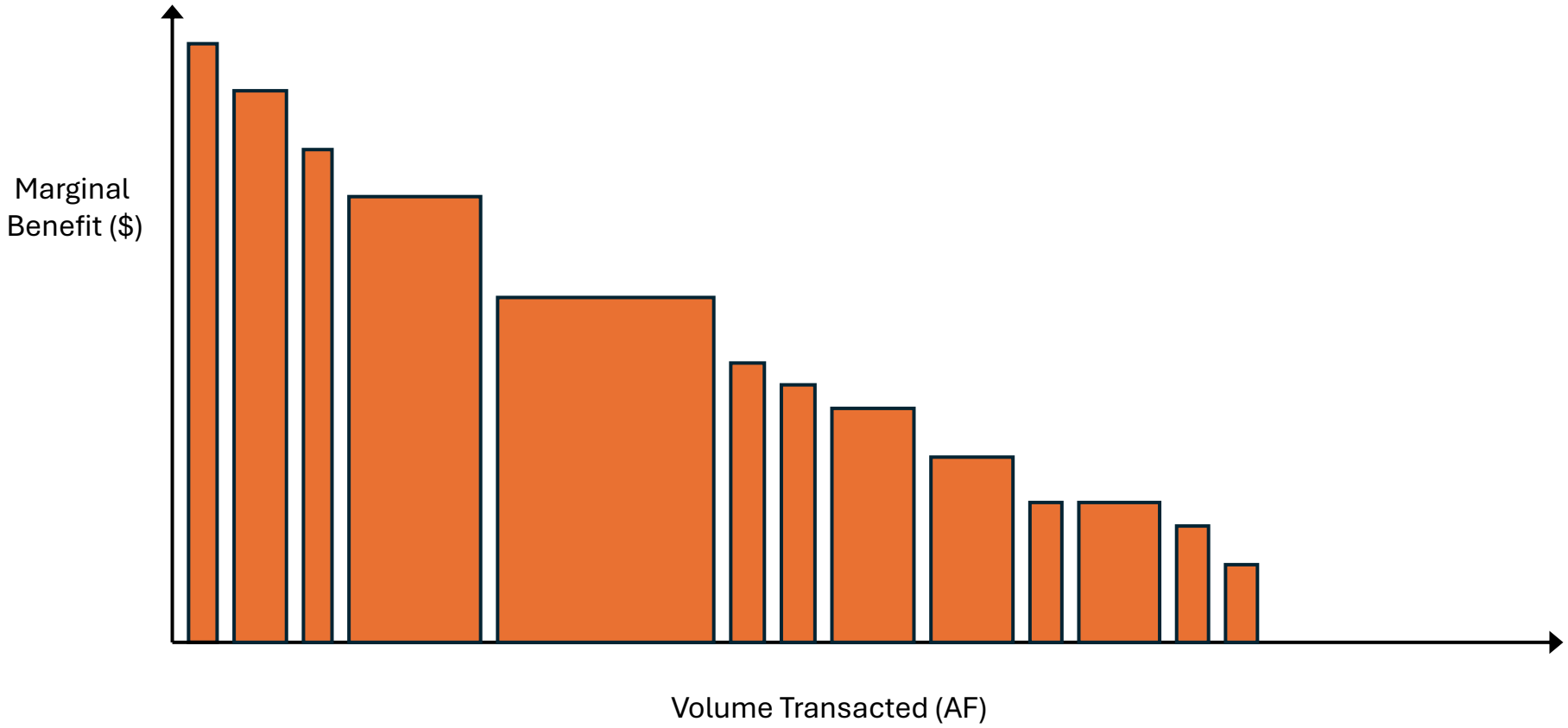
Palisades Volumes

- Palisade Volumes
  - To account for transmission losses, both offset obligations for groundwater wells and offset volumes for decree rights will be converted into “Palisade” volumes (i.e., volume of water at the Palisade gage)
  - This normalization will facilitate trade in the offset markets

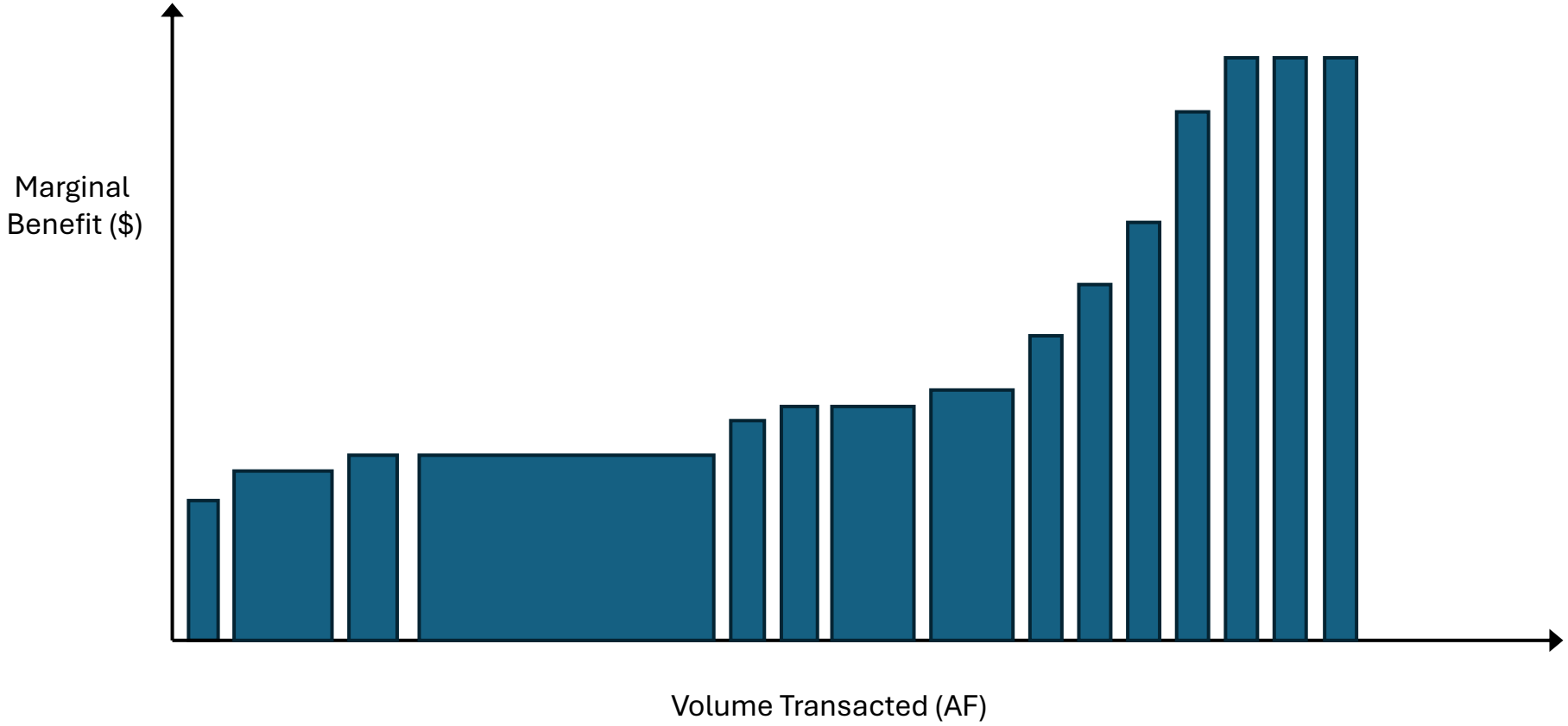
Water Rights Pricing for Analysis

- Prices are derived from real property transfer tax (RPTT) payments on transactions involving water rights only
- Price dataset constructed from abstracts of title with Reports of Conveyance filed with NDWR
  - Identify documents in abstracts of title that seem to pertain to water-rights-only transactions
  - Look up documents in county recorder offices
  - Collect information on RPTT paid and sales price from county recorder stamps and from Declaration of Value forms
- Due to the small number of water rights-only surface water sales, the econ team will work with stakeholders to ensure that prices included in the analysis are realistic

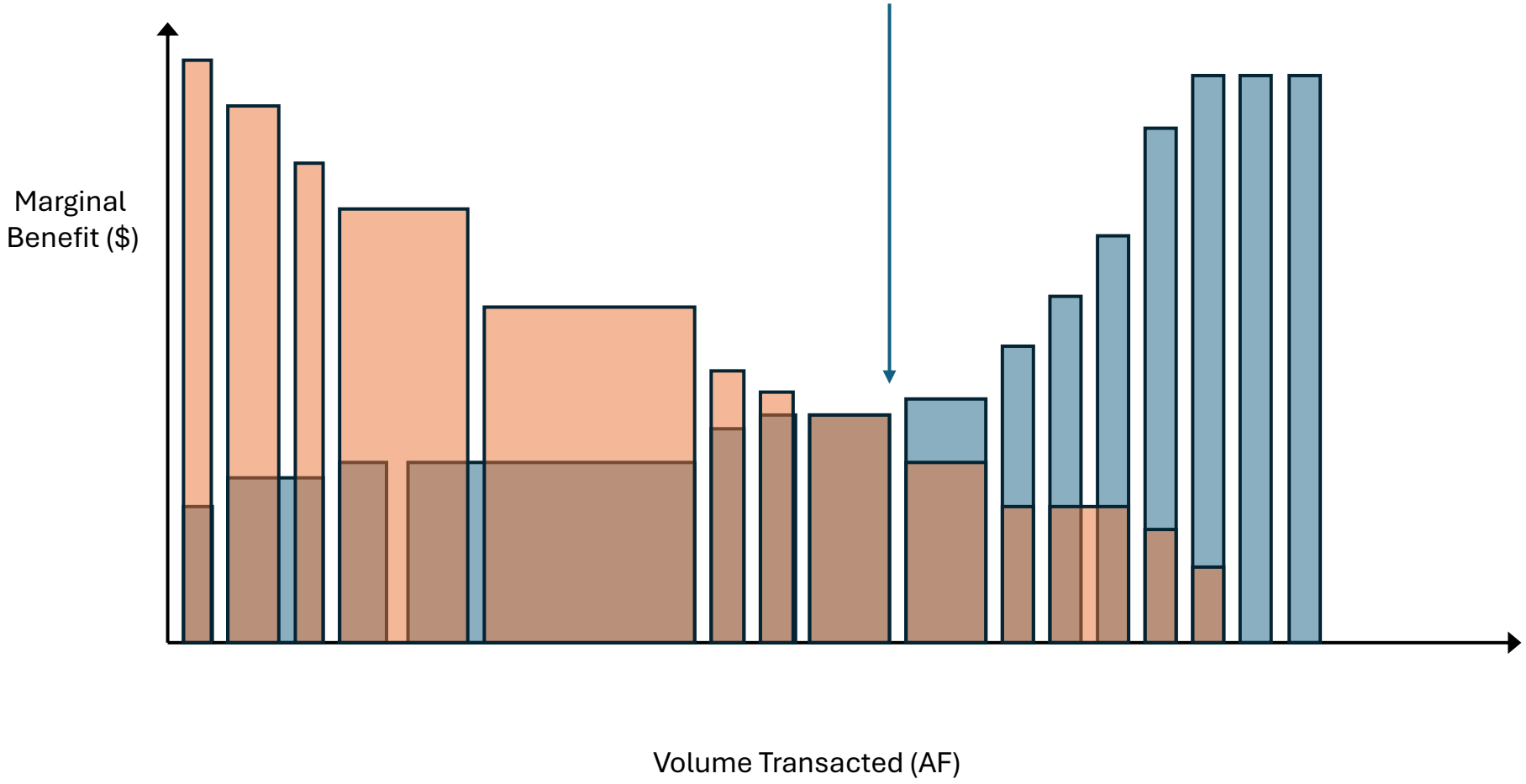
Orange boxes represent how much value groundwater rightsholders are **willing to pay** for an offset



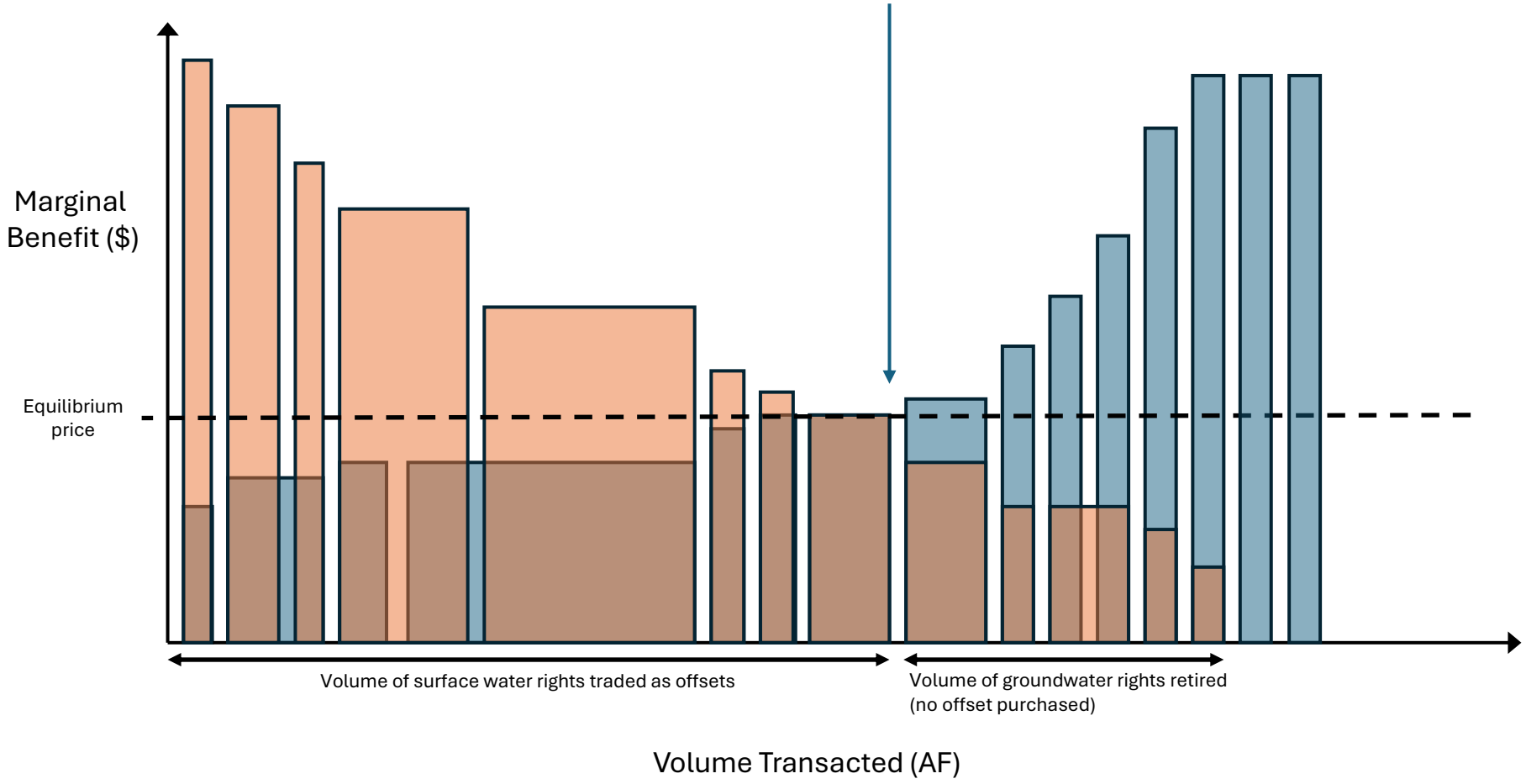
Blue boxes represent how much value surface water rightsholders are **willing to accept** to provide as offset



Up until this point, **willingness to pay** for offsets exceeds **willingness to accept**.



Up until this point, **willingness to pay** for offsets exceeds **willingness to accept**.

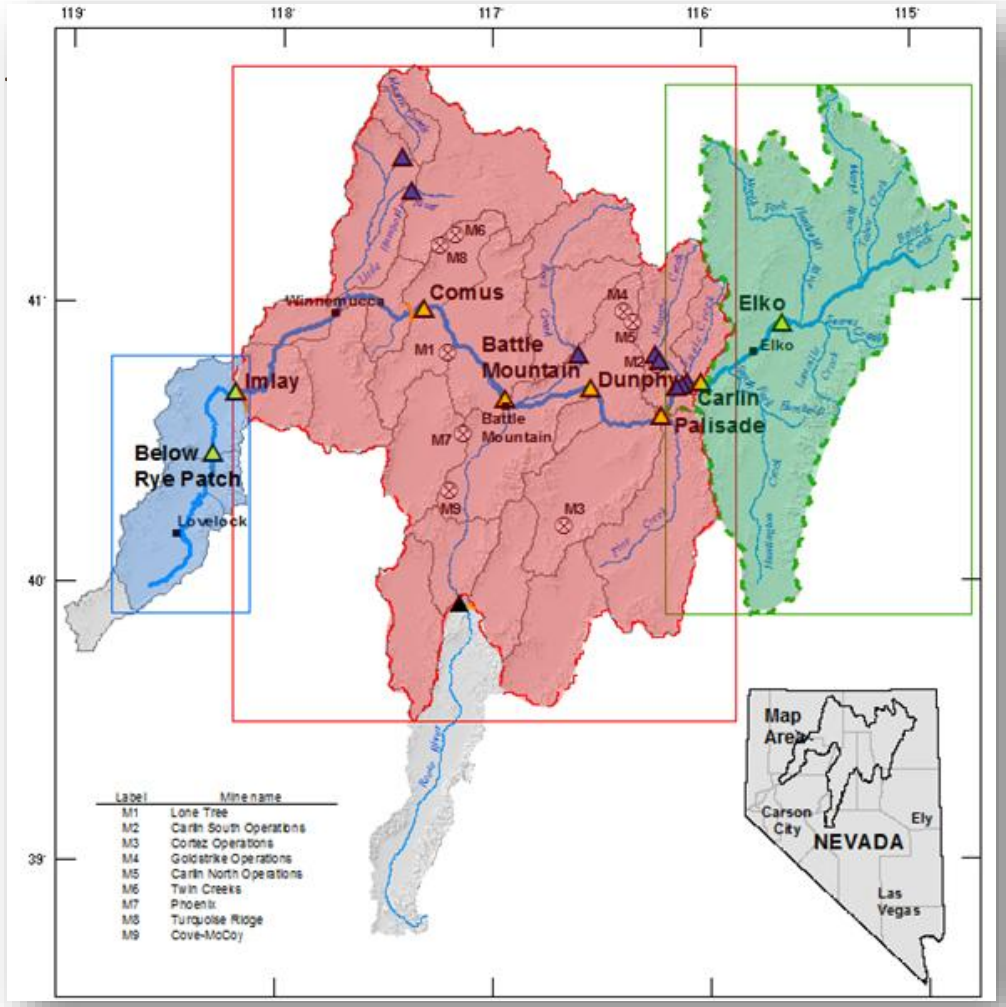


Contact Information

If you have any questions about this presentation, please contact Michael H. Taylor at taylor@unr.edu or (775) 784-1679.

University of Nevada
Cooperative Extension

University of Nevada, Reno



NEVADA DIVISION OF WATER RESOURCES

Nevada Department of CONSERVATION & NATURAL RESOURCES

Updates on Humboldt Models and Technical Subgroup Activity

Humboldt Stakeholder Working Group

Elko, Nevada
Sept 23, 2025

Presented By:
Kip Allander, *Chief Hydrogeologist*

Middle Model Update

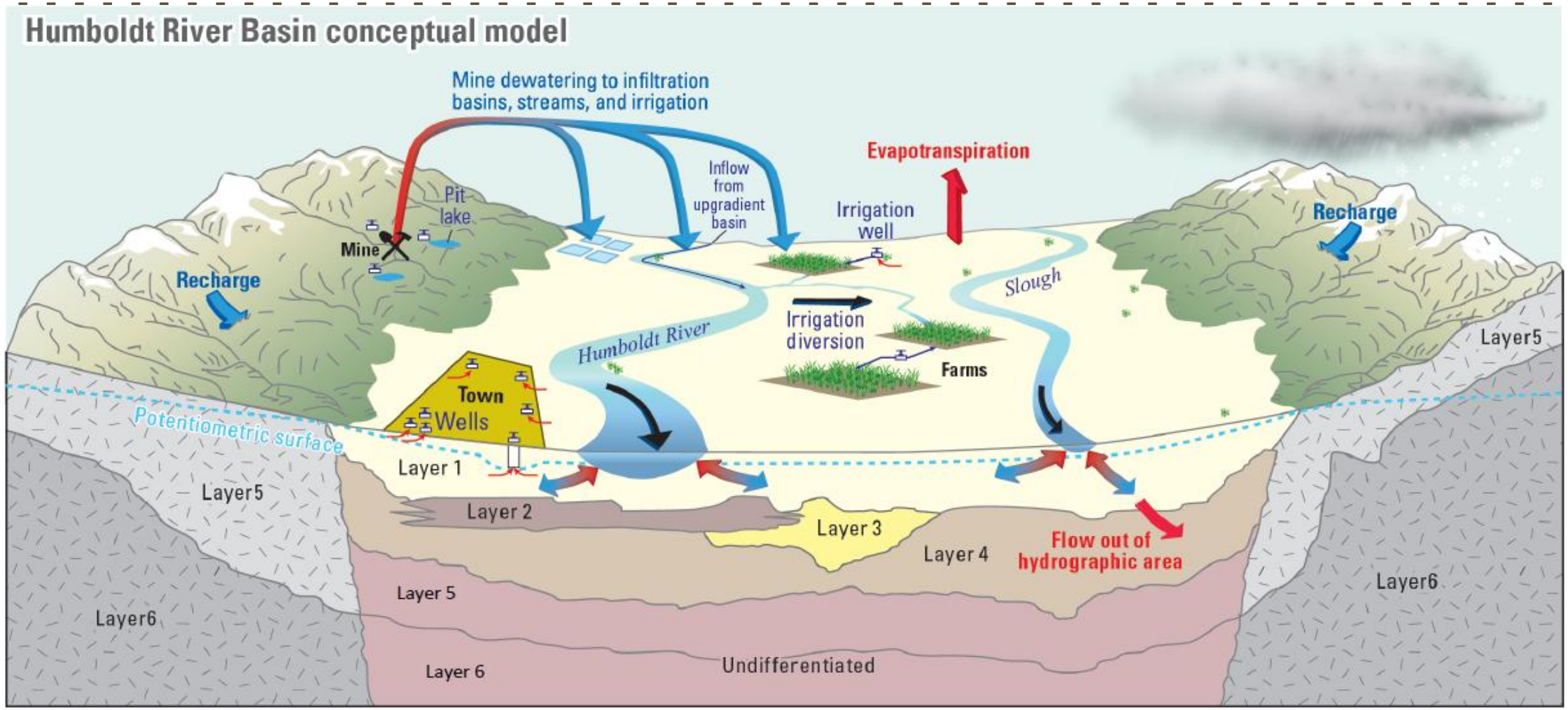
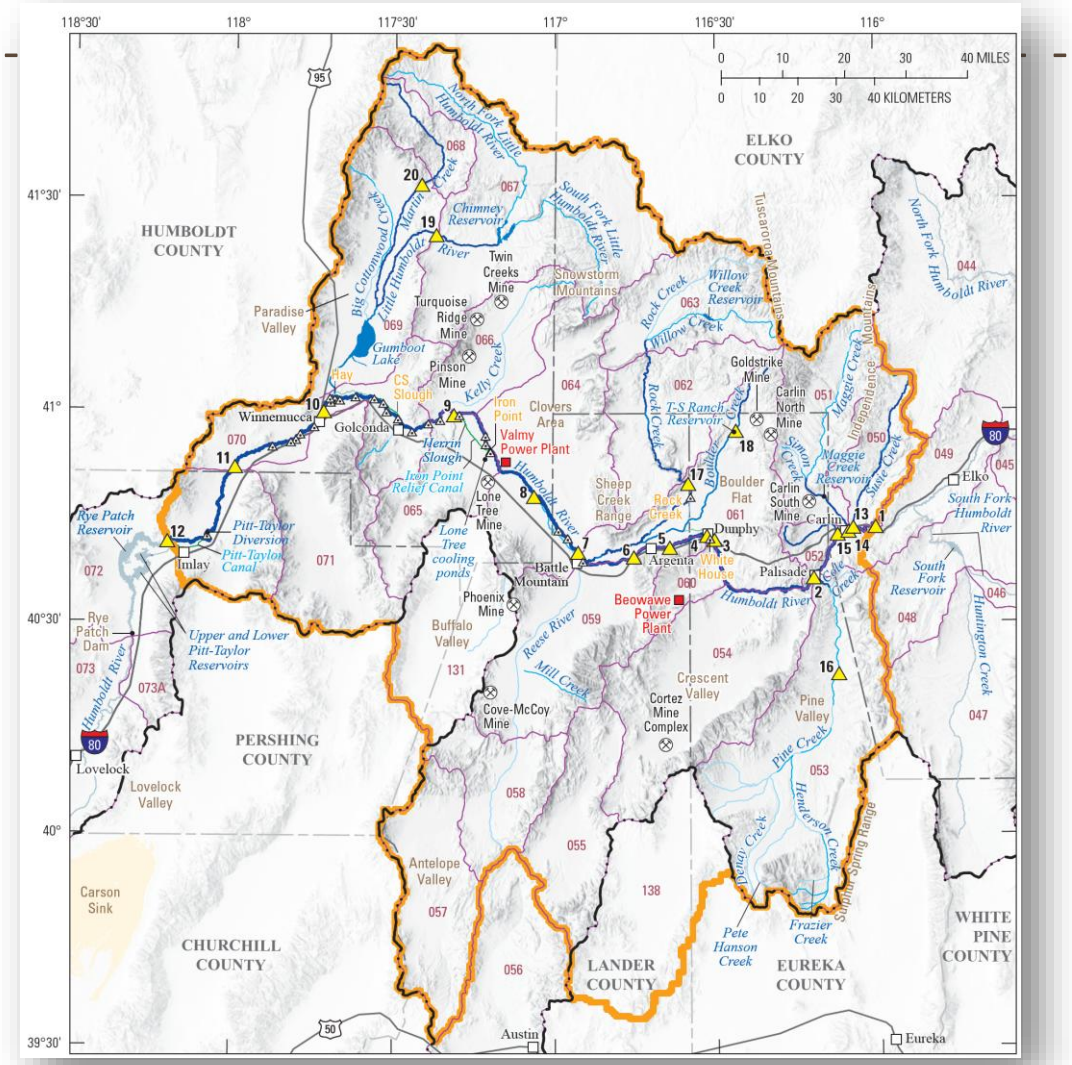


Image obtained from: https://water.nv.gov/uploads/humboldt-docs/6-10-2025_Humboldt_Update.pdf

Middle Model Update from Public Meetings in June

- Results largely unchanged since provisional results provided in March 2022.
- However, some additional limitations identified.

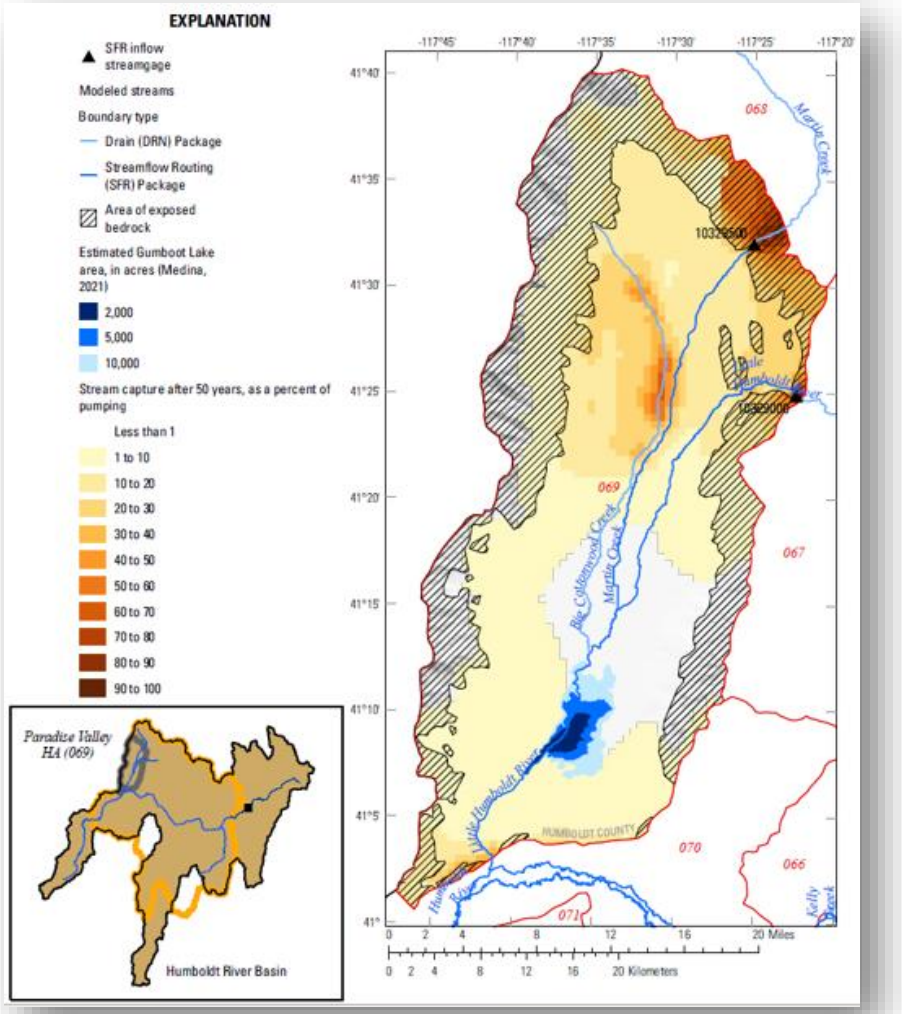


https://water.nv.gov/uploads/humboldt-docs/6-10-2025_Humboldt_Update.pdf

Middle Model Update – Basins where limitations exceed usefulness and model shouldn't be used

Paradise Valley (HA 069)

- Irrigation return flows are too low.
- Little Humboldt River flow is too high.
- Streambed K to restrictive to allow for proper GW/SW exchange.
- Gumboot Lake formation and through routing of streamflow improperly implemented.
- Effects on Model results.
  - Inadequate determination of properties.
  - Likely underestimates stream capture.



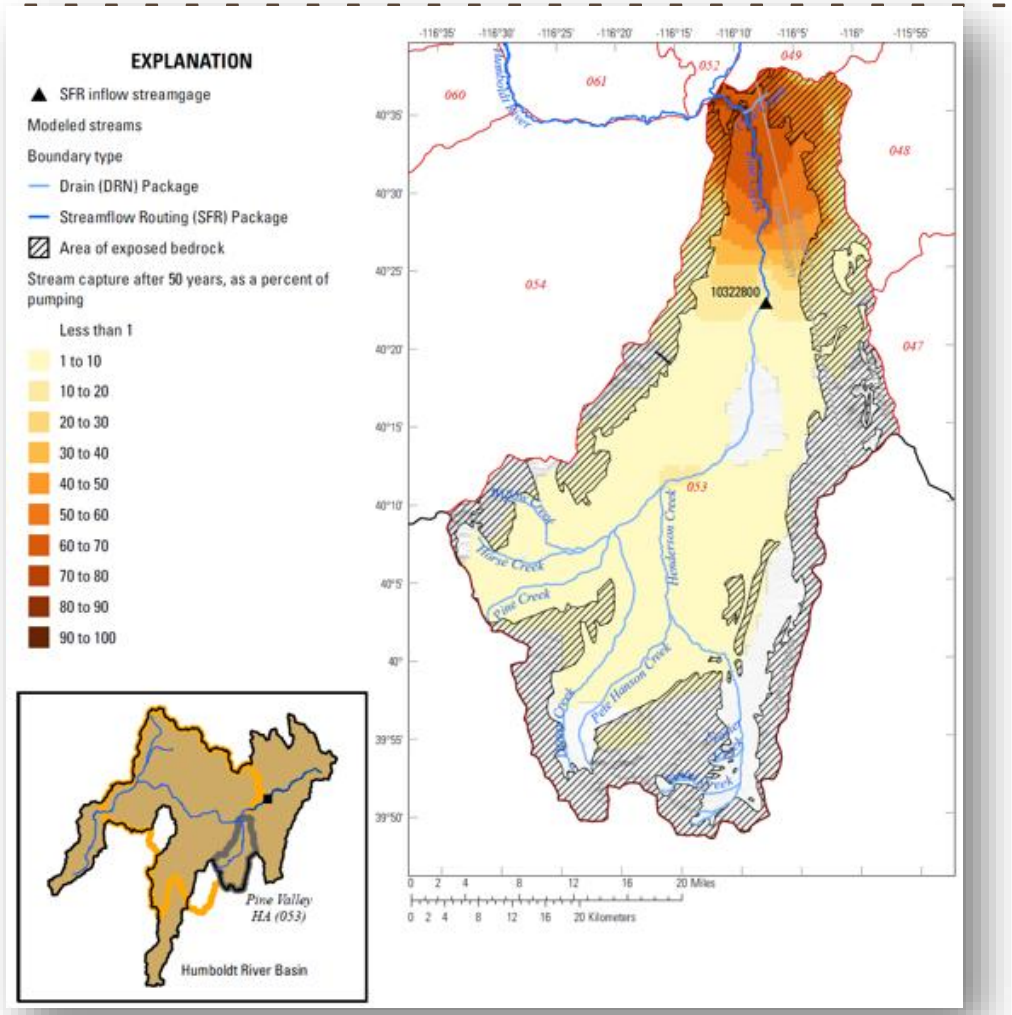
https://water.nv.gov/uploads/humboldt-docs/6-10-2025_Humboldt_Update.pdf

Middle Model Update – Basins where limitations exceed usefulness and model won't be used

Pine Valley (HA 053)

- Pumping unintentionally omitted.
- Pine Creek Decree Diversions unintentionally omitted.

- Effects on Model results
  - Inadequate determination of properties.
  - No evaluation of overall capture originating from Pine Valley HA.
  - Likely underestimation of stream capture.



https://water.nv.gov/uploads/humboldt-docs/6-10-2025_Humboldt_Update.pdf

Middle Model Products Update

- SE made formal request to USGS for provisional release of Middle Humboldt Model, Data, and Report on May 29th.
- USGS provided official response on June 27th.
  - Can provide us with provisional release of data and model.
  - Report must go through normal publication process though before it is released.

> "Here is a list of the products you have requested and a timeline of when we expect them to be completed or made available as provisional releases:
>
> 1. Presentation to the HRB Stakeholder Group – completed June 10 -11, 2025
> 2. Participation on the HRB Technical Working Group – participation approved June 16, 2025
> 3. Provisional release of the Middle Humboldt model archive – August 2025
> 4. Provisional release of the Middle Humboldt model capture results – October 2025
> 5. Provisional release of the Middle Humboldt model capture query tool – December 2025
> 6. Final publication of the Middle Humboldt report – early 2026"

Middle Model Update – Model provisionally released on September 18, 2025

USGS science for a changing world

ScienceBase-Catalog Communities Help Log in

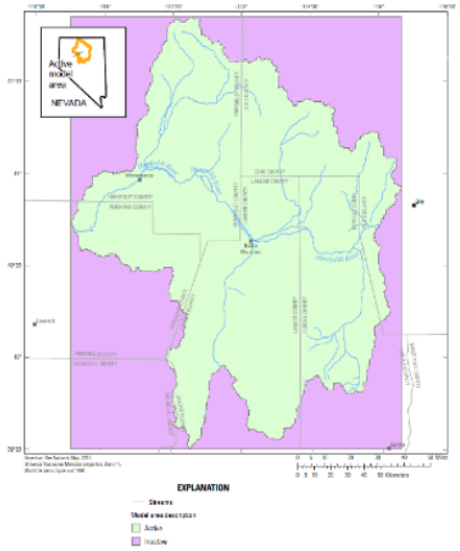
ScienceBase Catalog → USGS Nevada Water Scienc… → NVWSC In Progress Data R… → MODFLOW 6 groundwater fl…

MODFLOW 6 groundwater flow models and supporting data for evaluation of stream capture related to groundwater pumping, middle Humboldt River Basin, Nevada (Provisional Release)

View

Dates

Publication Date : 2025
Start Date : 1960-09-30
End Date : 2015-10-01
Release Date : 2025-09-18



Citation

Davis, K.W., Eldridge, W.G., Allander, K.K., Gardner, M.A., and Mayers, C.J., 2025, MODFLOW 6 groundwater flow models and supporting data for evaluation of stream capture related to groundwater pumping, middle Humboldt River Basin, Nevada (Provisional Release): U.S. Geological Survey data release, https://www.sciencebase.gov/catalog/item/6397944bd34e0de3a1f065e4.

Summary

NOTE: These data are preliminary or provisional and are subject to revision. They are being provided to meet the need for timely best science. The data have not received final approval by the U.S. Geological Survey (USGS) and are provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the data.

https://www.sciencebase.gov/catalog/item/6397944bd34e0de3a1f065e4

Middle Model Update – Capture Data provisionally released on September 22, 2025

USGS science for a changing world

ScienceBase-Catalog Communities Help Log in

ScienceBase Catalog → USGS Nevada Water Scienc… → NVWSC In Progress Data R… → Humboldt River Basin Model…

Humboldt River Basin Model Grids and Potential Groundwater Capture Results (Provisional Release)

View

Dates

Release Date : 2025-09-22

Citation

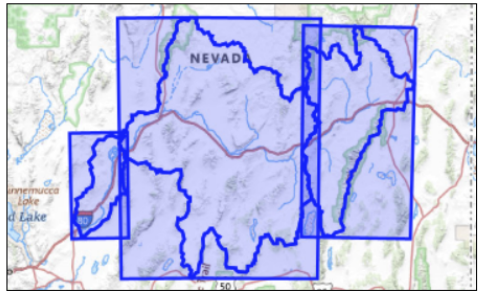
Mayers, C.J., Medina, R.L., Davis, K.W., Rybarski, S.C, Carroll, R.W., Eldridge, W.G. and Nadler, C.A., 2025, Humboldt River Basin Model Grids and Potential Groundwater Capture Results (Provisional Release): U.S. Geological Survey data release, https://www.sciencebase.gov/catalog/item/6577800cd34e952b227462d1.

Summary

NOTE: These data are preliminary or provisional and are subject to revision. They are being provided to meet the need for timely best science. The data have not received final approval by the U.S. Geological Survey (USGS) and are provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the data.

This U.S. Geological Survey data release presents polygon model grids and tables of 100-year groundwater capture results for the lower, middle, and upper Humboldt River basins, Nevada. The grids define the active model cells, including cell identifiers and elevations for the model layers. The tables summarize potential groundwater capture from three sources: stream depletion, salvaged evapotranspiration (ETg), and storage change. Note that in the lower

Map »



Spatial Services

ScienceBase WMS :

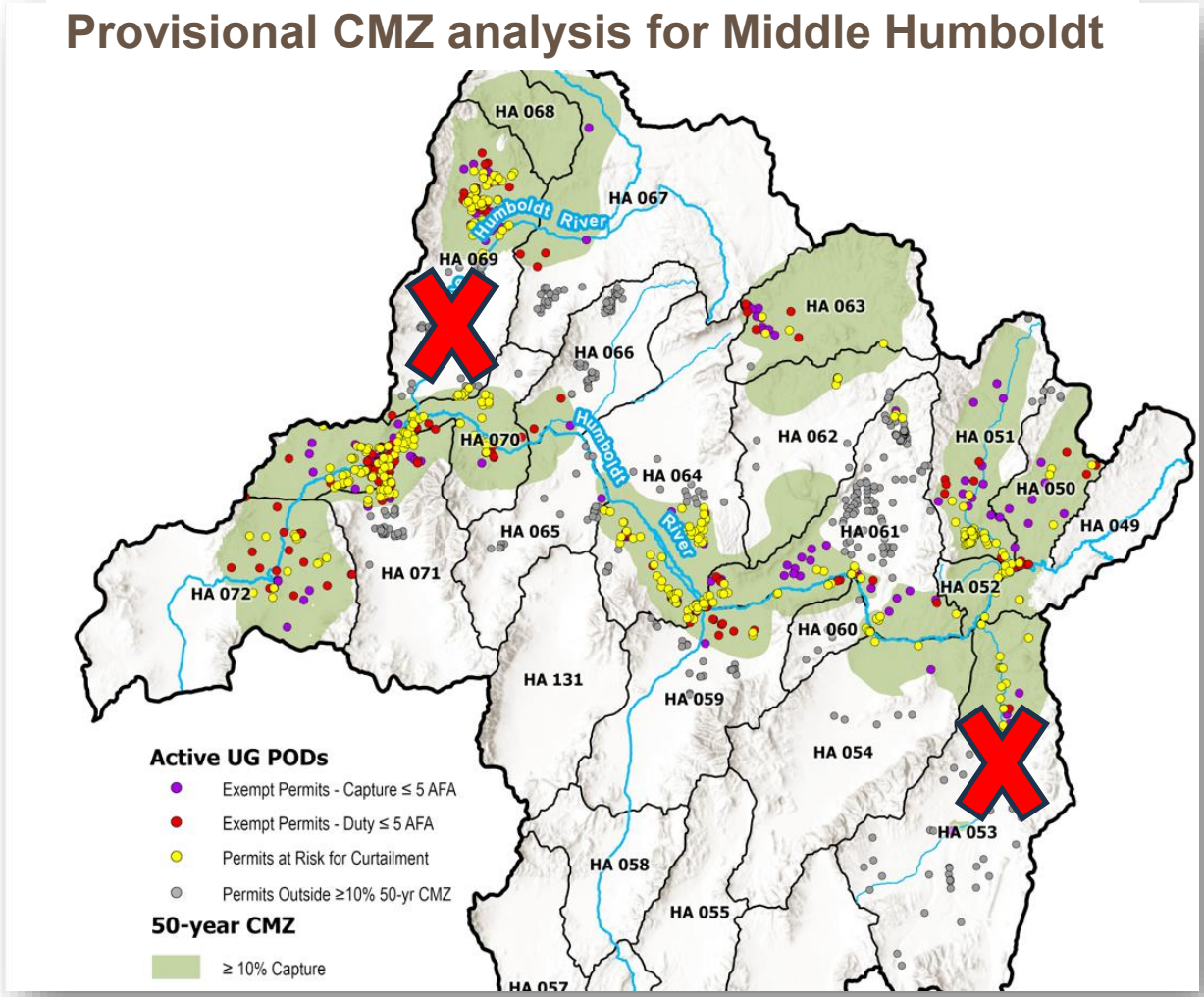
https://www.sciencebase.gov/catal

Communities

https://www.sciencebase.gov/catalog/item/6577800cd34e952b227462d1

NDWR Response/Actions

- Working with datasets as they become available.
- CMZ analysis for the Middle Humboldt is underway*.
- Phased implementation of Capture Management for Paradise and Pine.
- Considering alternatives to Pine and Paradise capture determination.
  - Use of other Pine Valley model if suitable for this purpose.
  - Scoping/Planning for new Paradise Valley model underway.



*Planned topic for an upcoming Technical Subgroup meeting.

UPDATE ON HRSWG TECHNICAL SUBGROUP

Technical Subgroup Topics

June 16, 2025 Meeting Agenda

- Purpose and scope of subgroup.
- Overview of issues to be addressed by subgroup.
- Membership and technical expertise recruitment.

August 7, 2025 Meeting Agenda

- Focus on Upper Humboldt basin hydrology.
- Contradiction between model and Prudic Trends analysis for assessment of upstream capture.
- Overview of opposing concepts for offsets for deeper discussion at future meeting.

June 16, 2025 Meeting

Purpose of this Subgroup

- Dive deeper into technical issues of interest to the SE and the greater HRSWG.
- Without bogging down the larger group with technical jargon and too much detail.
- Report back to HRSWG.

Topics to be covered

- Upper Model – limitations for assessing capture.
- Middle Model – Topics as they arise. Initially on how to approach Paradise and Pine Valleys.
- Upstream capture vs unused decree.
- Offsets – Continued development, refinement, evaluation, and communication.
- Offset types other than decree: Augmentation, Conservation credits, MAR.
- Evaluation of CMZ thresholds and impact of exemptions.
- Other topics as they develop.

June 16, 2025 Meeting (Continued)

Membership and Recruitment

- Initially composed of technical members of HRSWG.
- Recruitment of others with expertise outside of HRSWG clearly desired.
- Developed list of potential recruits to invite to group.

Technical Subgroup Membership

NDWR staff: Adam, Kip, Kelly, Landon, Taylor Vergin (new hydrologist).

HRSWG members: Jay, Chris, Dwight, Laurel, Jeff, Ed, Dawn, Erica and Joel.

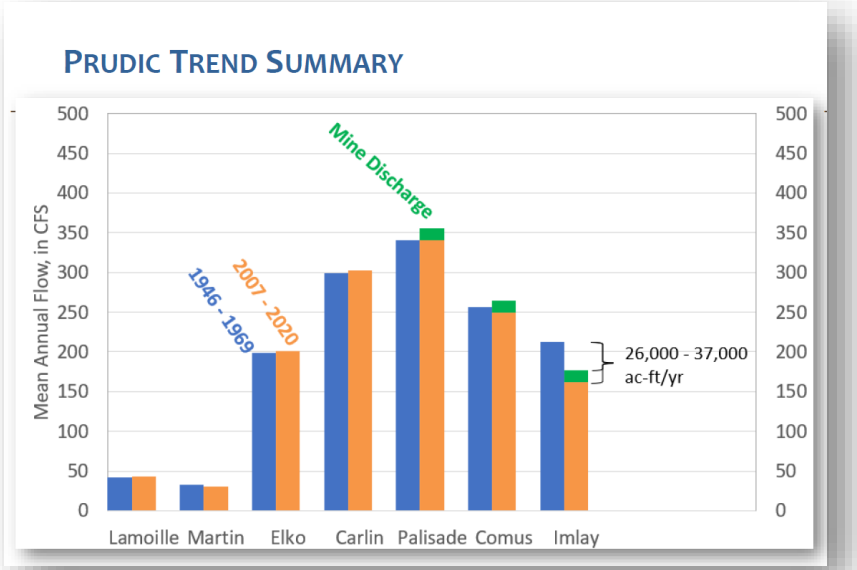
UNR Econ Team: Michael, Andrew, Thomas Bridges-Lyman.

Outside expertise: Kyle Davis (USGS modeler), Tracie Jackson & Johnny Zahn (Barrick Hydrogeologists), David Prudic (USGS retired).

August 7, 2025 Meeting

Main Question for this meeting:

There is a discrepancy between observed trends and upper model estimated trends upstream of Carlin gage. Why?



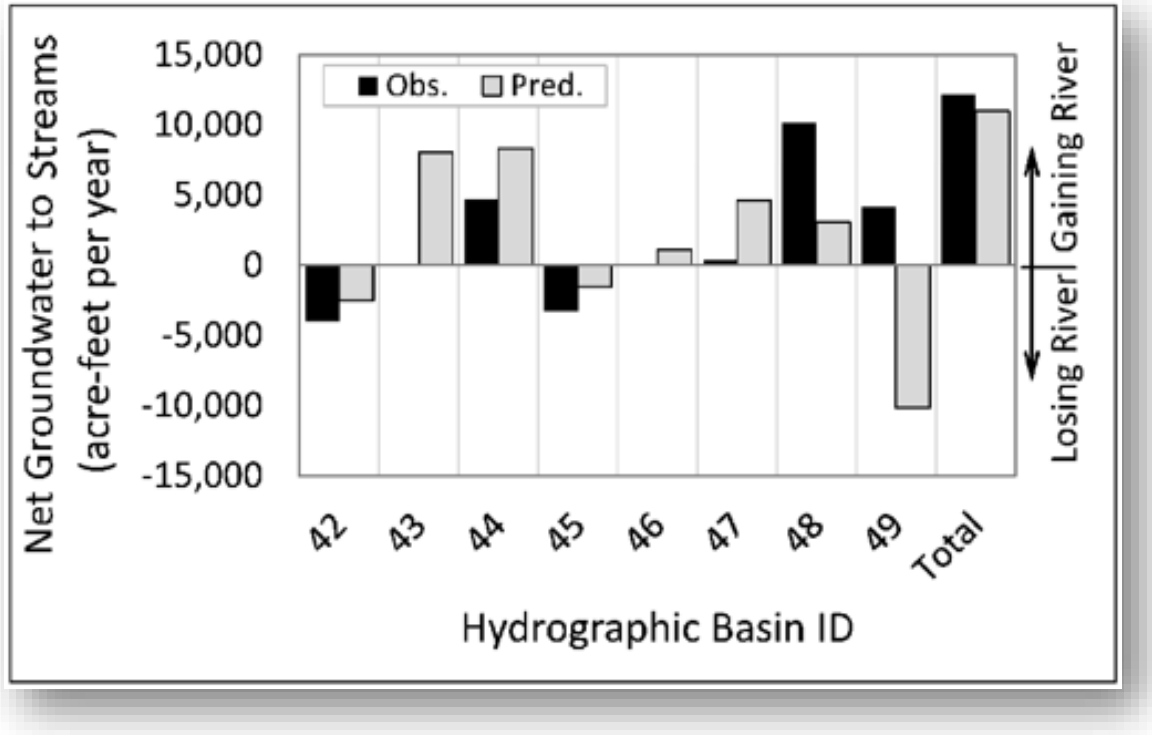
Understanding capture upstream of Carlin Gage: Upper Model vs Prudic Trend Analysis

- Prudic trend analysis does not identify change in streamflow in upper basin.
- Upper model suggests there is a reduction.
- What is role of unused decree in masking capture impacts?
- Model predictions are within uncertainty of trend analysis.

August 7, 2025 Meeting

Limitations of Upper Humboldt Model

- Calibration issues:
  - No calibration of transient model.
  - Limited data used to calibrate. Some basins without data.
  - Vertical movement of water not restricted enough.
- Conceptual model issues:
  - Baseflow originates from alluvial aquifer in model. In reality comes from hard rock aquifers.
  - Historic conceptual model is not valid and needs to be updated.



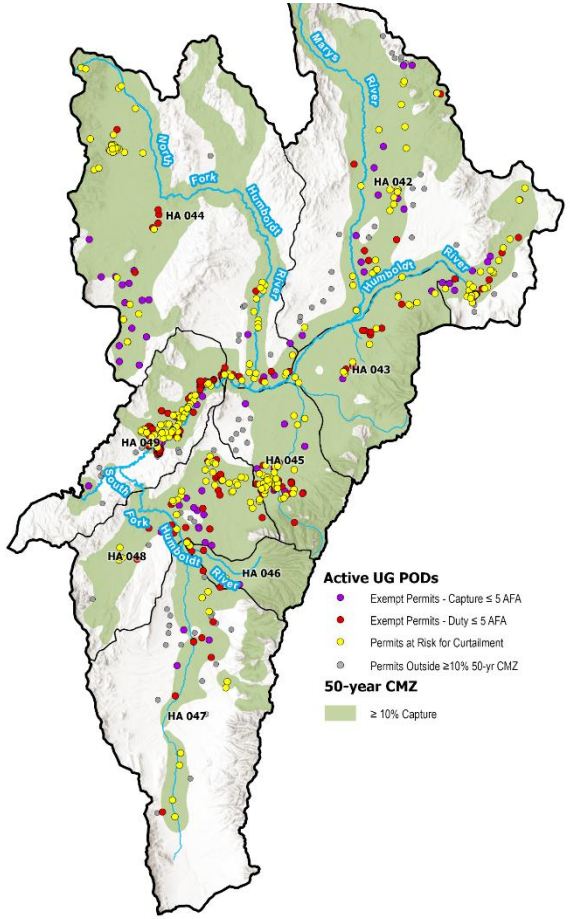
The Upper Humboldt Model work has made it clear that the working conceptual model for the Upper Basin is wrong and needs to be revised.

August 7, 2025 Meeting

Implications of limitations of UHM

- UH model shouldn't be used to estimate capture for specific locations.
- Overall capture estimate from the UH basin of 11,000 AFY is not verifiable using streamgage data.
- CMZ boundary for the UH is uncertain.
- More work is needed for the Upper Humboldt Basin

Example CMZ analysis for Upper Humboldt*



*Provided for demonstration purposes. Actual CMZ is TBD when science is updated.

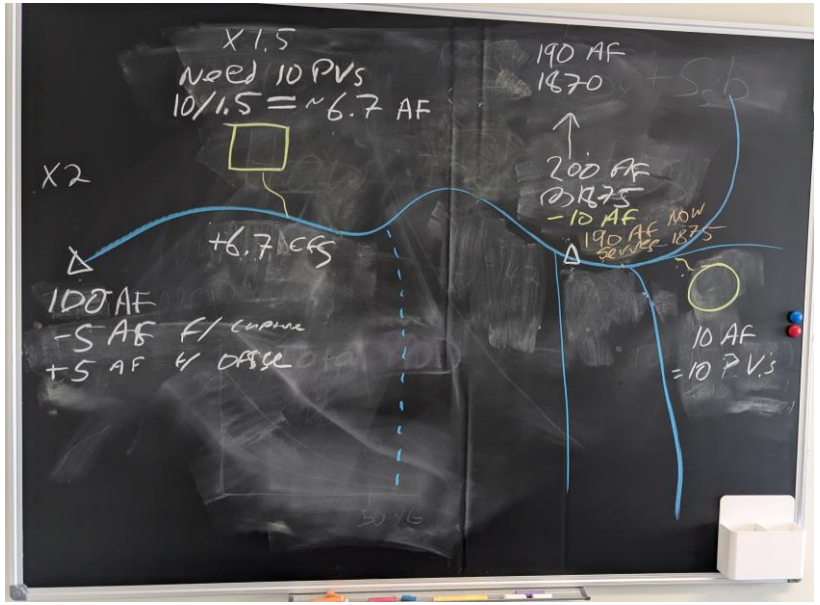
Technical Subgroup August 7, 2025 Meeting

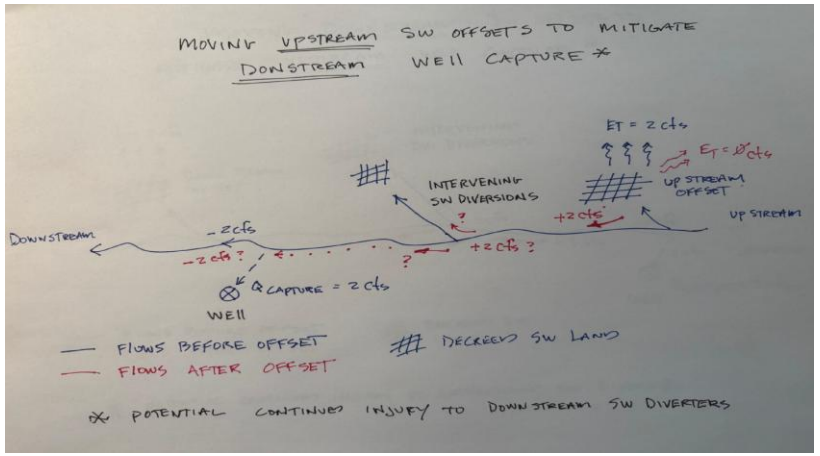
Overview of Offsets for future discussion

- Review of offset strategy where offsets can be traded and used up and down the River system to support a more robust market.

Vs

- By nature of the system, offsets are limited in time and location along the River where they can be used.

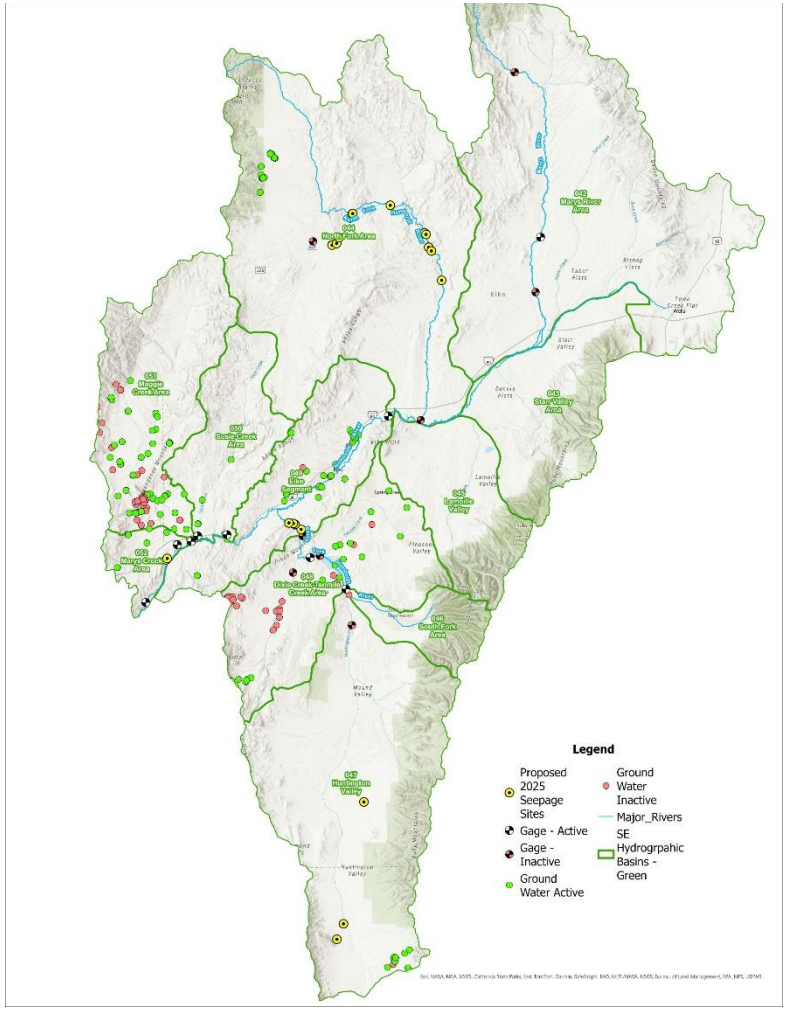




NDWR Response/Actions

- Phased implementation for capture management of Upper Basin as information and data allow.
- Establishing more extensive, targeted, and robust monitoring network.
- Study to refine upper Basin conceptual model.
- Update Upper Basin model and recalibrate as necessary.

Monitoring Network for Upper Humboldt



Discussion

DISCLAIMER: This is a DRAFT Order and is not being implemented at this time.

DRAFT ORDER
Curtailing the Use of Groundwater Rights that Conflict with Priority Decreed Stream Rights within the Humboldt River Region

This outline of the draft order is prepared for discussion purposes with the Humboldt Stakeholder Working Group meeting on September 23, 2025. The outline is not final and is intended to demonstrate what may be included in the draft order that is planned to be distributed for public review at the end of 2025. The reason for issuing a draft order for public review is to communicate broadly what a future curtailment order would contain, and to take public comment before any final order is issued.

The action needed in the Humboldt River basin is both urgent and long-term. We face hydrologic realities that require us to be responsive within the context of Nevada water law, but there is also a collective interest in respecting the traditions, rights, and livelihoods that rely on the waters of the Humboldt region. Decisions must be transparent, equitable to the extent possible, based upon the best available data and science, and rooted in long-term stewardship of water resources for future generations.

Conflict is occurring now. Senior water rights that are in priority do not receive all scheduled deliveries when the flow in the Humboldt River and its tributaries are depleted by groundwater pumping. Depletion is clearly demonstrated in the stream gaging data; what is less clear is a precise delineation of the source and magnitude of the conflict. The solution provided in Nevada law is to curtail junior rights to protect senior rights, but a curtailment that extends beyond what is necessary to remedy the conflict is unwarranted and unjustifiable.

As the existing conflict becomes more clearly demonstrated over time by the science and the data, so does the development of options and potential solutions to resolve the conflict without strict curtailment. The communities and industries affected by this hydrologic reality need to have the opportunity to reach solutions that minimize negative impacts. This could be achieved through offset programs, market-based approaches, conservation efforts, and through local organizations that are more adaptable than state authority. Curtailment is a severe action and it should be the last resort, but it would be a legal, and defensible, responsibility in the absence of other solutions.

The draft curtailment order is a framework that shows how curtailment could work: when it would be triggered, how and where it would be applied, and what the parameters and options are for water users to avoid curtailment. Distributing a draft for public review provides a basis for clarity, dialogue and collaboration. This is about ensuring that the process moves along with open eyes and an open mind, shaped with stakeholder input. It is <u>not about imposing immediate cuts.</u>

1. Introduction
    a. Basic Principles of stream depletion/capture caused by groundwater pumping.
    b. The Humboldt Decree established the relative rights to the waters of the Humboldt River and its tributaries in 1938, and it established that the stream system is fully appropriated in most years.
    c. Permits were issued in 1933 and 1938 for year-round storage of additional waters of the Humboldt River in the amount of 115,152 acre-feet.
    d. Because of the fully decreed stream system and year-round storage rights in Rye Patch Reservoir, the Humboldt River is almost always in regulation.
    e. Almost all groundwater in the Humboldt River Region is junior to 1938.
    f. Any amount of capture from a fully appropriated system when in regulation will reduce surface flow that would otherwise be delivered to senior right holders.

    g. Recognizing what was settled by Order 1329

        i. Existing conflict is happening now
        ii. Immediate measures can be taken to prevent the problem from getting worse.
        iii. When more accurate data are available then longer-term strategies are warranted to address existing conflict.
        iv. Further steps to implement those strategies will require extensive public outreach.
        v. Order 1329 was upheld in district court, no appeal to Supreme Court.

2. Water rights conflicts due to depletion from groundwater pumping has gradually increased over decades.
    a. Describe and cite the multiple analyses demonstrating depletion
        i. Imlay gage data
            1. Massive increase in zero flow days in recent years
        ii. Prudic trends analysis
            1. Describe what it did: solid analysis of historic stream gage data.
            2. Conclusions: Comus to Imlay vs. Upstream reaches.
            3. This report didn't set out to identify location and magnitude of capture over time.
        iii. Regional Groundwater Flow models
            1. Description of the publications.

2. This system-wide analysis is needed to have a baseline understanding of GW/SW connection and identify the location/magnitude of capture.

b. The nature of the problem and actions to resolve it need to be considered at the system-wide scale
    i. One decree governs the entire system
    ii. Segments of the Humboldt River and its tributaries vary greatly in their setting, but they are not hydrologically isolated from each other.

3. Authority and Necessity
    a. NRS 533.085 prohibits the impairment of vested water rights, regardless of the source of water.
    b. All statutorily granted water rights in Nevada are given subject to existing rights.
    c. All waters within the state are owned by the public.
    d. NRS 533.085 gives the State Engineer the authority to conjunctively manage surface waters with groundwater.
    e. Policy declarations in NRS 533.024 require the State Engineer to consider the best available science in rendering decisions concerning the available surface and underground sources of water.
    f. The definition of "basin" is broad and inclusive, and thus may include an aquifer and multiple previously delineated topographic basins.
    g. NRS 532.120 authorizes the State Engineer to make such rules, regulations and orders as are deemed essential for the welfare of the area involved where in his or her judgement the groundwater basin is being depleted.
    h. NRS 534.110 provides that the State Engineer shall conduct investigations in any basin or portion thereof where it appears that the average annual replenishment to the groundwater supply may not be adequate for the needs of all permittees and all vested-right claimants, and if the findings of the State Engineer so indicate, the State Engineer may order that withdrawals be restricted to conform to priority rights until the water level of the basin is stabilized.

4. Area Subject to this Order
    a. Define the Capture Management Zone (CMZ)
        i. Areas where a well would derive at least 10% of its water from stream depletion after pumping for 50 years.
        ii. Wells within the Capture Management Zone must mitigate their capture in accordance with Section 6 of this order to avoid curtailment.
        iii. Groundwater models are used to delineate the CMZ. Generally the portions of basins that are closer to the Humboldt River and its

tributaries have higher capture, but the distance depends on aquifer properties and hydrologic connections with Humboldt River and tributaries.

iv. Groundwater models are the best available science unless superseded by improved information, data, and/or analysis as described in subsection e.

b. Maps showing CMZ.
c. Describe areas where we have confidence and where we don't.
    i. Paradise Valley
    ii. Pine Valley
    iii. Upper Humboldt basin
d. When there is sufficient confidence in these areas to delineate a CMZ in the judgement of the State Engineer, then a supplemental order will need to be issued regarding the procedures required for those areas to resolve capture liability.
e. Explain the process to submit and review supplemental or alternative data to demonstrate more accurate site conditions than the existing published models.
    i. Requirements for submittal
    ii. Criteria for review and approval

5. Procedure to Determine Capture Liability by location
    a. Steps to determine capture liability
        i. Maps and capture curves
        ii. Site specific capture data obtained from Humboldt Capture Query Tool.
    b. Capture Liability is based on duty, not actual pumping. Water right holders may relinquish duty or move duty out of their well to reduce capture liability.
    c. Implementation is only for areas where there is a clear demonstration and confidence in the boundary of the CMZ and an accurate measure of capture fraction.

6. Procedure to mitigate capture liability and avoid curtailment within the CMZ
    a. Obtain offsets sufficient to mitigate capture for individual groundwater permits.
    b. Participate in a program or common pool offset managed by a local entity and approved by the State Engineer that sufficiently mitigates capture liability.
    c. Alternative measure or agreement that mitigates capture liability and is approved by the State Engineer.
    d. 5-year period after issuance of a final order to fully implement mitigation actions.

7. Metrics to demonstrate resolution of conflict over time
    a. Gage data
    b. Future trend analysis
    c. Annual summary of decree diversions vs. instream flow for offsets
    d. Model simulations

8. ORDER
    a. Curtailment in 5 years from the date of issuance of a final order of all groundwater rights within the CMZ junior to 1938 unless mitigation of conflict is fully demonstrated through mechanisms described above.
    b. Definition of curtailment for the purpose of this order: Groundwater within the CMZ cannot be withdrawn from its permitted point of diversion until conflict is mitigated. Groundwater rights that are curtailed subject to this order are still active rights held by the owner, and they may still be considered for change applications or for extensions of time to prevent forfeiture.
    c. Exemptions
        i. Those groundwater rights located in the administrative basins but not within the CMZ ie <10% capture in 50 yrs.
        ii. Those groundwater rights with <5 afa capture after 50 years.
    d. Consider check-ins (similar to DV GMP)
    e. Extent that this supersedes Order 1329

Compilation of Responses from Breakout Groups

September 23, 2025, HRSWG Meeting

Questions considered and responses from each of the breakout groups:

"What might be missing from the outline of draft curtailment order?"

- Add up the domestic wells – domestic wells still impact the basin and there is ½ AF under curtailment – how much impact do they have?
- Environmental conditions (not just groundwater use)
- Details re: offsets (e.g., 1:1 or something else depending on mechanism; what kind of credits for directly to river versus RIBs)
- (other than offset discussion) Mitigation – generally what are the types of mitigation that might be accepted. Also could point to "Methods" document that NDWR may be creating.
- Identify what has already been done to address the problem (addressing "low hanging fruit"), addressing efficiencies (gravel pits, lake evaporation), streamline river (too many marshes or "swampy area" – ie fix at Iron Point)
- (likely for Methods doc) Conservation – what this looks like, how it might be used, conservation credits (issue: how would you quantify this) (also discussed tamarisk eradication, removing phreatophytes, again, how do you quantify this)
- Add comment about "big picture" whether it is climate change or other so the "finger is not pointed at" groundwater users
- How can there be a draft order before the modeling is finalized?
- Use a broad definition of what can be used as an offset. Do not have definition. Current focus solely on decree rights.
- How will offset requirements for supplemental wells be handled?
- Wet water factors: historical versus projections

"What do you think about the timing of issuing the draft curtailment order by end of this calendar year?"

- The Division will need to provide a notice to the "top" water users that will face this in advance of issuing this order.
- Several thought the timing is too rushed – need to correct the models
- Timing – Overdue, but pleased to see the progress and anticipated timeline
- If the draft order comes out there may be lots of legislation to address the order to get carve outs
- Certain legislative action (e.g., conservancy districts) may need to be in place before the order is finalized
- Concerns about an order without a formal process when mitigation measures are in place
- What else would be beneficial to have from the legislature
- Should do upgrades and changes to infrastructure to confirm accuracy of diversions (address the low hanging fruit)
- Timing? – mixed feelings, but overall thought the timing was fine and realistic as it gives a full year for outreach to occur.

Looking ahead – Locally driven solutions, strategic outreach, strategy for conducting offsets, management of offsets, other comments

- Funding to get Upper and Middle Models corrected? Timeframe for that?
- Who will manage offset? Conservancy District or Division? How will it be managed?
    - Is there enough staff to mange the workload with increased analyses, change applications, boots on the ground to ensure there is no pumping, etc.?
    - The order may be issued to soon without these concepts flushed out
- Flush out measuring success because this would be compared to the models that have limitations
- Concerted effort to show public how the order/system operates – tools to show people what to do or to understand the system
- Conservancy districts – funding mechanisms; groundwater fees are not capped and are very low compared to other areas
- Prefer locally driven solutions.
- Any infrastructure will cost a lot of money
- Supplemental groundwater – if you have decreed surface water but rarely get it, so you use supplemental groundwater – can your unused surface water be an offset?
- Identify the players in each basin/sub-basin or segment along the river and include County Commissioners from each county.
- Outreach should include DWR and member(s) from stakeholder group so there is local representation. We don't want counties and localities to feel like we are "pushing things down their throat"
    - Outreach to be locally-driven, and often. Meet with all water user groups in system, use stakeholders to help set these up.
- Local representation to help bring people together. Reach out to all the groups in the stakeholder room and start having presentations with each (focusing on education, and noting curtailment is a "backstop")
- Need to look at charter/authorization for HRBWA to see if it can be used as the mechanism, noting need to change or amend to be more of a conservancy district (likely need legislation)
- DWR work with the conservancy district to set up guidelines in beginning, support science and tools used for mitigation and offsets, but DWR is not primary agency for day-to-day operations, management, administration.
- Long term – foresee one organization managing water shed with people on it from Upper, Middle, and Lower basins. Will need one group/person to take the lead, liaison with DWR. Start small and grow (like Carson Sub-Conservancy District did).
- Success would be:
    - Setting benchmarks/measurement goals and the goals being reached.
    - Annual reporting to DWR and the stakeholder group.
    - Strict compliance deadlines with some (little) wiggle room to allow for realistic issues that might come up (like 3 years of drought).
    - No fighting on the system (not protesting movement of water related to offset/mitigation), stakeholders working together
    - Buy-in from all water users on the system, both up and down stream.
- What are the numbers to support an exemption threshold of 5 AF? How much does this add up to, what is the proportion of the overall problem sourcing from groundwater rights that are less than 5 AF, and how much cumulative offset would be required?
- Community-driven actions need a champion to be successful.
- Conservancy District – Need a better understanding of how it could/would be financed

    - Fees have a tendency to incentivize reduction in use
    - Similarly, offset requirements may incentivize people to give up unused groundwater rights.
    - Needs a "champion" to be successful. Who will run it?
    - What will be its activities? Manage offsets? Conduct MAR and other large projects.
    - Who will pay the fees and how high will these fees be for the district to be successful?
- How to credit better efficiencies in surface water deliveries towards offsetting the overall capture, or does that not warrant credit at all? If not, what's to incentivize it? e.g. gravel pits along the river corridor.