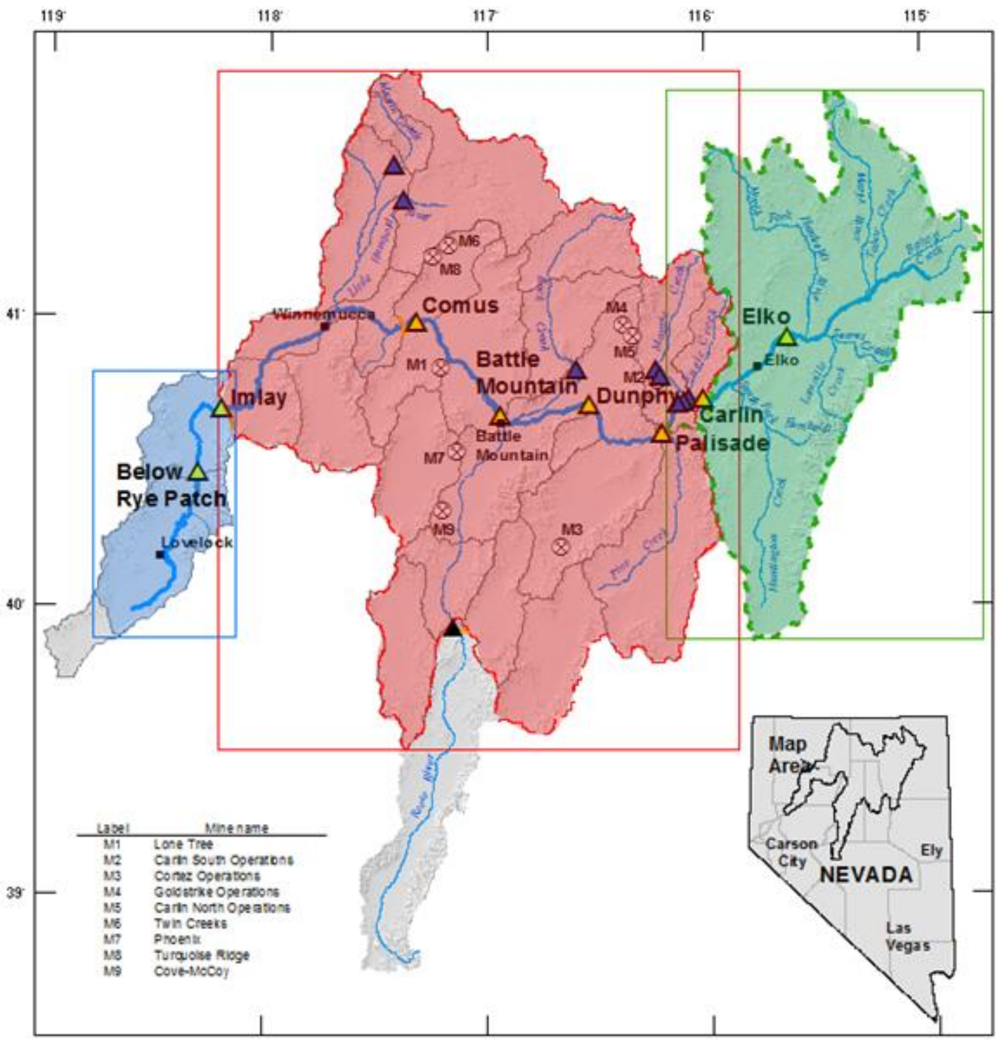

NEVADA DIVISION OF WATER RESOURCES

Nevada Department of CONSERVATION & NATURAL RESOURCES

NDWR Conjunctive Management Update for Humboldt River Region

NDWR

Carson City, Nevada and Virtual
March 19, 2024

Presented By:
NDWR Staff

Welcome and Introductory Remarks

- Agenda
  - Timeline
  - Overview of NDWR's core tenets to conjunctive management
  - Discussion of ideas presented last year
  - Formation of stakeholder working group
  - Questions/Discussion

Timeline/Process for Developing Conjunctive Management Strategy

- Mar 30, 2023 info meeting
- ~July 1, call for ideas, proposals, concepts
- ~Aug 1, first listening session
- Additional listening sessions or working groups to refine ideas
- Composite and summarize ideas to develop strategy. Develop scenarios for evaluation.
- Present results, refine concepts, re-evaluate as needed with Stakeholder working group.
- Implement Conjunctive management: accessible, measurable, defensible, effective

Overview of NDWR approach for Conjunctive Management in the Humboldt Region

- 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 economy.
  - Use data-based, building block approach.
  - Through engagement with stakeholders.
- Conjunctive management must work within the confines of NV water law and the Humboldt Decree.

SUMMARY OF CONJUNCTIVE MANAGEMENT IDEAS FOR THE HUMBOLDT RIVER REGION

Background on NDWR Recent efforts on Conjunctive Management

- 3 meetings/workshops held last summer and fall (Aug 1, Sep 6, and Sep 26, 2023).

- All material from those meetings is available: https://water.nv.gov/HumboldtRiver/Agenda_CM_09262023_Workshops.pdf

- Great participation by water resource community. Received many thoughts, ideas, and concepts.

- Generally, were of two types:
  - **Process**
  - **Management**

Management ideas

- No Action
- 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 plans
- Conservation as offset
- Water right buy back
- Use of private agreements
- Market-based approach
- Nature-based solutions
- Exemptions

Presentation of Conjunctive Management Ideas and Concepts

Summary - Bulleted summary of idea or concept.

Authority – Does **State Engineer** currently have authority, or does it require **Legislative**, **County**, or **Court** action.

Implementation – How long might it take to implement? **Near term** (1 – 5 yrs); **mid term** (3 – 7 yrs); **long term** (5 – 10+ years); **Ongoing** (already implemented or is a current practice). Does not imply that specific action will be undertaken.

Impacts/Benefits – What impacts to UG use, SW use, and to communities can be expected from implementation of specific idea or concept.

Testing - Can actions be tested with models to estimate effect of action.

No Action

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Suggested by many. • Manage UG as separate source - Manage UG only by basin perennial yields.	State Engineer	Current status	Ongoing economic harm to SW users. Ongoing economic benefit to UG users. Resumption of legal action-Court will decide	~25K AFY current conflict. ~50K AFY in 100 yrs under order 1329 >50K AFY under No Action

Curtailment of UG rights by Priority

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Strict curtailment of UG rights by priority, by basin. • Suggested by many as best or only legal approach. • Strictest application of Prior Appropriation Doctrine. • Ignores reality of impacts by location.	State Engineer or Courts	At Any Time: Possible outcome of legal action	Widespread/ catastrophic economic damage. Eliminates most UG. SW would incrementally i ncrease.	Yes

FOCUSED CURTAILMENT OF UG WATER RIGHTS BY IMPACT

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Curtail UG rights based on impact/conflict. • Requires determination of minimum threshold criteria for curtailment (e.g., 10% capture after 50 years). • Would most affect UG water rights near connected rivers and streams.	State Engineer	Mid – Long term	Potential for variable economic impact. Eliminates much UG near connected Rivers and Streams. SW would increase.	Yes

ESTABLISH CAPTURE MANAGEMENT ZONE (CMZ)

Summary	Authority	Implementation	Impact/ Benefit	Testing
• CMZ defined by a minimum level of conflict (e.g., 5% capture in 50 yrs). • Areas within CMZ subject to capture management. - Areas outside would be exempt. • Gradual implementation more manageable with less immediate impact. - But would take longer for conflict reduction. • Managed locally (e.g., Conservancy District). - Manage capture through $ assessments on conflict (capture).	State Engineer or Legislative Action	Short - Long term	Dependent on CMZ boundaries. UG could reduce. SW would increase.	Yes

ESTABLISH HUMBOLDT RIVER CONSERVANCY DISTRICT (HRCD) (NRS 541)

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Locally managed District to administer conjunctive management strategy. • Governed by locally elected board members. • Boundaries defined by CMZ. • Base assessments on UG and SW users within CMZ to fund staff and facilities. • Capture assessments for UG rights within CMZ based on magnitude of conflict. - Used to purchase UG and SW rights.	Legislative Action or Collective County Action NRS 541	Mid - Long term	Dependent on program.	No

Special Considerations for Public Supply

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Special allowances and considerations for 'regulated utilities' (public water supplies). • Exemption to capture management when outside of direct connection with main stem of Humboldt River. • Exemption for utilities with integrated/intertied systems. • "Back-end" conflict analysis. Conflicts to be managed with pumping strategies rather than a determining factor for granting of permits. • Use of treated wastewater for return flow credit – either direct discharge or through RIBS. • Use of local test data to refine analysis.	State Engineer and/or Legislature	Short - Long term	Unknown	Unknown

CONSIDER METHODS FROM OTHER WESTERN STATES

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Establish specific area and rules for special groundwater management. • Consider conjunctive management strategies that have been successfully implemented in other western states.	Legislative	Mid - Long term	Would depend on specifics.	Unknown.

Use of Decree water to Offset capture

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Allow for use of Humboldt Decree water to offset conflict from UG use.	State Engineer	Ongoing	No change in UG. SW would increase.	Yes

USE OF PUMPING REDUCTIONS OR UG RELINQUISHMENT/RETIREMENT/WITHDRAWAL TO OFFSET CAPTURE

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Allow for use of pumping reductions or relinquishments of UG rights to offset capture.	State Engineer	Ongoing	UG would decrease. SW could increase.	Yes

Limit UG irrigation seasons and duties to Humboldt Decree

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Limit UG irrigation to same season and duties as established in Humboldt Decree.	Legislative	Short - Mid term	Possible substantial community impact UG would decrease. SW would increase.	Yes

Improved Management of Humboldt Decree

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Serve equal priority in Upper and Lower basins. • More closely manage diversions. • Improve transparency. - Record and report all demands and deliveries. - Website showing priority being served. • Set priorities based on snowpack and forecast rather than daily streamflow. • Increase assessments and hire more field staff.	State Engineer Decree Court? Legislative	Short - Mid term	UG would not change. SW could increase or decrease.	No

Managed Recharge as Offset

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Allow for offset of impacts through managed recharge. • Can be through RIBS, injections wells, or ASR.	State Engineer	Short term	UG could reduce or stay same. SW would increase.	Yes. But requires specifics of a MAR program.

Augmentation as Offset (Similar to Colorado)

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Augmentation plans required for UG use – similar to Colorado. • Augmentation plans approved by Decree court. • Augmentation using surface water or new storage. • Allow for ASR, RIBS, and recharge wells to also be used for augmentation (see previous slide). • Pipe UG water from areas of no/low impact to discharge directly into river or stream. (augmentation wells)	State Engineer or Legislature	Short - Mid term	UG could reduce or stay same. SW would increase.	Yes, but depends on scenario.

CONSERVATION AS OFFSET

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Promote conservation through various means. • Conservation credits. Buy or Sell on a market. • Tax breaks for conservation efforts. • Credits used to offset capture impacts?	Legislature	Mid - Long term	Unknown	Unknown

WATER RIGHT BUY BACK

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Voluntary sale of UG water rights as part of water right buy back program.	Legislature	Current, but future program depends on funding	Depends on rights purchased UG could reduce SW could increase.	Yes. For specific purchase options.

USE OF PRIVATE AGREEMENTS

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Use of agreements between private parties or entities to resolve conflict.	State Engineer	On going	No effect.	No.

MARKET-BASED APPROACH TO MANAGE CAPTURE

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Create water markets that can be used for efficient trading/transfer/sale of water rights. • Consider Decentralized markets to coordinate sale of water rights. Lacks transparency and has high transaction costs. • Consider Centralized markets to coordinate sale of water rights based on 'willingness' of participants.	Legislature	Mid – Long Term	Market dependent.	No.

Nature-based Solutions

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Sustainable management and use of natural features and processes to help address conjunctive management. • Use of MAR (discussed earlier) in places that provide benefit to wetlands and springs and increase the surface water available through increased groundwater levels • Restoration projects – wetlands, river channels, floodplains, etc.	State Engineer	Near – Long term	UG no change Potential shift in SW hydrographs Water quality Wildlife	Depends on scenarios

EXEMPTIONS

Summary	Authority	Implementation	Impact/ Benefit	Testing
• Minimal impact (e.g., < 5 acre-ft/yr capture). • Domestic Wells • Public Water Supply (see earlier)	State Engineer Legislative	Short - Mid term	Variable depending on exemption.	Depends on exemption

FORMING THE STAKEHOLDER WORKING GROUP

Process for Forming the Stakeholder Working Group

- Seeking participants to further vet ideas, conduct or review technical analysis, expand/add new ideas, and ultimately make constructive contributions to the welfare of the region.
- Stakeholders can nominate representatives to work on their behalf for each of the identified categories.
- Goal is to maximize representation by category and geography.
  - From each of the core categories we are seeking one upstream representative and one downstream representative.
    - Palisade gage is considered the dividing point between up- and downstream.
  - No more than one person may be from each participating entity.
  - Preference will be given to those who actively participated in the stakeholder meetings in 2023.
  - **Send nominations to Levi Kryder by 5:00 pm on April 16, 2024.**

STAKEHOLDER WORKING GROUP REPRESENTATIVE CATEGORIES

Core Interest Category	Core Interest Category	Subject Matter Expert Category
County 1	Irrigation (UG) 1	Legal 1
County 2	Irrigation (UG) 2	Legal 2
Municipal Supply/City 1	Irrigation (SW) 1	Water Rights
Municipal Supply/City 2	Irrigation (SW) 2	Hydrogeology 1
Industrial 1	At-Large 1	Hydrogeology 2
Industrial 2	At-Large 2	Economics
Mining 1	Environmental	
Mining 2		

Stakeholder Working Group Anticipated Schedule

- Meet quarterly with NDWR staff to work on conjunctive management issues.
  - Meeting locations are expected to rotate through Carson City, Lovelock, Winnemucca, Battle Mountain, and Elko.
- Meet annually with larger stakeholder group and the public to provide updates.
- First quarterly meeting anticipated to be in July 2024.
- Annual meetings during the spring.

Questions?

Comments

Levi Kryder, Hydrology Unit Chief

Division of Water Resources
Email: lkryder@water.nv.gov

MEETING: Stakeholders Conjunctive Management Meeting

DATE: 3/19/2024

LOCATION: NDWR Tahoe Room

MEETING ATTENDANCE LIST

Page 1 of ____

NAME	E-MAIL	AFFILIATION
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Levi Kryder		
Kip K. Allander		
Adam Sullivan		
Sue Braumiller		
Alex Parker		
Leann Ramirez		

1. Summary

Meeting title	Humboldt Stakeholder Update Meeting	
Attended participants		100
Start time	3/19/24, 12:48:18 PM	
End time	3/19/24, 3:58:28 PM	
Meeting duration	3h 10m 10s	
Average attendance time	1h 28m 4s	

2. Participants

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USCID Conjunctive Management Materials 1986-2012

Humboldt River Stakeholder Meeting March 19, 2024 Prepared

by Schroeder Law Offices, P.C.

Articles available from NDWR; e-mail: lkryder@water.nv.gov

Date	Author	Title
7/1986	Kenneth Schmidt	Hydrogeologic Aspects of Subsurface Drainage
8/1986	Gregory Hobbs, Jr. and Bennett W. Raley Attorneys, Davis, Graham & Stubbs	One Mans Waste, Another Man's Water: The Agricultural Water Use Dilemma
9/1986	James Krider	Agricultural Irrigation and Groundwater Quality in Humid Areas of the United States
9/1986	J. Court Stevenson, Kenneth Staver, and Russel Brinsfield	Surface Runoff and Groundwater Impacts from Agricultural Activities in the Chesapeake Region
9/1987	Robert Swain and William Price	Conjunctive Use and Ground-water Recharge in the Cherry Creek Basin - Colorado
9/1987	D.S. Wilson and T.G. Sands	Conjunctive Use of Surface and Groundwater in an Agricultural to Urban Transition
9/1987	Lawrence MacDonnell	Conjunctive Use Management: A Case Study of the South Platte Basin, Colorado
9/1987	Donald Finlayson	Direct and In-Lieu Recharge for Conjunctive Use by the California State Water Project
9/1987	James Welsh	Ground Water Management in the Los Angeles Coastal Plain
9/1987	Helen Peters	Ground Water Recharge in California
9/1987	Karen Rudeen	Groundwater Management in the South Platte River Basin of Colorado
9/1987	John McClurg	Los Banos Grandes Offstream Storage Project
9/1987	Thomas Levy and Dennis Mahr	Management and Artificial Recharge of the Ground Water Basin Coachella Valley, California
9/1987	George Hargreaves and Zohrab Samani	Planning and Modeling the Conjunctive Use of Water
9/1987	Robert Reginato and R.D. Jackson	Remote Sensing of Water Use by Agricultural Crops and Natural Vegetation
9/1987	Lindell Elfrink and Richard Demlo	San Luis Valley Project, Closed Basin Division, Colorado
9/1987	Tom Griswold	Transmountain Diversions
9/1987	David Gill and Jeanette Micko	Water Management in Santa Clara Valley, California
11/1987	Helen Peters	A Rule Curve for Operation of the California State Water Project
1989	Peter Macy	A Complete Plan "…Experience from the U.S."
1989	J.D. Oster	Alternative Irrigation Strategies in the San Joaquin Valley of California

1989	Uli Kappus, Blaine Dwyer, and Ralph Kerr	The Role of Drought Management Measures in Water Resource Investigations
1989	Darell Zimbelman	Drought Management in Northeastern Colorado
1989	Nigel Quinn, S.A. Hatchett, and D.G. Swain	Evaluating Policy Options for Management of Selenium Contaminated Drainage and Drainage-Related Problems in the San Joaquin Valley
1989	Andrew Rose	Institutional Change for Efficient Water Resource Allocation
1989	Franklin Dimick	Managing Utah's Water through Interbasin Transfer
1989	David Wilson, Jr.	Managing Water Scarcity in Phoenix, Arizona
1989	Davis Busse	The Drought of 1988/89: A Success Story
1989	Kenneth Mitchell and Edward Pokorney	Structural Solutions for Alleviating Water Shortages: The Case of Two Forks Dam and Reservoir
1989	Ingo Dittrich, Dieter Eichhorn, and Ulrich Hartmann	Underground Treatment of Ground and Surface Water for Micro Irrigation Systems
1989	Ronald Willhite and Richard Randall	Water Banking – Ground Water Recharge, Recovery and Exchange Systems
1989	Richard Rigby	Water Banking in Idaho
1989	James Easton	Water Marketing in California
2/1991	Burt Babcock and C.E. Trotter	The Arvin-Edison Water Storage District Water Resources Management Program
2/1991	George Baumli	Banking Ground Water in California
2/1991	Charles Reich	Conjunctive Use of El Paso's Future Water Supply
2/1991	Richard Rhone and William O'Brien	Conjunctive Use Operations in the Central and West Coast Basins of Los Angeles County
2/1991	Thomas McClain	Ground Water Management Strategies in Kansas
2/1991	Bruce Glenn	Improving Western Water Management through Groundwater Basin Recharge
2/1991	Herman Bouwer	Treating Sewage for Irrigation and Drinking
10/1992	J.W. Fredricks and J.W. Labadie	GIS and Conjunctive Use for Irrigated Agriculture
10/1992	Herman Bouwer	Artificial Recharge of Groundwater
10/1992	Larry Dozier and Clifford Neal	Long-term Storage through Indirect Recharge
10/1993	T.R. Gohring and S.R. Haugen	Alta Irrigation District Groundwater Study
10/1993	John Brown and Ginger Strong	Kaweah River Delta Corridor Enhancement Study Visalia, California
10/1993	Kenneth Wright and Dr. F. Robert McGregor	Role of the Water Consultant in Basin-Wide Planning and Management
10/1993	Eric Stiles	Planning for Wetlands Water Quality A Resource Management Perspective

10/1995	S.G. Bhogle and R.B. Bharaswadkar	A Case Study of Water Users' Cooperative Societies in Maharashtra State (India)
10/1995	Ron Fehringer, Ed Lance and Serge Birk	Butte Creek Water Supply and Fish Passage Study
10/1995	Grant Davids	District Water Conservation: Concepts and Misconceptions
10/1995	Kathleen Klien and D.H. Smith	Agricultural Water Conservation in Colorado: Opportunities and Limitations
6/1996	Christie Moon Crother	Multipurpose Constructed Wetlands for Water Quality Improvement, Environmental Enhancement and Other Public Benefits
12/1996	Richard Rigby	Acquiring Water for Flow Augmentation
12/1996	Timothy Henley and James Jayne	The Arizona Water Baking Authority: Storing Colorado River Water in Arizona
12/1996	Mark Limbaugh	Building Consensus in Idaho to Benefit Water Quality, Endangered Species, The Environment and Irrigation
6/1998	Lyman Willardson and Richard Allen	Definitive Basin Water Management
6/1998	Rita Pearson	Water Resources Management in Arizona
10/1998	John Priest	A New Direction for Allocating Water of the Nile River in Egypt
10/1998	Condy Henriksen	Corps of Engineers Role in Solving Pacific Northwest Salmon Problems
10/1998	Warren Jamison, Mark Deutschman, and Jerry Schaack	Establishing Regional Instream Flow Recommendations for the Maintenance and Protection of Aquatic Life within the Sheyenne River Basin, North Dakota, USA
10/1998	Arnold Dimmitt and Fadi Kamand	Meeting the Challenge of Improving Management of a Shared Water Resource in the Lower Colorado River Basin – A California Experience
6/2000	Donald Whittemore, Carl McElwee and Ming-Shu Tsou	Arkansas River Salinity and Contamination of the High Plains Aquifer
6/2000	S.K. Gupta	Management of Waterlogged Saline Soils and Strategies to Minimize Problems of Drainage Effluent Disposal
6/2000	Dr. N.K. Tyagi	Managing Salinity in the North-West India: The Conjunctive Use Option
6/2000	K.K. Datta	Needs of Drainage for Sustainable Crop Production in the Saline Environment
6/2000	Algi Davar and Ahmad Barari	Reclamation of Tabriz Plateau
6/2001	Maurice Roos	How Do We Determine the Real Amount of Water Available for Transfer from One Basin to Another?
6/2001	Samuel Kao, Gary Small, Dorthy Timian-Palmer and David Merrill	Interstate Water Banking through Groundwater Recharge

6/2001	Alan Klienman and Margot Selig	Firming of M&I Water Reliability through the Use of Underground Water Banking
6/2001	Kathleen Curry and John McClow	Transbasin Diversions – A View from the Basin of Origin
5/2003	George Matanga, Kathleen Buchnoff, Claire Jacquemin etc.	Integrated Hydrologic Modeling of Surface and Subsurface Water Flow and Solute Transport in Irrigated Agriculture: Model Application
5/2003	Mark Svendsen	Managing River Basins – Lesson from Worldwide Experience
5/2003	Kenneth Seasholes	Agriculture's Role in the Storage and Recovery of Urban Water Supplies: Central Arizona Trends and Issues
10/2004	Beau Freeman and Charles Burt	Estimating Conservable Water in the Klamath Irrigation Project
10/2004	Ronald Bliesner, Andrew Keller, Timothy Flynn etc.	Gila River Indian Community – Managing a Multi-Source Conjunctive Use Water Supply for Long Term Sustainability
10/2004	Stephen Smith, Rachel Barta, and Donald Magnuson	Concepts of Ground Water Recharge and Well Augmentation in Northeastern Colorado
10/2004	Herbert Greydanus	Perceptions Can Stop Worthwhile Groundwater Banking Projects
10/2004	John Wiener	Water Banking in Colorado: An Experiment in Trouble?
5/2005	Kevin King and Steven Knell	An Irrigation District Perspective on Management of Groundwater Supplies for Agricultural, Industrial and Municipal Users
5/2005	Dean Edson	A Unique System of Resource Governance: Nebraska's Natural Resources Districts
5/2005	Ralph Scanga, Jr. and Ken Baker	The Upper Arkansas Water Conservancy District General Plan of Augmentation Under the Water Rights Determination and Administration Act of 1969
10/2006	Biran Westfall, Andrew Keller, Ronald Bliesner, etc.	Gila River Indian Community Water Resources Decision Support System – A Modeling System for Managing a Multi-Source Conjunctive Use Water Supply for Long-Term Sustainability
10/2006	Timothy Flynn, Peter Bannister, Ronald Bliesner, etc.	Groundwater Analysis Tool: A Component of the Water Resources Decision Support System for the Gila River Indian Community
10/2006	Bryce Contor and R.D. Schmidt	Ground-Water Banking in the Eastern Snake Plain Aquifer
10/2006	Brian Sauer and Dan Temple	Groundwater Management Improvements to Mitigate Declining Groundwater Levels – A Case Study
10/2006	Herbert Blank and Kyle Gorman	Ground Water Mitigation in the Deschutes Basin of Central Oregon
10/2006	Henriette Emond, Mark Madison and Frank Sinclair	High Rate Irrigation for Groundwater Recharge

10/2006	Imogen Fullagar, Dr. Catherine Allan and Prof. Shahbaz Khan	Managing Across Groundwater and Surface Water: An Australian Conjunctive Licence Illustration of Allocation and Planning Issues
10/2006	Daniele Zaccaria and Nat Marjang	Optimal Allocation of Limited Water Supply for a Large-Scale Irrigated Area – Case Study
10/2007	Dr. J.N. Patel	Application of Geospatial Technologies for Sustainable Irrigation and Reclamation of Saline Soil
10/2007	Owen Kubit, Richard Moss, and John Roldan	Drought Protection from an In-Lieu Groundwater Banking Program
10/2007	Ali Elhassan, Akira Goto, and Masakazu Mizutani	Impacts of Changing Rice Irrigation Practices on the Shallow Aquifer of Nasunogahara Basin, Japan
10/2007	Steve Macaulay and Francis Borcalli	Integrated Regional Water Management: The New Direction in California
10/2007	Ahmad Pourzand	A Practical Method for Volumetric Delivery of Water
10/2007	Gregory Thomas	Reoptimizing Global Irrigation Systems to Restore Floodplain Ecosystems and Buman Livelihoods
10/2007	Chang-Chi Cheng, Chun-E Kan, Kuang-Ming Chuang and Ming-Young Jan	Responsive Strategies of Agricultural Water Sector in Taiwan
10/2007	N/A	A Landmark Cooperative Solution Emerges: The Sacramento Valley Water Management Agreement and Short-Term Workplan
10/2007	Daniel Renault, Thierry Facon and Robina Wahaj	Mapping System and Services for Canal Operation Techniques: The Masscote Approach
5/2008	Deepak Lal, Byron Clark, John Hetrick, etc.	Consumptive Use in the Phoenix Area – Remote Sensing to Evaluate Changes in Evapotranspiration from Urbanization
5/2008	Eduardo Bautista, Abigail Roanhorse, Peter Waller, Michael Hanrahan	Agricultural Water Conservation Policy in an Urbanizing Environment: The Arizona BMP Program
5/2008	Daniel Phillips, Yvonne Reinink, Timothy Skarpuna etc.	Water Resources Management at the Salt River Project
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2009	Bryan Thoreson and Rick Massa	Orland Unit Water Users Association Regulating Reservoir, An Example of Verification-Based Modernization Planning
2009	S. Schaefer, R. Eid, R. Iger, etc.	System Optimization Review for the Poso Creek Integrated Regional Water Management Plan Region

2009	Randy Hopkins and Bill Stretch	Developing New Water Supplies in Fresno Irrigation District The Waldron Banking Facilities
2009	Randy Hopkins and Bill Stretch	Changing Customers – A Case Study of Urbanization Effects on Operations in Fresno Irrigation District
2009	Joseph Hopkins, Brian Ehlers, and John Mallyon	Dealing with an Uncertain Water Supply in James Irrigation District
2010	Rajeev Kumar Goyal	Bore Wells – A Boon for Tail End Users
2010	Thaddeus Bettner and Grant Davids	Glenn-Colusa Irrigation District Water Balance Model: A Foundational Component of a District Resource Management Plan
2010	David Dorrance, Andrew Werner and Wilmar Boschman	Marketing and Financing a Water Bank: "First Get Your House in Order"
2010	Tom Gill and Charles Bartlett	South Platte Ditch Company – Demonstration Flow Monitoring and Data Collection Project
2010	Sara Harper and Marc Van Camp	South Sutter Water District – A Case Study of an Agricultural and Urban Partnership
2010	Kevin Kaufman	Managing the Eastern San Joaquin County Sub-Basin an Urban-AG Partnership Case Study Stockton East Water District
2010	Joseph Hopkins, Biran Ehlers and John Mallyon	Utilizing Multiple Funding Avenues to Develop Necessary Infrastructure in James Irrigation District
2010	M. Rozman and W. Boschman	Semitropic-Rosamond Water bank Authority Antelope Valley Water Bank
2010	S. Schafer, R. Iger, I. Medina, P. Oshel	Water Supply Enhancement Project for the Poso Creek Integrated Regional Water Management Plan Region
2011	Steve Macaulay	California's New Focus on Water Supply Reliability and Sustainability
2011	Marc Rozman, Ronald Eid, Dana Munn etc.	Calloway Canal to Lerdo Canal Intertie
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2011	Jerrold Gregg and Richard Rigby	Meeting Water Challenges in Idaho through Water Banking
2011	Rich Juricich	Quantifying Resource Management Strategy Benefits and Robustness
2011	Rogert Burnett	The San Joaquin River Restoration and Potential Impacts to Adjacent Crop Production
2011	Pat Kennedy and Thaddeus Bettner	Supervisory Control and Data Acquisition Meets Public Policy – A Glenn-Colusa Irrigation District Case Study
2011	Laura Schroeder, Therese Ure, and Nathan Forbes	The Scenic Waterway Act: A Type of Instream Flow Requirement – Case Study of Oregon's Grand Ronde River Basin
2011	Laura Schroeder, Therese Ure and Sarah Liljelfelt	Water Use and Urbanization: The Truckee River Operating Agreement

2012	Bryce Contor, W. Roger Warner and David R. Tuthill, Jr.	Groundwater-Surface Water Interaction and Mitigation Credits in Eastern Idaho: Part II
2012	Bryce Contor, W. Roger Warner and David R. Tuthill, Jr.	Groundwater-Surface Water Interaction and Mitigation Credits in Eastern Idaho: Part III
2012	Eric Thompson and Joe Blankenship	Hydropower Development and Ecological Sustainability
2012	Joseph Turner, Timothy Godwin, Paul Gosselin, etc.	Case Study – Analysis of Aquifer Effects During Large Scale Agricultural Pumping
2012	Cortney Duke and Luke May	Rethinking Storage: Going Underground – An Oregon Study
2012	Chris Kapheim and Jim Wegley	Transition from a Traditional Irrigation District to a Regional Water Resource Agency
2012	Thaddeus Bettner, Grant Davids and Greg Thomas	Water Supply and Ecologic Flow Improvement through Reservoir Re-Operation and Conjunctive Management

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2024 MAR 11 AM 10:16
STATE ENGINEERS OFFICE

March 8, 2024

VIA U.S. MAIL ONLY

Nevada Division of Water Resources
Attn: Adam Sullivan, State Engineer
901 S. Stewart Street, Suite 2002
Carson City, NV 89701

RE: Conjunctive Management of Humboldt River Basin – March 8, 2024 Update

Dear State Engineer:

In response to the call for an update to our initial conjunctive management paper on the Humboldt River Basin issues, our office has provided this submission to review and update the White Paper on behalf of Pershing County Water District. This update could provide insight into other State's conjunctive management schemes, including how they have been implemented and/or updated since 2014, and may be of benefit to Nevada.

Attached is a report prepared by our office to supplement the abstracts submitted on conjunctive management and how various states have implemented the dual system while maintaining the fundamentals of the prior appropriation system. We reviewed five western states' conjunctive management plans and provided details as to how they were implemented. The enclosed report provides various management practices other states are using that may be useful to Nevada.

If you have any questions, please contact our office at (775) 786-8800.

Very truly yours,
SCHROEDER LAW OFFICES, P.C.

Caitlin Skulan
Associate Attorney

CRS:mpj
Enclosures
cc: Client – *via email only*
Kip Allander & Levi Kryder – *via email only*

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Water Management in a Prior Appropriation System:

Conjunctive Management Solutions to Groundwater Withdrawals Effecting Surface Water Flows within the Humboldt River Basin

Prepared for:

Pershing County Water Conservation District

March 8, 2024, Update

Prepared by:
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Introduction

Water resources in the western United States are finite and scarce.[1] Most western states follow the prior appropriation doctrine for water regulation.[2] Although surface and groundwater laws vary by state, there are three undercurrents that run through all western water legislation: water is scarce, water should be put to efficient and beneficial use, and prior/senior priority water rights must be protected.

In the past few years, many western states have worked on developing a better system for dealing with the execution and delivery of water under the prior appropriation doctrine. For years, surface and groundwater systems were considered separate; however, states are realizing that these waters are connected, and thus need to be managed collectively.[3] A method of management known as *Conjunctive Management* has developed that allows states to manage both surface and groundwater together. During times of drought, this system of water resource management is becoming more important.[4]

Conjunctive management practices began as a result of persistent drought when surface water right holders had no "wet" water to divert and suffered a curtailment while junior groundwater right holders continued appropriations from underground aquifers. Under the prior appropriation doctrine in cases where surface water is hydrologically connected to the groundwater, senior surface water right holders with a superior priority were entitled to see their rights served first and in priority before any junior appropriator is served.[5] Nevada is beginning its efforts to manage water conjunctively, and in accordance with the prior appropriation doctrine.

The failure to conjunctively manage creates hardship for senior surface water right holders, who have seen their supply of water cut back, while the junior groundwater uses continue. This problem is especially pronounced in the Humboldt River Basin.

The Humboldt River Decree governs the majority of senior priority surface water rights in the system, and due to the lack of water flowing in the Humboldt River, many decreed water right holders are not receiving water delivery. Because the Humboldt River has many hydrological connections to underlying aquifers, a lot of groundwater is being appropriated by junior groundwater users to the detriment of senior surface water rights.

Scientific investigations are underway, on the verge of publication, illustrating the fact that the groundwater aquifers, and appropriations, surrounding the Humboldt River have a direct

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[1] Tanya Trujillo, *Western U.S. Drought; Examining the Status and Management of Drought in the Western United States*, DEPT.OF.INTERIOR, (Oct. 6 2021), HTTPS://www.doi.gov/ocl/western-us-drought.

[2] David H. Getches, WATER LAW; IN A NUTSHELL (3d ed. 2003) pg. 7.

[3] Christine A. Klein, *Ground Water Exceptionalism: The Disconnect Between Law and Science*, 71 Emory L.J. 487, 493 (2022).

[4] *Id.* at 497.

[5] *Id.* at 506.

impact on the flows in the river.[6] These investigations are proving that groundwater pumping results in less water for surface water users.[7] Thus, to preserve the senior surface water rights, junior groundwater users must be curtailed in priority. Without the implementation of a Conjunctive Management Plan, the distribution of water in Nevada will ignore the prior appropriation doctrine in violation of Nevada law.

Those involved in water resource management in Nevada are aware of the current problem; however, it is challenging to approach a resolution.[8] This report provides a summary of the issues surface water right holders are facing in the state of Nevada and illustrate how other western states are managing conjunctively. This report will focus on five states: Colorado, Idaho, Utah, Washington, and Oregon. Each state has implemented a Conjunctive Management Plan to aid in managing surface and groundwater shown to be hydrologically connected. Each state has tailored their management practice to deal with the issues specific to their state, something Nevada is considering.

While many of the topics in this report are broadly covered, the principles are meant to illustrate ways that the problem plaguing the Humboldt River Basin can be solved. Specifically, the primary area of concern addressed is the lower reaches of the Humboldt River, where irrigators in the Lovelock Valley are feeling the worst effects.

As Nevada chooses a Conjunctive Management system for resource management; it is not legislatively entitled to change the basic precepts of water law in Nevada. If, however, a more comprehensive Conjunctive Management approach is not adopted, water resource management practices will continue in direct violation of Nevada law.

Origins of Prior Appropriation in Nevada

The earliest court decisions concerning water use rights in Nevada followed and discussed the principals of prior appropriation.[9] Nonetheless, from 1866 until 1885, the common law riparian doctrine controlled the use and ownership of possessory interests in water.[10] Application of the common law riparian doctrine required that a pre-1866 federal patent conveyed to the patentee "…not only the land, but the stream naturally flowing through it" despite any earlier attempt to appropriate the water by another.[11] Nonetheless, the judicial

[6] *Science in the Humboldt River Basin,* Nevada Water Science Center (Nov. 30, 2017) https://www.usgs.gov/centers/nevada-water-science-center/science/science-humboldt-river-basin; as of 3/7/2024, the Upper and Lower Humboldt River Models have been published, only waiting for the much anticipated model for the middle section.

[7] *Id.*

[8] Mike L. Baughman, *Overview of Organization and Key Issues,* Humboldt River Basin Water Authority (May 4, 2012) https://www.leg.state.nv.us/App/InterimCommittee/REL/Document/8042?rewrote=1

[9] *See, Lobdell v. Simpson*, 2 Nev. 275, 275 (1866); *see also*, *Ophir Silver Mining Co. v. Carpenter*, 4 Nev. 534, 543 (1869) ("Where the right to the use of running water is based upon appropriation, and not upon an ownership in the soil, it is the generally recognized rule here that priority of appropriation gives the superior right.").

[10] *Vansickle v. Haines*, 7 Nev. 249, 260-261 (1872) (holding "the common law is the law of this state and must prevail…where the right to water is based upon the absolute ownership of the soil"); *see also*, *Dalton v. Bowker*, 8 Nev. 190 (1873); *Lake v. Tolles*, 8 Nev. 285 (1873); *Union Mill & Mining Co. v. Dangberg*, 81 F. 73 (D.Nev. 1897).

[11] *Vansickle*, 7 Nev. at 260.

recognition of the prior appropriation doctrine and its principles signaled the customary reliance on acts of appropriation by the earliest settlers in the West.

The customary acts of appropriation that became common throughout the West were eventually sanctioned by Acts of Congress. One of the first federal legislative acts that recognized and protected the possessory rights of settlers without legal title in the land was the Lode Law of 1866, or more commonly referred to as the 1866 Mining Act.[12] The Mining Act provided that, "[w]henever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes, have vested and accrued, and the same are recognized and acknowledged by the local customs, laws, and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purposes herein specified is acknowledged and confirmed."[13]

After the Mining Act, the extent to which the pre-statutory appropriator's right to a perfected and vested water right could be maintained and protected was subject to those acknowledged local customs, laws and decisions of the courts.[14] A valid appropriation required actual physical diversion of the water from its source, with the intent to apply the water to beneficial use, followed within a reasonable time by application to beneficial use.[15] Pre-statutory water appropriations became fixed by the extent of the appropriation actually made. The beneficial use perfected is the basis, limit and measure of the water appropriated.[16]

By 1885, the Supreme Court of Nevada firmly repudiated the common law riparian doctrine and confirmed that prior appropriation as law.[17] Once prior appropriation became the law in Nevada, the doctrine required a claimant to show actual physical diversion of water from its source with intent to apply the water to beneficial use within a reasonable time to establish a possessory interest in water.[18] Generally, an appropriation of water relates back to the time when the first step to secure it was taken, if the work was prosecuted with reasonable diligence.[19] If construction, or other improvements are necessary to complete an appropriation of water, and such efforts are not prosecuted with due diligence, the right of use to the water will not relate back to the initial effort, but will date from the time when the work is completed, or the appropriation is fully perfected.[20]

Conjunctive Management

The system of Conjunctive Management, as referenced above, stems from the concept of Conjunctive Use, which refers to a concept where both groundwater and surface water are

[12] Act of July 26, 1866 ch. 262 § 9, 14 Stat. 251-253, codified at 43 U.S.C. § 661.
[13] 43 U.S.C. § 661.
[14] *Union Mill v. Ferris*, 24 F.Cas. 594, 597 (Cir.Ct. Nev. 1872).
[15] *Id.*
[16] Nev. Rev. Stat. § 533.210(1).
[17] *Jones v. Adams*, 19 Nev. 78, 84-88, 6 P. 442 (1885).
[18] *Application of Filippini,* 66 Nev. 17, 22 (Nev. 1949).
[19] *Irwin v. Strait*, 18 Nev. 436, 436 (1884).
[20] *Ophir Silver*, 4 Nev. at 536.

viewed as connected. Conjunctive Management is a concept where both sources of water are managed together so each can be used efficiently. In those western states where prior appropriation is the law, it allows the priority system to stay intact while achieving this goal.

Not all surface waters and groundwaters are connected. However, when one refers to Conjunctive Use, one focuses on water sources in which the surface water (river, stream, creek, etc.), and an underground alluvium are "hydrologically connected."[21] When the surface water and groundwater are hydrologically connected, many states refer to groundwater as "tributary" to the surface water.[22]

Determining the effect groundwater pumping may have on surface water flows is often quite difficult, sometimes requiring a hydrogeologist or other trained professional.[23] Conjunctive Management focuses on determinations that better serve all water users. As a result, rather than curtailment of all junior groundwater users in favor of senior surface water rights, one can allow connected junior users to continue use, as long as the negative effects on surface water flows can be mitigated so as not to injure senior surface water users.

State of Conjunctive Management in Nevada

Nevada is a prior appropriation state, and any person who wishes to use waters of the state must apply to the State Engineer for a permit.[24] Generally, an application must be filed, together with fees and supporting documents,[25] the application is published in order to allow interested parties to object to the application,[26] and a hearing may be granted.[27]

The statutory provisions of the Nevada Water Code provide the parameters as to when the State Engineer may approve an application to appropriate water, and when it must be denied.[28] Such provisions state that the State Engineer shall reject a permit "where there is no unappropriated water in the proposed source of supply, or where its proposed use or change conflicts with existing rights...or threatens to prove detrimental to the public interest..."[29] This standard applies to both surface and groundwater appropriations.[30]

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[21]Ruopu Li, Mahesh Pun, and Jesse Bradley, *Evaluating Hydrologically Connected Surface Water and Groundwater Using a Groundwater Model,* JOURNAL OF THE AMERICAN WATER RESOURCES ASSOCIATION, Vol. 52 No. 3(June 2016) https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/publications/2016June_EvaluatingHC_GWandSW_withGWModel_JAWRA.PDF

[22] R. Wakson & M. Neibauer, *Glossary of Water Terminology,* COL.STATE.U. (May 2012)*https*://extension.colostate.edu/topic-areas/agriculture/glossary-of-water-terminology-4-717/

[23] Sameul C. Zipper, Tom Dallemagne, Tom Gleeson, Thomas C. Boerman & Andreas Hartman, *Groundwater Pumping Impacts on Real Stream Networks; Testing the Performance of Simple Management Tools*, Water Resources esearch, Vol. 54, Issue 8 (2018).

[24] Nev. Rev. Stat. § 533.335 through § 533.340. There are exemptions from this requirement. *See, e.g.*, Nev. Rev. Stat. § 534.013.

[25] Nev. Rev. Stat. § 533.350.

[26] Nev. Rev. Stat. §§ 533.360, 533.365.

[27] Nev. Rev. Stat. § 533.365.

[28] Nev. Rev. Stat. § 533.370(2).

[29] *Id.*

[30] Nev. Rev. Stat. § 534.050 (before sinking a well, a person wishing to appropriate groundwater must apply for a permit pursuant to Nev. Rev. Stat. § 533).

Nevada Water Code also provides for transfers of water rights and changes of the point of diversion, place of use, and manner of use.[31] Water rights are treated as real property interests, and may be freely transferred through deed.[32] When an appropriator desires to change the permit, they must apply to the State Engineer for prior approval.[33] The State Engineer is guided by the same principles in granting a new appropriation: The change cannot impair existing rights and cannot prove detrimental to the public interest.[34]

Although groundwater appropriations are approved in the same manner as surface waters,[35] until 2017, Nevada had no recognition or express statutory scheme in place for Conjunctive Management of surface and groundwater.[36] Applications for new and changed uses must be rejected if they conflict with existing rights, but prior to 2017 many water rulings in Nevada ignored known relationships between groundwater appropriations and reduced surface flows focusing on a statutory distinction between surface and groundwater based upon the application made rather than the conjunctive nature of water. [37]

In one example prior to 2017, the State Engineer approved twenty-six applications for changes in place of diversion, place of use and manner of use for groundwater permits.[38] In these applications, protestants alleged that the changes, which moved the diversions closer to the river, would dewater the river, further injuring existing surface rights, and asked that action be withheld until hydrologic connection studies were completed.[39] In that ruling, the State Engineer recognized that there were certain areas of hydrologic connection between the appropriated groundwater and the river, but determined, without investigation, that moving the points of diversion closer to the river would merely affect "the timing of potential interaction" with the river, rather than reduce surface water flows.[40] The State Engineer acknowledged that wells within close proximity of a stream "have the potential to capture river water," but felt that this risk was adequately reduced by the administrative rule that a well within a quarter mile of a river must be sealed up to a depth of 100 feet.[41] We know now, that without hydrogeologic studies, this depth may be wholly inadequate to protect the existing surface water rights depending on the underground geology. While Nevada has taken strides to recognize the connection issues, the practical implications and administration is still being developed.

The following examines how Colorado, Idaho, Utah, Washington, and Oregon have integrated Conjunctive Management into their prior appropriation systems. One will notice that

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[31] Nev. Rev. Stat. § 533.345.

[32] Nev. Rev. Stat. § 533.382 through § 533.384; *see also, Adaven Mgt., Inc. v. Mt. Falls Acquisition Corp.*, 191 P.3d 1189 (2008); note, however, that water rights are appurtenant to the place of use. Nev. Rev. Stat. § 533.040.

[33] Nev. Rev. Stat. §§ 533.325, 533.345.

[34] Nev. Rev. Stat. § 533.370.

[35] Nev. Rev. Stat. § 534.050.

[36] Nev. Rev. Stat. § 534.024(1)(e): "To manage conjunctively the appropriation, use and administration of all waters of this State, regardless of the source of the water."

[37] Nev. Rev. Stat. § 533.370(5).

[38] Nevada State Engineer Ruling No. 5823 (2008).

[39] Nevada State Engineer Ruling No. 5823, 13-15 (2008).

[40] Nevada State Engineer Ruling No. 5823, 39 (2008).

[41] *Id. See also*, Nev. Admin. Code § 534.390(1)(a)

under these other states' systems, the above referenced permits to appropriate groundwater from a point in near proximity to the river, would likely not have been permitted.

Colorado

Many consider Colorado to be the model when it comes to Conjunctive Management of surface water and groundwater interconnection. This is probably because it has managed its water systems in this manner for longer than other states and it uses specialized water courts. Like most western states, Colorado has adopted the prior appropriation doctrine and is able to effectively manage water sources without violating the core principles of this doctrine.[42] As is the case with most western states that have adopted a Conjunctive Management approach, the applicability of the conjunctive management system depends on whether the two sources are hydrologically connected. Other than "designated" waters (that are managed differently) groundwater that is connected to surface water is defined as "tributary" water.[43] Pumping water from these so-called tributary aquifers has an effect on surface waters.[44] The effect plays out equally: pumping from the alluvial aquifer can have an effect on surface flows, and diversion from surface flows can have an impact on water levels in an aquifer.

In 1969, Colorado passed "The Water Rights Determination and Administration Act." *See,* Colorado Revised Statutes (*Exhibit 1*).[45] This legislation is important as it requires all tributary groundwater to be included with surface water when determining priority under the prior appropriation system of water distribution.[46] This legislation led to the implementation of a Conjunctive Management Plan to allow both surface water and groundwater to be managed together.

It is now scientifically accepted that many of the water systems in Colorado, and elsewhere, are in fact tributary (*Exhibit 2*).[47] This fact was subsequently accepted by the Colorado legislature.[48] Systems such as the South Platte and Arkansas River Basins are tributary in nature. In fact, this interconnection is so evident, that Colorado has gone as far to create a presumption of interconnection.[49] This means that in a dispute between water users, the system

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[42] Colo. Const. art. XVI §§ 5, 6.
[43] *See generally*, *Empire Lodge Homeowners' Ass'n v. Moyer*, 39 P.3d 1139 (Colo. 2001).
[44] *Id.* at 1150.
[45] *See*, Colo. Rev. Stat. § 37-92-101 to 602.
[46] Colo. Rev. Stat. § 37-92-102.
[47] *See*, USGS "Ground Water and Surface Water A Single Resource" (1998).
[48] *See*, Colo. Rev. Stat. § 37-92-103(11) ("Underground water", as applied in this article for the purpose of defining the waters of a natural stream, means that water in the unconsolidated alluvial aquifer of sand, gravel, and other sedimentary materials and all other waters hydraulically connected thereto which can influence the rate or direction of movement of the water in that alluvial aquifer or natural stream.).
[49] *Bd. of County Comm'rs v. Park County Sportsmen's Ranch, LLP*, 45 P.3d 693, 702 (Colo. 2002) ("Colorado law contains a presumption that all ground water is tributary to the surface stream unless proved or provided by statute otherwise.").

will be viewed as if the surface water and groundwater is interconnected and treated under the Conjunctive Management standards, unless it can be shown otherwise.[50]

Conjunctive Management is more than just a senior versus junior approach to water right management, it is about efficient use of water resources while remaining true to the prior appropriation doctrine. To further allow for groundwater users to continue to exercise their water rights of use, and to avoid total curtailment of water use in drier years, the state began a system of "Augmentation."[51] These court approved "Augmentation Plans" allow a junior appropriator to use water, so long as they have a plan in place to replace the water used that negatively affects senior water users.[52] Additionally, the Augmentation Plans are able to take advantage of the delayed effect pumping has on surface rights, giving groundwater users time to supplement the surface rights.[53]

The Colorado model for Augmentation Plans is a simple concept: A junior water right holder is allowed to divert water out of priority so long as the junior water right holder supplements the surface flows before the senior water right user "calls" for water diversion on their senior water rights of use. In its practical application, the state requires the junior water right holder to show proof of the amount, timing, location, and impact of the diversion, and exactly how such impact is mitigated under an approved Augmentation Plan.[54] Until such proof is furnished, the junior appropriator may not divert water.

Idaho

Like Colorado, Idaho is a prior appropriation state.[55] Prior appropriation with its "first in time, first in right" principle of water resource management has been used in Idaho since the state constitution was adopted in 1890.[56] Today, both surface and groundwater in Idaho are managed together under a single statutory scheme.[57]

In 1951, Idaho passed the "Idaho Groundwater Act." This act contemplated a more efficient way of using the state's water resources other than simply by priority.[58] Later, Idaho passed the "Rules for Conjunctive Management of Surface and Ground Water Resources" (*Exhibit 3*). This set of rules put in place very specific procedures for managing the ground and surface water in the state. The rules specifically provide "for responding to a delivery call made

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50 *Id.*
51 *See, Id.* at 696.
52 *See generally, Empire Lodge Homeowners' Ass'n v. Moyer*, 39 P.3d 1139, (Colo. 2001).
53 In Colorado, the Upper Arkansas Water Conservancy District uses augmentation plans which cover hundreds of wells and are used to offset stream depletions caused by ground water pumping.
54 Colo. Rev. Stat. § 37-92-305(8).
55 *See, Malad Valley Irrigation Co. v. Campbell*, 2 Idaho 411, 414 (Idaho 1888).
56 Idaho Const. art. XV, § 3.
57 *See*, Idaho Code Ann. § 42-103.
58 Idaho Code Ann. § 42-226 ("...while the doctrine of "first in time is first in right" is recognized, a reasonable exercise of this right shall not block full economic development of underground water resources.").

by the holder of a senior-priority surface or groundwater right against the holder of a junior-priority groundwater right in an area having a common groundwater supply."[59]

Additionally, these rules define "Conjunctive Management" as "[l]egal and hydrologic integration of administration of the diversion and use of water under water rights from surface and ground water sources, including areas having a common ground water supply."[60] Consideration is given to an important distinction between surface water and groundwater that do not affect each other, and those that do. The rules outline criteria for determining whether water sources are connected: "The ground water source supplies water to or receives water from a surface water source; or Diversion and use of water from the ground water source will cause water to move from the surface water source to the ground water source."[61]

Similar to augmentation plans in Colorado, Idaho set up a system in which junior users can avoid curtailment if they submit an approved "Mitigation Plan."[62] These Mitigation Plans prevent injury to senior water users by providing "replacement water supplies or other appropriate compensation to the senior-priority water right during a time of shortage even if the effect of pumping is spread over many years and will continue for years after pumping is curtailed."[63]

In 2007, the Conjunctive Management rules were challenged on the basis of their constitutionality. In *Am. Falls Reservoir Dist. No. 2 v. Idaho Dep't of Water Res.*, the Idaho Supreme Court reviewed a lower court determination that found the Conjunctive Management rules to be unconstitutional.[64] The Idaho Supreme Court reversed the lower court's holding, and found that the Conjunctive Management rules were in fact constitutional as drafted.[65] The Idaho Supreme Court noted that such rules were promulgated to "jointly administer rights in interconnected surface water (diverting from rivers, streams and other surface water sources) and groundwater sources."[66]

Conjunctive Management of the Eastern Snake Plain Aquifer that is designated as an area having a "Common Ground Water Supply" is ongoing.[67] On January 28, 2014, due to the drought affecting the western United States, the Idaho Department of Water Resources sent a letter to water users within the Eastern Snake Plain Aquifer. *Exhibit 4*. This letter stated that their rights may be subject to curtailment during the 2014 irrigation season resulting from the Surface Water Coalition making a call on their water. On April 23, 2014, as the water data began to come in, a notice was subsequently sent stating that "the holders of consumptive groundwater rights bearing priority dates junior or equal to July 1, 1983, were required to curtail or refrain from

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59 Idaho Admin. Proc. Act 37.03.11, Rule 1.
60 *Id.* at Rule 10.03.
61 *Id.* at Rule 31.03.
62 *Id.* at Rule 42.02.
63 *Id.* at Rule 43.03.
64 *Am. Falls Reservoir Dist. No. 2 v. Idaho Dep't of Water Res.*, 143 Idaho 862 (Idaho 2007).
65 *Id.* at 883.
66 *Id.* at 867.
67 Idaho Admin. Proc. Act § 37.03.11, Rule 50.01(d).

diverting groundwater beginning at 12:01 a.m. on May 5, 2014." *Exhibit 5*. Even though the Idaho Ground Water Appropriators had a mitigation plan in place, it was not enough to cover the lack of water. Thus, in accordance to the prior appropriation doctrine, curtailment was necessary to supply senior water right holders with water.

Further, the Idaho State Water Plan notes that "[w]here a hydraulic connection exits between ground and surface waters, they should be conjunctively managed to maintain a sustainable water supply."[68] Idaho's water resources are managed in a way to "optimize the benefits."[69] The State Water Plan identifies a number of implementation strategies, including 1) work to quantify ground and surface water connection, 2) listing basins in need of additional information to determine ground and surface water interaction, 3) creating tools for evaluating connection, 4) estimating rate of aquifer recharge and depletion under varying climactic conditions, and 5) funding.[70] Many of these strategies are well on their way.

Utah

Utah's system of water resource management is similar in organization to Nevada's. Like Nevada, and the other western states discussed, Utah is a prior appropriation state.[71] However, Utah does not draw the hard line distinction between surface water and groundwater.[72] Prior to the 1935 amendments to the Utah Water Code, Utah law stated that, "[t]he water of all streams and other sources in this State, whether flowing above or under the ground, *in known or defined channels*, is hereby declared to be the property of the public, subject to all existing rights to the use thereof."[73]

To clear up the confusion over different types of groundwater, the code was amended to read, "all waters in this state, whether above or under the ground are hereby declared to be the property of the public, subject to all existing rights to the use thereof."[74]

Today, Utah manages ground and surface water conjunctively based on prior appropriation.[75] In 2005, the Utah Division of Water Resources published "Conjunctive Management of Surface and Ground Water in Utah" (*Exhibit 6*) as part of the state water plan. This publication is meant to "introduce and promote conjunctive management with aquifer storage and recovery in Utah."[76] Utah focuses its Conjunctive Management approach on four

[68] Idaho State Water Plan Sec. 1E.
[69] *Id.*
[70] *Id.*
[71] *See, Mt. Lake Mining Co. v. Midway Irr. Co.*, 47 Utah 346, (Utah 1915).
[72] *Id.* at 360 ("…it is immaterial whether the water, when encountered, is flowing in well-defined subterranean channels or is percolating through the soil, gravel, and the fissures and crevices of the rock. In either event, the presumption is, until overcome by satisfactory proof, that the water is tributary to the main stream, and the right to its use is vested in the prior appropriators of the stream.").
[73] Utah Rev. Stat. 1933, sec 100-1-1.
[74] Utah Rev. Stat. 1933, sec 100-1-1, as amended by Laws, 1935, Ch. 105 (Removing "in known or defined channels").
[75] John Ruple, *Clear Law and Murky Facts: Utah's Approach to Conjunctive Surface and Groundwater Management*, 47 IDAHO L. REV. 27, 223 (2011).
[76] "Conjunctive Management of Surface and Ground Water in Utah" (2005) at v.

primary goals:[77] 1) "Use more surface water and less groundwater when surface water is available during wet periods."[78] 2) "Store unused surface water above ground and underground during wet periods."[79] 3) "Take water out of surface and ground water storage during dry periods."[80] 4) "Use more ground water during dry periods when insufficient surface water is available in streams and reservoirs."[81]

Utah recognized the problem many states are facing. Water rights granted for groundwater are starting to exceed the natural recharge of groundwater aquifers.[82] Utah recognizes two Conjunctive Management methods either with or without an aquifer storage and recovery component. Conjunctive Management without an aquifer storage component "allows for a more complete utilization of the available water supply and improves the reliability of that supply."[83] Conjunctive use with an aquifer storage component takes this one step further.

"Aquifer Storage and Recovery" is the storing of water in groundwater aquifers intentionally, so it can later be extracted and put to beneficial use.[84] These programs can be quite expensive, and their viability must be assessed before implementation. However, the point is that states must continue to pursue every option available in order to use the limited water resources available, in the most efficient way.

To support the push toward aquifer storage and recovery programs, Utah passed the "Utah Ground Water Recharge and Recovery Act" (*Exhibit 7*).[85] This act gives the Utah State Engineer authority to oversee these projects.[86] Appropriators can obtain a recovery permit and thus recover at a later date the water stored in the underground aquifer.[87]

The State of Utah published the "Coordinated Action Plan for Water" in November of 2022 to establish "a statewide water cooperative action plan that prioritizes conservation, storage, agriculture preservation, and use optimization."[88] Where statewide water issues are addressed by multiple agencies, the government is then effective at managing the resource from all controllable fronts.

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[77] *Id.* at xi.
[78] *Id.*
[79] *Id.*
[80] *Id.*
[81] *Id.*
[82] *Id.* at 1.
[83] *Id.* at 30.
[84] *Id.* at 32.
[85] Utah Code Ann. § 73-3b-101 to 402.
[86] *Id.* at 104.
[87] *Id.* at 107.
[88] *Utah's Coordinated Action Plan for Water, State of Utah* (Nov. 2022) https://gopb.utah.gov/wp-content/uploads/2022/11/2022_11-Plan-for-Coordinated-Water-Action-FINAL.pdf

Washington

Like the other states referenced, Washington is a prior appropriation state.[89] Unlike Utah, for example, Washington does not take a blanket approach to surface and groundwater management. More like Colorado, Washington recognizes that some groundwater is connected to surface water, and some is not. Nevertheless, Washington enacted regulations pertaining to groundwater to specifically protect senior surface water users.[90] Washington's groundwater code states that "any underground water is part of or tributary to the source of any surface stream or lake, or that the withdrawal of groundwater may affect the flow of any spring, water course, lake, or other body of surface water, the right of an appropriator and owner of surface water shall be superior to any subsequent right hereby authorized to be acquired in or to groundwater."[91]

These legal principles go hand in hand with a Conjunctive Management Plan in which junior appropriators are able to divert water so long as existing rights are not impaired. In 1971, the Washington legislature passed the "Water Resources Act of 1971" (*Exhibit 8*). The purpose of the 1971 law is stated to provide "[p]roper utilization of the water resources of this state is necessary to the promotion of public health and the economic well-being of the state and the preservation of its natural resources and aesthetic values."[92] One of the fundamentals of this act includes that "[f]ull recognition shall be given in the administration of water allocation and use programs to the natural interrelationships of surface and ground waters."[93]

Washington's approach has been implemented in a number of Water Resources Management Programs. For example, a program implemented in the Okanogan River Basin states that "[i]f department investigations determine that there is significant hydraulic continuity…any water right permit or certificate issued shall be subject to the same conditions as affected surface waters."[94] Additionally, the program states that should "department investigations determine that withdrawal of groundwater from the source aquifers would not interfere with stream flow during the period of stream closure or with maintenance of minimum instream flows, then applications to appropriate public ground waters may be approved."[95]

As with most states' application of Conjunctive Management, the issue of "hydrological connection" is key to its implementation. The Court of Appeals of Washington faced this issue in the case of *Hubbard v. Department of Ecology*.[96] This decision involved a challenge to the Department of Ecology's determination that a groundwater aquifer was connected to a surface stream. The Court found that senior surface rights were superior to the groundwater rights as there was "significant hydraulic continuity."[97] The Court clarified that the term "significant" is

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[89] Wash. Rev. Code § 90.03.250.
[90] Wash. Rev. Code § 90.44.020 to 540.
[91] Wash Rev. Code § 90.44.030.
[92] Wash. Rev. Code § 90.54.010.
[93] Wash. Rev. Code § 90.54.020(9).
[94] Wash. Admin. Code § 173-549-060.
[95] *Id.*
[96] *Hubbard v. Department of Ecology*, 86 Wn. App. 119 (Wash. Ct. App. 1997).
[97] *Id.* at 125.

not referring to the severity of the effect of the appropriation, but rather that the effect "would eventually reach the river in the form of reduced flow."[98] In other words, the Court found the effect need only be a nominal amount to allow the Department of Ecology to reject or condition an application to appropriate water.

Oregon

Oregon is a prior appropriation state.[99] For the most part, surface waters and underground waters are managed in the same permit system.[100] Conjunctive use management is utilized "where the groundwater is hydraulically connected to, and the use interferes with, surface waters."[101] Oregon defines "Hydraulic Connection" as water that "can move between a surface water source and an adjacent aquifer."[102]

Oregon's administrative process for permitting water use is similar to that of Nevada. Oregon's permitting system expressly recognizes hydraulic connections between surface and groundwater, and regulates appropriations based on these connections. For instance, a permit for the appropriation of groundwater will not be issued if the appropriation might "impair or substantially interfere with existing rights to appropriate surface water by others."[103] The Oregon Water Resources Department promulgated rules wherein all wells located less than a quarter mile from surface waters, and withdraw groundwater from unconfined aquifers, are presumed to be hydraulically connected to surface water sources.[104] Wells between a quarter mile and a mile of a surface water source, so not carry a presumption of hydraulic connection, but are subject to scrutiny by the Oregon Water Resources Department groundwater section before permits are issued, if at all. Aquifers determined to be hydraulically connected to surface sources are "assumed to have the potential to cause substantial interference with the surface water source" under certain listed circumstances.[105].

Further, changes in points of diversion are restricted to diverting water from the same source as originally permitted.[106] Therefore, a groundwater permittee may not change his point of diversion to pumping from confined to unconfined aquifers. Additionally, a surface diversion may be changed to a groundwater diversion only if the groundwater is hydraulically connected to the surface water, and the proposed withdrawal would affect the surface water in a similar manner as the original surface water diversion.[107]

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[98] *Id.* at. 126, 127.
[99] Or. Rev. Stat. §§ 537.120, 537.130.
[100] Waters and Water Rights § I(C)(5) (Robert E. Beck ed., 3rd Edition).
[101] Or. Admin. R. § 690-009-0010.
[102] Or. Admin. R. § 690-009-0020(6).
[103] Or. Rev. Stat. § 537.629(1).
[104] Or. Admin. R. § 690-009-0040(2). This is a rebuttable presumption. *Id.*
[105] Or. Admin. R. § 690-009-0040(4)&(5).
[106] Or. Admin. R. § 690-380-2110(2).
[107] Or. Admin. R. § 690-380-2130(2)(b); O.R.S. § 540.531. The statute also requires the new point of diversion to be located within 500 feet of the surface water source, and to maintain similar stream proximity.

Surface and groundwater interconnection is also used in Oregon to manage water resources in other ways. In 1968, the United States Congress passed the "Wild and Scenic Rivers Act."[108] After the passage of such act, state laws were enacted to provide protections to rivers designated under the act. Oregon's Scenic Waterway Act provides extensive protection for rivers and river segments designated as natural, scenic, or recreational. In 1995, the Oregon Legislature expanded the reach of their state Scenic Waterway Act by prohibiting groundwater appropriations that could also result in diminished surface water flows in designated rivers.[109] To establish that a groundwater use will decrease surface flows, the Oregon Water Resources Department Director must find that a hydraulic connection exists based upon a "preponderance of the evidence."[110] Despite the complex nature of these interactions, the "preponderance of evidence" necessary to prove the existence of a hydraulic connection is low enough to allow the Oregon Water Resources Department to easily assert jurisdiction and regulate or deny groundwater appropriations. This expansive interpretation of the Scenic Waterway Act has led to the creation of "de facto" critical groundwater areas in riparian corridors in many parts of the state that would otherwise only be limited by rulemaking.

The Grande Ronde River Basin in eastern Oregon includes three river segments designated under Oregon's Scenic Waterway Act and the federal Wild and Scenic Rivers Act. In January of 2006, the Oregon Water Resources Department found the threshold relating to groundwater impact on surface was reached on the Grande Ronde.[111] It was determined that the cumulative impact threshold under the Scenic Waterway Act is the lower of either: 1% of average daily flow, or 1 cubic foot per second. Since the cumulative impact determination, the Oregon Water Resources Department no longer grants additional groundwater permits in the basin unless the impacts on surface flows are fully mitigated.[112]

Oregon also has developed aquifer use programs to more efficiently use the water resources in the state. Aquifer Storage and Recovery ("ASR") allows water users, who already have existing water rights, to place water into a confined aquifer to be later withdrawn.[113] ASR programs are used to benefit all water users including domestic, municipal, and irrigation. Artificial Aquifer Recharge ("AR") programs have been around in Oregon for quite some time, and primarily benefit municipal uses. The Oregon legislature deemed that "appropriation of water for the purpose of recharging groundwater basins or reservoirs is declared to be for a beneficial purpose."[114] The Oregon Administrative Code governs these programs and states that a water user is required to engage in a permitting process that is in addition to, and separate from, the required stream or groundwater permit, in order to recharge an aquifer.[115] Additionally, the water user is required to keep an accounting record of the "water in" and the "water out," noting

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[108] 16 U.S.C. § 1271 (2006).
[109] *Waterwatch of Oregon, Inc. v. Water Resources Commission*, 199 Or. App. 598, 608 (2005).
[110] Or. Rev. Stat. § 390.835(9)(a) (2009).
[111] Douglas Woodcock, OWRD Memorandum to OWRC: Informational Update on Scenic Waterway Evaluations with Respect to Ground Water in the Grande Ronde Basin, Oregon (February 2007).
[112] *Id.*
[113] *See generally*, Or. Rev. Stat. § 537.531 to § 537.534; and Or. Admin. R. § 690-350-010 to § 690-350-030.
[114] Or. Rev. Stat. § 537.135(3).
[115] Or. Admin. R. § 690-350-0120(1).

that something less than 100% of water stored is actually recovered.[116] Because of its expense, ASR is not a viable alternative for most types of use.

Hydrologic Connectivity in the Humboldt Basin

The Humboldt River, at 330 miles, exists entirely within the State of Nevada's borders.[117] Spanning 17,000 square miles, the Humbold River Basin contains 34 hydrographic regions.[118] While most water utilized from the system is for agricultural purposes, the majority of the state's mining operations are in the Basin on the Carlin Trend.[119] This region is experiencing a growth in development from both agriculture and mining, but the Humboldt River is fully appropriated which leaves groundwater as the sole future source of water.[120] It is this developing conflict, between current right holders and future interests, conjunctive management is crucial to Nevada's interests.

The trend, as seen in Conjunctive Management Plans, revolves around the issue of hydrologic connectivity. Unless the surface water and groundwater systems are connected, they will not, and should not, be managed together. Science and hydrogeological research has come a long way in the last 50 years, and it's now possible to examine water systems and determine whether such connection exists.

Pertinent here, scientific evidence exists to support the fact that groundwater pumping is having an effect on instream flows of the Humboldt River. In 2006, Dr. David E. Prudic, along with Richard G. Niswonger and Russell W. Plume, published a study for the United States Geological Survey entitled *Trends in Streamflow on the Humboldt River between Elko and Imlay, 1950-99* (*Exhibit 9*). The study considered the "[e]ffects of ground-water withdrawals on annual runoff" by reviewing stream flow and precipitation data collected between 1950 and 1999. [121],[122] While limited by available historical data (including inflows from tributaries, precipitation, evapotranspiration, and water discharges back to the system) it was determined that "[g]roundwater withdrawals in the Humboldt River Basin have the potential for decreasing annual runoff in the Humboldt River."[123]

While not conclusive for the entire Humboldt River system, Dr. Prudic's study provided evidence that in the lower reaches of the river, groundwater withdrawals effect instream flows. In the lower reaches of the Humboldt River, between Comus and Imlay, data "suggests that ground-

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[116] *See generally,* Or. Admin. R. § 690-350-0120
[117] *Science in the Humboldt River Basin,* Nevada Water Science Center USGS, (Nov. 30 2017) https://www.usgs.gov/centers/nevada-water-science-center/science/science-humboldt-river-basin.
[118] *Id.*
[119] *Id.*
[120] *Id.*
[121] USGS: Trends in Streamflow on the Humboldt River between Elko and Imlay (2006) at 49.
[122] *Id.* at 3.
[123] *Id.* at 49.

water withdrawals...may have caused a decrease in annual runoff at Imlay. Much of the decrease was between 1970 and 1998 when ground-water withdrawals increased sixfold."[124]

Dr. Prudic completed further Humboldt River studies in writing his dissertation entitled *Evaluating Cumulative Effects of Ground-Water Withdrawals on Streamflow* (*Exhibit 10*). Dr. Prudic stated that "[t]he overall purpose of this dissertation is to evaluate such effects on surface-water supplies for a specific basin in the western United States."[125] This study took his prior research one step further. In this later work, Dr. Prudic ran simulations to determine how groundwater withdrawals will affect the surface flows going forward.

Dr. Prudic ran two separate simulations. One that did not include any groundwater withdrawals, and one that did.[126] Each study began in 1961 and continued through to 2077, using actual data through 1999, and theoretical data thereafter.[127] The results were as follows: Annual runoff at Palisade was the same for each simulation.[128] Because the mines were discharging groundwater into the river, runoff increased at Comus.[129] The simulation assumed that mining discharge ended in 2015.[130] Between 1960 and 1988, groundwater withdrawal for irrigation did not affect runoff at Palisade, however decreased runoff was determined at Battle Mountain by about 1000 acre feet.[131] This decrease stayed constant between Battle Mountain and Comus.[132] In 1992 the Lone Tree Mine was discharging water to the river, thus creating a greater runoff at Comus.[133] This increased in 1998 when the Betze Mine was also discharging water into the river.[134] Once the groundwater discharge was simulated to cease in 2015, the annual runoff began to fall.[135] The largest effect was seen at the Comus gauge due to groundwater withdrawals between Battle Mountain and Comus.[136] In years of drought, the effect on runoff was the most severe.[137] Due to its location, Dr Prudic determined the Lone Tree Mine was responsible for the majority of the groundwater table decline.[138] Additionally, the simulations showed that the annual runoff continued to drop even after the withdrawals ceased.[139]

Studies are currently underway by the United States Geological Survey ("USGS") and Desert Research Institute ("DRI") that aim to calculate streamflow depletion from ground water

[124] *Id.* at 53.
[125] Prudic, Cumulative Effects of Ground-Water Withdrawals on Streamflow (2007) at 5.
[126] *Id.* at 284.
[127] *Id.* at 285.
[128] *Id.*
[129] *Id.*
[130] *Id.*
[131] *Id.* at 286.
[132] *Id.* at 287.
[133] *Id.*
[134] *Id.*
[135] *Id.* at 288.
[136] *Id.* at 289.
[137] *Id.*
[138] *Id.* at 290.
[139] *Id.* at 304.

withdrawals.[140] In 2023, the Desert Research Institute published its "Evaluation of Stream Capture Related to Groundwater Pumping, Upper Humboldt Rier Basin, Nevada". And, in late 2023, the USGS published its "Evaluation of Stream Capture Related to Groundwater Pumping, Lower Humboldt River Basin, Nevada." Now, all parties are anxiously awaiting the publication of the "middle model". The Upper and Lower models have both found some level of streamflow capture by groundwater pumping. More importantly, these models are creating an interactive tool that will be used to assess surface water capture by individual wells in the Humboldt Basin. This is a monumental step for Nevada, and the Humboldt River Region in assessing and bring conjunctive management tools online.

The Humboldt Basin and the Mining Pit Lake Problem

According to the *Humboldt River Chronology*, published by the Nevada Division of Water Planning, one of the "water-related issues presently affect[ing] the Humboldt River Basin" is "mine dewatering and mine pit lake formation, and their potential near-term and long-term effects on groundwater levels and surface-water flows."[141] Further, while pit lakes are certainly not within the purview of the Clean Water Act, Nevada has a responsibility to "maintain the quality of the water of the State consistent with the public health and enjoyment, the propagation and protection of terrestrial and aquatic life…"[142] Thus, the dilemma of pit lakes requires a careful balancing of mining industry interests while respecting prior appropriation and beneficial use as well as environmental challenges.

Open-pit mining is a popular method of mineral extraction in Nevada.[143] When these pits drop below the water table, they fill with water. This creates what is known as a "pit lake."[144] In order for the mine to continue production, the mine must pump the water out of the pits or engage in the practice of "dewatering."[145] Dewatering is generally accomplished by drilling a series of wells near the pit to draw down the water table. This draw-down creates a cone of depression under the pit, effectively drying out the mining area.[146]

In an article entitled *Nevada's Pit Lakes: Wasted Water*, published in the December 2012 issue of the *Desert Report*, Nevada's pit lake problem was discussed in detail.[147] Nevada has more precious metal pit lakes than any other state in the country.[148] The majority of pit lakes in the State of Nevada are in the Humboldt River Basin, and when filled, hold over 1 million acre-feet of water.[149]

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[140] *Evaluation of Streamflow Depletion Related to Groundwater Withdrawal,* USGS, (Feb. 2016) https://nevada.usgs.gov/HumboldtDepletion/index.html
[141] Humboldt River Chronology – Part I at I-13 to14.
[142] NRS 445A.305 *Legislative Declaration*
[143] *Id.* at I-94.
[144] *Id.*
[145] *Id.*
[146] *Id.*
[147] Nevada's Pit Lakes: Wasted Water, Desert Report, December 2012, John Hadder.
[148] *Id.* at 1.
[149] *Id.*

Evaporation from these pit lakes is also staggering. It has been estimated that evaporation from pit lakes will "remove the equivalent of five percent of the flow of the Humboldt River at Winnemucca each year."[150] Additionally, the Betze Mine, referenced in Dr. Prudic's research, contains a pit lake. When filled, this lake holds an estimated 580,000 acre feet of water, all from the groundwater aquifer.[151]

The State Engineer has acknowledged the possible effect that these pit lakes may have on both groundwater and surface water flows. Thus, mitigation plans are often put in place in attempts to lessen the impacts.[152] These mitigation plans include direct re-injection of the water back into the aquifer, storage of water in surface infiltration ponds, or pumping water into an existing stream system.[153] Of course, when the mine ceases active operations in the pit, the dewatering pumping stops, and the pits then fill up creating a lake. Once created the pit lakes also interfere with the movement of water underground. The Nevada State Engineer now requires water permits for the evaporation as a form of "use".

Under Nevada's Water Code, lakes, or artificial impoundments of water, can also obtain a water right for storage as the beneficial purpose.[154] Like other beneficial uses of water, the Nevada legislature has provided a statutory framework for securing a permit for storing water and using stored water for a beneficial use. Pit lakes are essentially man-made storage akin to a dam or reservoir; however, this use is not required to undergo water permitting scrutiny.

First, the rules governing dams and other obstructions state that, "[a]ny person proposing to construct a dam in this state shall, before beginning construction, obtain from the State Engineer a permit to appropriate, store and use the water to be impounded by or diverted by the dam."[155] If the dam is or will be 20 feet or more in height, or is less than 20 feet in height and will impound more than 20 acre-feet of water, the person wishing to store water must submit triplicate plans and specifications for approval 30 days before construction is to begin.[156] A "dam" for this purpose[157] is administratively defined as "any structure that stores or diverts water for a beneficial purpose."[158],[159]

A water user intending to store water for a beneficial use, must obtain a permit to appropriate, store and use the water to be impounded.[160] On its face, this legislative directive is broad and applies to all storage of water and all intended beneficial uses of stored water. The

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150 Southwest Hydrology, Volume 1, Number 3, September/October 2002, Precious Metal Pit Lakes: Controls of Eventual Water Quality, Glen C. Miller, Ph.D.
151 Humboldt River Chronology – Part I at I-13 to14.
152 *Id.* at I-95.
153 *Id.*
154 Nev. Rev. Stat. § 533.055.
155 Nev. Rev. Stat. § 535.010(1).
156 Nev. Rev. Stat. § 535.010(2)(b).
157 Nev. Rev. Stat. § 535.010, et. seq.
158 Nev. Admin. Code § 535.040.
159 Perhaps the definition of a "dam" should include a man-made hole if 20 acre-feet or more of water is stored or captured.
160 Nev. Rev. Stat. § 535.010(1).

amount of water that will be authorized for storage depends in part on the intended beneficial use. For example, if stored water is used for a subsequent irrigation use, the State Engineer is directed to consider and determine the irrigation requirements in the region to determine the amount of water that may be stored.[161]

Any application to the State Engineer that contemplates the storage of water must include the following information: (i) the purpose of the stored water; (ii) the dimensions and location of the proposed dam; (iii) the capacity of the proposed reservoir; and, (iv) a description of the land to be submerged by the impounded waters.[162] Finally, any person proposing to apply stored water to a beneficial use must file an application for a permit, known as a secondary permit, authorizing the proposed withdrawal of water out of the reservoir for beneficial use.[163] A secondary use permit must comply with the provisions of NRS 533 applicable to non-secondary use permits and once the beneficial use is perfected, a certificate is issued confirming the secondary use.[164]

Mines that will create a pit lake at the end of mine life, should be required to obtain a storage permit. While Nevada is taking strides to address mine dewatering, evaporation and pit lake water use, Nevada seems to continue its relaxed policy in which mines are able to create very large pit lakes, drill wells to dewater them, and then subsequently dispose of such "waste" water without engaging in the rigors of a permanent permitting process like every other public water appropriator in the State of Nevada.[165] This, coupled with the fact that the water pumped from these pit lakes is only required to be returned to the groundwater system if it is "feasible," and is not used for any beneficial purpose, creates a very large and realistic danger for present and future injury to senior water users.

It can be argued that the water mined from the pit lakes is actually helping other appropriators if it is being returned in some quantity to the Humboldt River, and thus, arguably, to the downstream users benefit. For example, when water is being discharged into Nike Creek from mining operations, a tributary of the Humboldt River, what is certain, is that water placed into the surface system is not reliable or consistent and will suffer some loss by evaporation in being brought to and carried along the surface rather than staying in a specified underground basin. Eventually the mine will cease work, and any extra flow will cease. Thus, the remaining water users are left to deal with the long term effects of the groundwater depletion caused by the filling of pit lakes.

The groundswell of grassroots efforts by farmers, irrigators, environmentalists and water right holders have resulted in political pressure to change mining regulations. In 2023, AB313, sponsored by Assemblywoman Sarah Peters (D-Reno), "would require new mining operation to

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161 Nev. Rev. Stat. § 533.070(2).
162 Nev. Rev. Stat. § 533.340(6).
163 Nev. Rev. Stat. § 533.440(1).
164 Nev. Rev. Stat. § 533.440(4).
165 While NAC 445A.429 provides some protection to the degradation of State waters from pit lakes, it does not ensure much of anything. The term of art "to the extent practicable" permits a wide range of practices that could hurt groundwater supplies.

prevent the creation of a pit lake by refilling – or backfilling-an open pit after mining ceases."[166] Ms. Peters explains that the bill is about "responsibility" and the ability for all rightful water right holders to have their water delivered.[167] Similarly, SB113 was signed by Governor Joe Lombardo that clarified statutory language to require that groundwater management plans receive support from priority water rights users.[168] Other proposed bills in 2023 did not fare as well. AB387, that would have required state officials to consider the "best available science" when making decisions was not passed.[169]

Other western states have come up with solutions to pit mining and the lakes they create. They understand the issue, wherein senior surface water right holders are not receiving water to appropriate while the junior appropriator mines are able to pump thousands of acre feet for their mining projects. This has led to regulations in various states to combat this issue and bring water resource management back into compliance with the prior appropriation doctrine.

For example, in Colorado, pit lakes are managed under the same augmentation plan programs as discussed above. Colorado also allows pit lakes to be managed under an approved "Substitute Water Supply Plan."[170] Under the Colorado Revised Statutes for Underground Water, the state's legislature adopted rules for truly mitigating the effects of pit lakes. It states, "A person shall not …expose groundwater to the atmosphere unless said person has obtained a well permit from the state engineer…issued upon approval by the water court of a plan for augmentation or upon approval by the state engineer of a plan of substitute supply."[171] The Colorado Division of Water Resources has put out "General Guidelines for Substitute Water Supply Plans for Sand and Gravel Pits (*Exhibit 11*)." In this publication, the State Engineer most importantly states, "[r]eplacement water to compensate for out-of-priority depletions must be available either directly or by exchange in the proper quantity, quality, place and time to ensure that existing water rights are not injured."[172]

Similarly, New Mexico passed legislation to regulate dewatering of pit lakes. In 1980, the New Mexico Legislature passed the Mine Dewatering Act.[173] The Act states that its purpose is to "promote maximum economic development of mineral resources while ensuring that such development does not impair existing water rights."[174] The Act requires that a mine obtain a dewatering permit issued by the state engineer prior to engaging in such act.[175] Most importantly,

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166 Daniel Rotheberg, *Bill Seeking to Avoid Mining Pit Lakes Advances in Legislature,* THENEVADAINDEPENDENT (Apr. 19, 2023) https://thenevadaindependent.com/article/bill-seeking-to-avoid-mining-pit-lakes-advances-in-legislature.
167 *Id.*
168 The Nevada Independent Staff, *Nevada Policy Tracker: A Guide to Key Issues in the 2023 Legislative Session*, (Jun. 25, 2023) https://thenevadaindependent.com/article/nevada-policy-tracker-a-guide-to-key-issues-in-the-2023-legislative-session#environment.
169 *Id.*
170 *See*, General Guidelines for Substitute Water Supply Plans for Sand and Gravel Pits (2011).
171 Colo. Rev. Stat. § 37-90-137(11)(a)(I).
172 General Guidelines for Substitute Water Supply Plans for Sand and Gravel Pits (2011) at 8.
173 N.M. Stat. Ann. § 72-12A-1.
174 N.M. Stat. Ann. § 72-12A-2(B).
175 N.M. Stat. Ann. § 72-12A-6.

the Act states that any existing water rights which are based on an application to the beneficial use of water must be recognized, and the Act is not intended to impair such rights, or effect their priority.[176]

Sullivan v. Lincoln County

On January 25, 2024, the Nevada Supreme Court unanimously affirmed the authority of the Nevada State Engineer to conjunctively manage the State's groundwater and surface water supplies.[177] This represents a massive shift in the legal and political interpretation of water rights within the State of Nevada.

Order 1309, issued in 2020 by State Engineer Adam Sullivan, claimed that the water of seven basins north of Las Vegas were substantially interconnected in a manner such that withdrawals from one basin affected the amount of water in the other basins.[178] He determined that pumping from any of these seven subbasins may affect vested surface rights. In particular, Order 1309 noted that groundwater appropriation within these interconnected subbasins would undoubtably affect the Muddy River which was fully appropriated in 1905.[179] To better manage the troubling scenario, the State Engineer in Order 1309 moved to combine the seven smaller basins into one entity known as the Lower White River Flow System ("LWRFS"). Creation of the LWRFS would permit the Engineer to conjunctively manage surface and groundwater as an interconnected entity. In other words, Order 1309 aimed to empower the State Engineer to conjunctively manage water resources to prevent harming senior vested water rights.

As expected, junior water rights holders and entities interested in procuring groundwater appealed to the Clark County District Court. They argued that the State Engineer could not conjunctively manage surface and groundwaters and that Order 1309 surpassed the State Engineer's authority. The district court sided with the plaintiffs and the State Engineer appealed the decision. In 2024 the Nevada Supreme Court ("Court") decided that the State Engineer was within his authority to manage the waters conjunctively and was able to issue and enforce Order 1309. The Court also determined that NRS 533.085 that prohibits the impairment of prior vested right granted the State Engineer the implied authority to conjunctively manage.[180] The Court found it nonsensical that the law would prohibit the Engineer from recognizing the affects related subbasins have upon one another. Afterall, the Court said, NRS 533.024 requires the Engineer to use the best available science and the facts made clear there was hydraulic connectivity between the seven basins. It is, as the Court explained, the Engineers' responsibility to prevent over appropriation from causing infringement of vested water rights. Therefore, if the State Engineer was only able to manage surface and groundwater as separate entities, then it would be impossible to protect water right holders and uphold the law.

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[176] N.M. Stat. Ann. § 72-12A-13.
[177] *Sullivan v. Lincoln County Water Dist.*, 542 P.3d 411 (Nev, 2024).
[178] Conjunctive Management, *Western States Water Council*, https://westernstateswater.org/wp-content/uploads/2024/02/News-2595-Special-Report.pdf
[179] *Id.*
[180] "Nothing contained in this chapter shall impair the vested right of any person to the use of water, nor shall the right of any person to take and use water be impaired, or affected…" NRS 533.085

Conjunctive management is an authority granted to the State Engineer. The Nevada Supreme Court made clear that Nevada law expressly permits the ability to do so.

Water Banking and How It Can Help Nevada and the Humboldt River Basin

Water banking is a term that generally describes varying styles of water management strategies to more efficiently use our water resources, and generally include some form of aquifer storage and recovery component. The most comprehensive analysis of water banking was done by the Washington State Department of Ecology in a publication entitled *Analysis of Water Banks in Western States* (*Exhibit 12*).[181] The report defines water banking in general as "an institutional mechanism that facilitates the legal transfer and market exchange of various types of surface, groundwater, and storage entitlements."[182]

The purpose of water banking is to help furnish water supply during years of drought ensuring that users have water to continue to benefit their livelihoods and the public.[183] The bank itself acts as a market and balances the ground and surface water interests to their greatest efficiency. The Report discusses in detail twenty-three water banking programs, this report will highlight a few, as well as those already taking place in Nevada. [184]

Currently, water banking programs are being used in Arizona, Colorado, Montana, New Mexico, Texas, Washington, California, Idaho, Nevada, Oregon, Utah, and Wyoming.[185] Two that will be discussed in greater detail will be the Deschutes Water Exchange Groundwater Mitigation Bank in Oregon, and the Truckee Meadows Groundwater Bank in Nevada.

Water banking in Nevada is not a new subject. The Truckee Meadows Groundwater Bank combines with an Aquifer Storage and Recovery program to serve the municipal water needs of the Truckee Meadows. The bank was established in 2000 under State Engineer Order 1161.[186] This water bank was established when Sierra Pacific Power (subsequently water management was taken over by Truckee Meadows Water Authority), realized that the area population was on the rise and the Truckee River provided the majority of the municipal water needs. The order establishes a simple accounting water bank in which during dry years, groundwater can be used in quantities up to 15,950 acre feet of water, and in years with more than enough surface water, water can be recharged into the aquifer, and thus a credit is "deposited" into the bank that is later used during times of drought.[187]

More similarly related to the Humboldt River Basin issues, the Deschutes Basin was found to be almost entirely supported by groundwater flows, and thus the surface and

[181] Peggy Clifford, Clay Landry, and Andrea Larsen-Hayden, *Analysis of Water Banks in the Western States*, Wash. Dept. of Ecology, Pub. No. 04-11-011 (2004).
[182] *Id.* at 3.
[183] *Id* at ii.
[184] *Id.*
[185] *Id.* at 1.
[186] State Engineer Order 1161, 2000, Michael Turnipseed, P.E.
[187] *Id.*

groundwater were hydrologically connected.[188] This meant that over pumping of groundwater in the basin directly affected flows of the river.[189]

In 2002, the Oregon legislature authorized the enactment of the Deschutes Basin Mitigation Credit Rules to mitigate the impact of groundwater withdrawals in the Deschutes Basin.[190] Mitigation credits are a means of encouraging investment in mitigation projects, such that credits earned by such projects may then be held, applied, sold, or otherwise transferred.[191] Prior to issuing a permit to appropriate groundwater, the applicant must fulfill certain mitigation obligations.[192] Studies have shown the program to be a resounding success. By the end of 2019, approximately 84 CFS was protected instream by permanent and temporary mitigation projects in the Deschutes and its tributaries.[193] There is currently no evidence to suggest that the mitigation program has resulted in any injury to surface water rights.[194]

How It All Fits Together

Nevada is a prior appropriation state. Thus, "first in time, first in right" is the rule in water resource management. Those who put water to beneficial use first will receive the benefit of water first when there is not enough to go around. Before the influx of groundwater appropriation, system management was less convoluted, as delivery of water to a senior user usually meant surface water management only. However, due to the increase in groundwater appropriations, management under prior appropriation is skewed.

Scientific evidence tells us that the groundwater and the surface water resources are connected in many areas. Consequently, groundwater appropriations have an effect on the amount of water in surface streams. Conversely, a depletion in surface flows can have an effect on the amount of water in the groundwater aquifers. Thus, many states have begun implementing methods to manage surface water and groundwater together by Conjunctive Management.

In order to uphold the true nature of the prior appropriation doctrine of water resource management, in a connected system senior surface rights cannot be curtailed (either directly or indirectly) while allowing junior groundwater rights to continue appropriations. However, if at all possible, simply shutting off groundwater rights to benefit senior surface should also be avoided. This leads to the conclusion that under an appropriate conjunctive management plan, the goal is to create an individually tailored system that benefits both ground water and surface water together using water in the most efficient way possible while honoring the prior appropriation doctrine.

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[188] Deschutes Ground Water Mitigation Program, at http://www.oregon.gov/owrd/docs/deschutes_mitigation_7-5-2007.pdf.
[189] *Id.*
[190] Analysis of Water Banks in the Western States, Washington Department of Ecology, 2004 at 111.
[191] OAR 690-521-0100(3).
[192] *Id.*
[193] Dwight French, Sarah Henderson, et al, Review of the Deschutes Basin Groundwater Mitigation Program, pg. 2 OWRD (2021) https://www.oregon.gov/owrd/WRDReports/5YearDeschutesGWMitigationProgramReport.pdf.
[194] *Id.* at 14.

It has been shown that the various groundwater aquifers beneath the Humboldt River Basin are hydrologically connected to the Humboldt River itself. As seen in the lower reaches of the Humbolt River, groundwater withdrawals along the river system create a negative impact to decreed surface water users.

Holding junior groundwater appropriators accountable for their impacts of surface water withdrawals is key.[195] All appropriators, mines included, must be required to apply for a permanent permit to appropriate water. When reviewing these applications, the State Engineer must evaluate the impact on the senior water right holders. If the State Engineer determines that the applicant will have an impact on the senior water right holders, no permitted use should be granted unless those appropriators can mitigate the surface water effect. Such mitigation plans must be science based and enforceable. The State Engineer can require groundwater appropriators to use tools and management systems to be consistent with the priority system that allow junior groundwater uses if they augment, or mitigate the losses they cause to senior surface right users.

ACTION ITEMS

1) Continued development of a Conjunctive Management system of water resource management in the Humboldt River Basin, honoring the first in time surface rights before allowing junior groundwater rights to be "in priority" for use.

2) Implement State Engineer Order 1329 and expand on this Order to include provisions to deal with current water rights causing impacts to senior water rights.

3) Require connected groundwater right holders to develop mitigation plans, or augmentation plans or otherwise face curtailment of their water rights of use.

4) Create water banks in the Humboldt River system as a tool to integrate surface water and groundwater right holders mitigation plans.

5) Establish critical or limited groundwater management areas for all over-appropriated groundwater basins similar to the Oregon system.

6) Regulate mine dewatering wells under statutory water code. Factoring mine appropriations into the perennial yield of the groundwater basins, and cease granting arbitrary "temporary" permits for mining upon which wells will last indefinitely. This includes adding express conditions into permit terms to require relinquishment upon cessation of mine life.

[195] Mandatory metering requiring yearly reporting to the State Engineer should be imposed on all ground water withdrawals, allowing for a more comprehensive understanding of the cumulative impact the withdrawals are having on surface water flows.

7) Regulate pit lakes pursuant to statutory code relating to storage of water, requiring a valid permit to store and appropriate water (evaporation), beneficial use of the water, and factor such use into the perennial yield of the basins.

8) Begin curtailment of junior ground water rights where conflicts exist.

Exhibit List

Exhibit	Description
1	The Water Rights Determination and Administration Act, Colorado (1969)
2	USGS, "Ground Water and Surface Water, A Single Source" (1998)
3	Rules for Conjunctive Management of Surface and Ground Water Resources, Idaho
4	January 28, 2014 Idaho Department of Water Resources Letter to Water Users within the Eastern Stake Plain Aquifer
5	April 23, 2014 Idaho Department of Water Resources Letter to Water Users Within the Eastern Stake Plain Aquifer
6	Conjunctive Management of Surface and Ground Water in Utah
7	Utah Ground Water Recharge and Recovery Act
8	Water Resources Act of 1971, Washington
9	Trends in Streamflow on the Humboldt River between Elko and Imlay, 1950-99
10	Evaluating Cumulative Effects of Ground-Water Withdrawals on Streamflow
11	General Guidelines for Substitute Water Supply Plans for Sand and Gravel Pits
12	Analysis of Water Banks in Western States