OVERVIEW OF ACTIVITIES AND CHALLENGES OF THE HUMBOLDT RIVER BASIN WATER AUTHORITY

Nevada Legislative Commission's Subcommittee to Study Water

Winnemucca, Nevada

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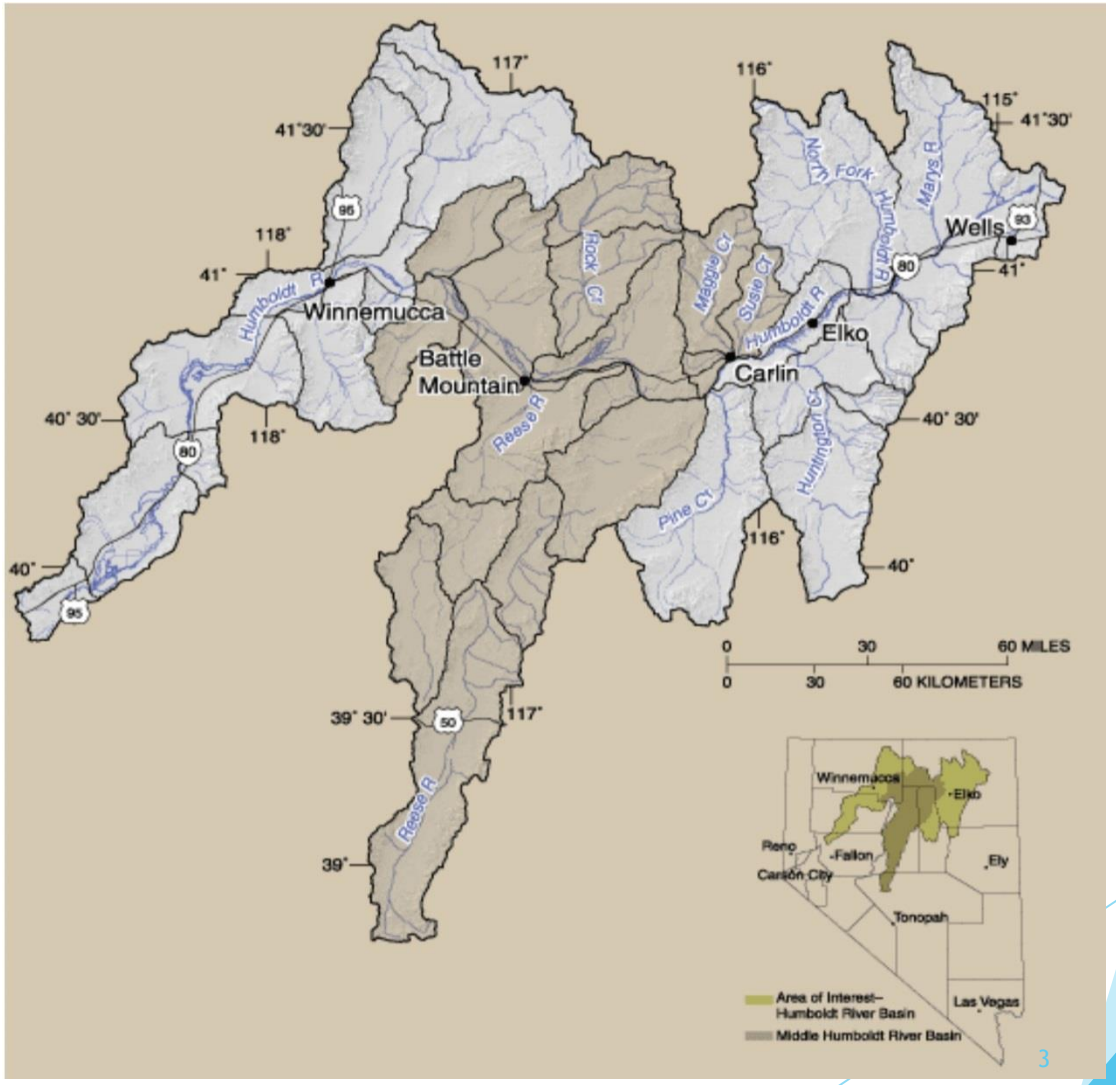
Humboldt River Basin Water Authority

Overview of Humboldt River Basin Water Authority

- Established in 1995 by Elko, Eureka, Lander, Humboldt and Pershing Counties
- Organized to Oppose Proposal to Export in Excess of 300,000 acre feet of Groundwater from the Upper Humboldt River Basin to the Lower Carson River Basin (EcoVision Project)
- EcoVision Water Right Applications Denied By Nevada State Engineer As Speculative In Nature
- Fifteen-member Board of Directors; 3 appointed by each member county commission; includes at least one county commissioner from each member county; NMA representative appointed as non-voting member
- For Past 20 Years 15-Member HRBWA Board of Directors Have Continued to Meet Quarterly to Address Water Resource Issues of Concern

Humboldt River Basin Characteristics

Drainage area of 7,410 square miles (larger than HI, CT, DE, RI)



Humboldt River Basin Characteristics (Cont'd.)

- Population Growth in Nevada Spawns Demand for Agricultural Products
- 1900 – 42,235
- 1910 – 81,875
- Historically High Flows During Period Between 1905 and 1925 (300,000 plus AFY)
- Increasing Agricultural Production Led to Conflicts Among Users
- January 17, 1923 – State Engineer Files Final Order of Determination with Court
- Bartlett Decree Entered October 1931
- Edwards Decree Entered October 1935

Humboldt River Basin Characteristics (Cont'd.)

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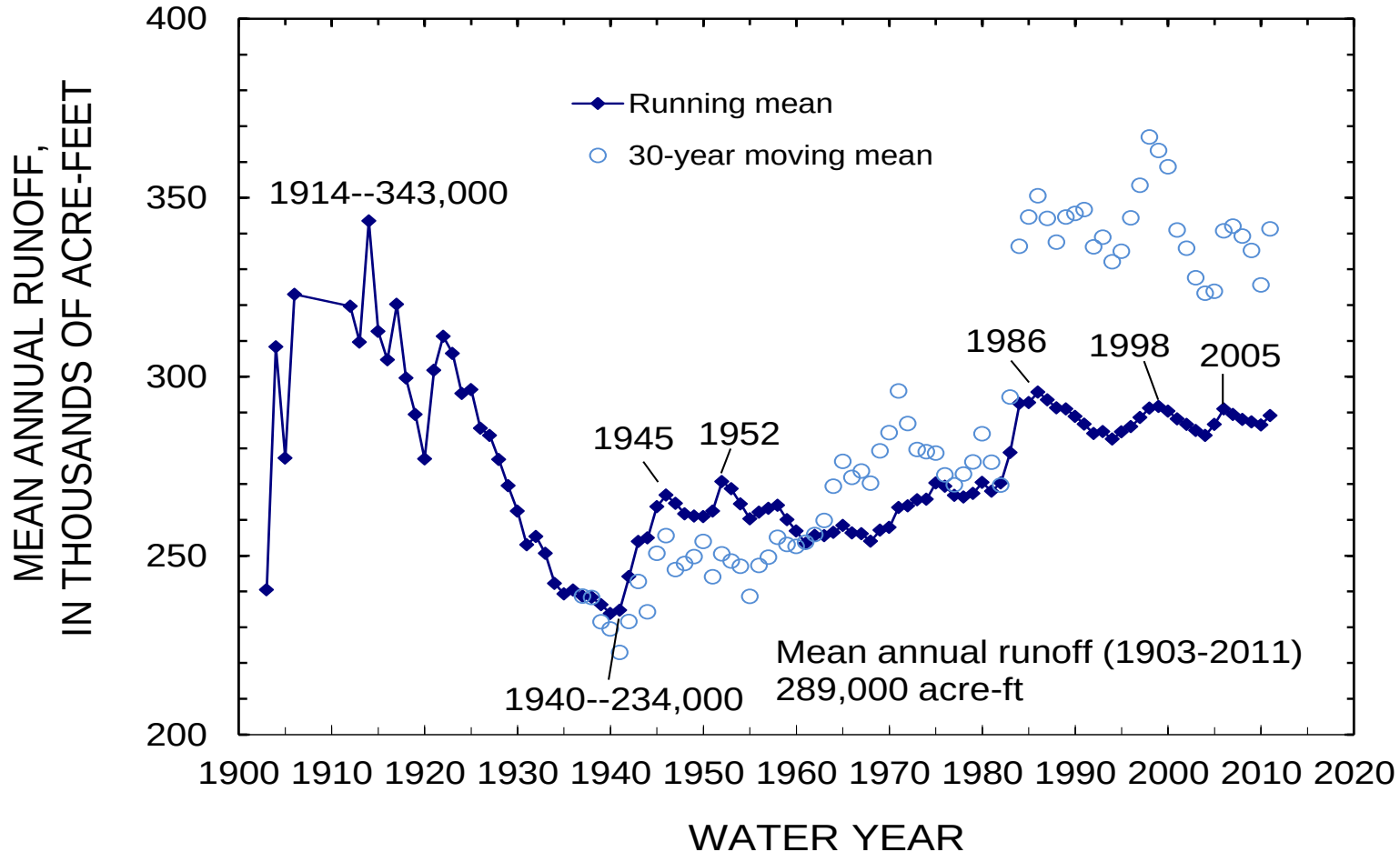
- January 17, 1923 – State Engineer Files Final Order of Determination with Court
- Bartlett Decree Entered October 1931
- Edwards Decree Entered October 1935
- Period of Substantial Decline in Flows Begins in 1925 and Continues through 1935
- Decrees Based Upon Irrigated Acreage During Time of Plenty, Ignoring Significant Reductions in Humboldt River Flows
- Most Senior Humboldt River System Surface Right – 1861

Humboldt River Basin Characteristics (Cont'd.)

Variation of Mean Annual Discharge of Humboldt River at Palisade 1903-2011

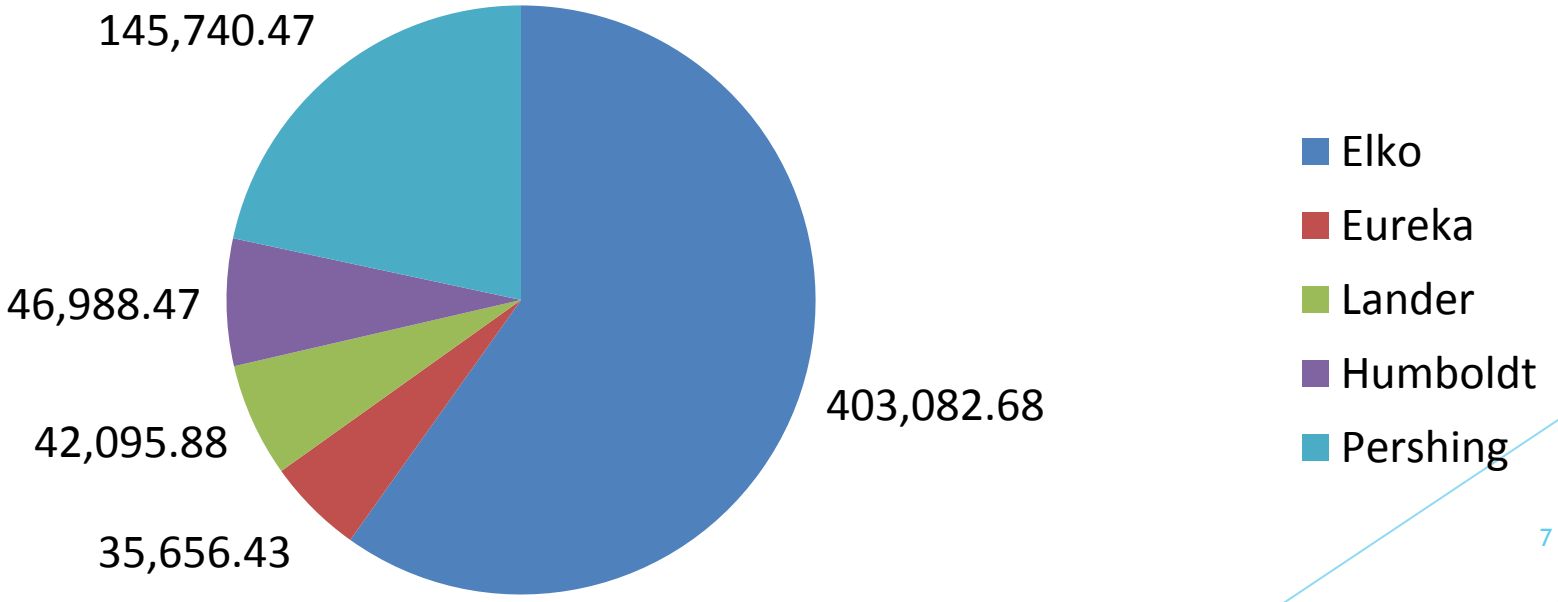


Source: Prudic, David E., Evaluating Cumulative Effects of Groundwater Withdrawals on Flows in the Humboldt River, Presentation to Nevada Water Resources Association Annual Meeting, March 7, 2012

Humboldt River Basin Characteristics (Cont'd.)

- Mean Annual Discharge at Palisade is Approximately 290,000 acre feet
- Approximately 690,000 acre feet of Decreed Surface Water Rights
- Highly efficient reuse of agricultural irrigation water runoff is key to meeting demand which greatly exceeds annual average flows.
- Annual variations in surface water flow produce economic and environmental uncertainty.

Distribution of Humboldt River System Decreed Surface Water Rights by County (acre-feet)



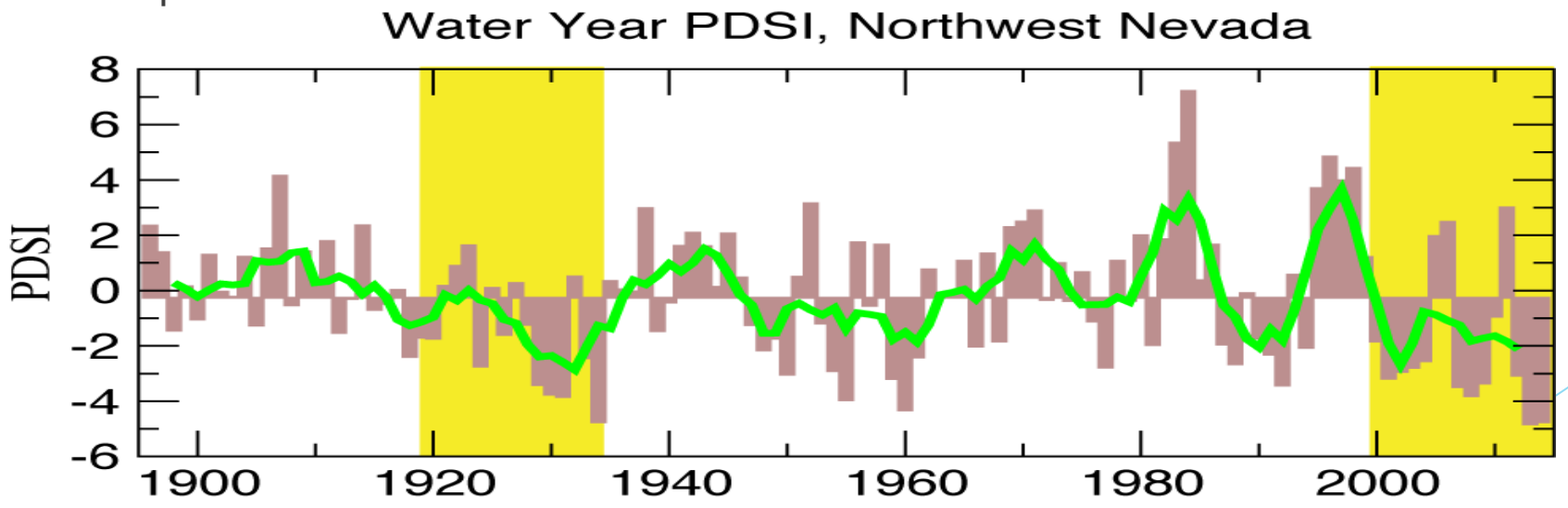
Recent Surface Water Availability in the Lower Humboldt River Basin (Pershing County): Nothing At All

- 2014 and 2015 Surface Water Deliveries to Pershing County Water Conservation District: ZERO
- Humboldt River Below Winnemucca: Largely Dry for Much of Past Two Years
- Annual Variations in Surface Water Flow Produce Economic and Environmental Uncertainty

Photos: Rye Patch Reservoir Pre and Post Drought; Left, Nevada Division of State Parks; Right, Reno Gazette Journal.

Factors Contributing To Diminished Base Flow of the Humboldt River

- Loss of Proper Functioning Riparian Areas
- Groundwater Pumping
  - Agriculture
  - Mining, Milling and Dewatering
  - Municipal and Industrial
- Warming Trends
  - Reduced Snowpack
  - Earlier Runoff
- Drought



Source: Mike Dittenger, USGS Scripps Institute of Oceanography

Humboldt River Basin Characteristics (Cont'd.)

Groundwater

- Approximately 469,000 acre feet of Perennial Groundwater Yield
- Approximately 757,758 acre feet of Committed Groundwater Rights
- Very Little Unappropriated Groundwater Remains Available, 23 of 34 Groundwater Basins are Over-Appropriated
- All Groundwater Basins within the Humboldt River Basin have been Designated by the Nevada State Engineer as Requiring Special Management
- Long-term over-pumping of groundwater basins is impacting base flow of the Humboldt River

Water Resource Issues Requiring Resolution within Humboldt River Basin – Lack of Storage

- Storage in upper and middle Humboldt River Basin is not available for consumptive uses such as irrigation.
- Storage in lower Humboldt River Basin requires adequate upper and middle-Humboldt River flow to move water to Rye Patch Reservoir.
- During years of average and better flows, lack of upstream storage results in significant losses of water to evaporation in the Humboldt Sink.
- Little to no storage capacity results in little to no drought reserve within the Humboldt River Basin.

Left: South Fork Reservoir
Right: Chimney Creek Reservoir

Water Resource Issues Requiring Resolution within Humboldt River Basin – Unpermitted Pit Lake Evaporation

Gravel Pit Evaporation of Decreed Surface Water

North Fork Humboldt River near Elko

Water Resource Issues Requiring Resolution within Humboldt River Basin – Unpermitted Pit Lake Evaporation

- Precious Metal Mining Pit Lake Evaporation of Groundwater

Lone Tree Mine in vicinity of Battle Mountain

Water Resource Issues Requiring Resolution within Humboldt River Basin – Unpermitted Pit Lake Evaporation (Cont'd.)

Unpermitted Pit Lake Evaporation is Unlawful

- ***NRS 533.025 Water belongs to public.*** *The water of all sources of water supply within the boundaries of the State whether above or beneath the surface of the ground, belongs to the public.*
- ***NRS 533.325 Application to State Engineer for permit.*** *Any person who wishes to appropriate any of the public waters, or to change the place of diversion, manner of use or place of use of water already appropriated, shall, before performing any work in connection with such appropriation, change in place of diversion or change in manner or place of use, apply to the State Engineer for a permit to do so.*

- Unpermitted Pit Lake Evaporation is Unfair
  - Impacts to valid existing water right holders
  - Inconsistent enforcement by Nevada Division of Water Resources

(see 11/1/13 and 3/6/15 letters from Nevada Division of Water Resources to Douglas P. and Lori L. Miller)

Water Resource Issues Requiring Resolution within Humboldt River Basin – Unpermitted Pit Lake Evaporation (Cont'd.)

- Unpermitted Pit Lake Evaporation is Unresolved
  - Discussions with NMA began in earnest in 2012
  - HRBWA suggests legislation to compel compliance in 2013
  - NMA commitment to address compliance voluntarily in 2013
  - HRBWA recommends, and Legislative Public Lands Committee agrees to request, legislation compelling compliance in 2014
  - SB 173 introduced in 78th NV Legislature in 2015
  - NMA renews commitment to address compliance voluntarily in 2015
  - HRBWA informs NV Legislature, no further action on SB 173 required

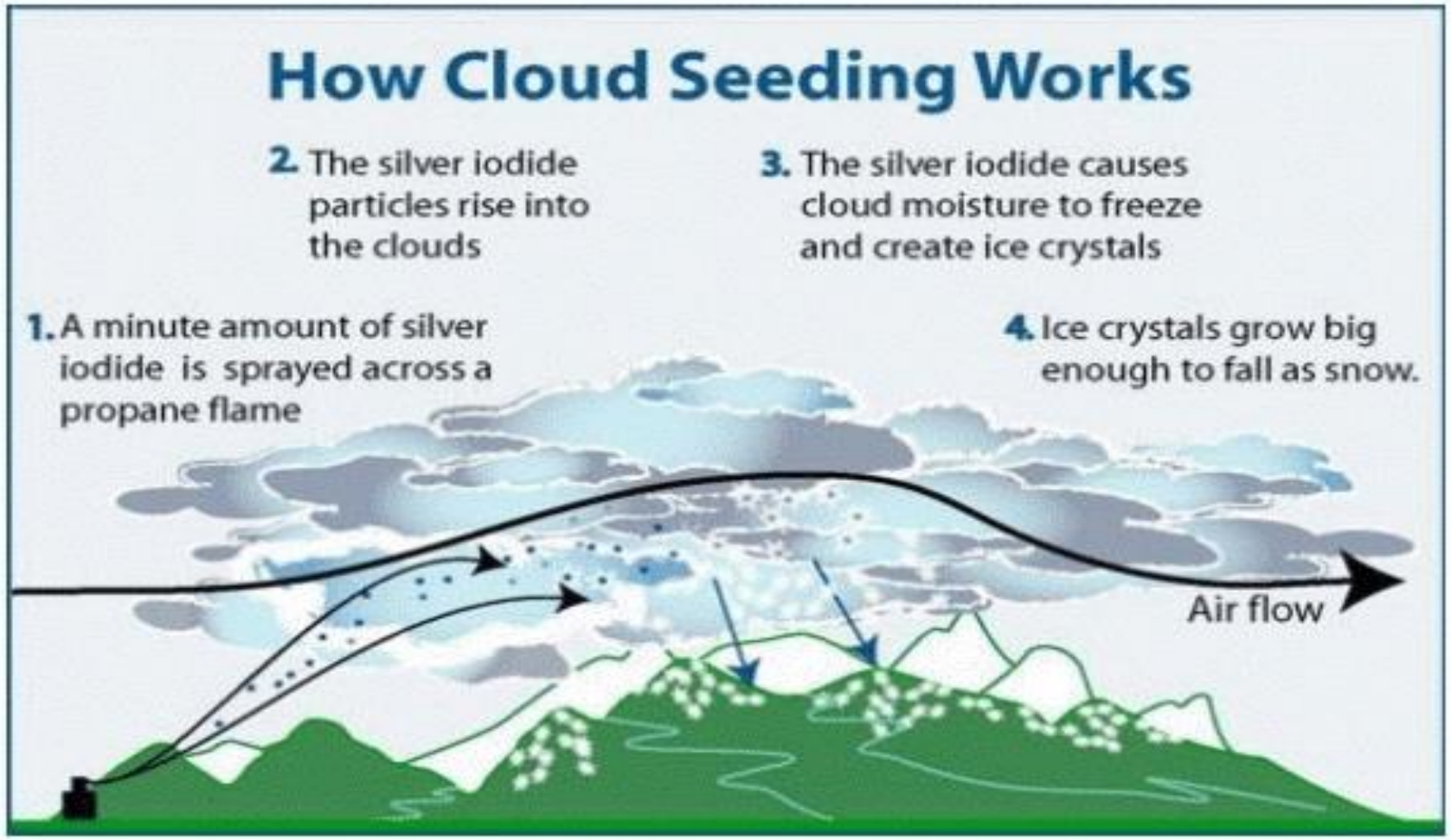
Moving Forward

- Drought Recovery
  - Humboldt River Operating Plan
    - Goal: No Water Lost to Evaporation on Humboldt Sink
    - Filling of Rye Patch Reservoir
    - Off-Season Water Spreading
      - Senior Rights Holders First
      - Improve Soil Moisture and Quality
      - Replace Lost Bank Storage
- Drought Resiliency
  - Increased Storage
    - Aquifer, Storage and Recovery
    - Reservoir Enhancements
    - New Upstream Reservoirs
    - Use of Pit Lakes
  - Cloud Seeding

Moving Forward (Cont'd.)

- Restore Base Flow/Balance Demand with Sustainable Supply
  - Division of Water Resources Depletion Analysis
  - Reduce Demand through Conservation
  - Curtailment by Priority (surface and groundwater rights conjunctively)
  - Augmentation
  - No Change in Place Of Use for Existing Supplemental Groundwater Rights to Points of Diversion Proximate to Decreed Surface Waters
  - No New Applications for Supplemental Groundwater Rights Where Point of Diversion is Proximate to Decreed Surface Waters
- Living with a Flawed Decree
  - Reduce Demand through Conservation
  - Compensation of Downstream Senior Rights Holders by Upstream Junior Rights Holders
- Technological Fixes
  - Low Water Use Crops
  - Improved Irrigation
  - Water Holding Soil Amendments

Moving Forward (Cont'd.)
Cloud Seeding 101



Cloud Seeding 101 (Cont'd.)

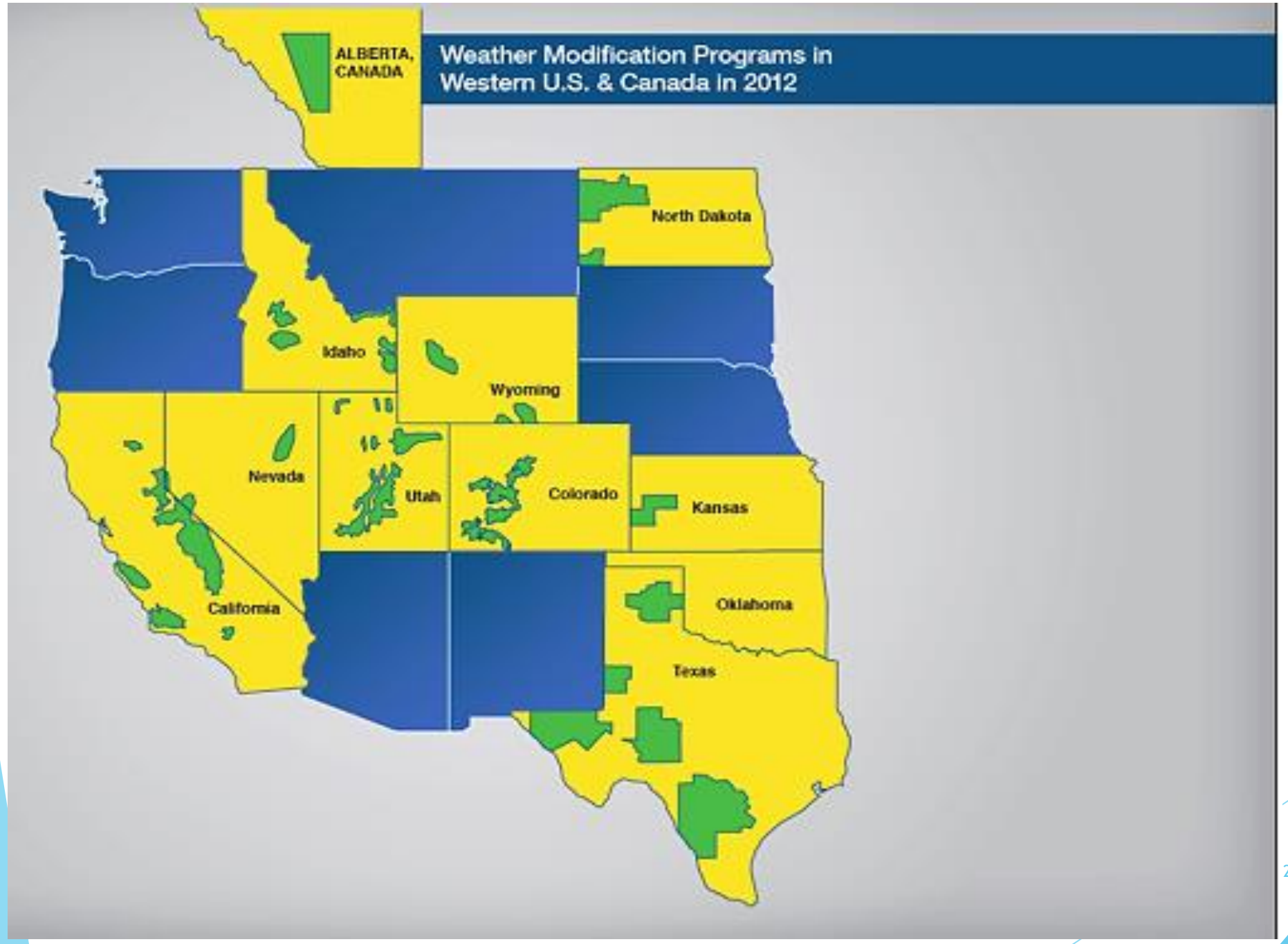
Manual Generator

Automated Generator

Cloud Seeding 101 (Cont'd)

Motivation for Wintertime Cloud Seeding

- Increase surface water runoff from enhanced snowpack
  - Additional water for agriculture
  - Add to municipal water supplies
  - Increased water for wildlife
- Increase soil moisture
- Benefit to forests and rangeland vegetation
  - Improved wildlife habitat
- Replenish ground water
  - Replace storage lost due to drought
- Drought Resiliency
  - Enhance reservoir storage
  - Increase groundwater storage


ALBERTA, CANADA
Weather Modification Programs in Western U.S. & Canada in 2012
North Dakota
Idaho
Wyoming
Nevada
Utah
Colorado
Kansas
California
Oklahoma
Texas

Cloud Seeding 101 (Cont'd.)
Nevada Cloud Seeding Stakeholders: SB 423 of 78th NV Legislature

- Walker River Irrigation District
- Truckee-Carson Irrigation District
- Truckee Meadows Water Authority
- Pershing County Water Conservation District
- Carson Water Subconservancy District
- Humboldt River Basin Water Authority
- Southern Nevada Water Authority
- Washoe County Regional Water Commission
- Central Nevada Water Authority

Cloud Seeding 101 (Cont'd.)
Historic Cloud Seeding In Nevada

- Cloud seeding in Nevada began in the late 1970's as DRI research
- State of Nevada funded cloud seeding in the Sierra Nevada and Ruby Mountains from early 1980's through 2008
- Recession resulted in loss of State of Nevada funding for cloud seeding in Nevada
- SB 423 sought to re-establish State of Nevada funding for cloud seeding in Nevada

Cloud Seeding 101 (Cont'd.)
DRI Cloud Seeding Proposal

- Target Areas (27 ground-based fully automated generators)
  - Tahoe-Truckee-Carson area (6)
  - Ruby Mountains (6)
  - Owyhee/Tuscarora area (2)
  - Schell Creek Range (6)
  - Toiyabe Range (2)
  - Walker River Basin (5)
- Annual Water Production 82,000 to 131,000 acre feet
- Annual Cost $996,323 or $7.61 to $12.15 per acre foot

Cloud Seeding 101 (Cont'd.)
North American Weather Consultants Cloud Seeding Proposal: Humboldt River Basin

- Target Areas (50 ground-based manual generators)
  - Independence Mountains (6)
  - Ruby Mountains (11)
  - Toiyabe Range (13)
  - Santa Rosa Range (7)
  - Sonoma Range (3)
  - Humboldt Range (4)
  - Diamond Range (6)
- Annual Water Prod. 153,220 ac ft
- Annual Cost $312,000 or $3.04 per ac ft

Recommendations for Subcommittee Action

Encourage/Request State Investment In:

- Drought Resiliency
  - Increased Storage
    - Aquifer, Storage and Recovery
    - Reservoir Enhancements
    - New Upstream Reservoirs
    - Use of Pit Lakes
  - Cloud Seeding
- Conservation to Reduce Demand for Ground and Surface Water
- Research/Technology
  - Low Water Use Crops
  - Improved Irrigation
  - Water Holding Soil Amendments

Recommendations for Subcommittee Action (Cont'd.)

- Encourage Nevada State Engineer to Issue Orders Applicable to the Humboldt River Basin Which:
  - Disallow New Applications Seeking a Change in Place Of Use for Existing Supplemental Groundwater Rights to Points of Diversion Proximate to Decreed Surface Waters
  - Disallow New Applications for Supplemental Groundwater Rights Where Point of Diversion is Proximate to Decreed Surface Waters
- Request Legislation Which Requires Compensation of Downstream Senior Rights Holders by Upstream Junior Rights Holders Served Water by the Nevada State Engineer on an Out of Priority Basis
- If a Voluntary Process or Processes for Securing of Water Rights by Owners of Pit Lakes to Cover Pit Lake Evaporative Losses is Not Adopted and Implemented in the Near Future then Request Legislation Compelling Compliance by Said Owners and/or Nevada Division of Water Resources

For Additional Information or Questions Contact:

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