HUMBOLDT WORKING GROUP

Opening Remarks

APRIL 11, 2025

PURPOSE OF THE GROUP

To evaluate and propose strategies for reducing water right conflicts in the Humboldt River region, including solutions beyond the authority of the NDWR.

NDWR APPROACH FOR CONJUNCTIVE MANAGEMENT IN THE HUMBOLDT

1. *Core tenets of conjunctive management strategy:*

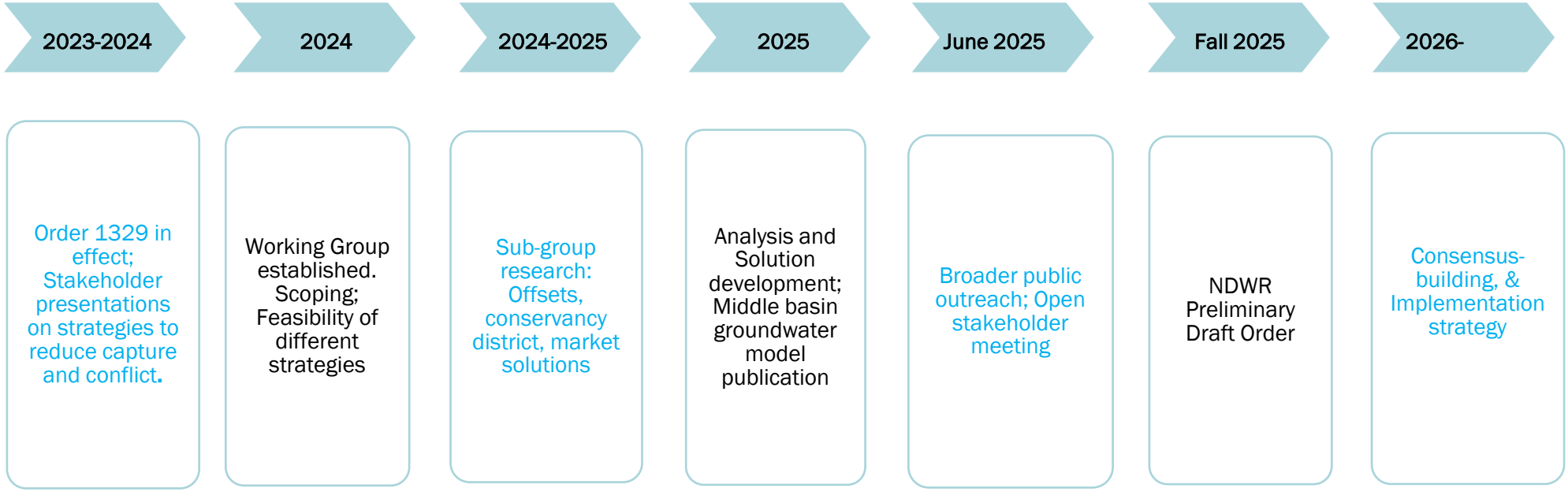
   - Optimize beneficial use of water resources, both underground and surface water.
   - Adhere to the Prior Appropriation Doctrine.
   - Prevent increase in conflict from underground water rights moving into the future.
   - Reduce conflict from existing UG water rights.
   - Minimize harm to local and regional economies.
   - Use data- and science-based, building block approach.
   - Through engagement with stakeholders.

2. Conjunctive management must work within the confines of Nevada water law and the Humboldt Decree.

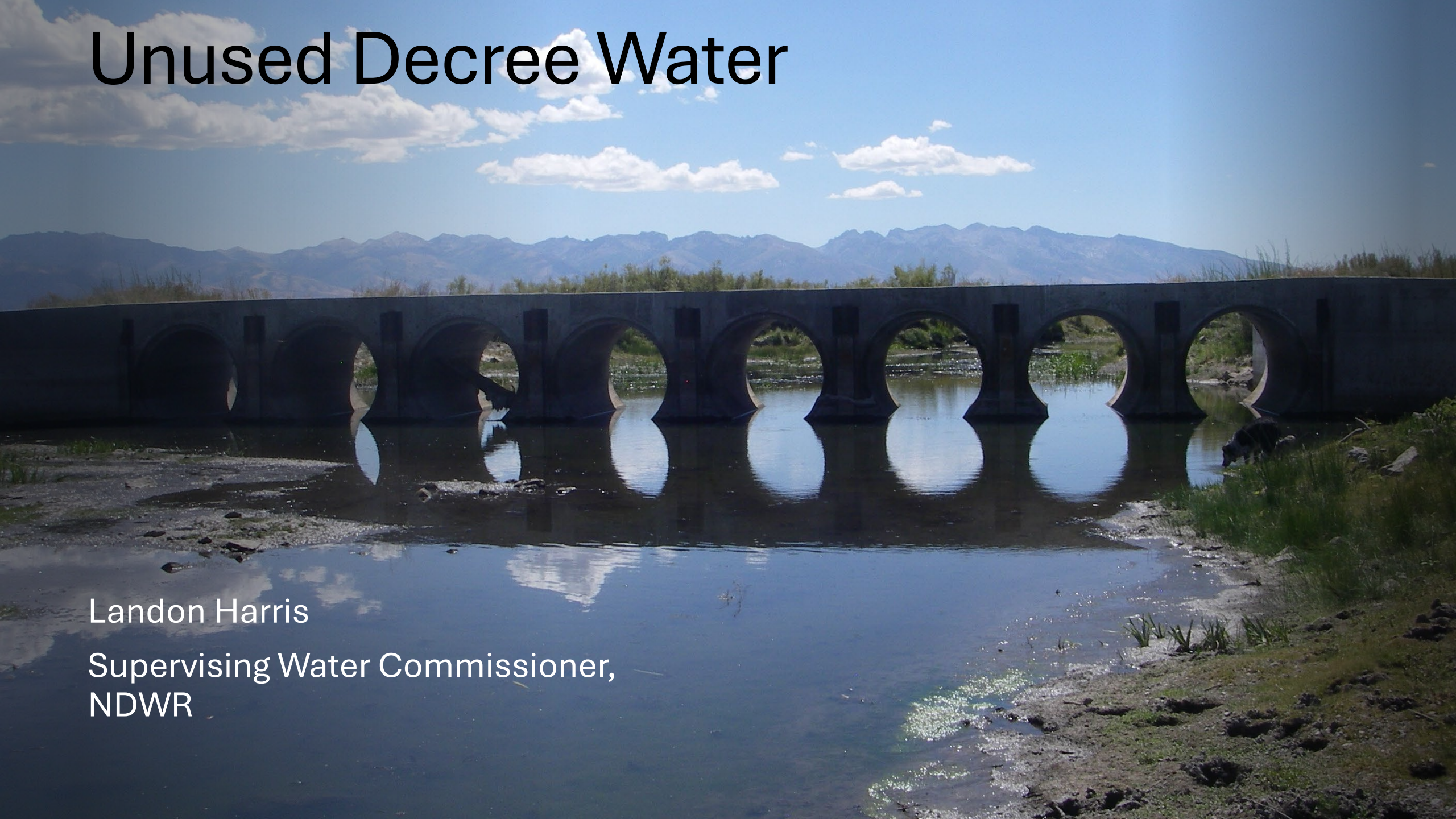
CONJUNCTIVE MANAGEMENT IDEAS FOR THE HUMBOLDT RIVER REGION

- Curtailment of UG by priority
- Focused curtailment of UG by impact
- Establish Capture Management Zone
- Establish conservancy district
- Special considerations for public water supply
- Consider methods from other Western States
- Use of Decree to offset capture
- Use of pumping reductions or UG relinquishments
- Limit irrigation seasons and duties to that of Decree
- Improved management of Decree
- Managed recharge as offset
- Augmentation as offset
- Conservation as offset
- Water right buy back
- Use of private agreements
- Market-based approach
- Nature-based solutions
- Exemptions
- No Action

PROGRESS SEQUENCING



Unused Decree Water



Landon Harris

Supervising Water Commissioner,
NDWR

Why is there unused water in the system?

- Washed out dams
- Degraded infrastructure
- Subdivided land/small parcels
- Instream flow for wildlife*
- SE Permits

Above Palisade

- Main Stem
  - 6,000
- South Fork/Dixie Creek
  - 2,669
- North Fork
  - 1,908
- Mary's River
  - 7,497*
- Lamoille
  - 2,139
- Smith/Huntington Creek
  - 1,740
- Misc. in Elko Co.
  - 342
- Pine Valley
  - 303

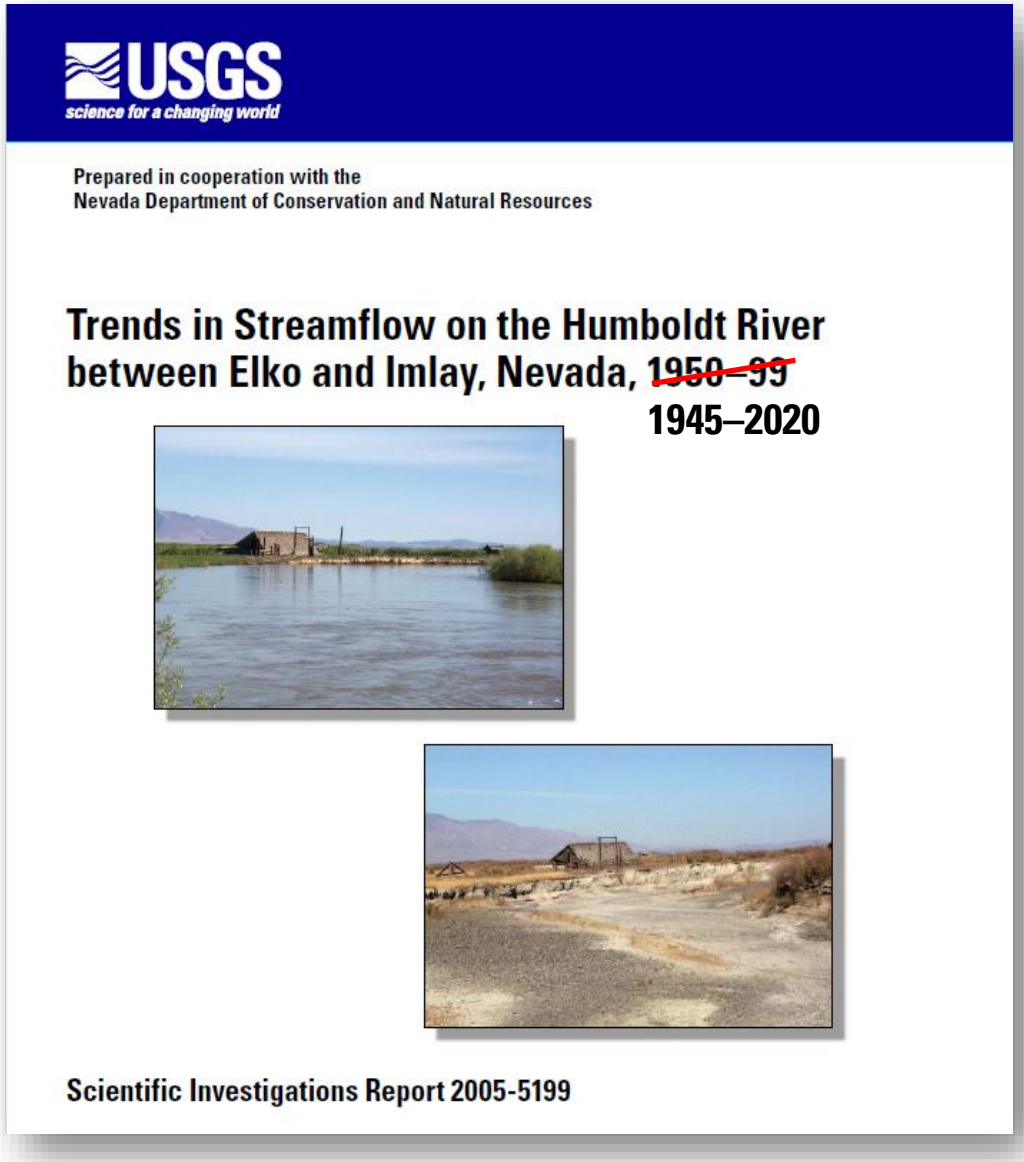
Total: 22,598

Below Palisade

- <u>Main Stem</u>
  - 1,405

Why such a small amount compared to above Palisade?

Questions?



NEVADA DIVISION OF WATER RESOURCES

Nevada Department of CONSERVATION & NATURAL RESOURCES

Prudic's trends contrasted with model estimated capture along the Humboldt River

Humboldt Stakeholder Working Group

Carson City, Nevada
April 11, 2025

Presented By:
Kip Allander, *Hydrogeologist*

PRUDIC TREND SUMMARY

ISSN: 2373-5996
DOI: 10.22542/jnwra/2024/1/3

Trends in flow of the Humboldt River, North-Central Nevada, 1945 to 2020

DAVID E. PRUDIC, 702 Crain Street, Carson City, NV 89703 (davideprudic@gmail.com)

ABSTRACT

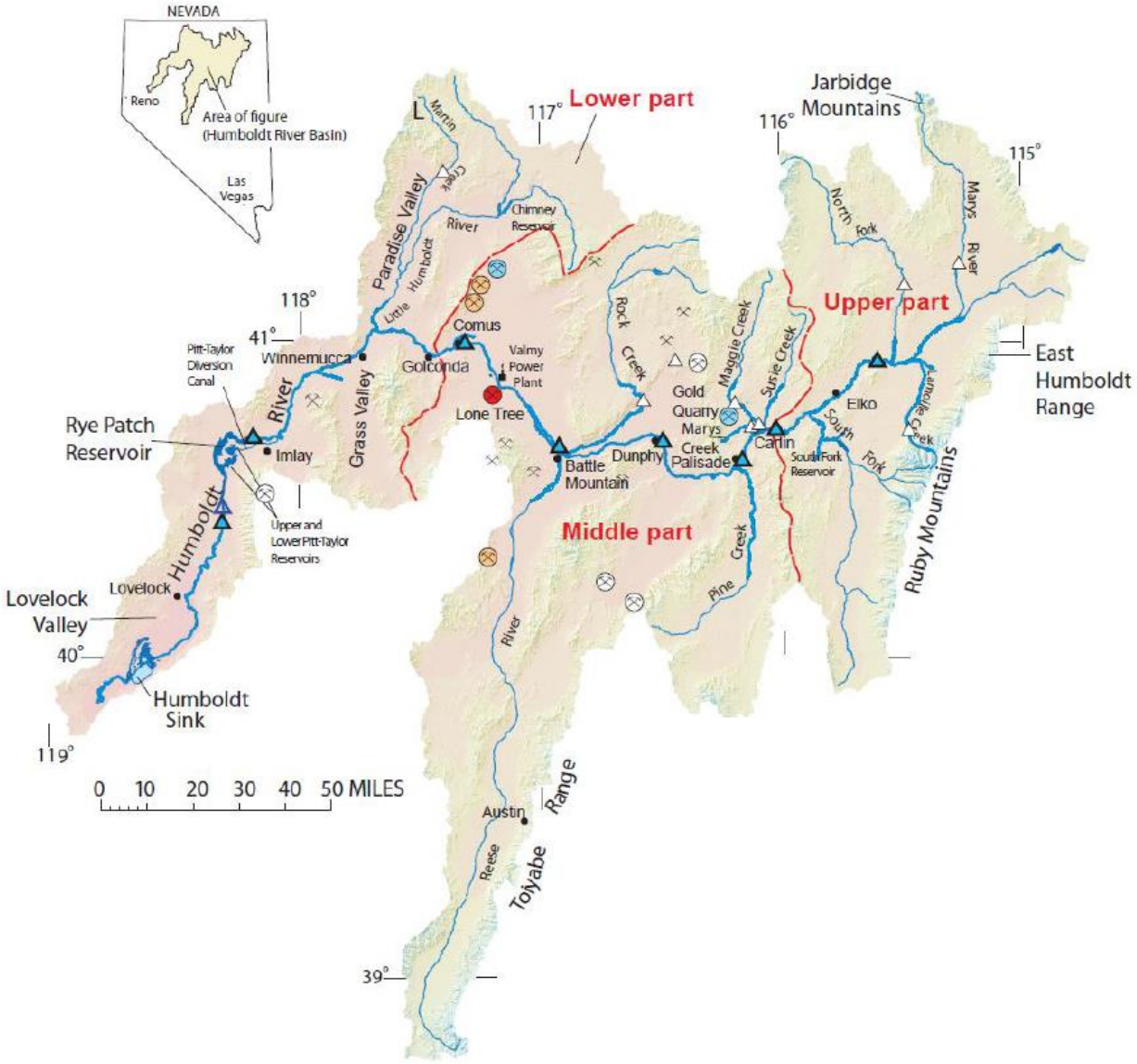
The Humboldt River flows from its headwater areas east of Elko to the Humboldt Sink southwest of Lovelock. Water in the river is used primarily for irrigation of crops and the river has been fully appropriated and adjudicated since the 1930's. Groundwater pumping for irrigation began increasing in the 1960's. Dewatering of mines began in the early 1990's. Pumping of groundwater has raised concerns over its effects on flow in the river, particularly during periods of drought. Five continuously operated gaging stations on the Humboldt River were used to evaluate if groundwater pumping since the 1960's could be causing a decrease in flow.

Various analysis using annual, monthly, and daily flows at Humboldt River gaging stations indicate flow between the Comus and Imlay gaging stations showed an increase in loss that exceeded estimated measurement errors. The mean difference in flow between gaging stations during two droughts—water years (WYs) 1953 to 1955 and 2012 to 2015 also indicate increased loss between the two gaging stations. Daily mean flows at the gaging stations show little difference between October 1945 to September 1969 and January 2007 to September 2020 except for the Imlay gaging station where the daily mean flow for the latter period was less 90 percent of the time than the earlier period. The lack of a change in flow at the Comus gaging station is consistent with the number of days when daily mean flow at the gaging station was less than 1 cubic foot per second (cfs) for two 13-year periods with nearly the same mean flow (1,297 days during WYs 1951 to 1964 and 1,291 days during WYs 2007 to 2020). However, the number of days when the daily mean flow at the Imlay gaging station was less than 1 cfs increased from 64 days during the earlier period to 941 days during the later period. In conclusion, flow at gaging stations upstream of Comus indicates no measurable decrease that could be attributed to groundwater pumping, whereas a measurable decrease in flow at the Imlay gaging station is best explained by groundwater pumping near the river downstream of Comus.

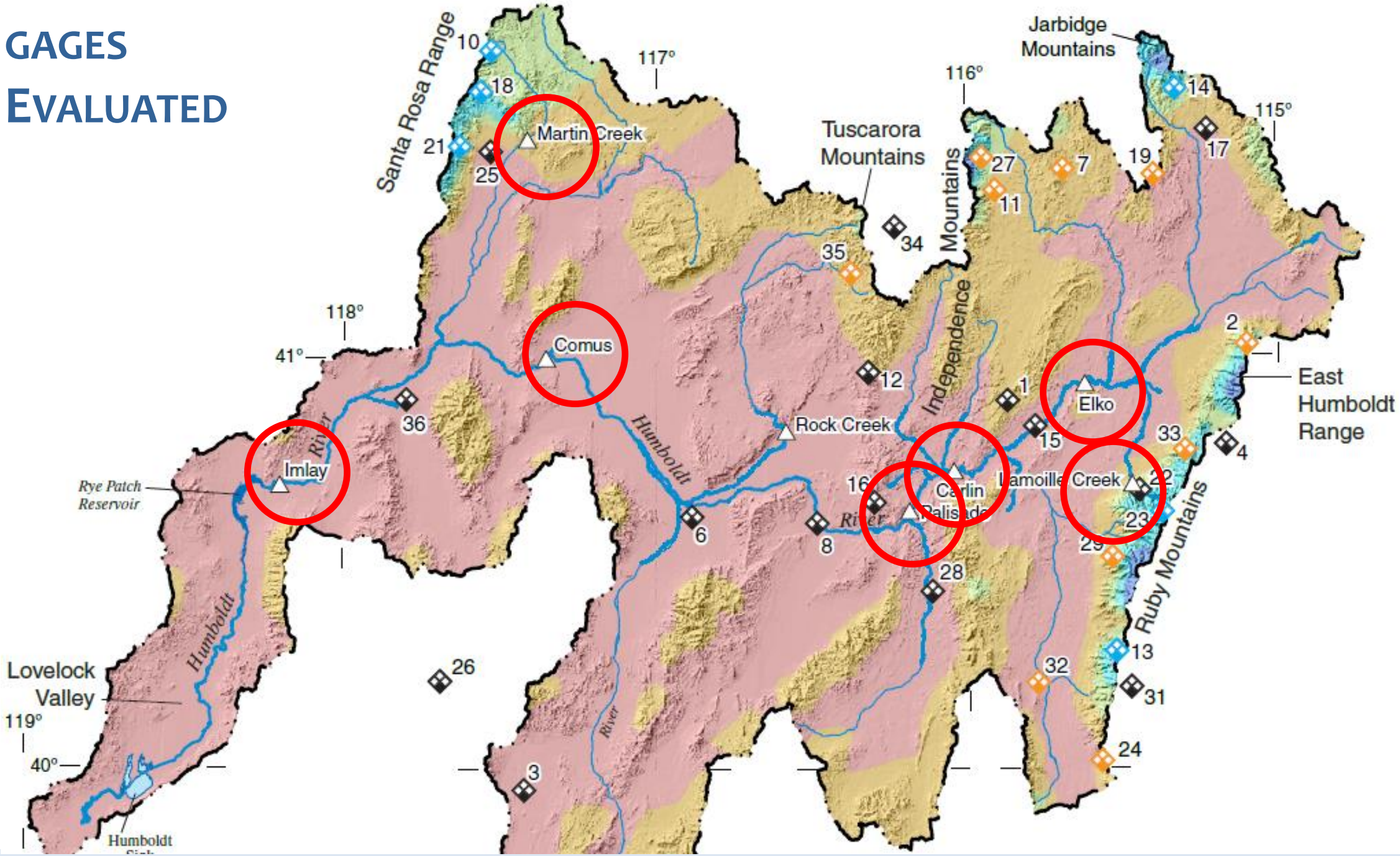
Prudic, David E. 2024, Trends in flow of the Humboldt River, North-Central Nevada, 1945 to 2020. Journal of the Nevada Water Resources Association, Winter 2024, p. 43-64. DOI: 10.22542/jnwra/2024/1/3.

PRUDIC TREND SUMMARY BACKGROUND

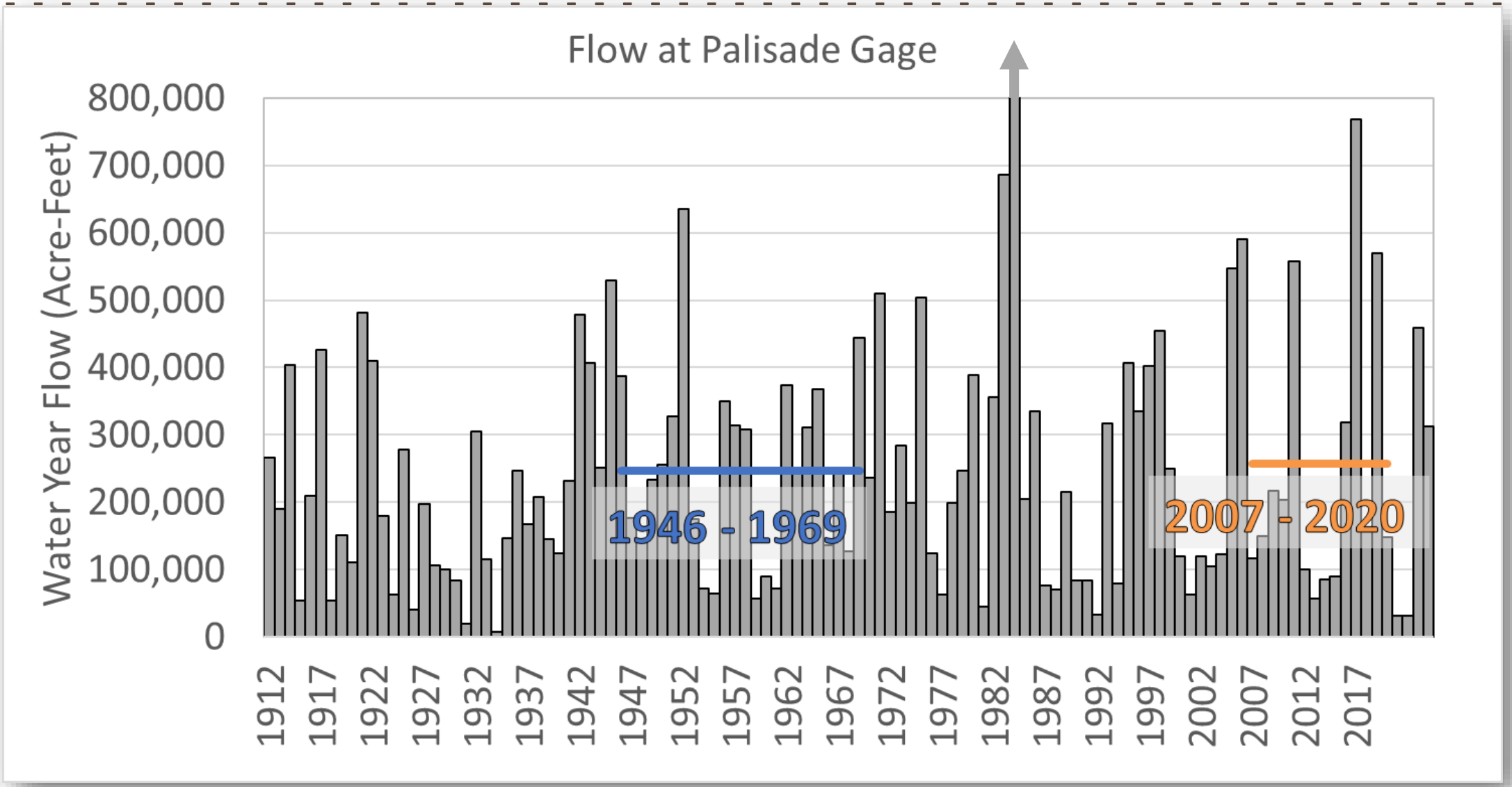
- Original Trend analysis released in 2006.
- Trend analysis updated through 2020.
- Based on continuous gage data beginning 1946.
- Two periods of similar hydrology compared: WY's 1946 – 1969 and Jan 1, 2007 – WY 2020.



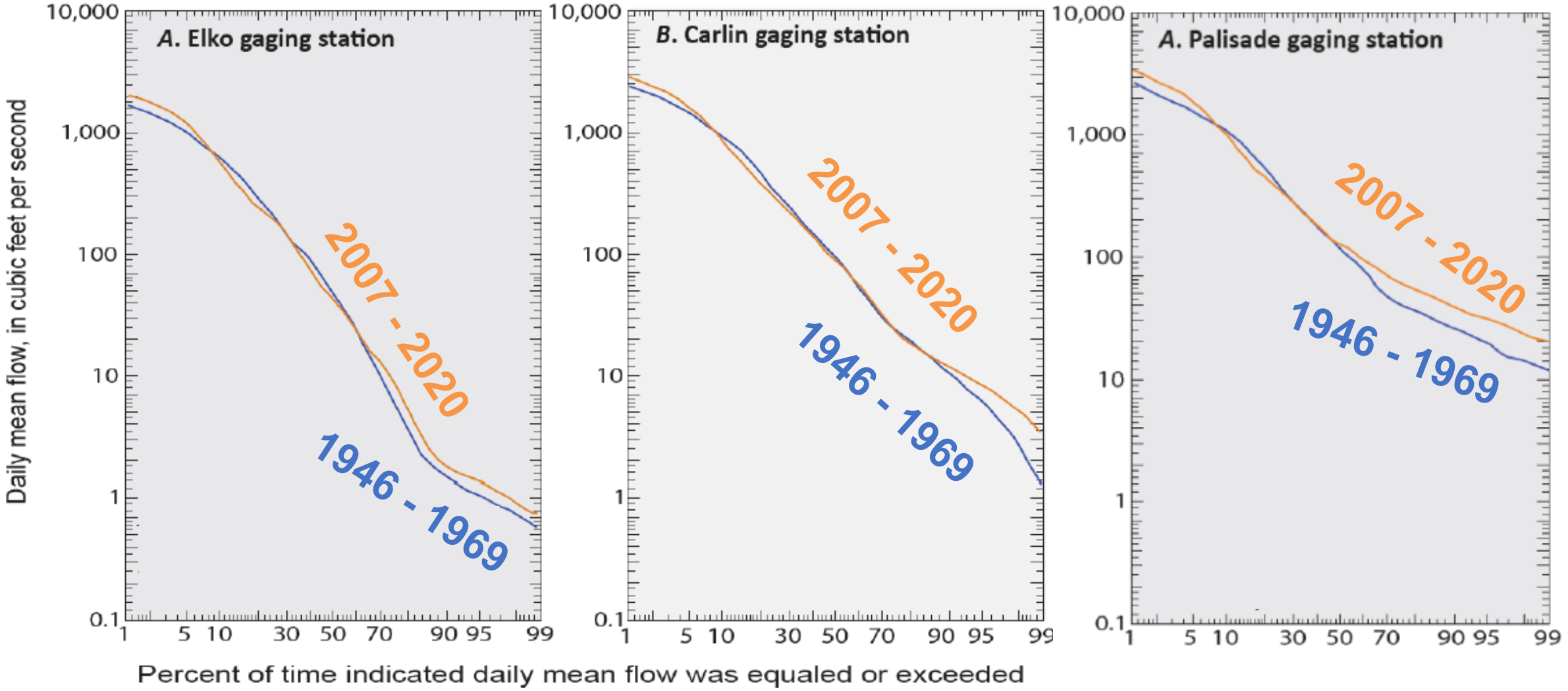
GAGES EVALUATED



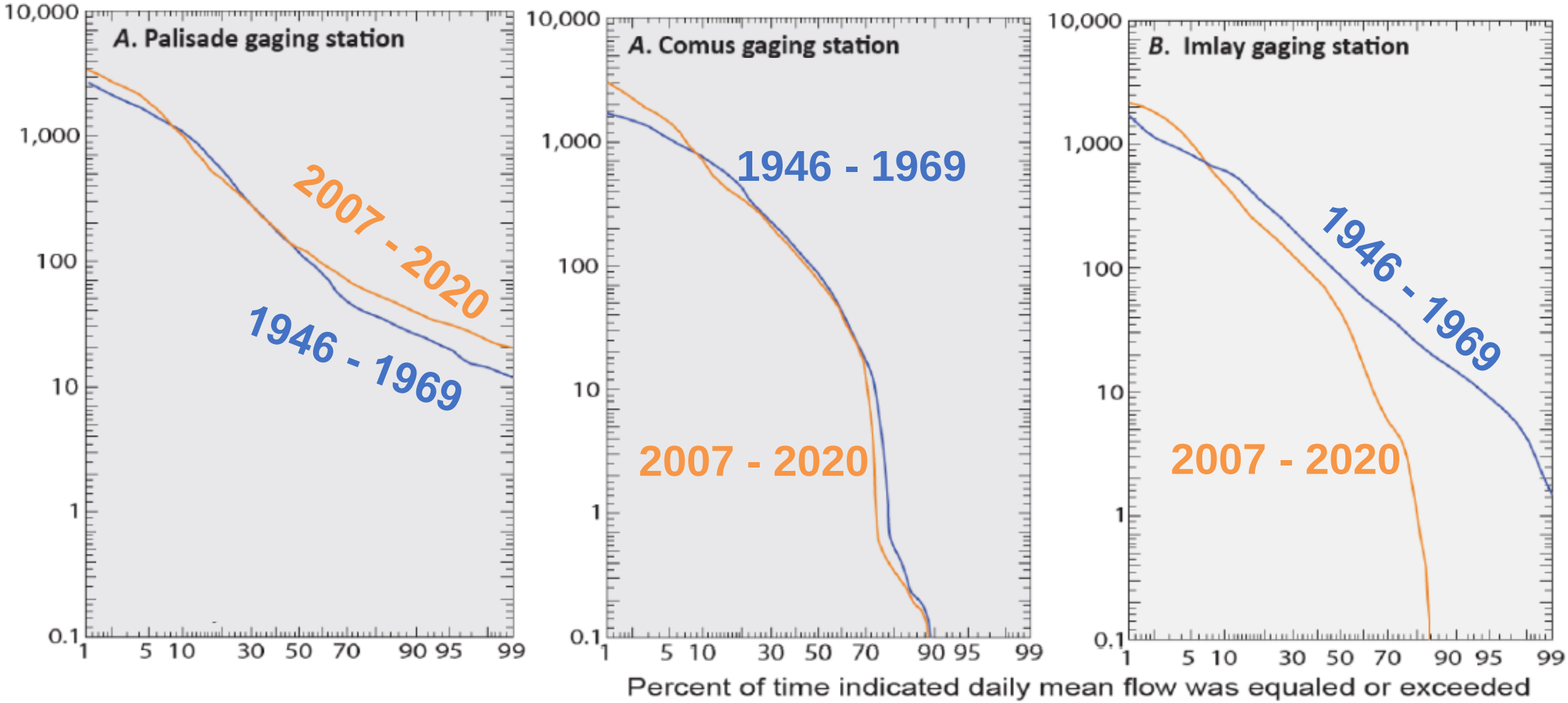
PERIODS BEING COMPARED



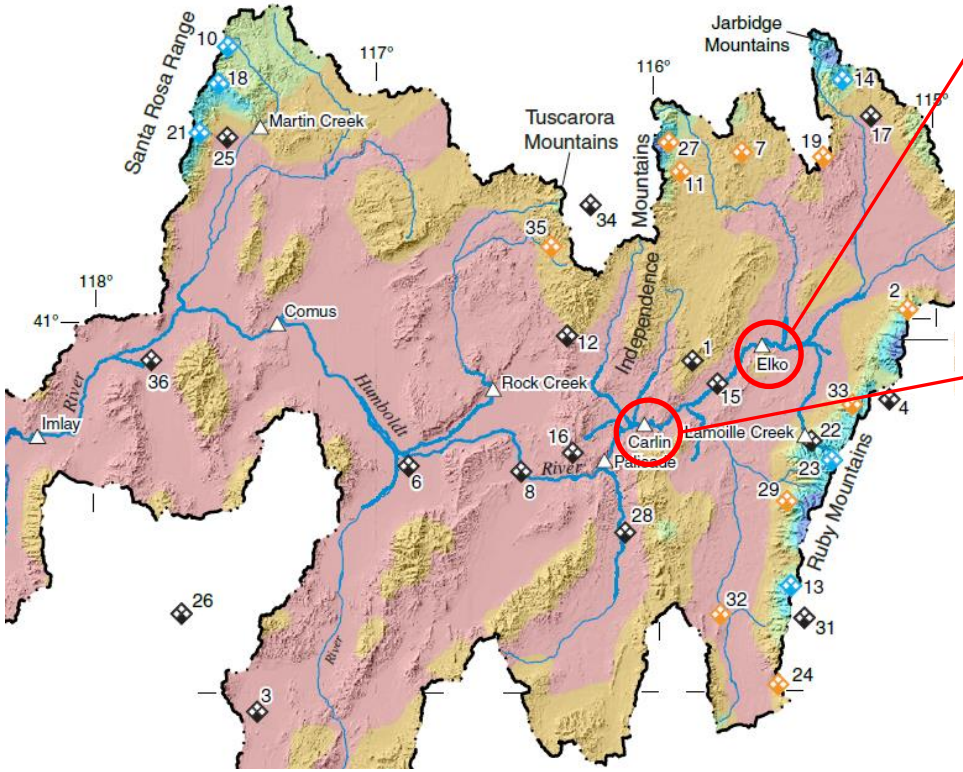
Flow Duration – Upper Basin

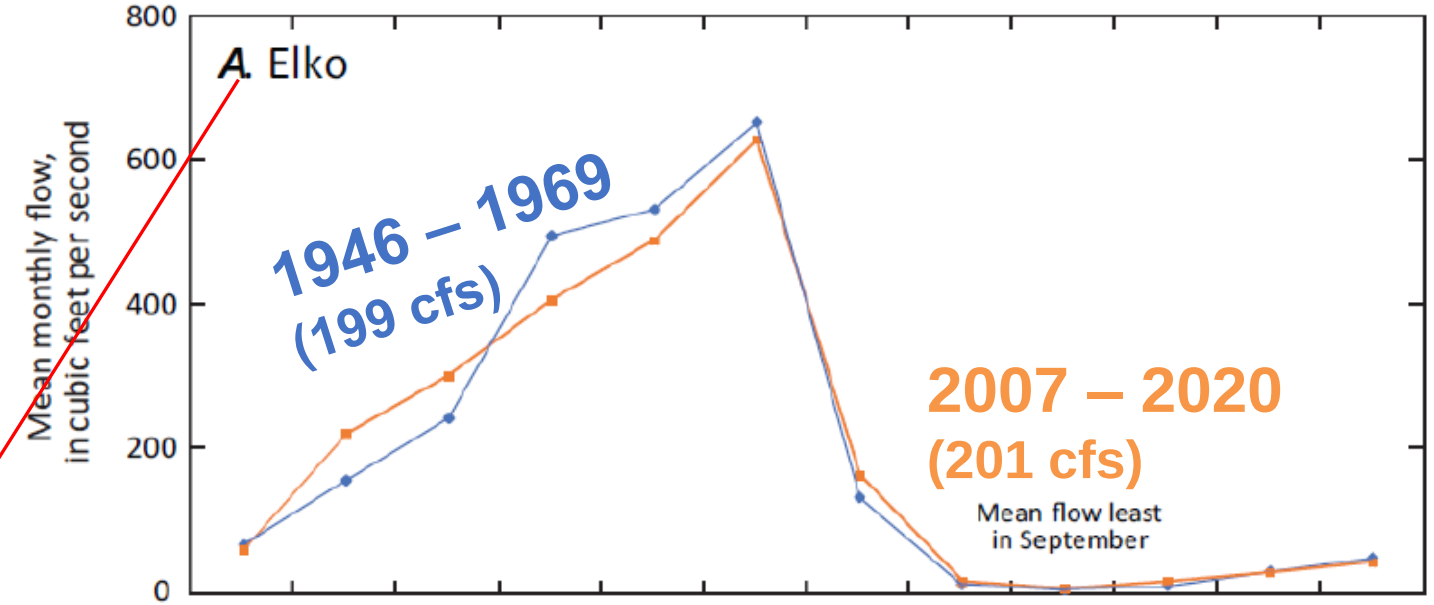


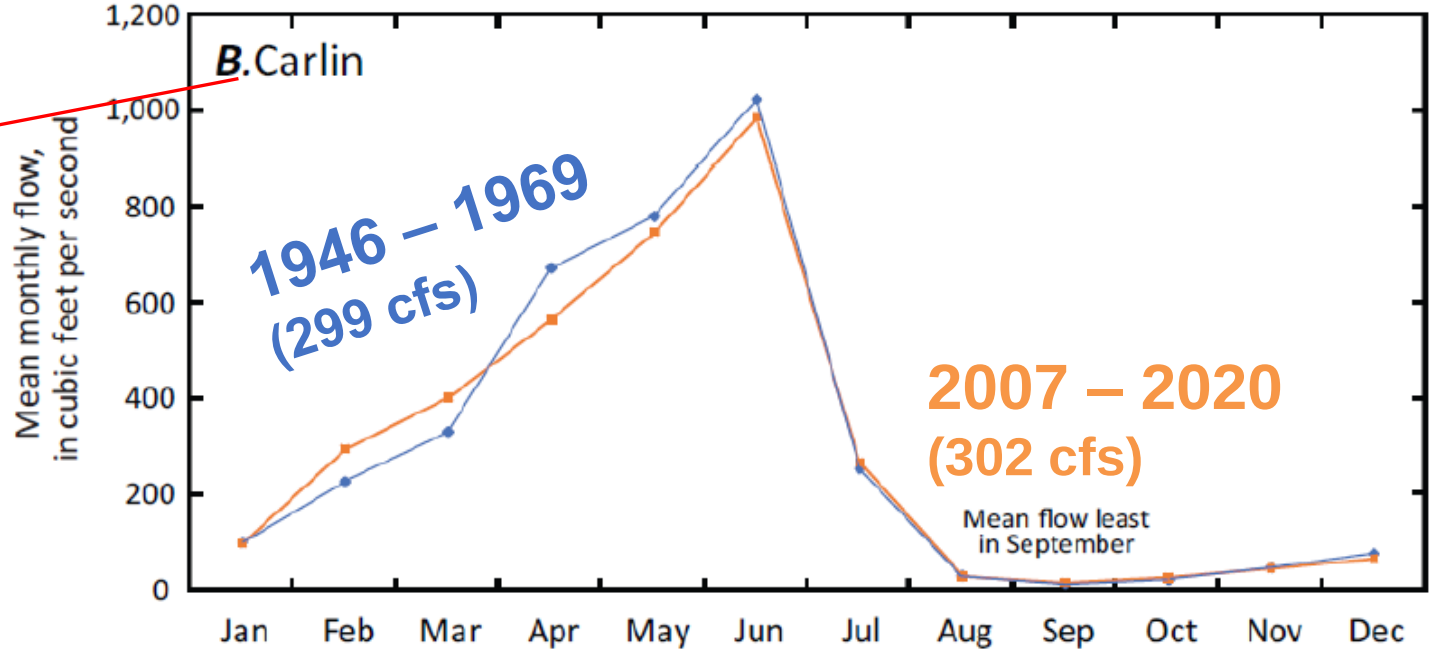
Flow Duration – Middle/Lower Basin



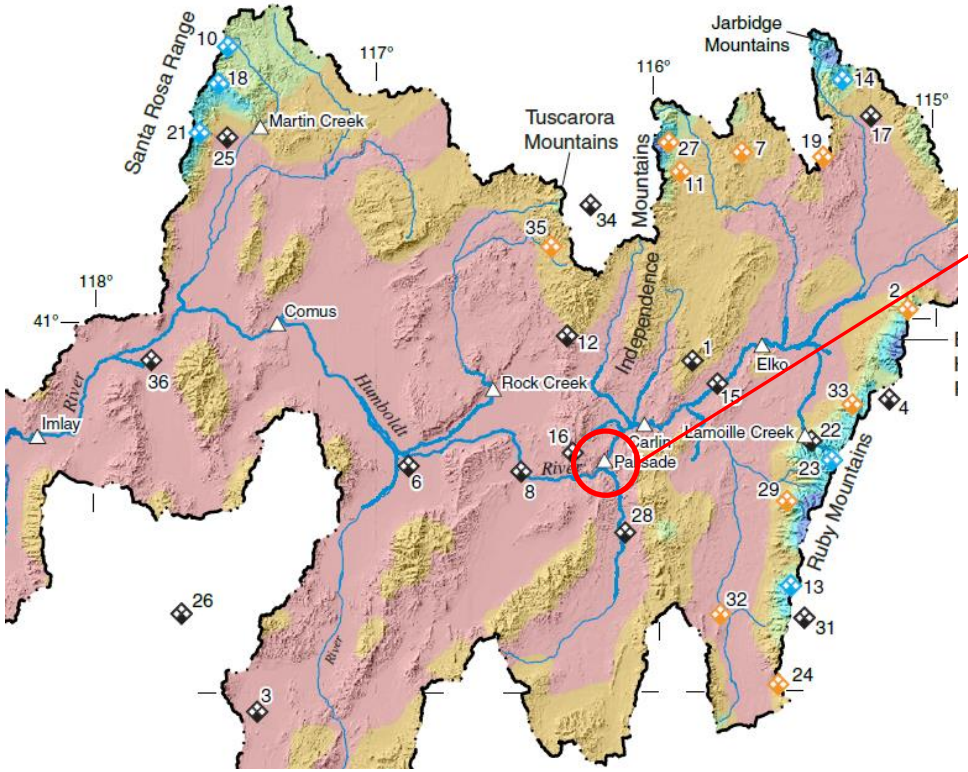
Mean Monthly Flow – Upper Basin

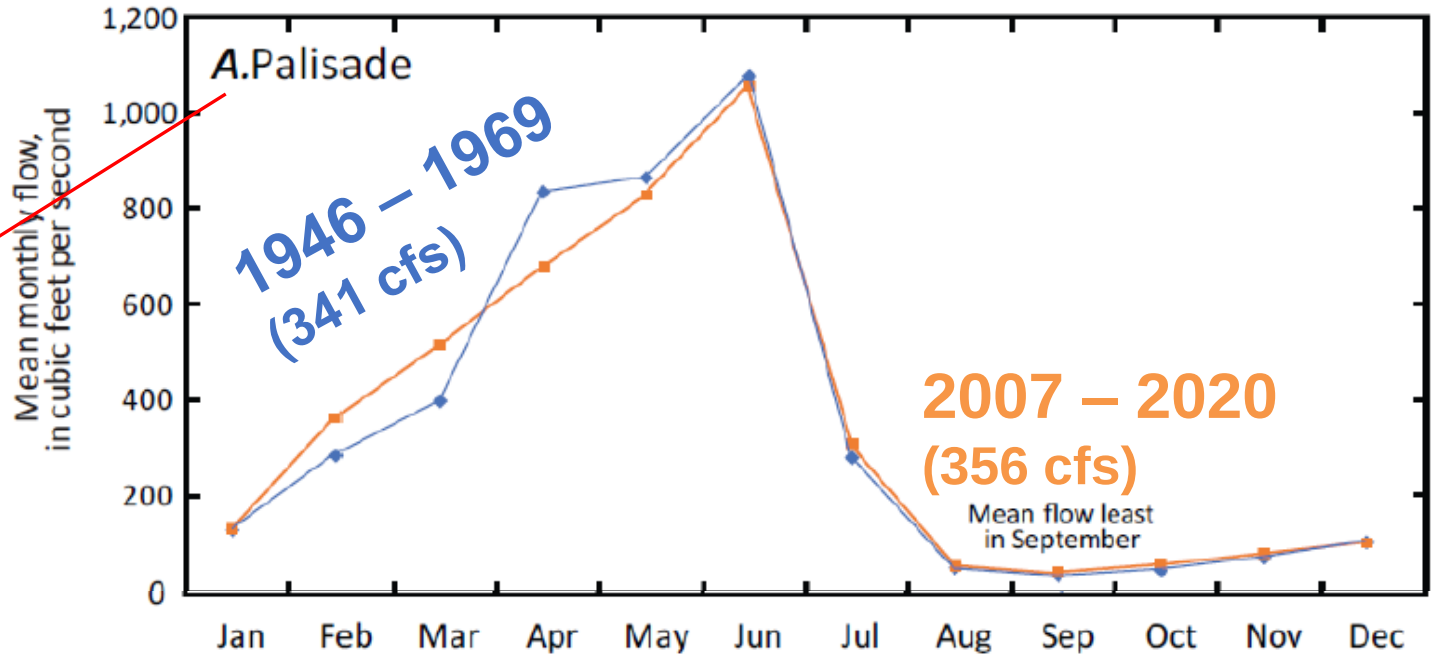




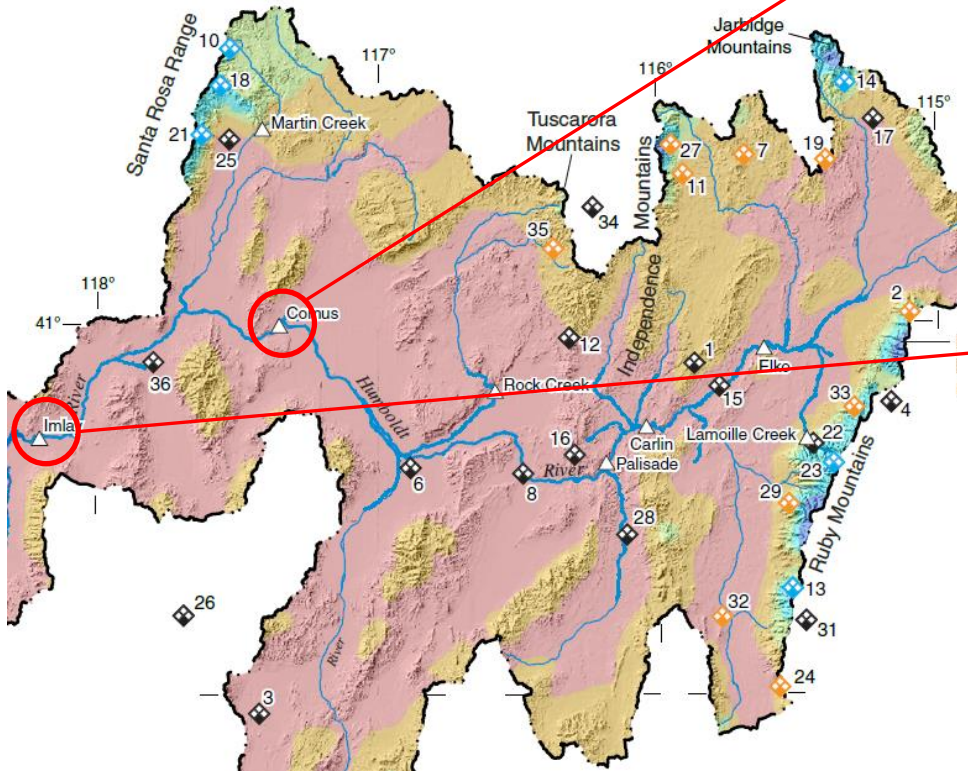


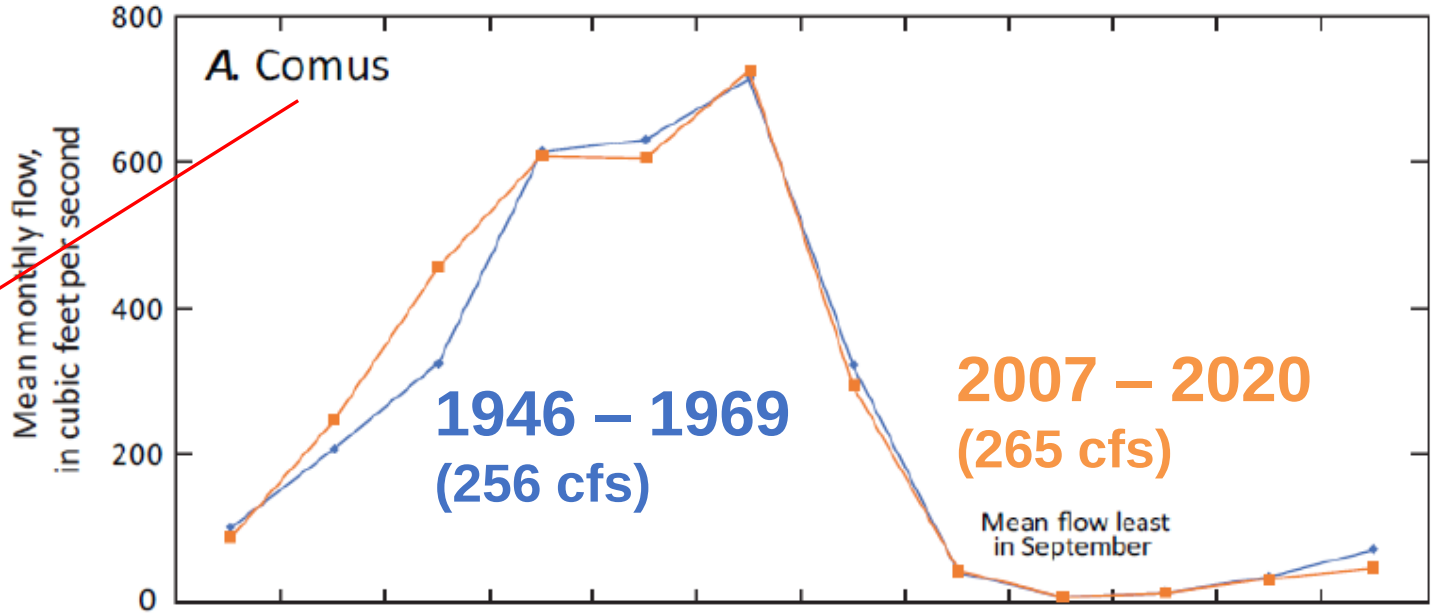
Mean Monthly Flow – Upper/Middle Basin

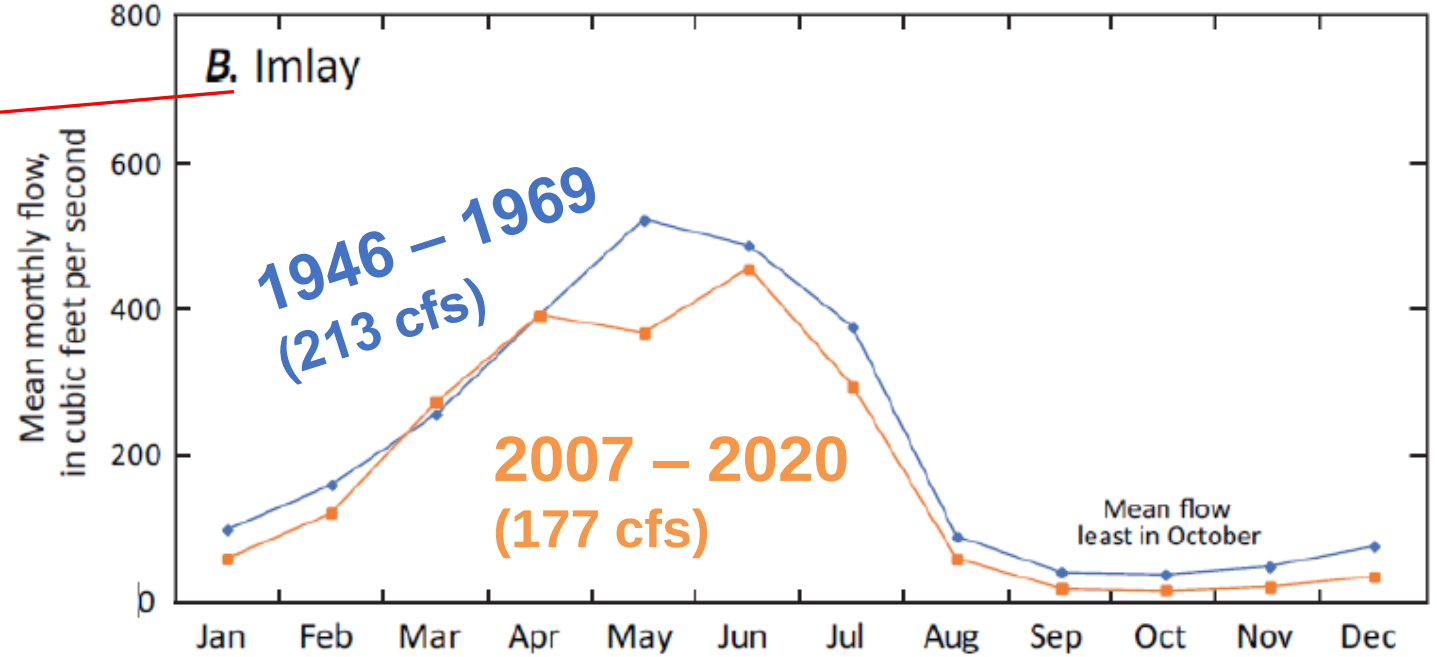




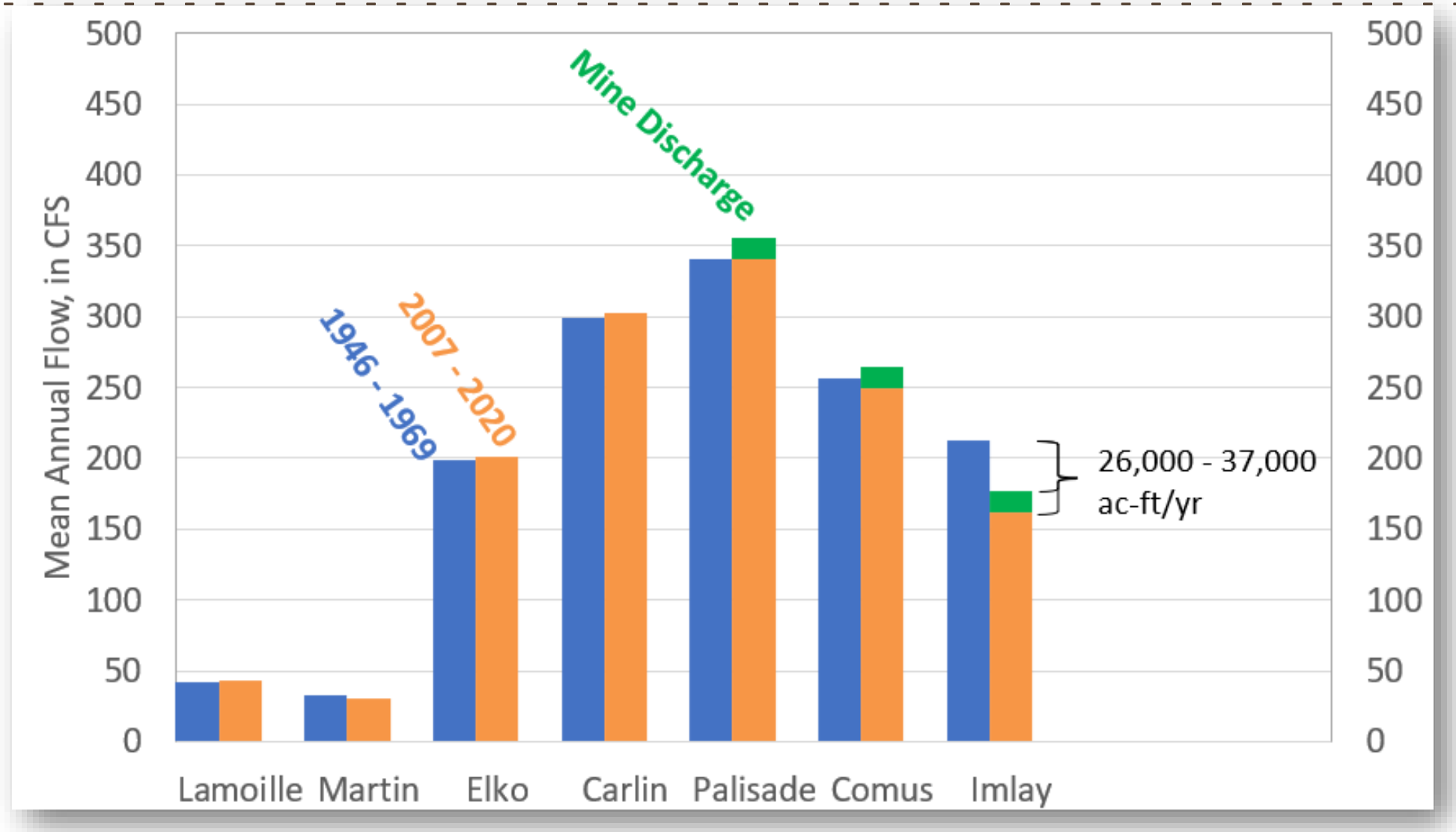
Mean Monthly Flow – Middle/Lower Basin







PRUDIC TREND SUMMARY

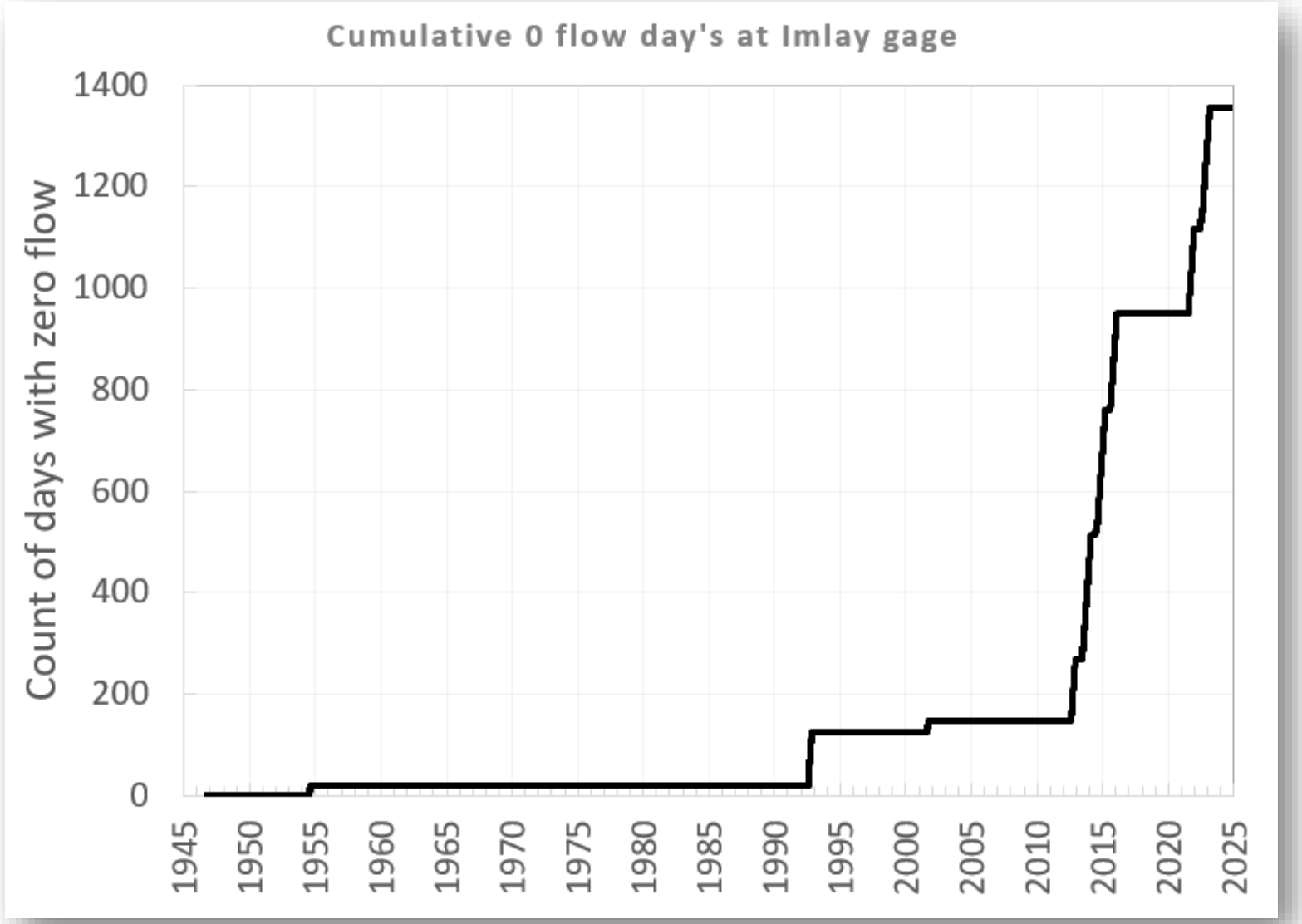


Trends upstream of Comus do not appear to be present.

Decreasing trend at Imlay is alarming!

Estimated capture at Imlay based on flow difference ~26,000 – 37,000 AFY.

Zero flow days at Imlay*



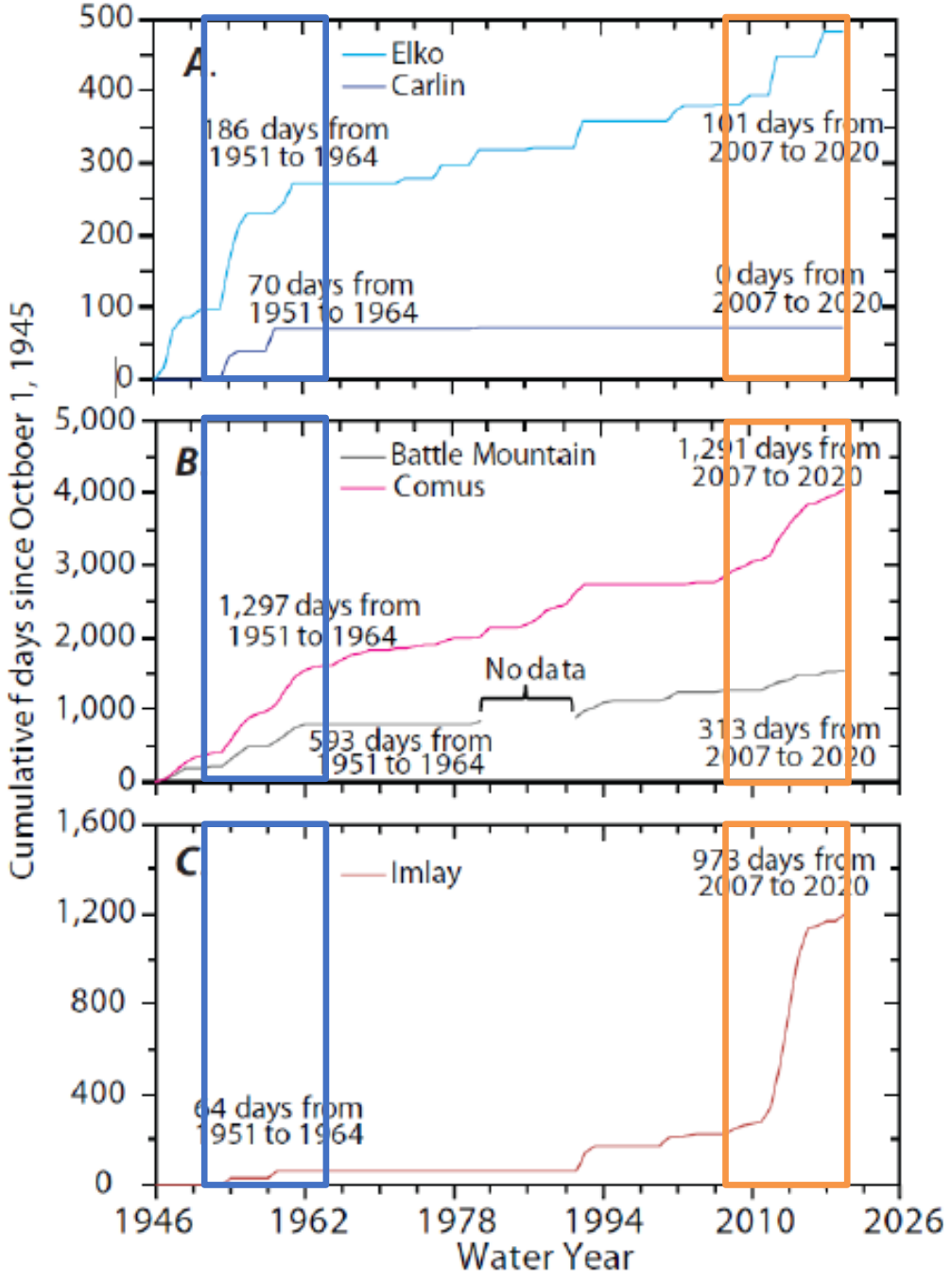
Noticeable increase in zero flow days in early 1990's.

Substantial increase in zero flow days beginning with 2012 drought.

*Analysis by NDWR

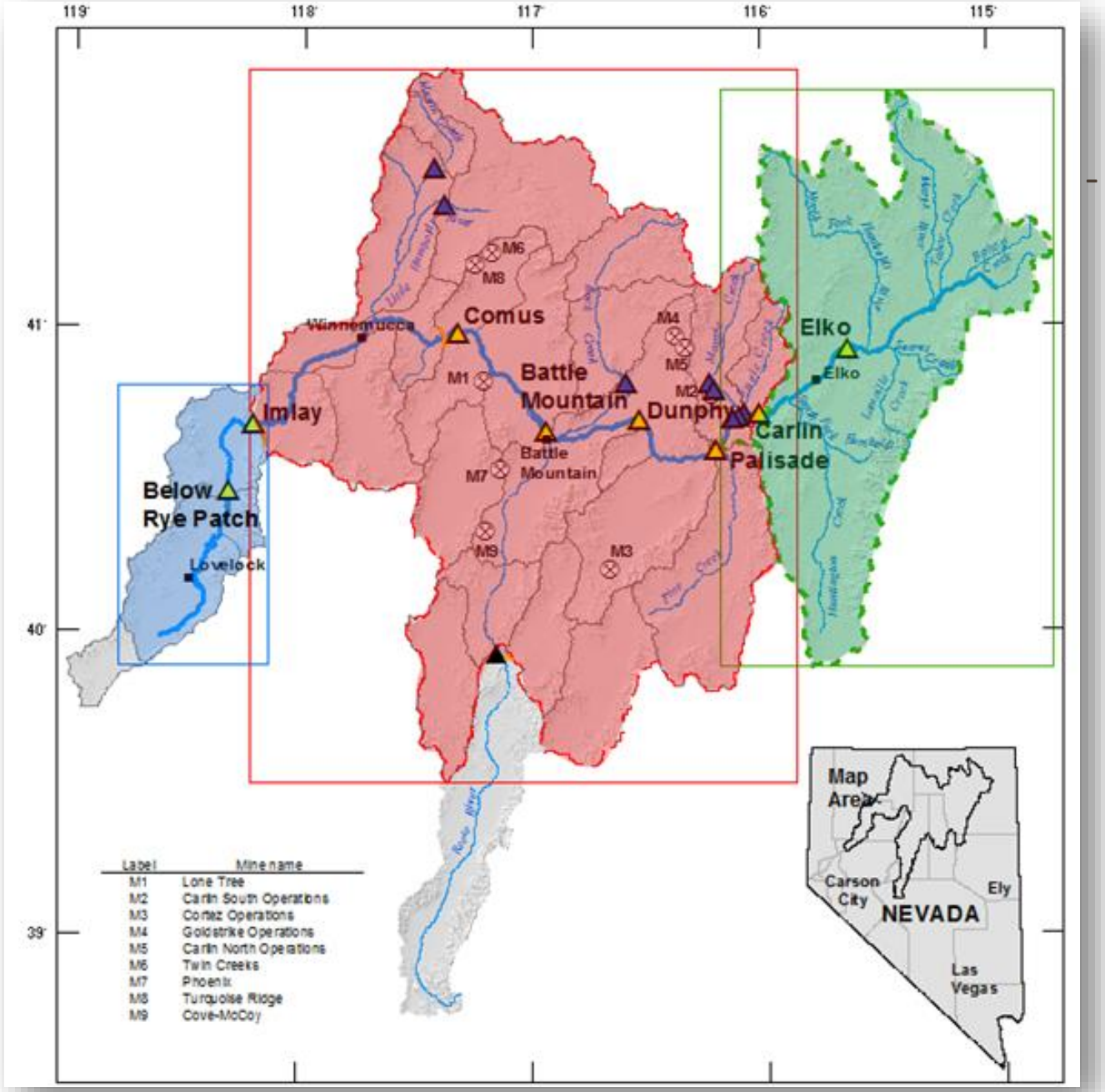
Days with Daily flow < 1 cfs

Gage	1951 – 1964	2007 – 2020
Elko	186	101
Carlin	70	0
Palisade	0	0
Comus	1,297	1,291
Imlay	64	973



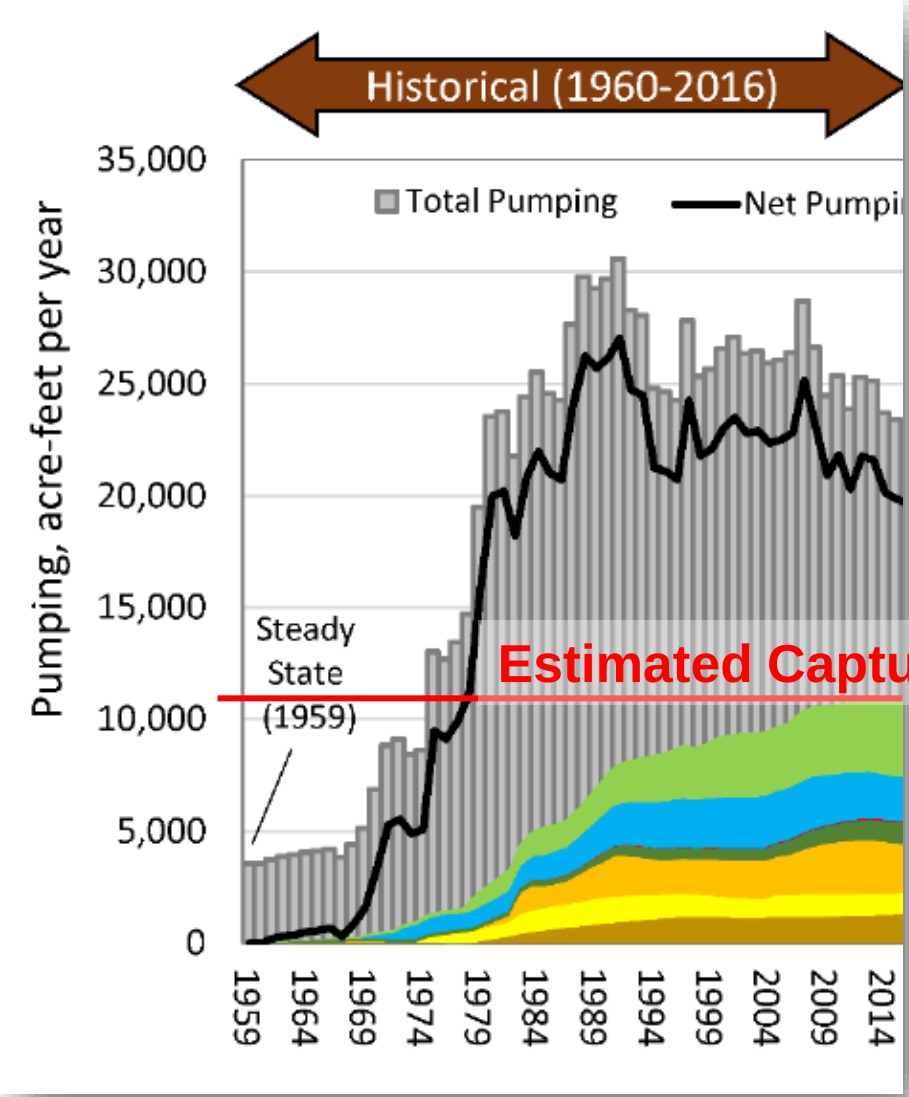
Capture Estimates from Models

- Estimates from Upper and Middle* models.
  - Period of estimate is ~2015.
- Upper model represents cumulative capture at Carlin gage.
- Middle* model represents cumulative capture at Imlay gage.



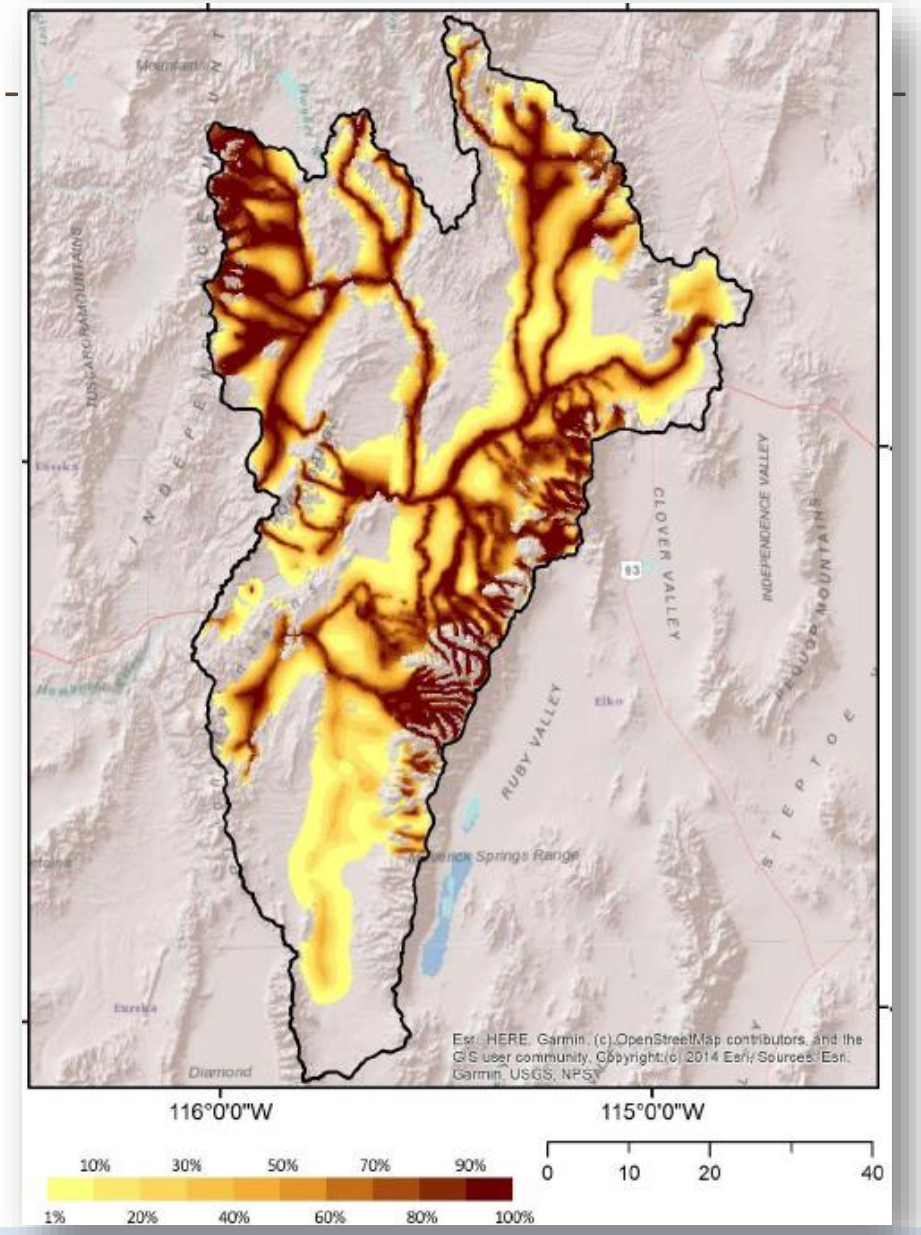
Middle model results are provisional

Upper Humboldt Capture

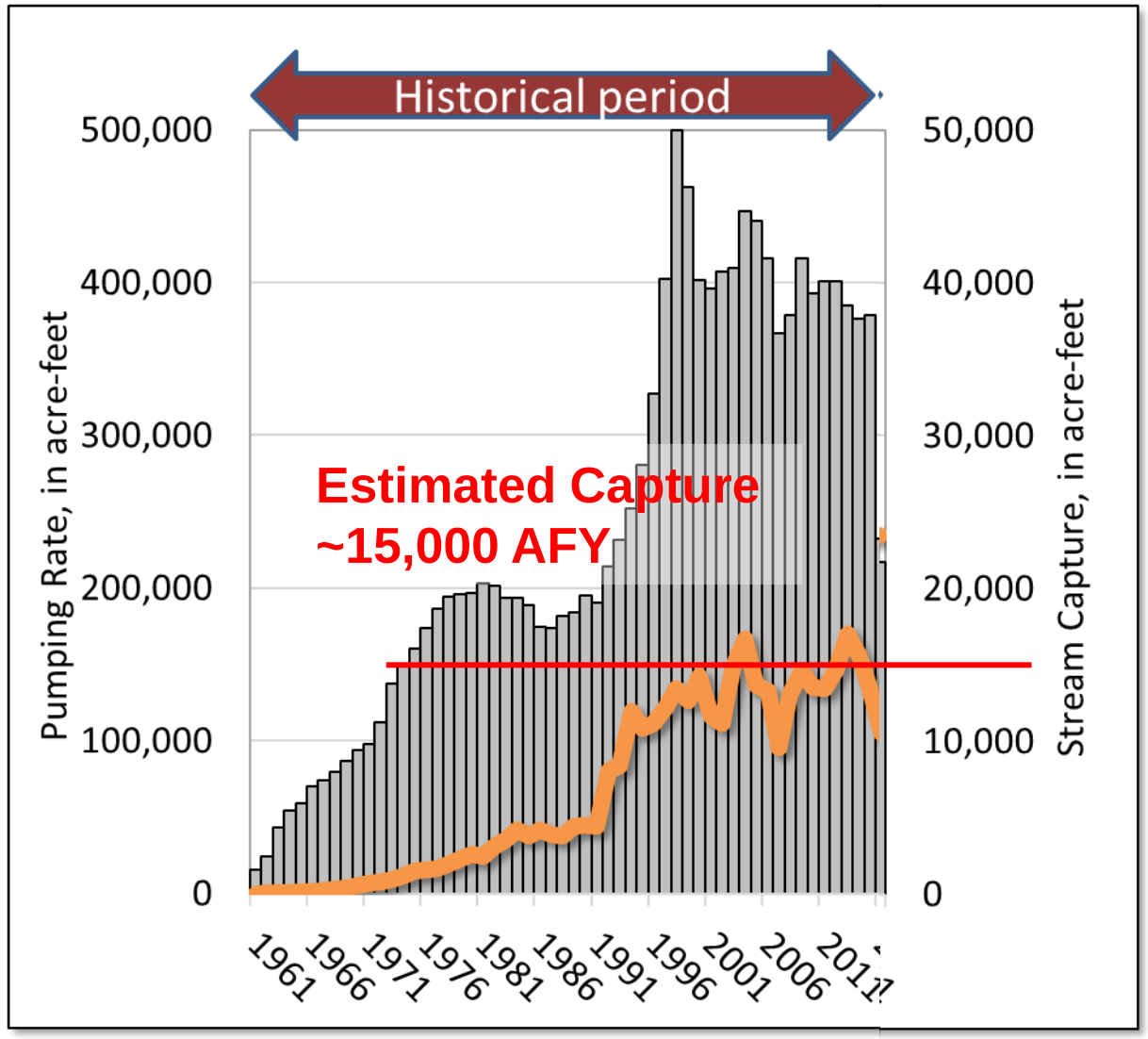


Estimated Capture ~11,000 AFY

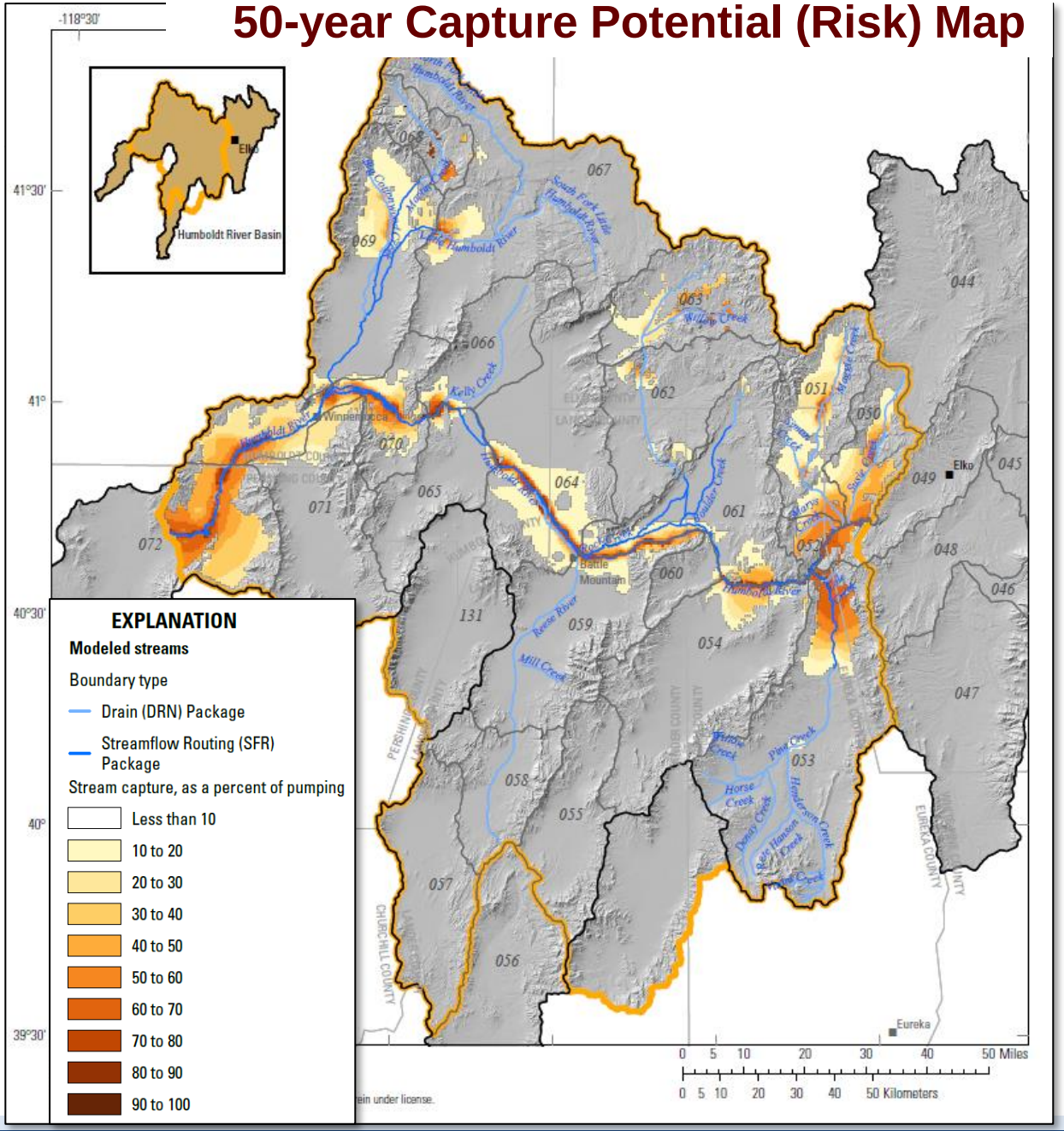
50-year Capture Potential (Risk) Map



Middle Humboldt Capture

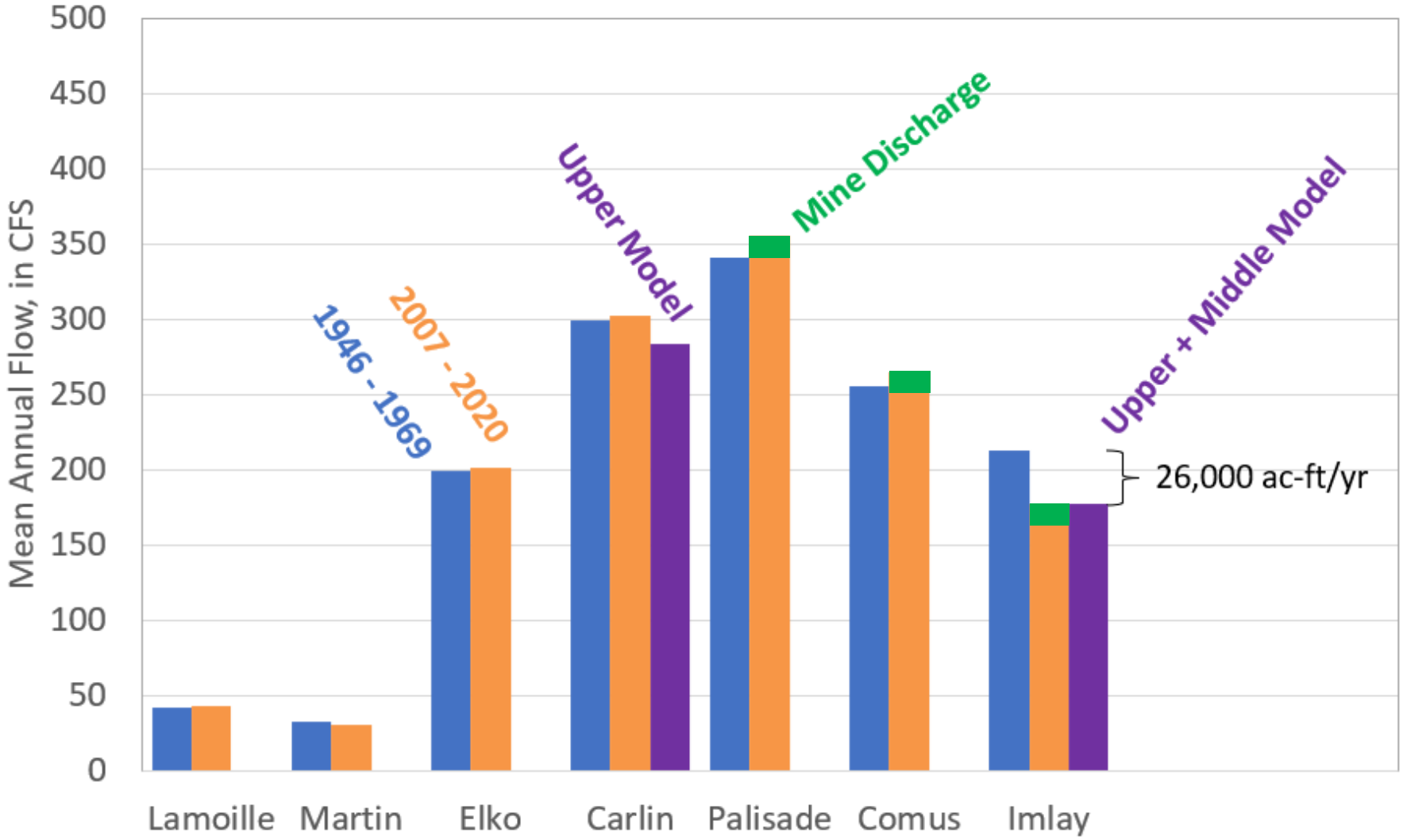


50-year Capture Potential (Risk) Map



Middle model results are provisional

Compared with Prudic Trend summary



Models do not account for the 'unused' decree in the system indicating that we may potentially be underestimating the 'true' capture.

Summary and Conclusions

Prudic's Trends report

- Trends at upstream gages indicate no change in flow.
  - Elko, Carlin, and Palisade gages.
- Possible slight trend at Comus gage.
- Alarming trend at Imlay gage.
  - Flow reduction of ~26,000 – 35,000 afa.

There is a discrepancy between observed trends and upper model estimated trends for sites upstream of Palisade gage.

Capture models

- Upper model suggests there should be ~11,000 afa reduction in flow at Carlin gage from capture.
- Middle model suggests there is ~15,000 afa reduction in flow at Imlay gage from capture along middle reach of Humboldt.
- Upper and Middle models suggest a combined capture of ~26,000 afa at the Imlay gage.

Discussion

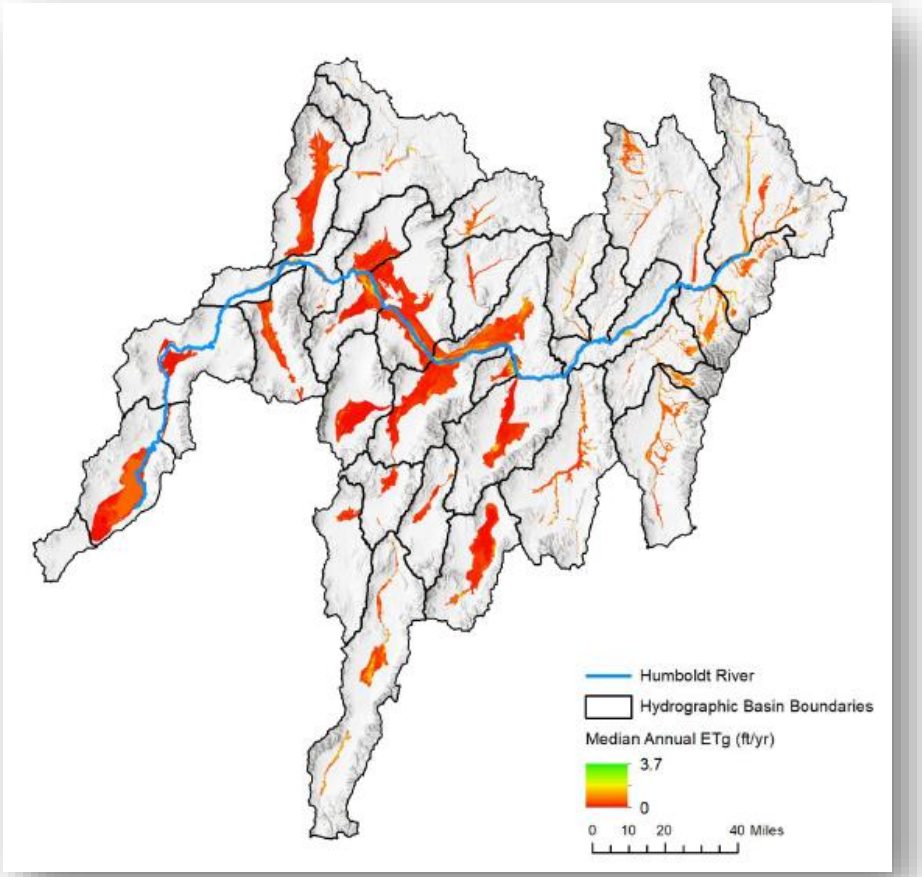
Is unused decree water masking capture impacts in the Upper Humboldt or are Upper Model capture estimates substantially in error?

If wells in the Upper Humboldt are not capturing flow from streams, then where is pumped water coming from?

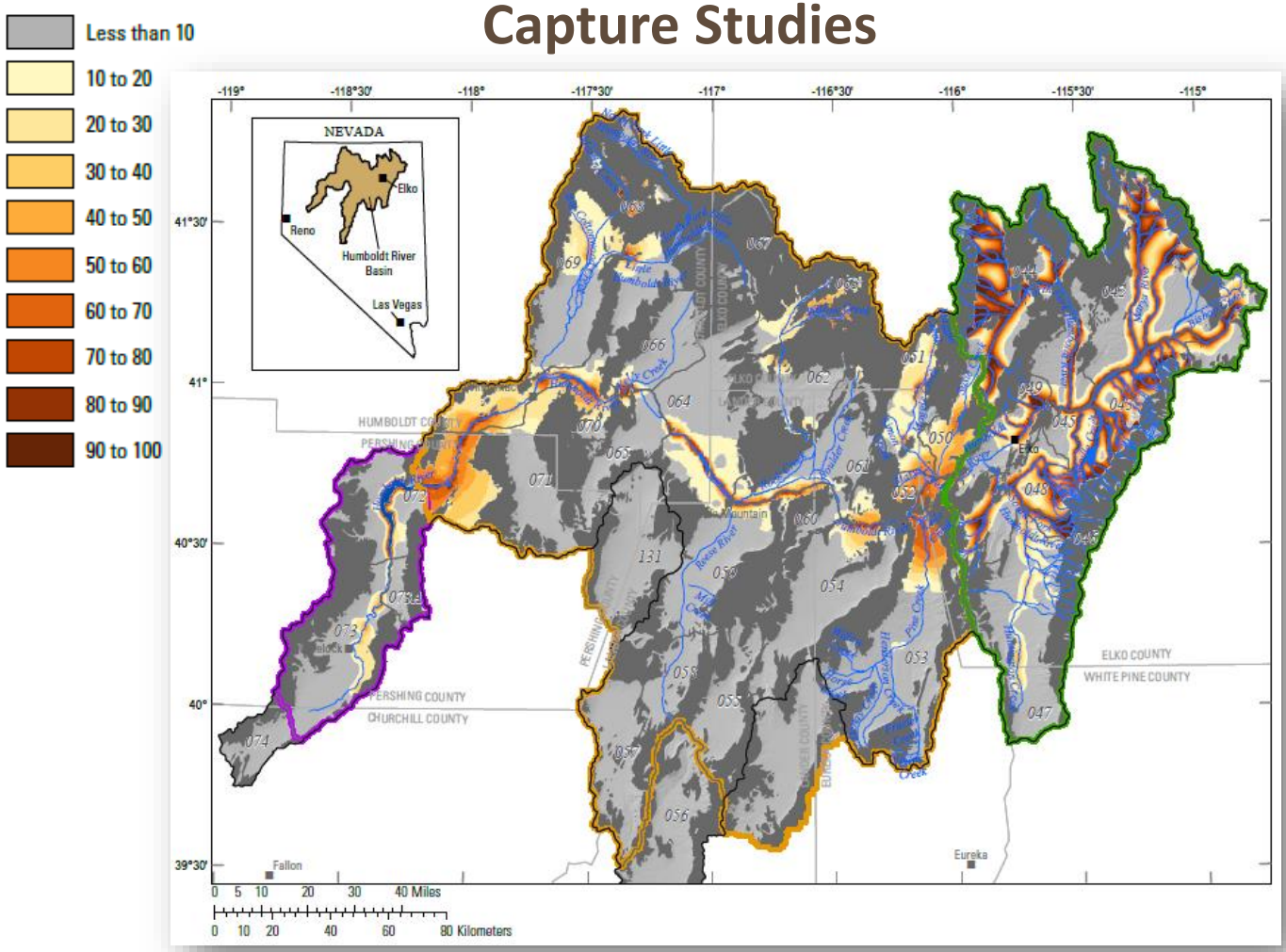
Do identified limitations with Upper Humboldt model limit it's usefulness for estimating overall capture?

Capture Study Components

Regional Evapotranspiration Study

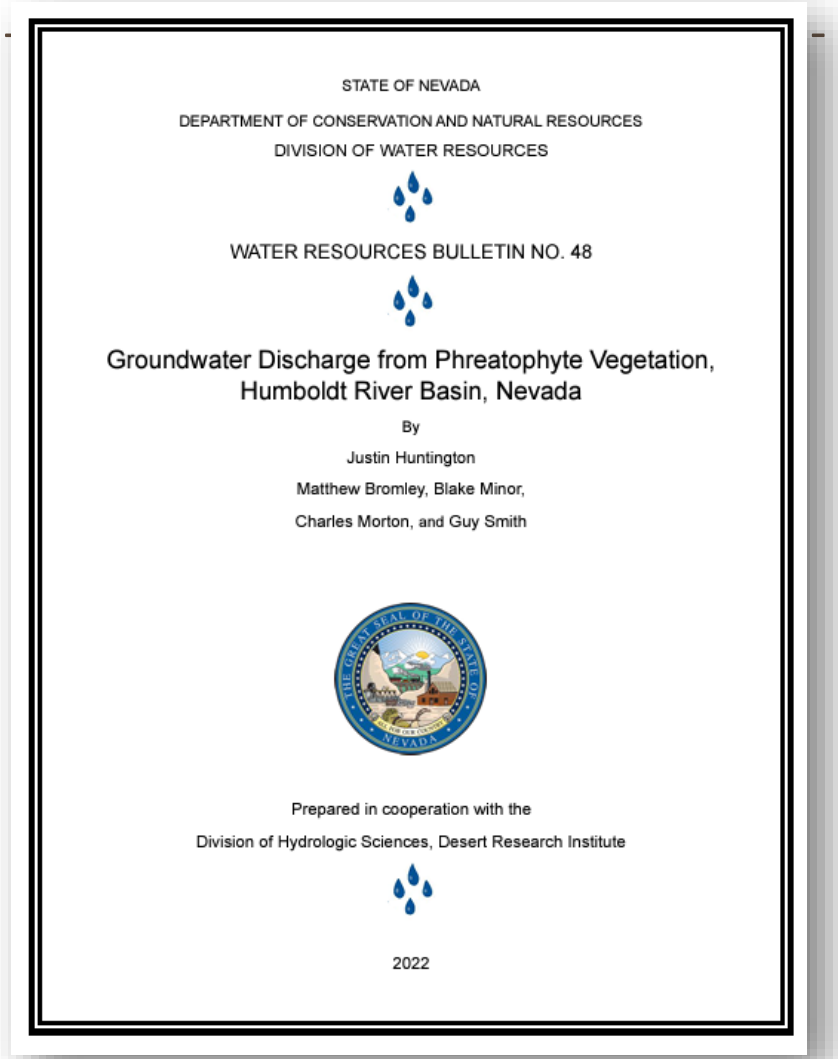


Capture Studies



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

Report and Data Access



STATE OF NEVADA

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF WATER RESOURCES

WATER RESOURCES BULLETIN NO. 48

Groundwater Discharge from Phreatophyte Vegetation, Humboldt River Basin, Nevada

By

Justin Huntington

Matthew Bromley, Blake Minor,

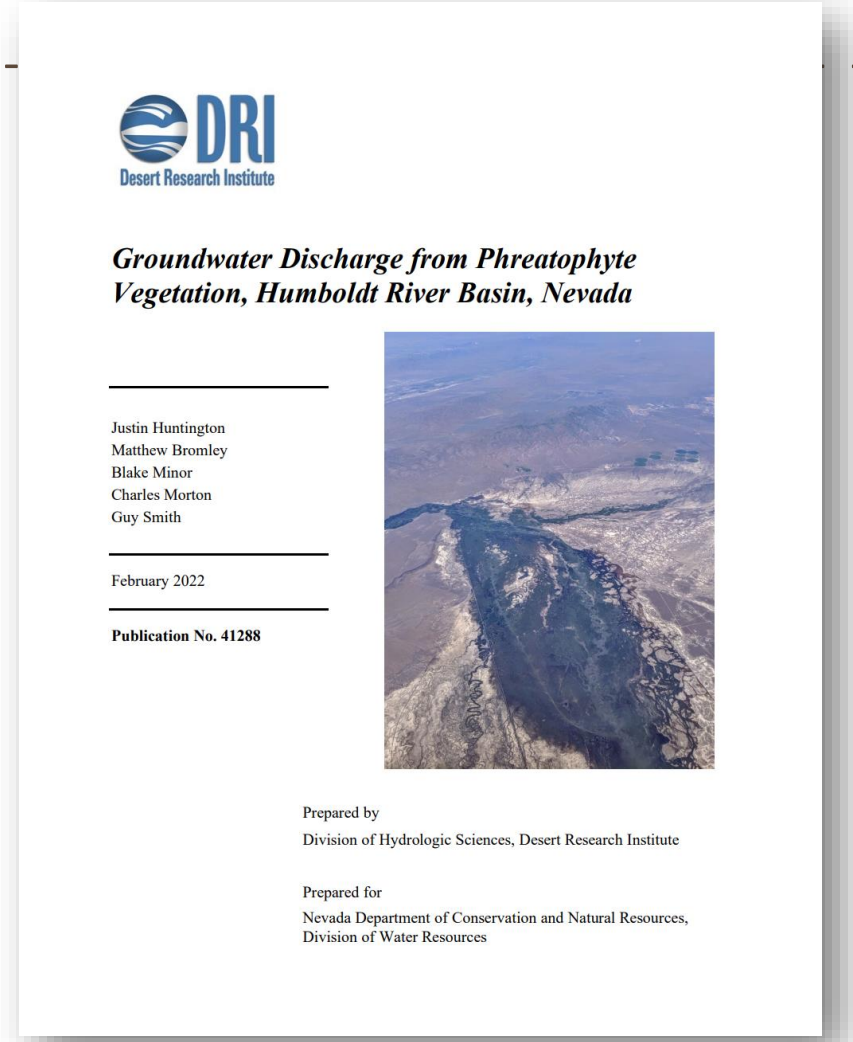
Charles Morton, and Guy Smith

Prepared in cooperation with the

Division of Hydrologic Sciences, Desert Research Institute

2022

https://water.nv.gov/library/water-resource-bulletins



DRI Desert Research Institute

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February 2022

Publication No. 41288

Prepared by

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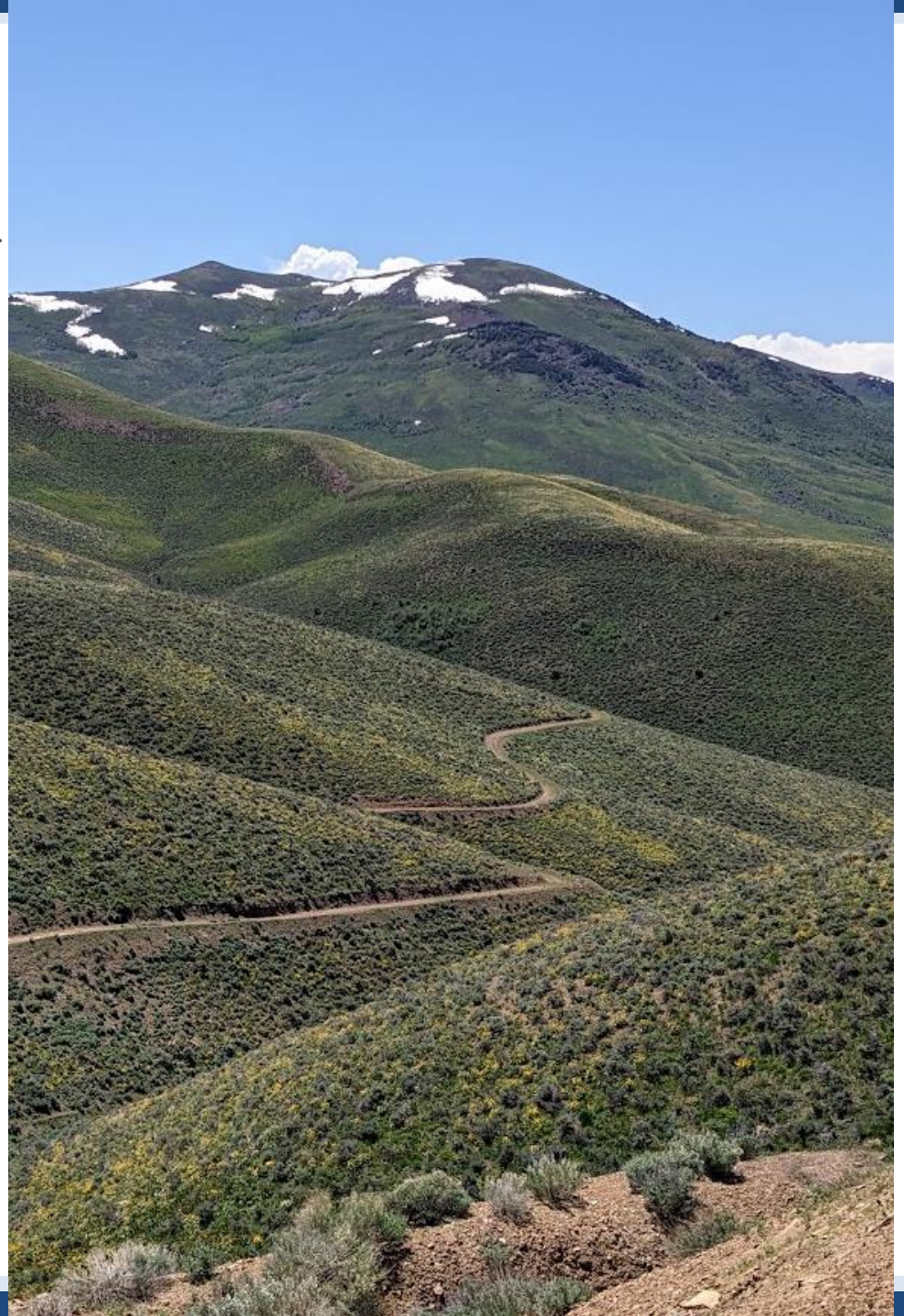
Prepared for

Nevada Department of Conservation and Natural Resources, Division of Water Resources

https://www.dri.edu/humboldt-etg



Conservancy Subgroup-Update to HRSWG

Friday, April 11, 2025

Many questions..
Too few answers

- Two meetings – February 21 and March 14
- Host presentation from Garrick Baxter (Ground Water Districts – ID)
- Sequencing
- Leadership/Roles
- Missing information/data
- Tools required
- Scope of impact (potential offset requirement)
- Impact of limitations with basin models

Considerations of Subgroup

- Review and examine NV District types (e.g., Conservancy, Conservation)
- Non-Profit or NGO/Existing authorities (statutes)
- Funding/Fee structure & Grant opportunities
- Examine roles of different “Districts” ID, CO examples
- Understand additional needs
- Existing opportunities (e.g., available offsets, conservation, mitigation, etc.)
- District(s) (type, size, and number)

Outcomes and Recommendations

- Improved transparency of group activities
- Need for greater public outreach
- Successful examples from other State’s
- NV specific legislation
- Functional models
- Model limitations and necessary updating

“District” Formation

PROS

- Potentially avoids curtailments
- Allows smaller users who may not have capital or technical expertise to purchase offset & have them managed
- Ability to fund larger scale mitigation projects (MAR’s, Augmentation, WR purchases, etc.)
- Grant funding opportunities

CONS

- Political opposition
- Admin & Operational Costs
- Taxes & Fees on water users

Potential Structures:

- Funded through taxes & fees spread over large number of users
- Allows for more granular management of offsets rather than DWR approach of 50-year capture liability
- Maintain a bank or portfolio of offsets from which water users can draw from
- Locally managed offsets: Upper, Middle, Lower vs watershed wide or County by County?
- Legacy capture mitigation if someone sells WR or out of business

Economics Subgroup – Update to HRSWG

Friday, April 11, 2025

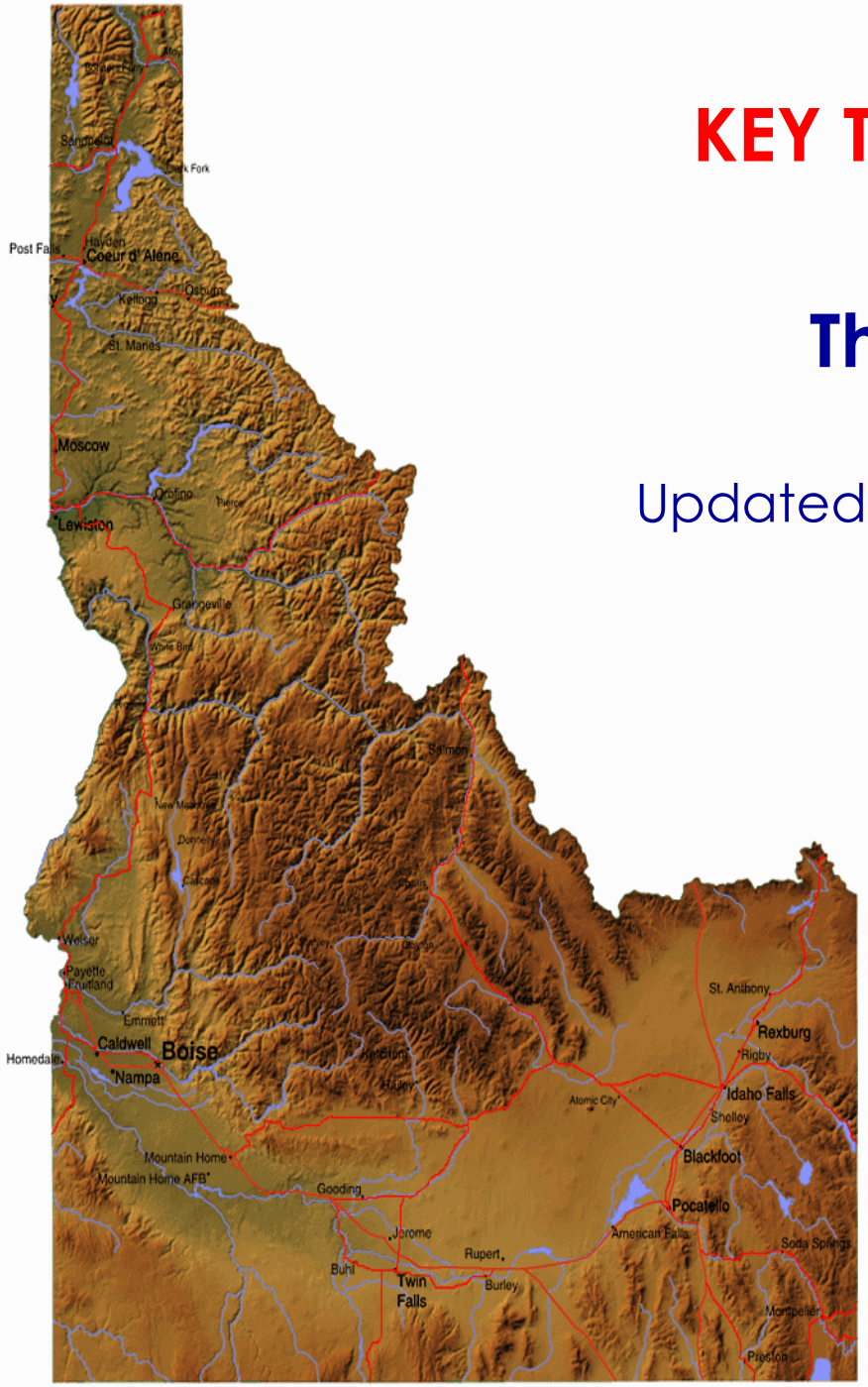
Economic Factors In Assessing Conjunctive Management/Offsets

- **Offset - Market Based Approach**
- Must Equal Capture
- Bought, Sold, or Leased
- Sources - Surface, Managed Aquifer Recharge, Augmentation
- **Advantages** - Favors more profitable uses of water, based on capture amount, incentivizes pumping from wells with lower conflict/capture; Groundwater fees could help fund a "District"
- Enhanced Value of SW Rights - Less profitable decree will be sold/leased
- Dynamic Economic Incentives – Development of cost-effective methods to increase flows, generates marketable offsets, reduce overall costs of implementing conjunctive management

Questions Needing Answers

- What is the amount of offsets needed?
- Need to understand the mechanics of fees (e.g., reduction in pumping, revenue generation, etc.)
- Will offsets be tradable?
- What offsets are most viable/feasible?
- NRCS, FSA, Insurance programs – Effects on potential participants?
- What/Where is the CMZ? - Magnitude of users impacted?
- What definition will be used for “Offset”?
- What are administrative needs for certifying/transacting offsets?
- Opportunities/Costs/Values of implementing conservation offsets?
- How can we analyze and measure effectiveness? (cost benefit ratios)

NEXT MEETING SCHEDULED FOR MAY 21, 9:30 – 11:30



KEY TAKEAWAYS Conjunctive Management:

The Idaho Experience w/ GW Districts

Updated presentation for the Humboldt River Stakeholder Meeting

2-25-25

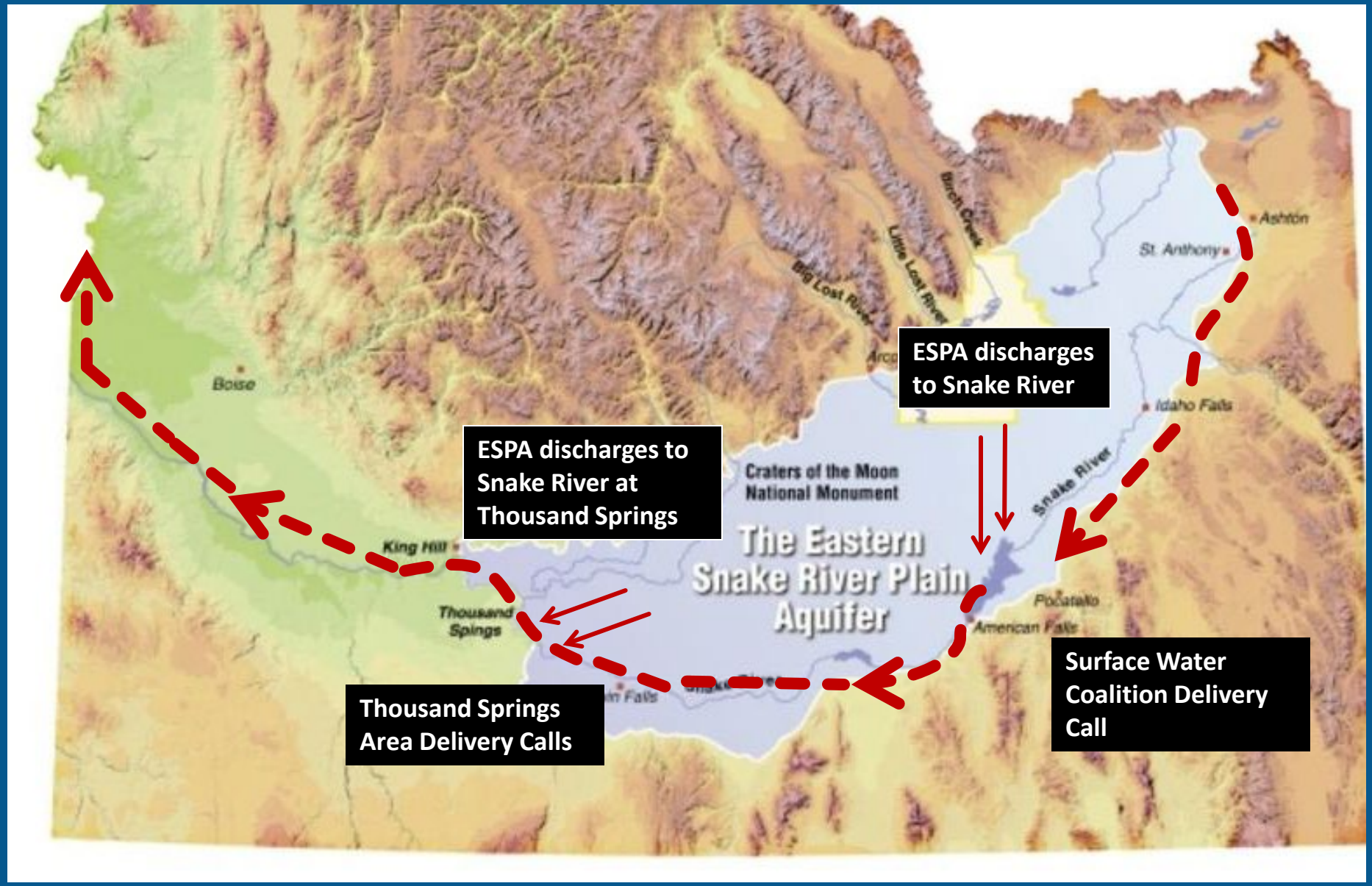
Garrick Baxter
Deputy Attorney General
Idaho Department of Water Resources

Presentation from Garrick Baxter - Idaho DWR - Lead Deputy Attorney General-20250225_140305-Meeting Recording (2).mp4

Chris Mahannah, P.E., WRS
Mahannah & Associates, LLC

April 11, 2025

The Eastern Snake Plain Aquifer


ESPA discharges to Snake River
ESPA discharges to Snake River at Thousand Springs
Thousand Springs Area Delivery Calls
Surface Water Coalition Delivery Call
The Eastern Snake River Plain Aquifer
Craters of the Moon National Monument
Boise
King Hill
Thousand Spings
Big Lost River
Little Lost River
Birch Creek
Ashton
St. Anthony
Idaho Falls
Snake River
Pocatello
American Falls

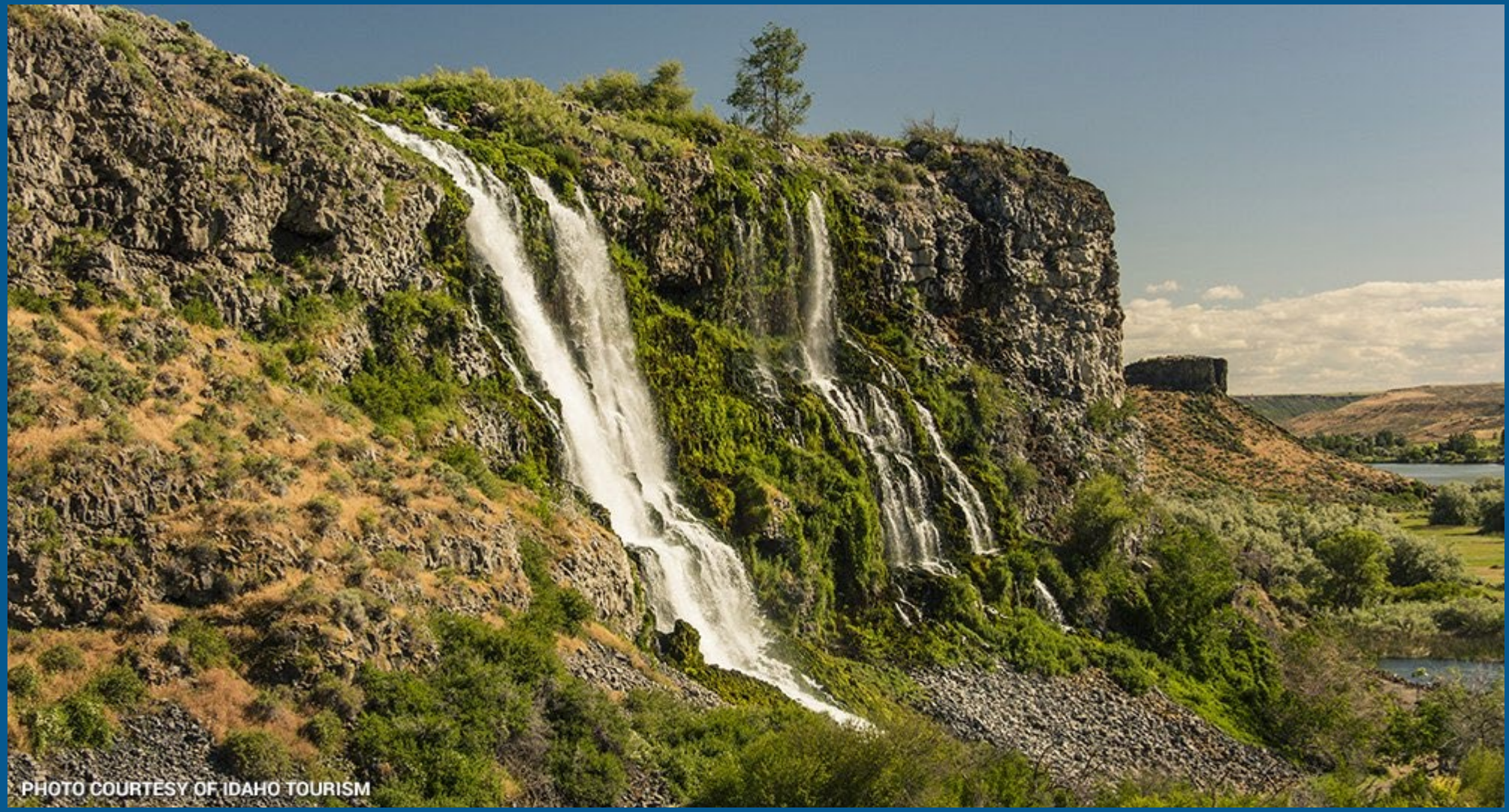


PHOTO COURTESY OF IDAHO TOURISM

Musser v. Higginson (1994)

- Under the prior appropriation doctrine, the IDWR Director has "clear legal duty" to administer surface and groundwater water rights together
- Mid 1990's Legislature funded $3M modeling efforts
- Groundwater Districts started forming after Musser

JUNIOR GW WATER USERS:

CONJUNCTIVE ADMINISTRATION WILL RESULT IN SUBSTANTIAL ECONOMIC HARM

JUNIOR GW WATER USERS:

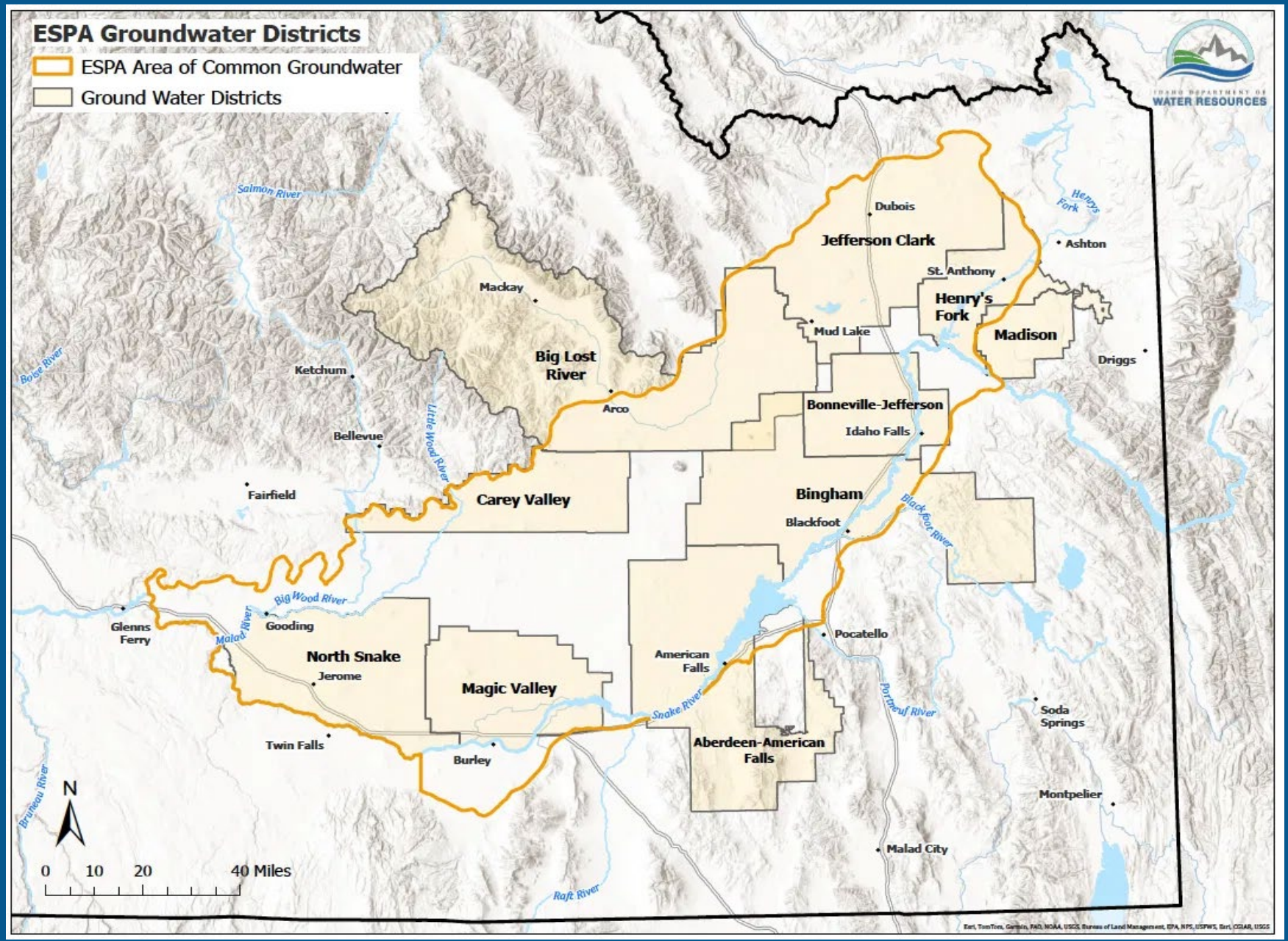
THE BUSINESSES THAT HAVE JUNIOR WATER RIGHTS ARE MORE PROFITABLE

JUNIOR GW WATER USERS:

CONJUNCTIVELY ADMINISTERING JUNIOR WATER RIGHTS WOULD RESULT IN A TAKING OF THEIR WATER RIGHTS

YEARS OF LITIGATION…

CONJUNCTIVE MANAGEMENT SOLUTIONS



TITLE 42 IRRIGATION AND DRAINAGE — WATER RIGHTS

CHAPTER 52 GROUND WATER DISTRICTS

42-5201 SHORT TITLE — TITLE OF DISTRICTS — DEFINITIONS.
42-5202 ESTABLISHMENT OF GROUND WATER DISTRICTS.
42-5203 PETITION FOR ORGANIZATION — MAP — BOND.
42-5204 NOTICE OF PRESENTATION TO COUNTY COMMISSION.
42-5205 NOTICE OF COUNTY COMMISSION HEARING.
42-5206 EXAMINATION BY DEPARTMENT OF WATER RESOURCES — REPORT TO COUNTY COMMISSION — AMENDMENT
42-5207 ORGANIZATION HEARING BEFORE COUNTY COMMISSION — ORDER OF COUNTY COMMISSION.
42-5208 DIVISIONS OF DISTRICT FOR ELECTION OF DIRECTORS.
42-5209 NOTICE OF ELECTION.
42-5210 QUALIFICATIONS OF VOTERS FOR DISTRICT ELECTIONS.
42-5211 CONDUCT OF ELECTIONS.
42-5212 REGISTRATION NOT REQUIRED.
42-5213 CANVASS OF VOTES — COMPLETION OF ORGANIZATION.
42-5214 GROUND WATER USERS INCLUDED WITHIN THE DISTRICT — NOTICE AND HEARING FOR MEMBERS INCLUDED ORDER — APPEAL AND CONCLUSIVENESS.
42-5215 LIMITATION ON PROCEEDINGS AFFECTING VALIDITY.
42-5216 ORGANIZATIONAL MEETING OF BOARD.
42-5217 TREASURER'S OFFICIAL BONDS.
42-5218 ELECTION, TERM OF OFFICE, NOMINATIONS AND QUALIFICATIONS.

https://legislature.idaho.gov/statutesrules/idstat/title42/t42ch52/

Non-profit: Idaho GW Association: IGWA

MITIGATION PLANS

A plan submitted by junior-priority water right holders that identifies actions and measures to prevent or compensate seniors for injury

Types of Mitigation:

- Voluntary buyouts
- Monetary compensations
- Negotiated settlements: reductions in pumping
- Recharge projects
- Storage acquisitions & releases
- Conversions of GW to SW use
- Expanded cloud seeding

KEYS TO EFFECTIVE AND EFFICIENT CONJUNCTIVE MANAGEMENT:

- Strong legislative support
- Dedicated judge or judges that understand water law
- Conjunctive management rules
- Adjudication
- State investment in modelling

KEYS TAKEAWAYS:

- Prior Appropriation doctrine rules
- Jr GW arguments of takings, economic harm & more profitable fail
- Vastly different hydrology, some solutions in ID wont work in NV
- Defendable science/modeling & updates are key
- Benefits of Idaho GW Districts:
  - Talk as an entity verses individual users
  - Fund mitigation projects & apportion obligations among themselves
  - Ability to collect funds from users & lien bad actors
  - Districts decide on how to reduce pumping: proportional or by priority

21 March 2025

Scope of Work for Graduate Research Assistant (GRA) – Economic Analysis of Alternative Approaches to Conjunctive Management in the Humboldt River Basin

Prepared by Michael H. Taylor, Dept of Economics, University of Nevada, Reno

Budget: The total requested budget is $40,888, which includes:

- Graduate Research Assistant (GRA) salary: $25,800 (12 months at 20 hours per week)
- Tuition: $5,331 (two semesters at 6 credits per semester)
- Health insurance: $5,386
- Mandatory fees: $672
- Fringe benefits: $3,328 (based on UNR's 12.9% fringe rate for graduate students)
- Facilities & Administrative (F&A) costs: $3,717 (based on UNR College of Business's 10% F&A rate)

Timeline: The timeline will be determined by the priority assigned to different components of the economic analysis by the Division of Water Resources (DWR).

Budget Justifications: The GRA will work under the supervision of **Dr. Michael H. Taylor** (UNR Department of Economics), with collaboration from **Dr. Andrew Ayers** (also from UNR Economics). Drs. Taylor and Ayers will guide project conceptualization, selection of methodological approaches, and identification of necessary data to address key research questions. Drs. Taylor and Ayers will lead the interpretation and written presentation of findings. The GRA will be responsible for:

- Data collection
- Model development, programming, and validation
- Conducting econometric and/or simulation analysis
- Preparing results in the form of figures and tables

Economic Analysis Part 1: Potential Revenue for Groundwater Pumping Fees

A critical factor in assessing the potential success of a conservancy district established to fund and/or implement mitigation projects is determining the revenue that could be generated from groundwater pumpers within the Capture Management Zone (CMZ). The economic analysis would include the following components:

- **Data Collection:** Gather historical pumping data for all wells within the CMZ.
- **Pumping Response Analysis:** Assess how groundwater pumping would change with the introduction of pumping fees, considering historical pumping patterns and each well's percent capture. This analysis would utilize elasticity estimates of groundwater use in response to pumping costs from Smith et al. (2017).

- **Revenue and Pumping Reduction Projections:** Estimate potential revenue under different fee levels.
- **Limitations:** This analysis would not account for variations in the price elasticity of groundwater demand among different types of users within the CMZ.

Economic Analysis Part 2: Evaluation of Potential Mitigation Projects
The feasibility of mitigation projects, such as managed aquifer recharge (MAR) or streamflow augmentation using pumped groundwater from outside the CMZ, in addressing conjunctive management in the Humboldt River Basin depends on their potential scale and cost. The economic analysis would:

- **Identify Potential Mitigation Projects:** Engage with stakeholders and water management professionals to identify sites for viable mitigation strategies in the Humboldt River Basin.
- **Assess Cost and Implementation Timelines:** Examine comparable past projects to estimate costs and the time required for implementation.

Economic Analysis Part 3: Trade Volumes in Offset Markets
Groundwater pumpers could mitigate their well capture by purchasing surface water rights, or decree rights, to offset the impact of their pumping. The economic analysis would:

- **Assess Available Surface Water Offsets:** Determine the volume of surface water rights that could be used as offsets across different reaches of the Humboldt River and its tributaries, applying DWR offset requirements.
- **Estimate Offset Requirements:** Analyze the volume of offsets needed under various scenarios, depending on what portion of the total 35,000 acre-feet of capture is mitigated through decree rights purchases.
- **Simulate Market Responses:** Run simulations to estimate the expected volume of offsets purchased and the corresponding reduction in groundwater pumping under various scenarios.
- **Limitations:** Estimates of demand and supply functions for offsets will rely on elasticity values from studies conducted outside the Humboldt River Basin.

Economic Analysis Part 4: Economic Impacts
Work that falls outside the scope of the current project, but could be pursued in the future, would involve building on the analysis from Parts 1-3 to quantify the implications for economic variables such as irrigated acres, total agricultural income, and employment. This would require an economic impact analysis and cannot be completed within the one-year timeframe for this project, as it depends on the deliverables from Parts 1-3.

Bibliography
Smith, S.M., K. Andersson, K.C. Cody, M. Cox, and D. Ficklin. 2017. “Responding to a groundwater crisis: The effects of self-imposed economic incentives.” *Journal of the Association of Environmental and Resource Economists* 4(4):985–1023.