Conjunctive Management of the Waters of the Humboldt River Basin, Nevada

WSE Spring Workshop
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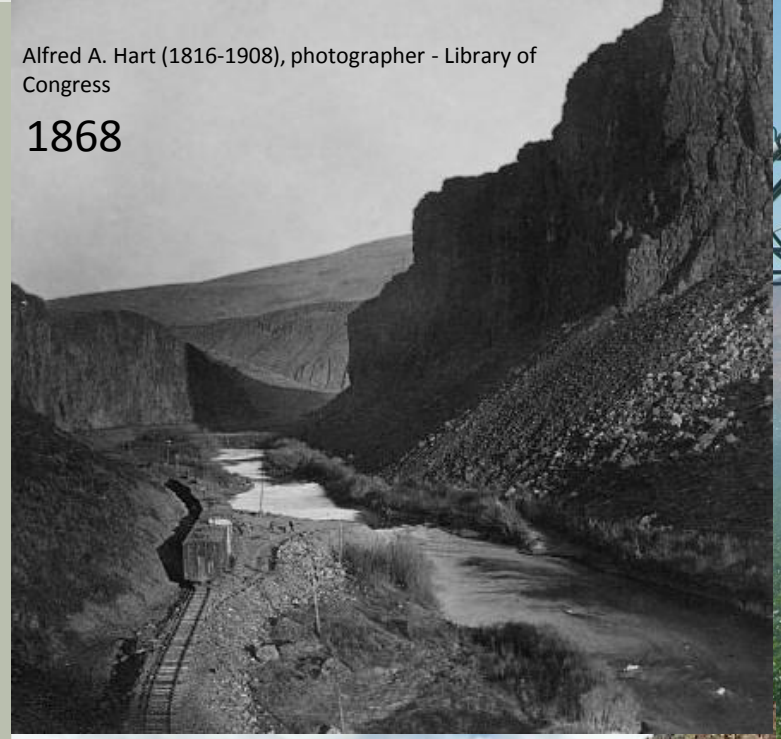
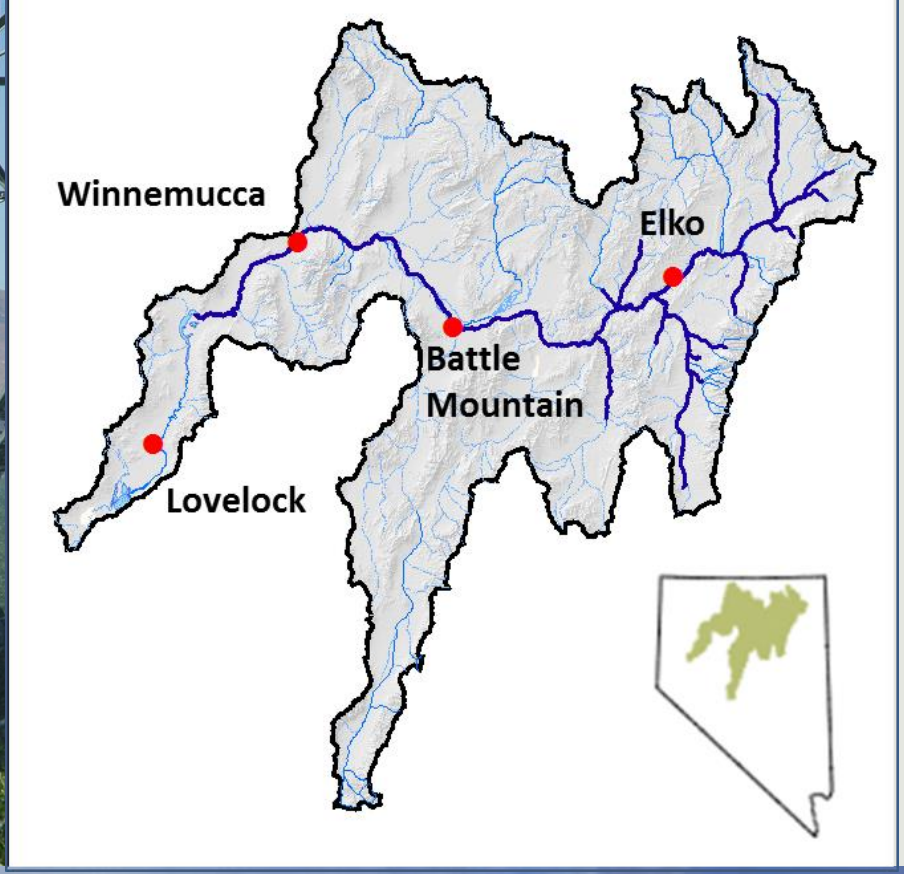
Adam Sullivan, P.E.
Deputy Administrator

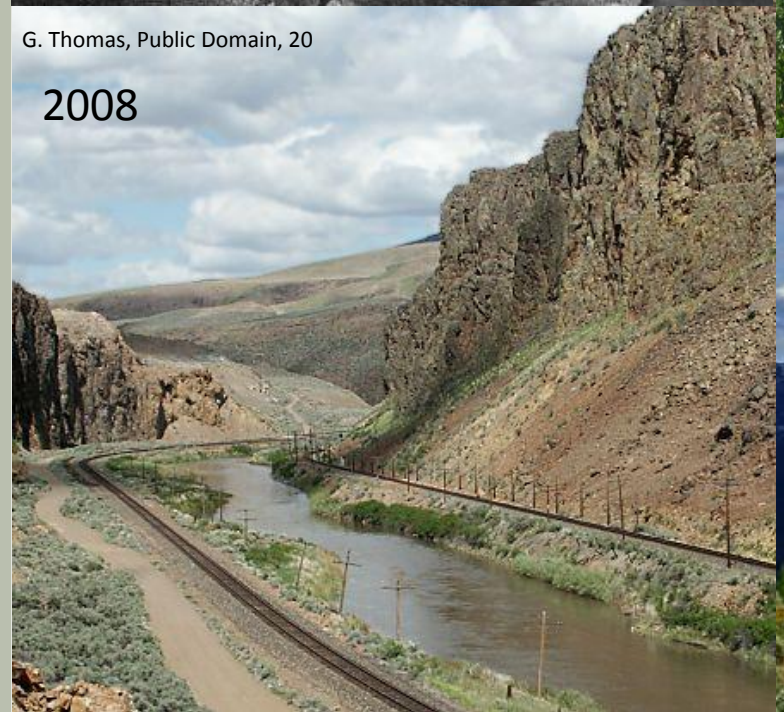
Nevada Department of CONSERVATION & NATURAL RESOURCES



Alfred A. Hart (1816-1908), photographer - Library of Congress

1868





G. Thomas, Public Domain, 20

2008

Some SW/GW History

2001:

IV.

The State Engineer concludes that Nevada water law provides for the management of surface water and ground water as distinct sources. The State Engineer concludes that to change that scheme of water management at this point in time would conflict with existing rights and threaten to prove detrimental to the public interest. The State Engineer also concludes that since he has

Ruling 5079

Conjunctive Management

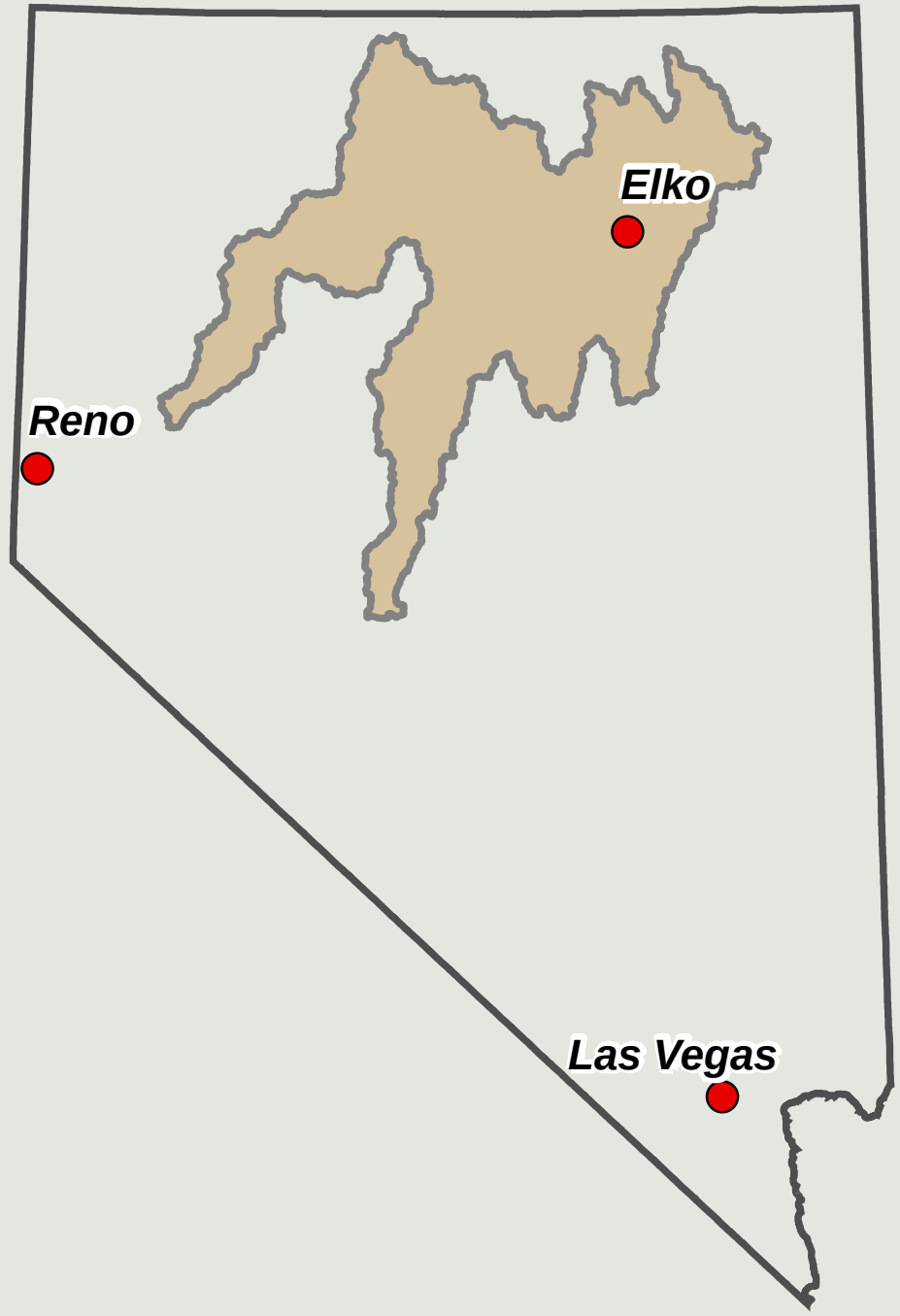
It is the policy of this State:

"To manage conjunctively the appropriation, use and administration of all waters of this State, regardless of the source of the water."

2017 Legislative declaration

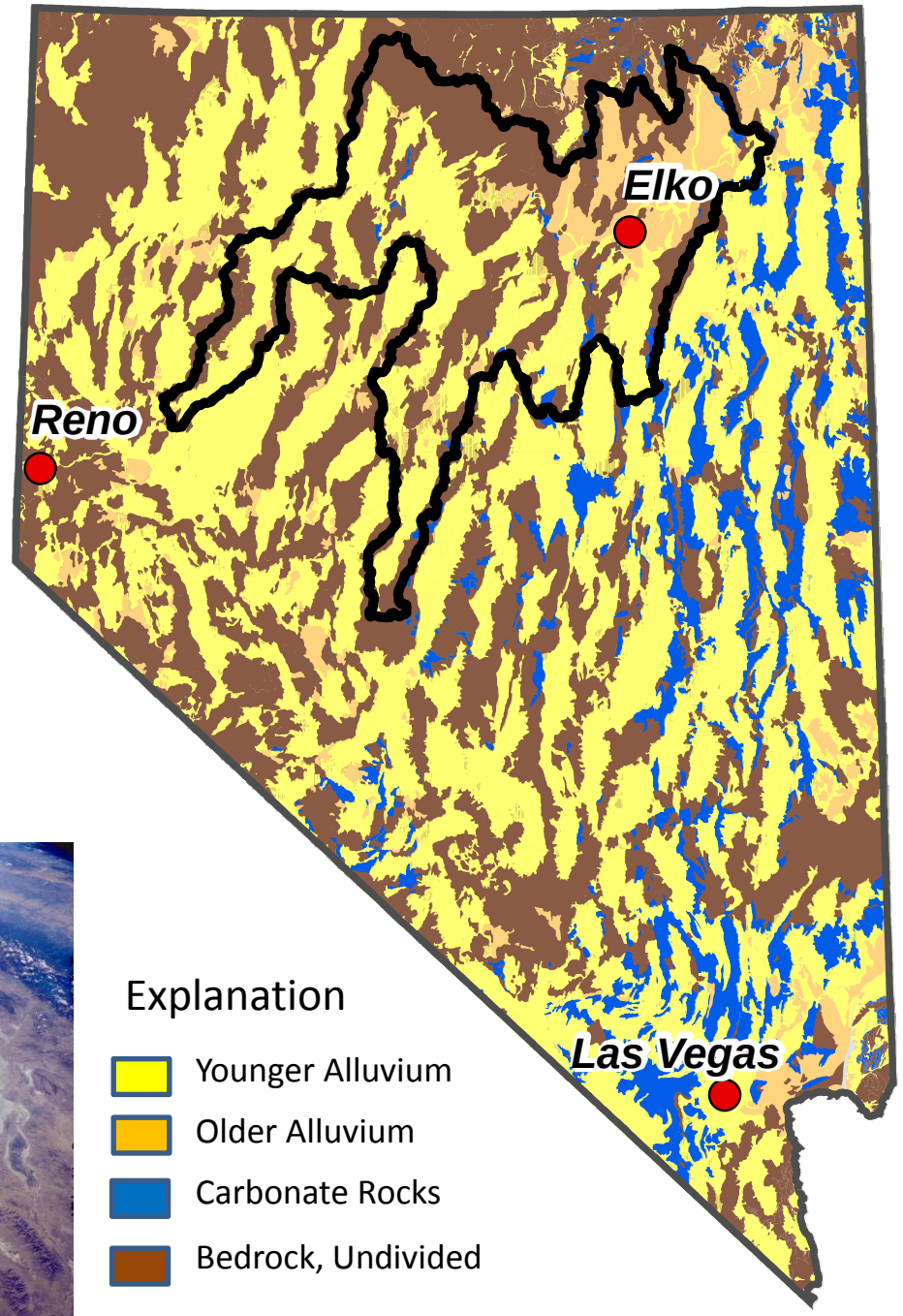
Humboldt River Basin

- 15% of State by area
  - ~17,000 square miles
  - 4-hour drive along the length of I-80
- 25% => State's surface water irrigation
  - Humboldt River: Fully decreed at 661,000 acre-feet
- 30% => State's groundwater irrigation
  - 280,000 acre-feet pumped
- 3% => State's population
  - ~ 85,000 people

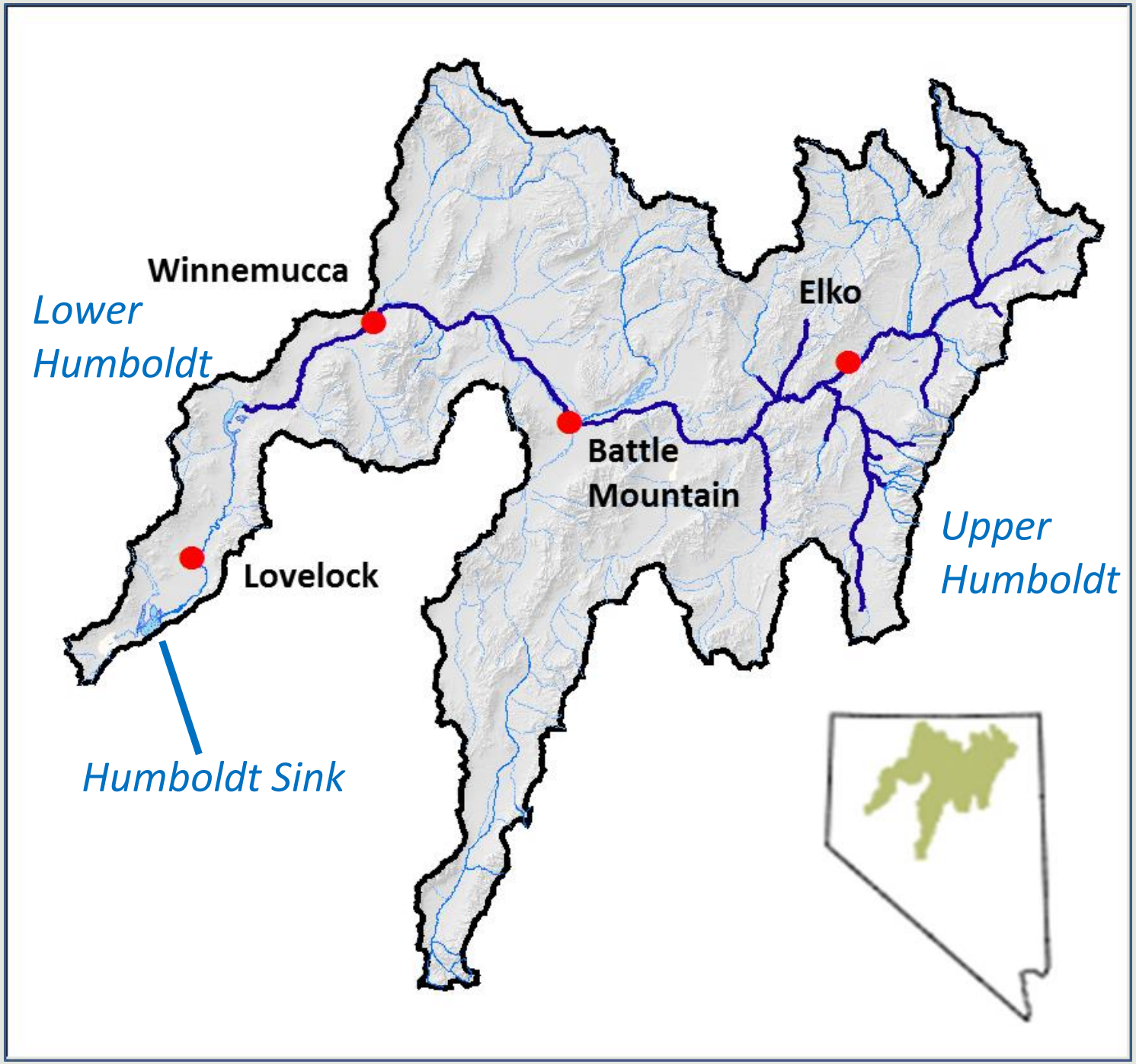


Humboldt River Basin

- Basin and Range topography
- Multiple basin-fill aquifers separated by elongate mountain ranges
- Up to 6,000 feet of relief
- Basin-fill as deep as mountains are high



Humboldt River Basin



Surface Water

- 300,000 afy = Average Annual Flow
- 661,000 afy = Decreed SW rights
- SW use ~ 100% Ag
- Only storage capacity is in Lower reach

Groundwater

- 320,000 afy = Annual Pumpage
- 667,000 afy = Permitted GW rights
- GW use ~ 70% Ag
- 429,100 afy = Water Availability (PY)

Humboldt River

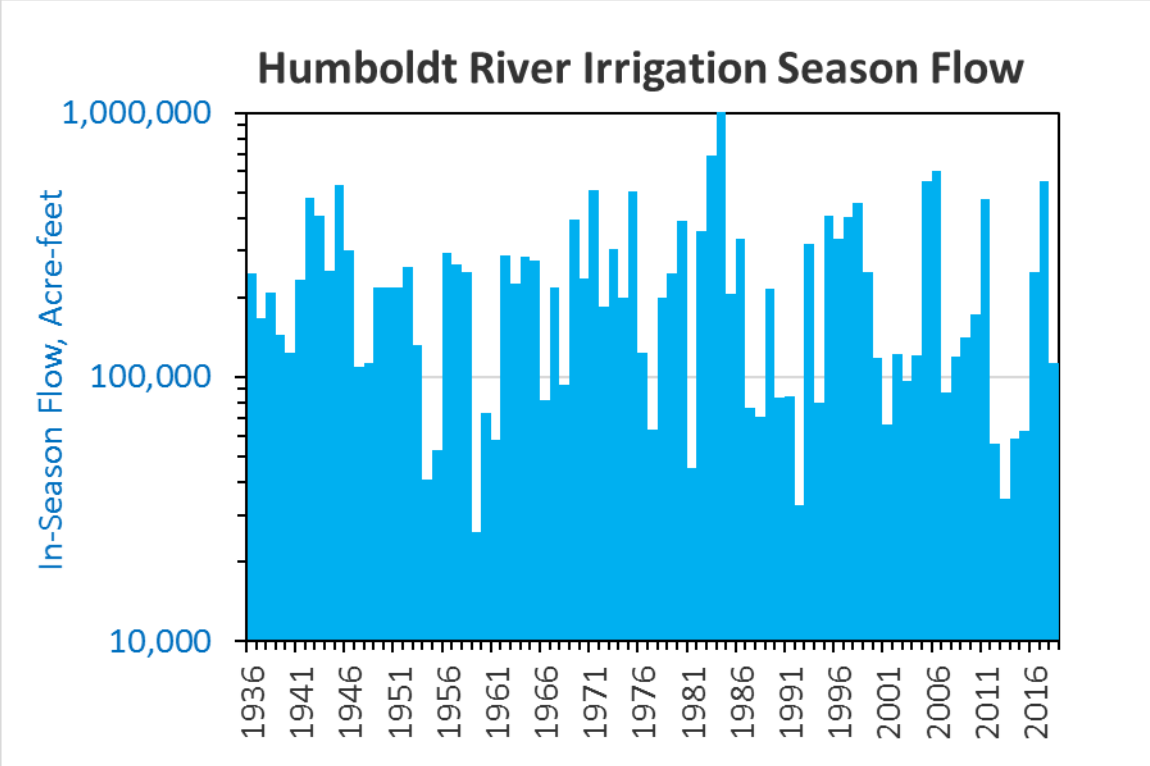
“One of the pleasantest and most invigorating exercises one can contrive is to run and jump across the Humboldt River till he is overheated, and then drink it dry.”

-Mark Twain

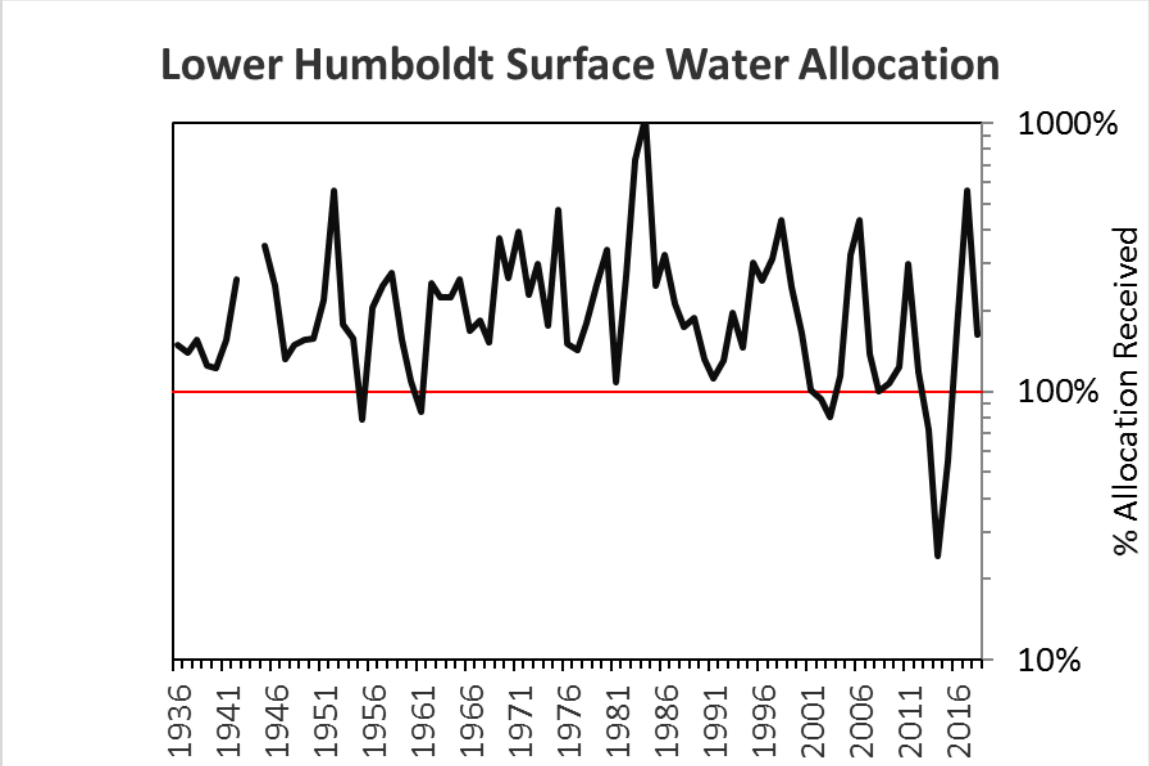
Photographs by David E. Prudic, U.S. Geological Survey during on June 9, 1999 (upper) and no flow October 18, 2003 (lower)

Humboldt River

Surface Water Availability and Allocation



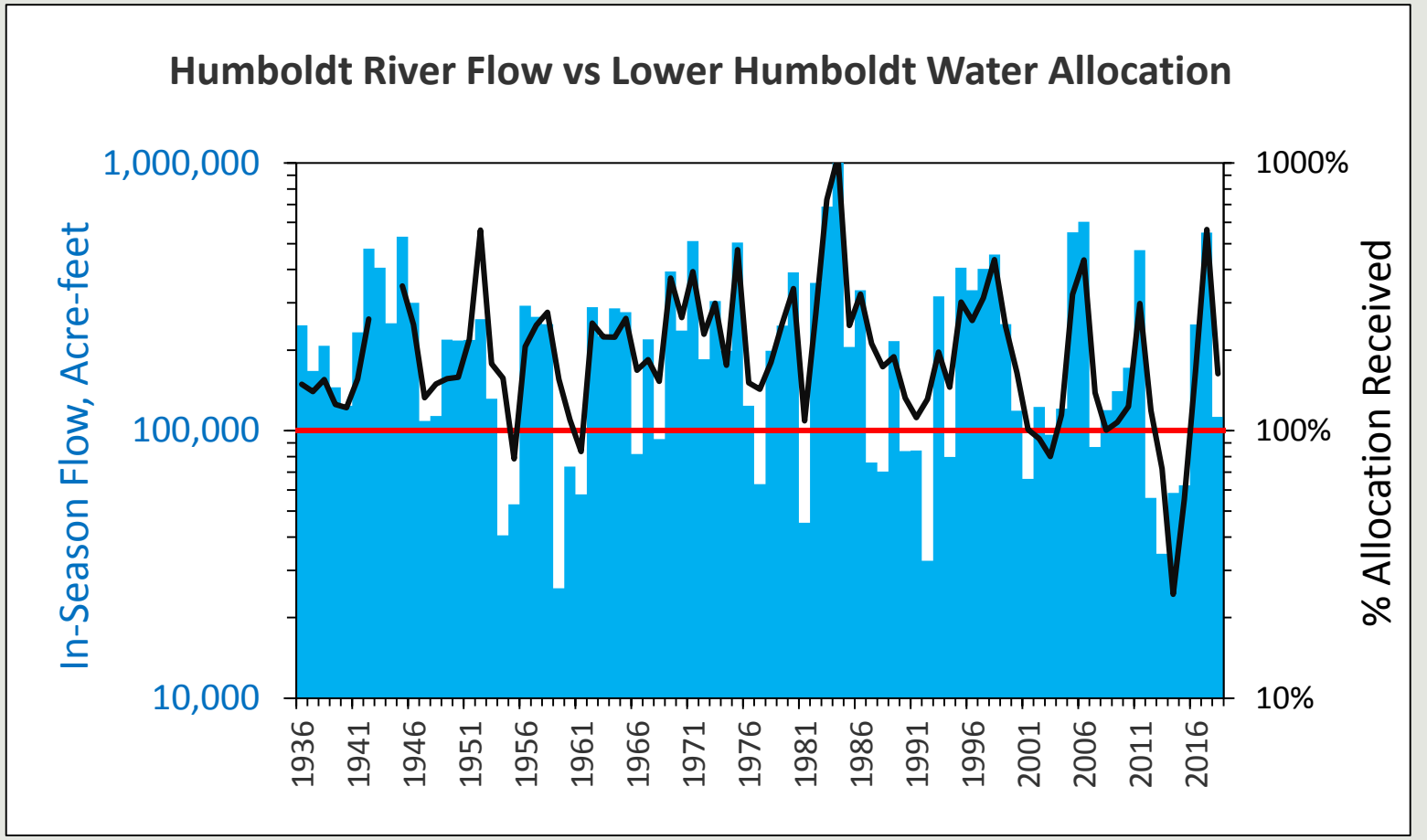
Year-to-year flow volume can vary by more than an order of magnitude



Deliveries are generally met except in 1955, 1961, 2002, and 2012-2015

Humboldt River

Surface Water Availability and Allocation



Allocations are not met during extended droughts

The Problem

- 2012-2015 drought, senior SW users did not get their scheduled deliveries while junior GW pumpers continued to pump
- State Engineer recognized the potential conflict in a hydrologically-connected system
- Curtailment by priority demonstrated to be futile

The Approach

- Develop a tool to understand SW/GW system and quantify pumping impacts
- Initiate development of conjunctive management strategy to mitigate future conflict

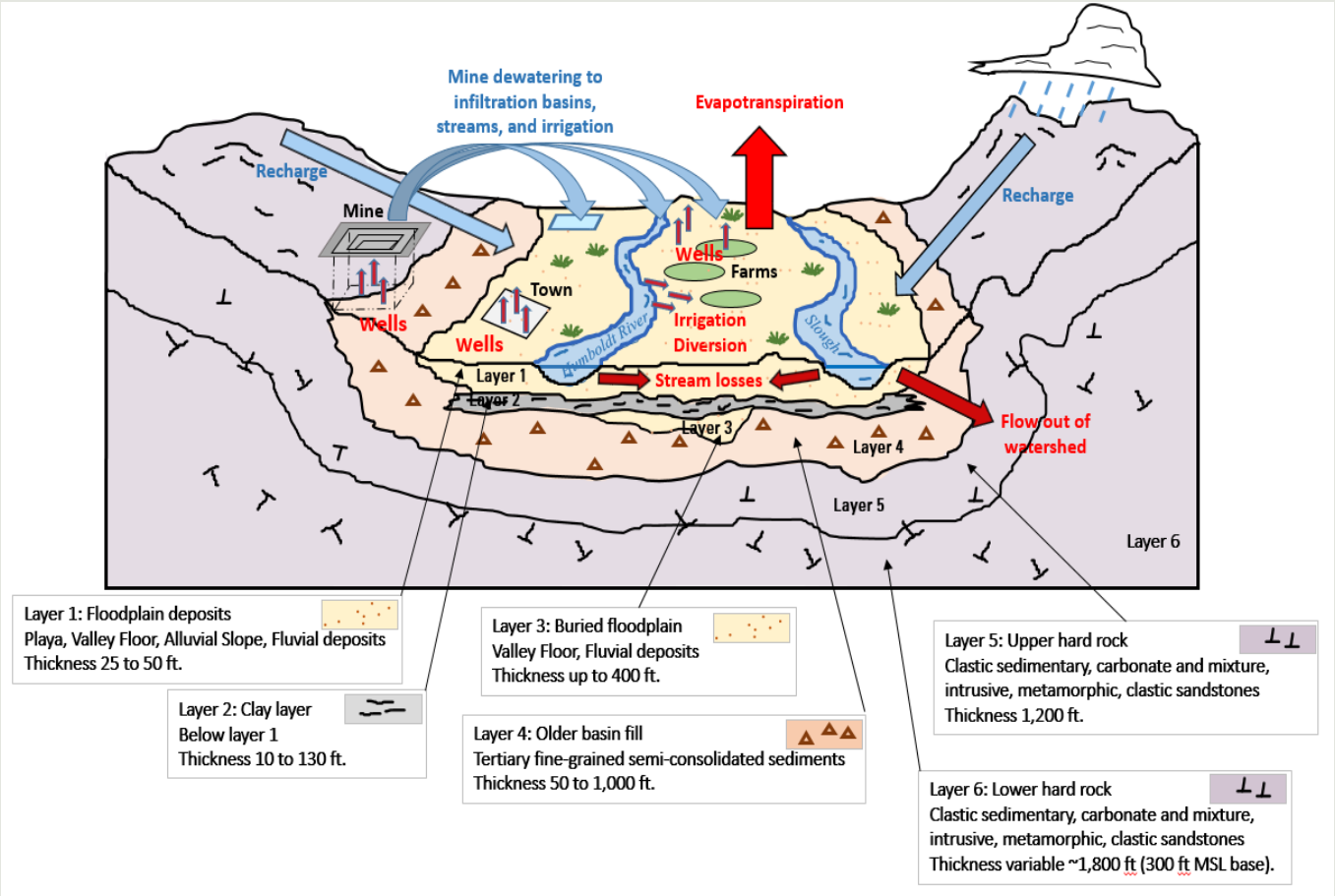
Conjunctive Management as alternative to Curtailment

Proposed Regulations:

- Consistent with conjunctive management statute
- Maximize beneficial use of the limited water resource
- **Approach problem from conflict perspective**
  - **GW users only subject to compensating SW users when conflict occurs**
  - **GW users that don't cause injury not subject to compensating SW users**
- Provide mitigation ($) to senior Decree rights if/when conflict occurs
- Incentivize reduction of pumping near river
- Allow for continued GW use for mines, municipalities, domestic well owners

The Process

SCIENCE → *LINKED TO* → *REGULATIONS*



Preliminary Draft Regulations for the Mitigation of Surface Water Conflicts in the Humboldt River Basin

GENERAL PROVISIONS

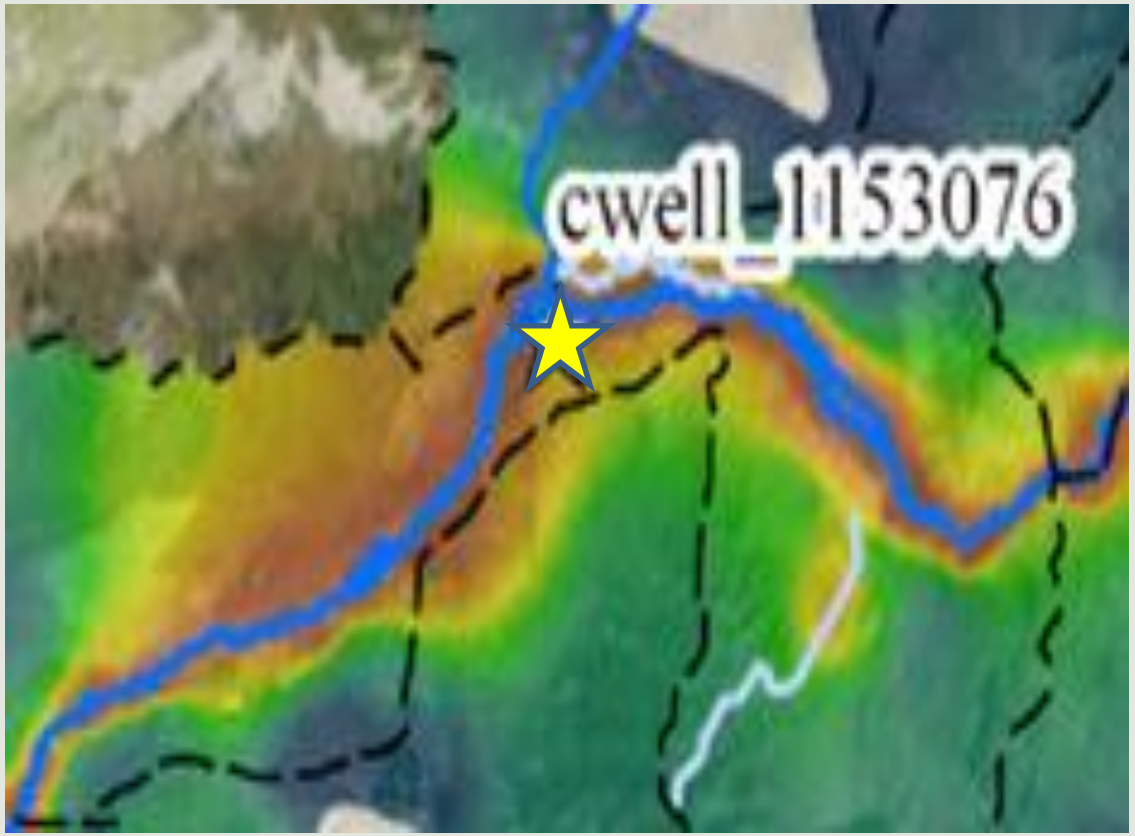
1. **Definitions.** (NRS 532.120) As used in this chapter, unless the context otherwise requires, the words and terms defined in NAC 533.xxx to 533.xxx, inclusive, have the meanings ascribed to them in those sections.
2. **"Capture" defined.** (NRS 532.120) "Capture" means a depletion of surface water caused by groundwater diversions.
3. **"Conflict" defined.** (NRS 532.120) "Conflict" means the inability of a holder of a water right to fully exercise that right due to diversions of groundwater by junior-priority water rights.

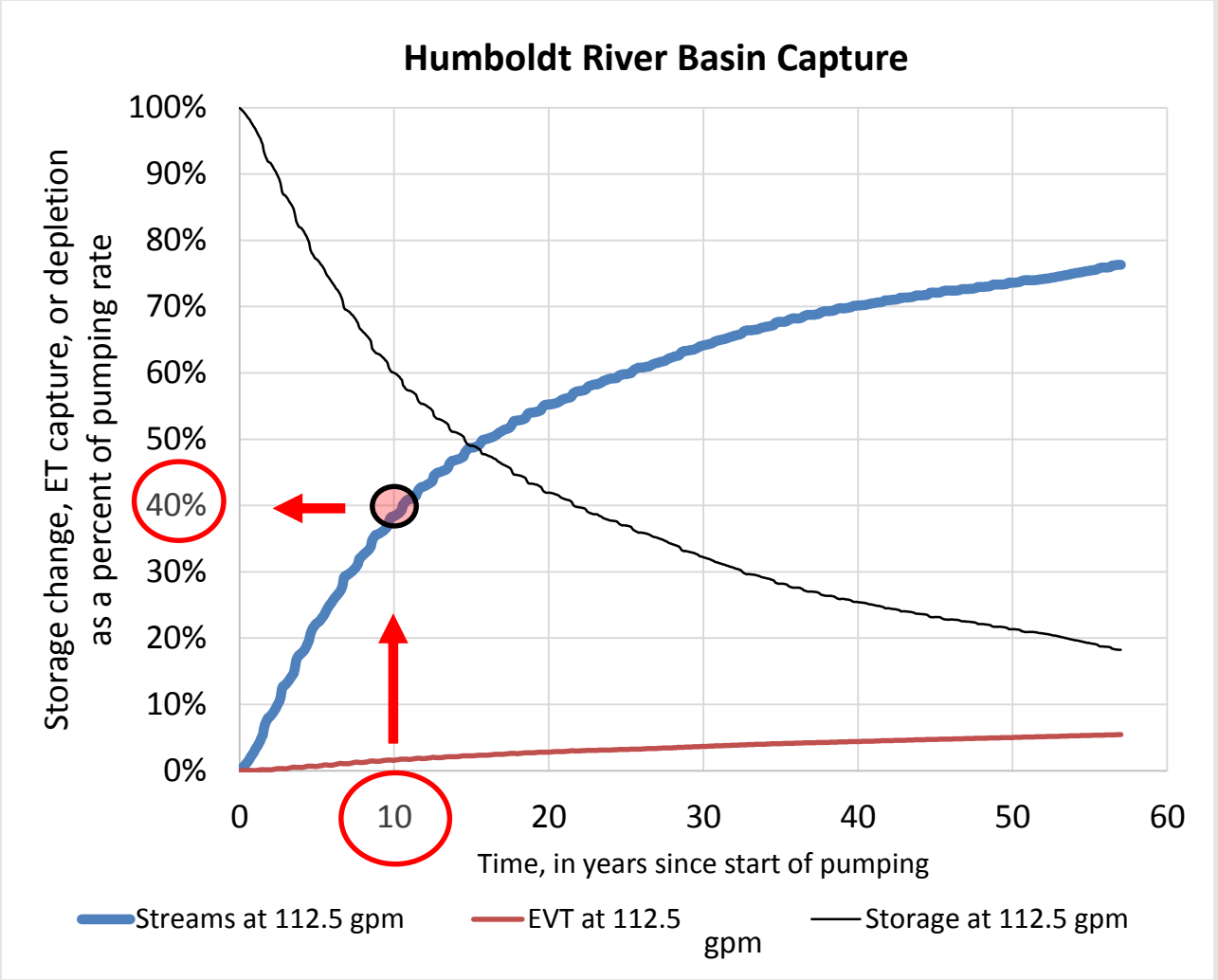
Determine Capture Amounts

SCIENCE

Hypothetical well

- **5,000 ft from Humboldt River**
- **Pumping 112.5 gpm**



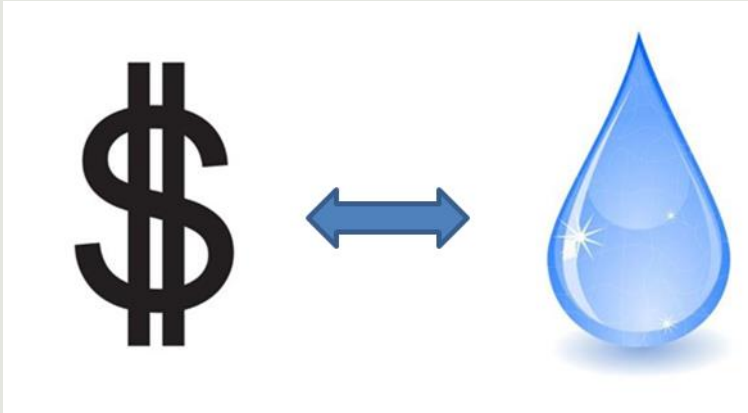


Individual Capture Amount after 10 years:

40% X 112.5 gpm = 45 gpm, or 72.6 acre-feet/year

Humboldt River Basin Proposed Regulations

REGULATIONS



General Approach:

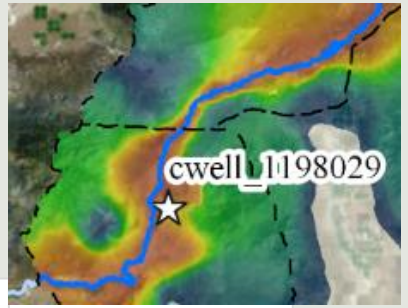
- SW users compensated based on field-measured conflict
- GW users can either avoid conflict by providing replacement water or pay for conflict by being assessed a fee based on model-derived capture amount
- Fees/compensation based on independent value of water
- Basinwide GW Fees = Basinwide SW Compensation

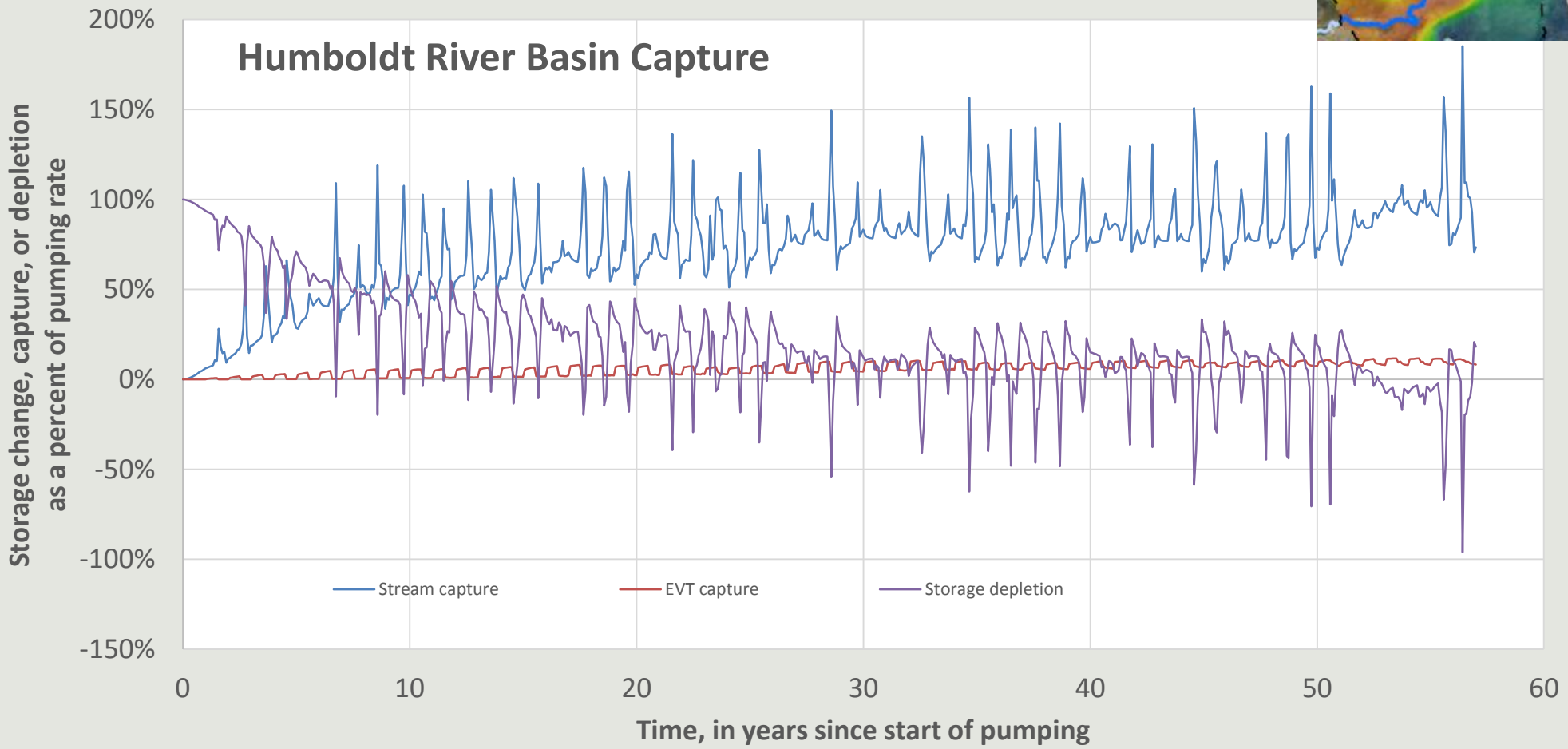
Technical Challenges

SCIENCE

Streamflow capture under varying flow conditions (hypothetical well #1198029)

- **5,800 ft from Humboldt River**





Regulations Challenges

- SW users want water, not money
- GW users are not convinced they cause conflict
- Do not provide a direct or immediate fix a water shortage on the river
- Mitigation assessment fees not addressed in Nevada Statutes
- Assessment fees may prove too costly for some users
- Unintended implications for other statewide management issues

Ultimately will need to either increase supply or decrease demand on surface water supply

Lessons Learned (so far)

- Dynamic, nonlinear nature of surface water/groundwater connection in the Humboldt River Basin poses a challenge to developing a groundwater model that can be used as an effective tool for conflict management
- Developing management scheme (regulations) and tools (science) at the same time, while maintaining participation and buy-in from both surface water and groundwater users, is a challenge
- Even with strong stakeholder participation, divisive nature of issue (GW vs SW) will make it hard to get buy-in for regulations, legislative support, etc.

- Stay tuned……..


QUESTIONS