

NORM JONES – BRIGHAM YOUNG UNIVERSITY

# Debating the Long-Term Impact of the Southern Nevada Pumping Project

# Background

- 28 wells
- 306 miles of pipelines
- 5 pumping stations
- Construction
  - 2011-2022
- Cost
  - \$7B
  - \$15B including financing costs



Clark, Lincoln, and  
White Pine Counties  
Groundwater  
Development

EIS

Ely

Las Vegas



# Opposition



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## Environmental coalition calls for rejection of SNWA groundwater pumping proposal

Story

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Attorney for Mormon church offers dire warning at water pipeline hearing



CATHLEEN ALLISON/THE ASSOCIATED PRESS

Las Vegas attorney Paul Hejmanowski, who represents the Mormon church, listens Monday to input on a pipeline plan that involves White Pine County's Spring Valley.

BY HENRY BREAN  
LAS VEGAS REVIEW-JOURNAL

Posted: Sep. 26, 2011 | 12:38 p.m.  
Updated: Sep. 27, 2011 | 7:27 a.m.

Every spring will run dry in the vast valley just west of Nevada's only national park if the Southern Nevada Water Authority is allowed to pump all the groundwater it wants and pipe it to Las Vegas.

That was the dire warning delivered Monday by an attorney for a new and

### Tools

29 22

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### News & Articles

Dec. 16, 2011

#### ONCE AGAIN THE WATER AUTHORITY SAYS "NO" TO CONSERVATION OF WATER

In the newest battle over how much you pay for water, the Southern Nevada Authority wants a "flat" rate increase to cover its mounting debt. Conservationists say the rate increase will cost thousands of dollars more per year.



opposed to a plan by the Southern Nevada Water Authority to supply future demand says the project is unnecessary, and that the project would cost \$1.5 billion.

from Nevada residents expressing concern about the will rule early next year on the first set of groundwater needed Nov. 18.

through Dec. 2.



# Project Location

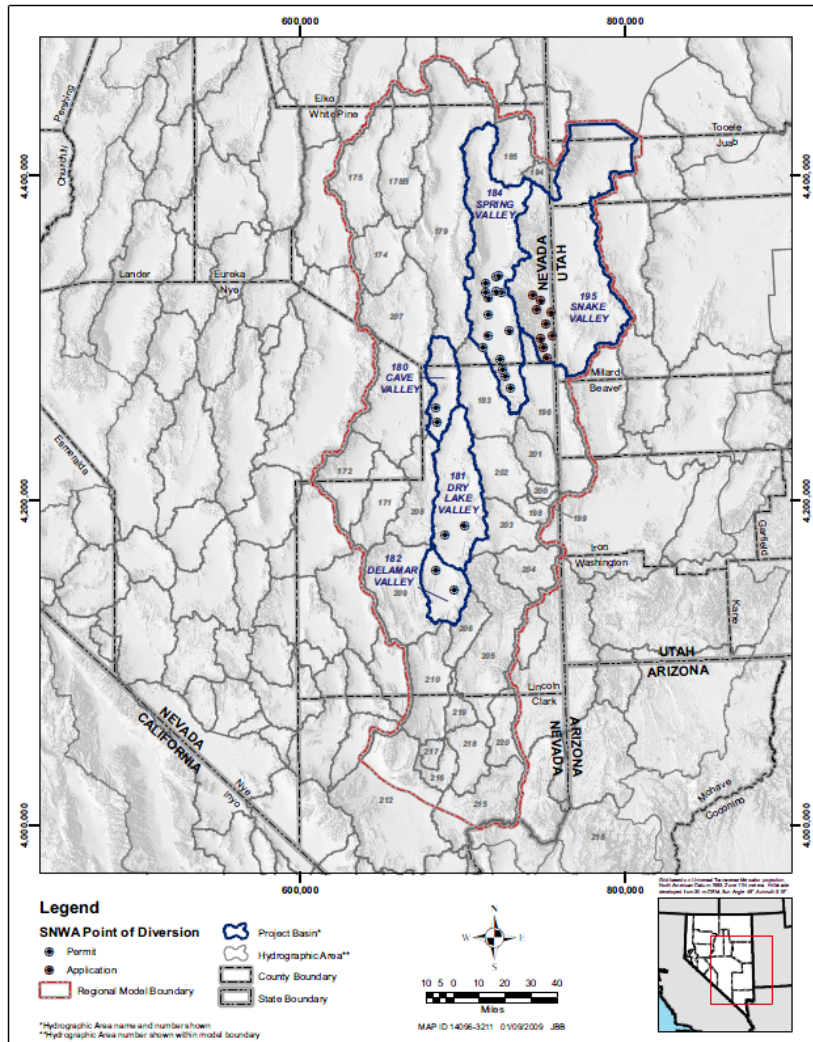
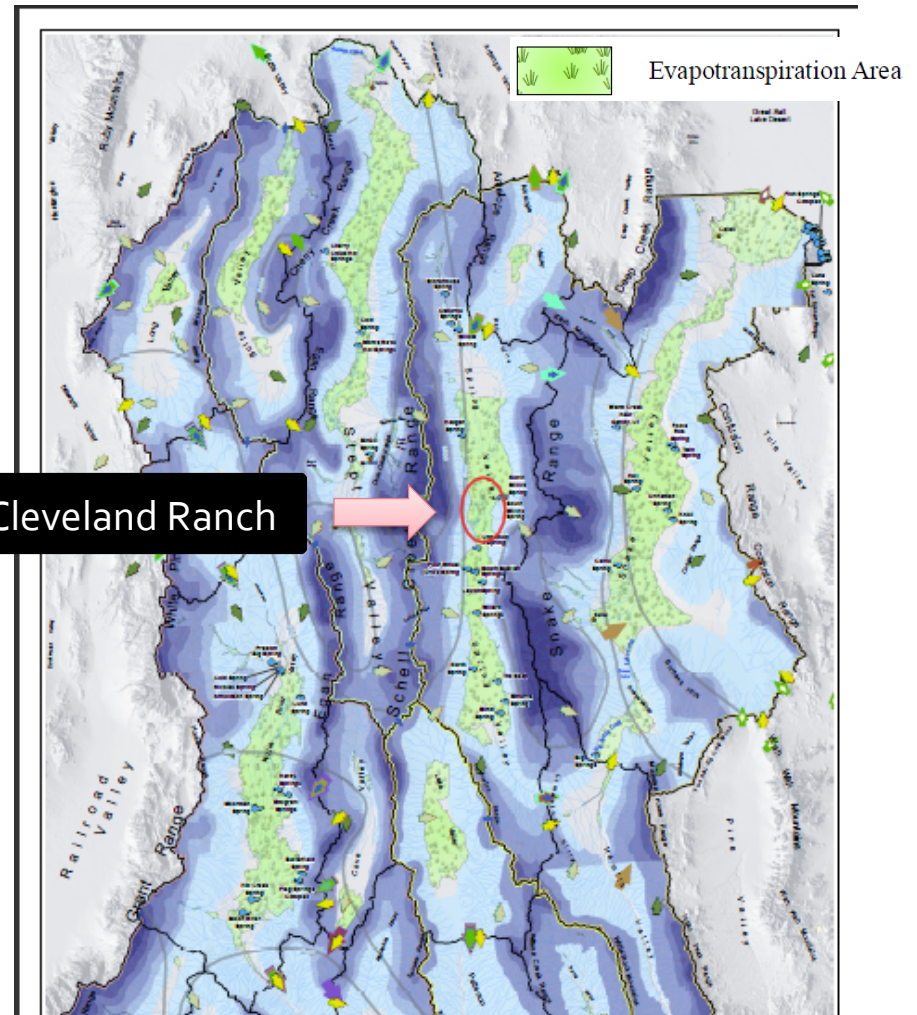


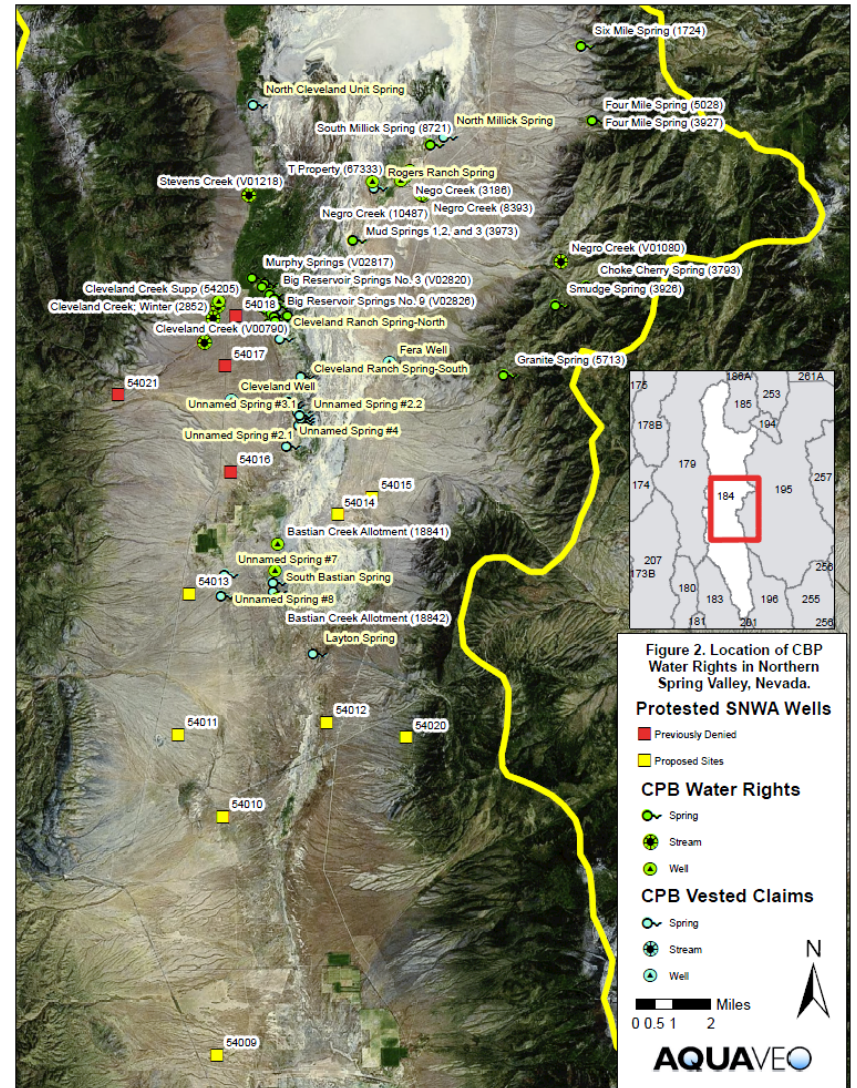
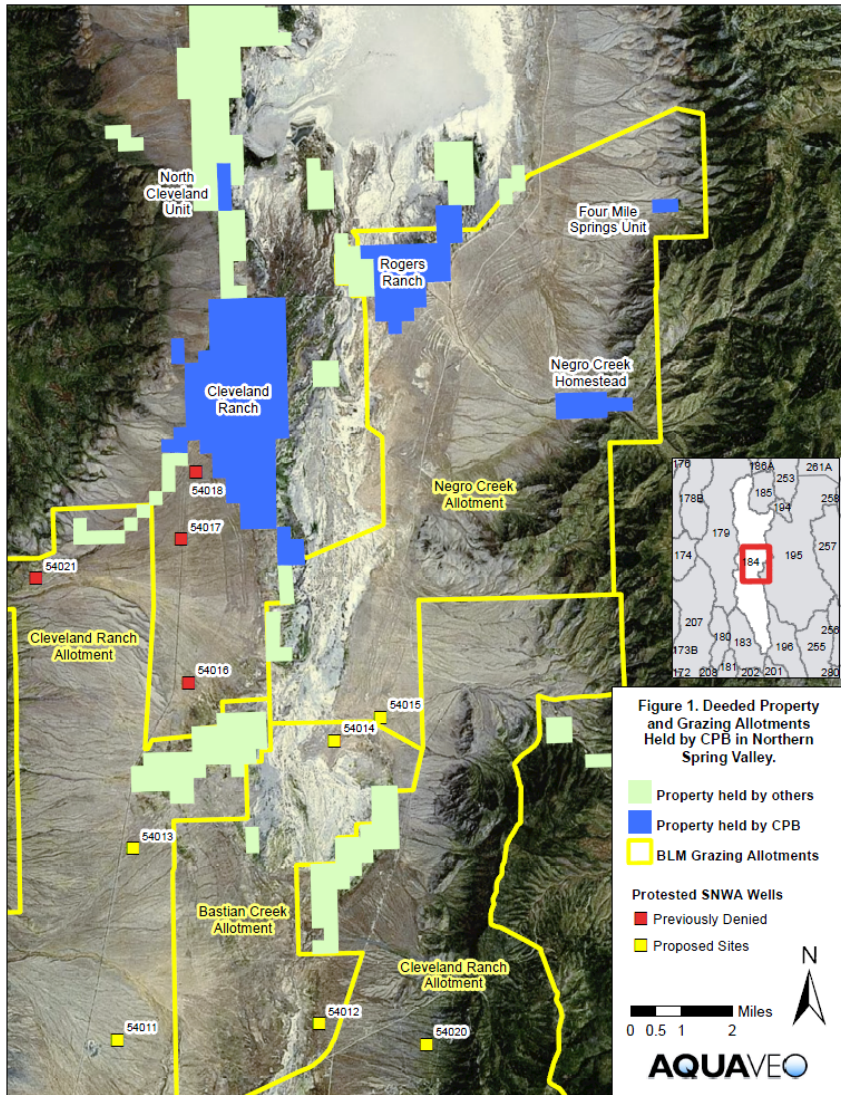
Figure 1-2

Location of Project Basins and Points of Diversion



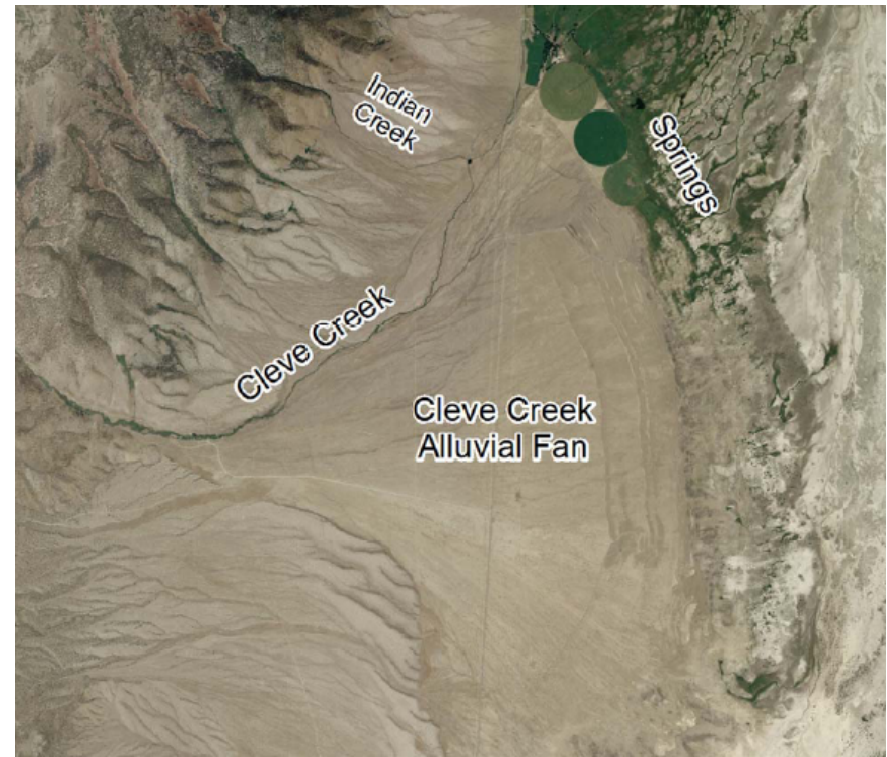


# Cleveland Ranch





# Hydrogeologic Setting



# Cleveland Ranch

IN THE OFFICE OF THE STATE ENGINEER  
OF THE STATE OF NEVADA

IN THE MATTER OF APPLICATIONS )  
53987 THROUGH 53992, INCLUSIVE )  
AND 54003 THROUGH 54021, INCLUSIVE )  
FILED TO APPROPRIATE THE )  
UNDERGROUND WATERS OF SPRING )  
VALLEY, CAVE VALLEY, DELAMAR )  
VALLEY AND DRY LAKE VALLEY )  
HYDROGRAPHIC BASINS (180, 181, 182 )  
AND 184), LINCOLN COUNTY AND )  
WHITE PINE COUNTY, NEVADA. )

OPENING STATEMENT ON  
BEHALF OF THE CLEVELAND  
RANCH

## I. PRELIMINARY STATEMENT

The Cleveland-Rogers Ranch (the "Ranch") operates in northern Spring Valley on 7,000 acres of fee land and approximately 60,000 acres of grazing allotments.<sup>1</sup> To support this major agricultural project, the Ranch has 5,071 AFA of certified or deeded surface water rights, 26,400 AFA of claims of vested irrigation surface water rights, and 2,082 AFA of supplemental

- 12 of 19 wells in Spring Valley protested by CPB
- Formal protests filed by several other groups, including Great Basin Water Network

## Impact of Proposed SNWA Wells on CPB Water Rights in Northern Spring Valley, Nevada

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August 26, 2011

Submitted to:

Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints,  
a Utah corporation sole  
50 East North Temple St.  
Salt Lake City UT 84150

Submitted by:

**AQUAVEO**  
Water Modeling Solutions





# Arguments in Favor

Southern Nevada Water Authority

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# SNWA Modeling Report

## **Conflicts Analysis Related to Southern Nevada Water Authority Groundwater Applications in Spring, Cave, Dry Lake, and Delamar Valleys, Nevada and Vicinity**

PRESENTATION TO THE OFFICE OF THE NEVADA STATE ENGINEER

Prepared by



SOUTHERN NEVADA  
WATER AUTHORITY

# Drawdown Analysis

**Table C-1**  
**Model Simulated Results at Spring Valley Water-Right Locations**  
**Spring Valley Production Begins in Year 2028**  
 (Page 2 of 3)

App	Source	Geographic Location	Simulated Drawdown Greater than 50 ft for Specified Year				
			2029	2042	2062	2082	2117
11355	UG	Alluvial Fan/Valley Floor	No	No	No	No	No
12467	UG	Alluvial Fan	No	No	No	No	No
13457	STR	Alluvial Fan	No	No	No	No	No
16890	UG	Alluvial Fan	No	No	No	No	No
18043	UG	Valley Floor	No	No	No	No	No
18044	UG	Valley Floor	No	No	No	No	No
18045	UG	Valley Floor	No	No	No	No	No
18841	UG	Valley Floor	No	No	No	Yes	Yes
18842	UG	Valley Floor	No	No	No	Yes	Yes
18843	UG	Valley Floor	No	No	No	Yes	Yes
19435	RES	Alluvial Fan/Valley Floor	No	No	No	No	No
19436	RES	Alluvial Fan/Valley Floor	No	No	No	No	No
21220	STR	Alluvial Fan	No	No	No	No	No



# Impact on Springs

**Table C-5  
Environmental Areas of Interest  
Model Simulated Changes in Discharge**

Site ID	Name	Hydrographic Area	Site Type	Geographic Location	Model Simulated Discharge Reduction Greater than 15 percent for Specified Year				
					2029	2042	2062	2082	2117
<b>Spring Valley and Vicinity</b>									
1847101	Keegan Spring near Piermont, NV	Spring Valley	Spring	Alluvial Fan/Valley Floor	No	No	No	No	No
1845702	South Millick Spring	Spring Valley	Spring	Valley Floor	No	No	Yes	Yes	Yes
1951901	Big Springs	Snake Valley	Spring	Alluvial Fan	No	No	No	No	No
<b>Cave, Dry Lake, Delamar Valleys and Vicinity</b>									
2070901	Preston Big Spring	White River Valley	Spring	Alluvial Fan/Valley Floor	No	No	No	No	No
2071501	Hardy Springs	White River Valley	Spring	Alluvial Fan/Valley Floor	No	No	No	No	No
2071101	Moorman Spring	White River Valley	Spring	Valley Floor	No	No	No	No	No
2071401	Butterfield Spring	White River Valley	Spring	Alluvial Fan/Valley Floor	No	Yes	Yes	Yes	Yes
2071301	Flag Springs	White River Valley	Spring	Alluvial Fan/Valley Floor	No	Yes	Yes	Yes	Yes
2070501	Hot Creek Spring near Sunnyside, NV	White River Valley	Spring	Valley Floor	No	No	No	No	No
2090101	Hiko Spring	Pahranagat Valley	Spring	Valley Floor	No	No	No	No	No
2090401	Crystal Springs	Pahranagat Valley	Spring	Valley Floor	No	No	No	No	No
2090501	Ash Springs	Pahranagat Valley	Spring	Valley Floor	No	No	No	No	No
2191501	Moapa National Wildlife Refuge Warm Springs West	Muddy River Springs Area	Spring	Valley Floor	No	No	No	No	No

Source: Environmental Areas of Interest identified in Marshall and Luptowitz (2011)

<sup>a</sup>UTM, NAD83, Zone 11N

2029

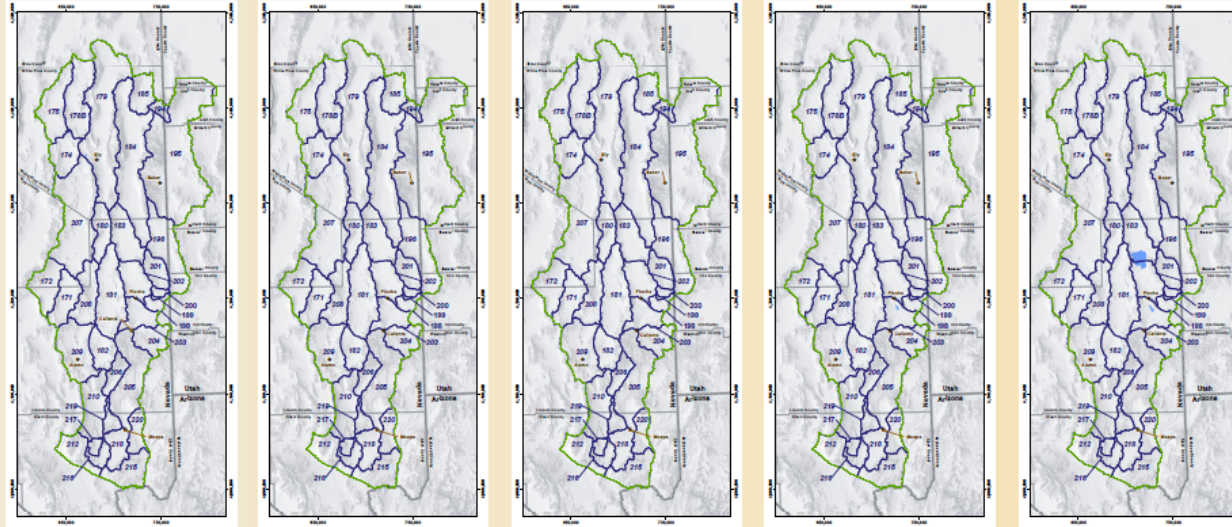
2042

2062

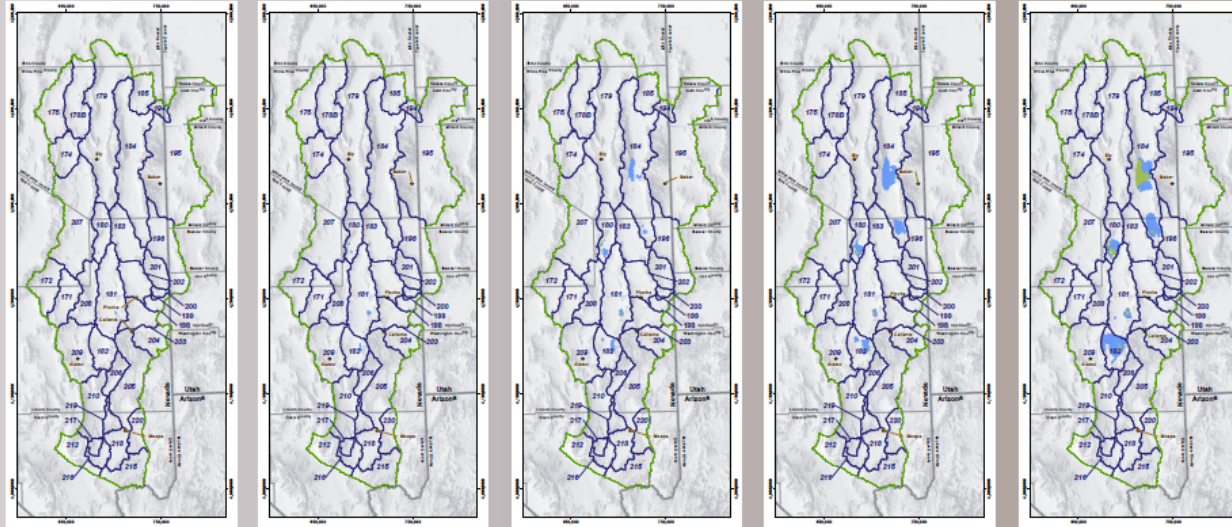
2082

2117

Baseline



POD



SNWA  
Drawdown  
Contour  
Maps

Legend

- ★ Town
  - State Boundary
  - ⬭ CCRP Model Boundary
  - County Boundary
  - ⬭ Hydrographic Area within Model Boundary:
- 1 Depicted drawdowns do not include effects of baseline pumping.  
2 Hydrographic Area number shown.

Drawdown (feet)

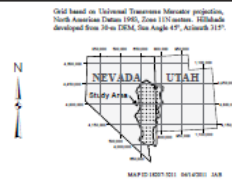
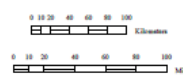
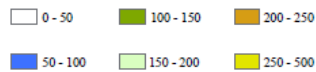


PLATE 2 - SIMULATED DRAWDOWN CONDITIONS FOR THE BASELINE AND POINTS OF DIVERSION MODEL SIMULATIONS

# SNWA Arguments - Summary

- Water is critical to future of Las Vegas
- No harm to senior water rights (monitor-manage-mitigate)
- Model represents worst case scenario
- Some unavoidable changes to eco-system



# Arguments in Opposition

Cleveland Ranch

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# Model Simulated Drawdown

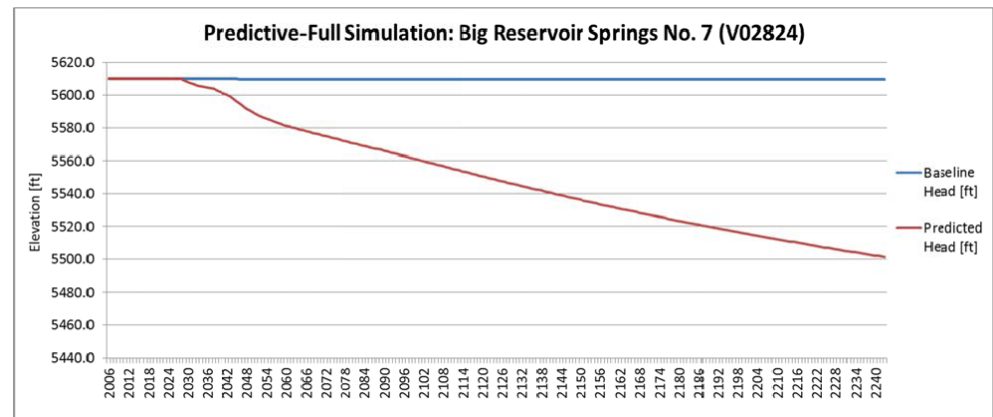
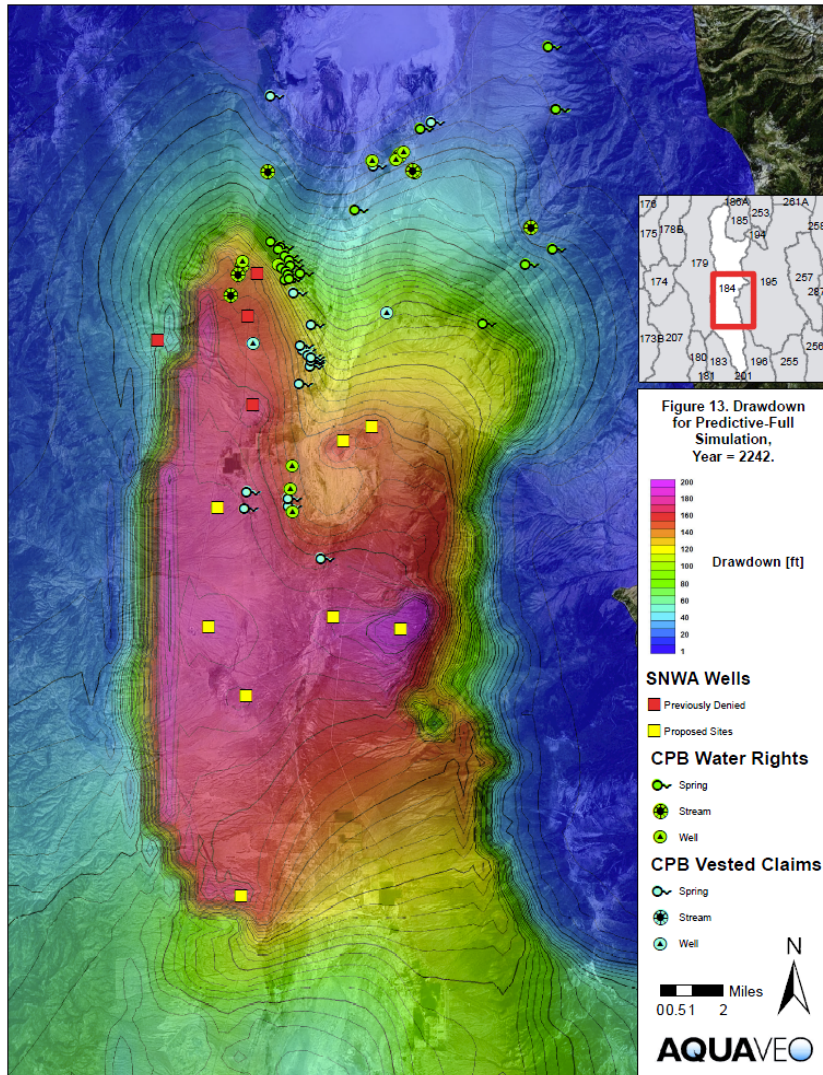


Figure 21 Simulated Head vs. Time for Big Reservoir Springs No. 7.

Drawdown = 150-200 ft for most water rights locations!

# Impact on Springs

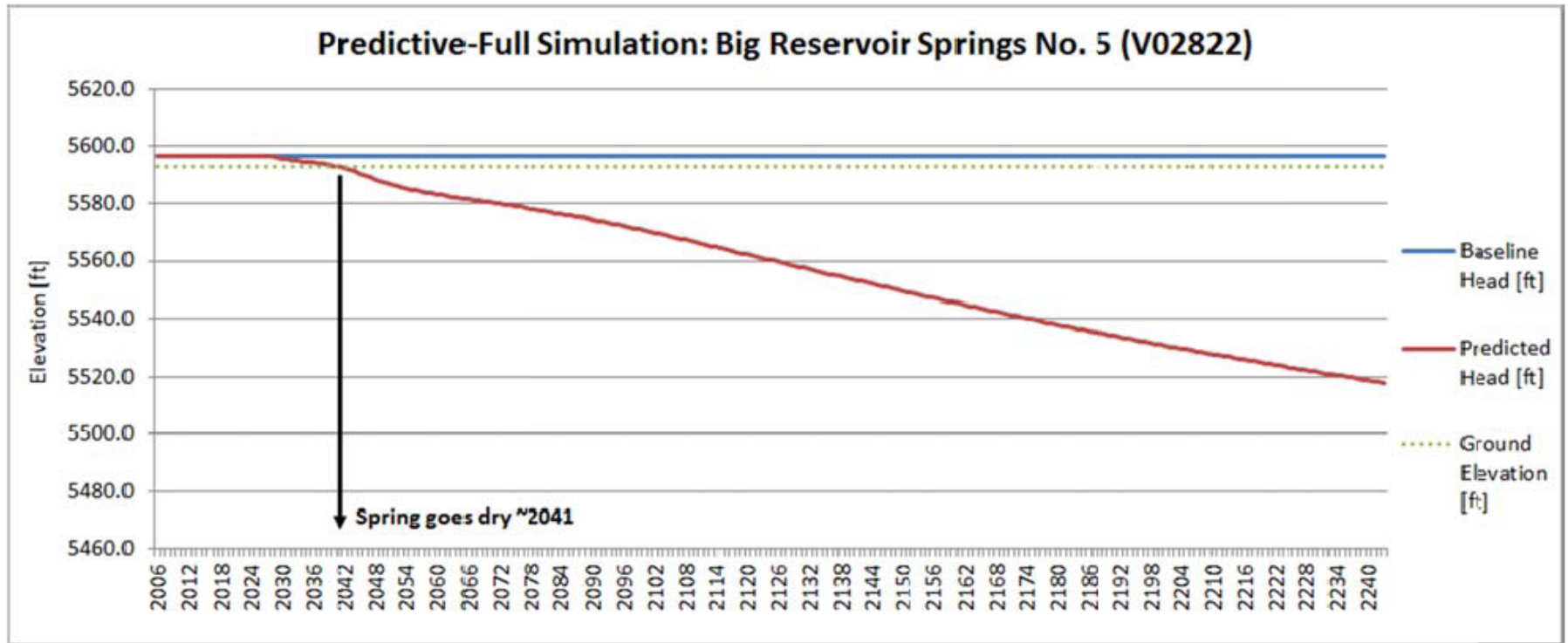
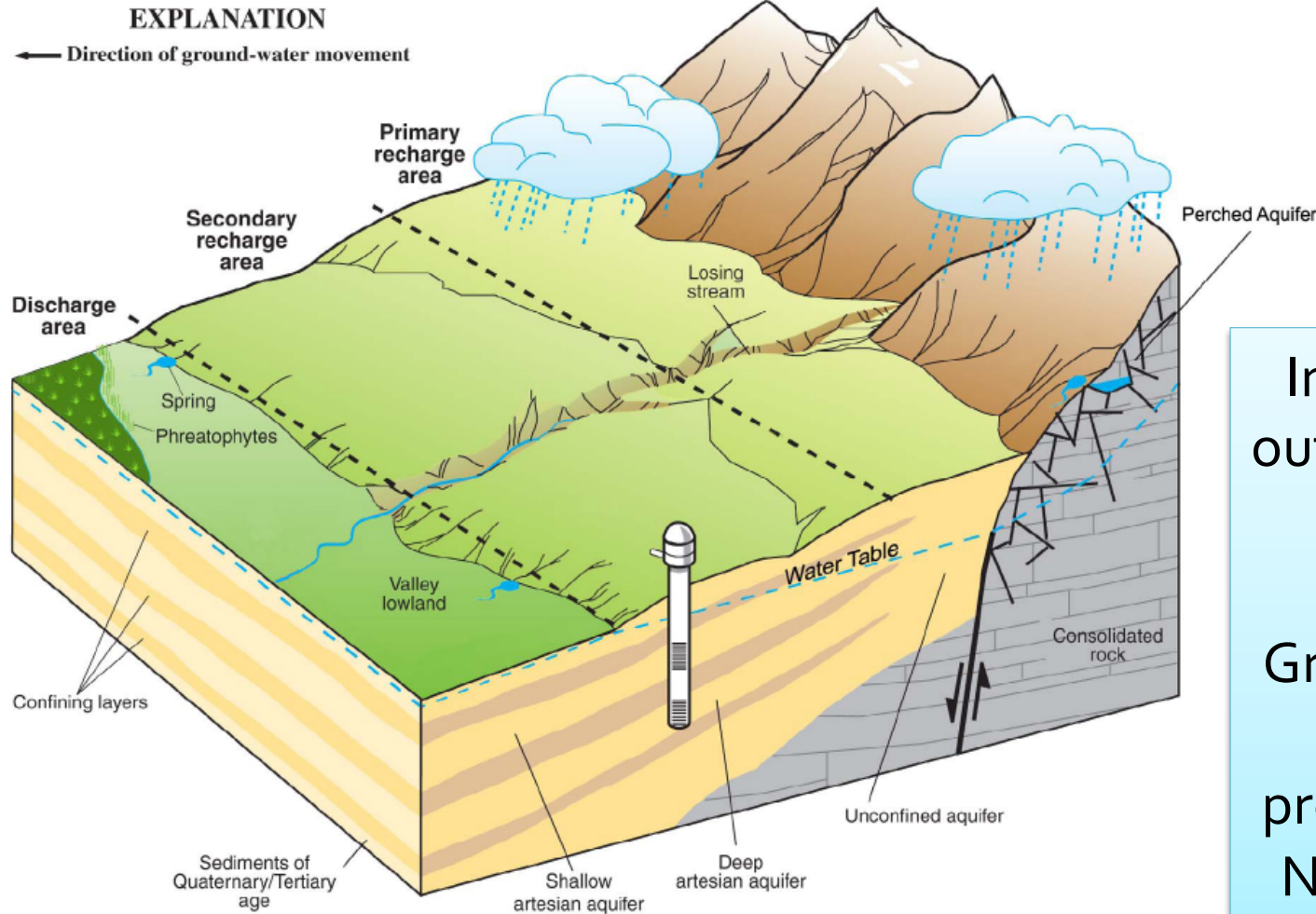


Figure 26 Simulated Head Relative to Spring Elevation.

Virtually all valley floor springs go dry after a few years of pumping!



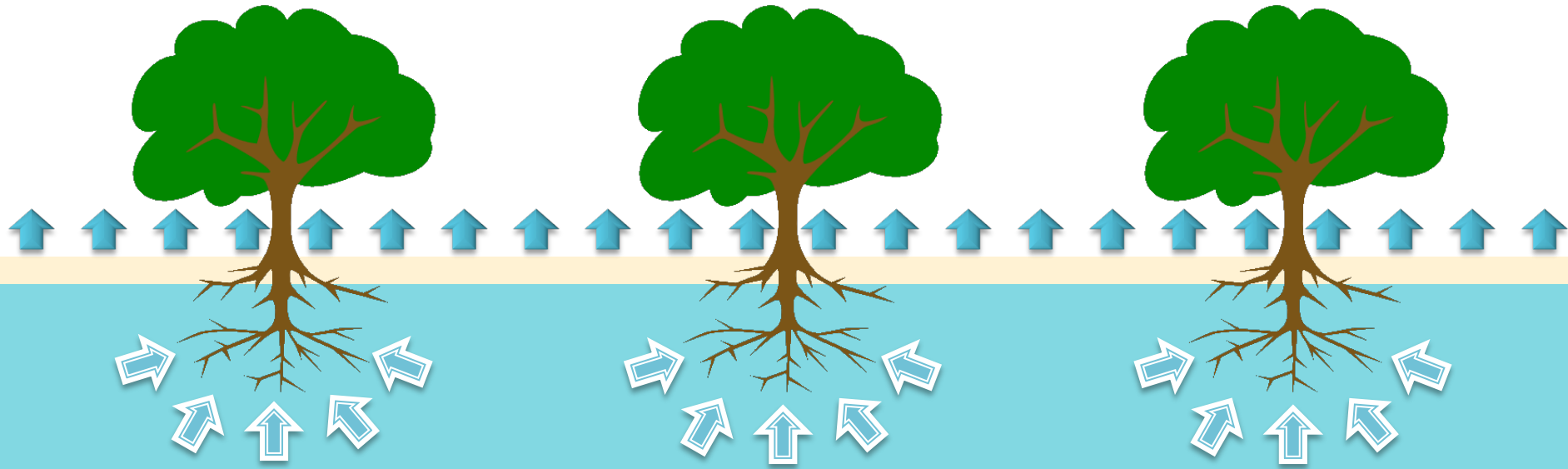
# Water Balance



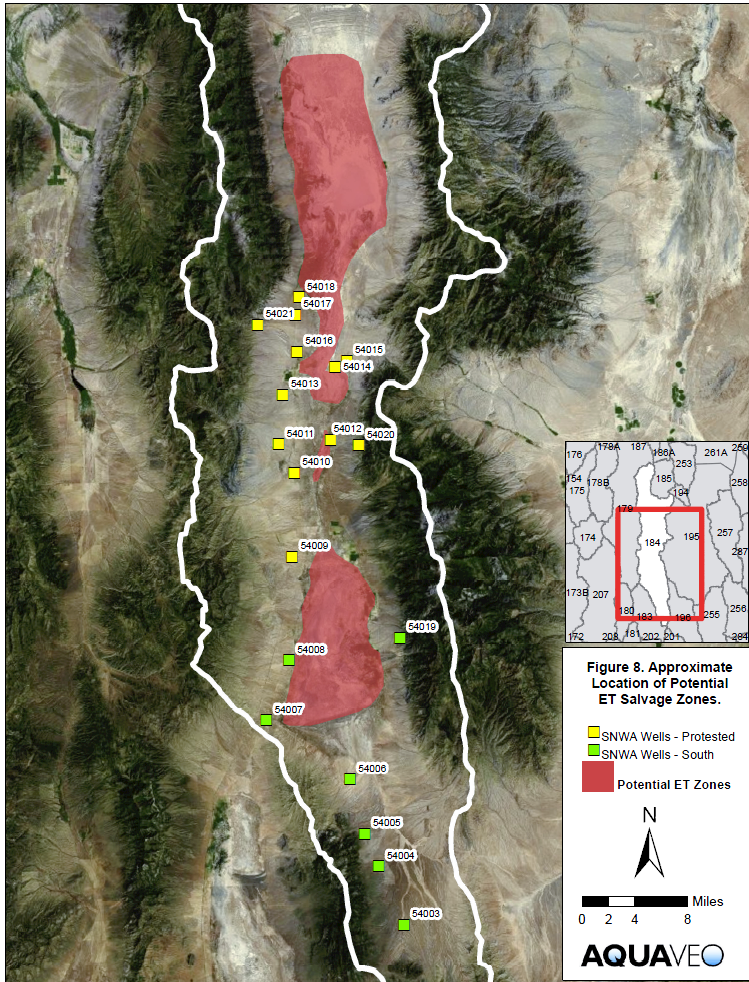
Inflows and outflows must balance.

Groundwater mining is prohibited by Nevada Law

# Evapotranspiration



# ET Salvage



- Sustainable yield for valley based primarily on concept of ET salvage
- Pumping system will draw down water table below ET extinction depth
- Water currently lost to surficial discharge will be captured



# Groundwater Mining

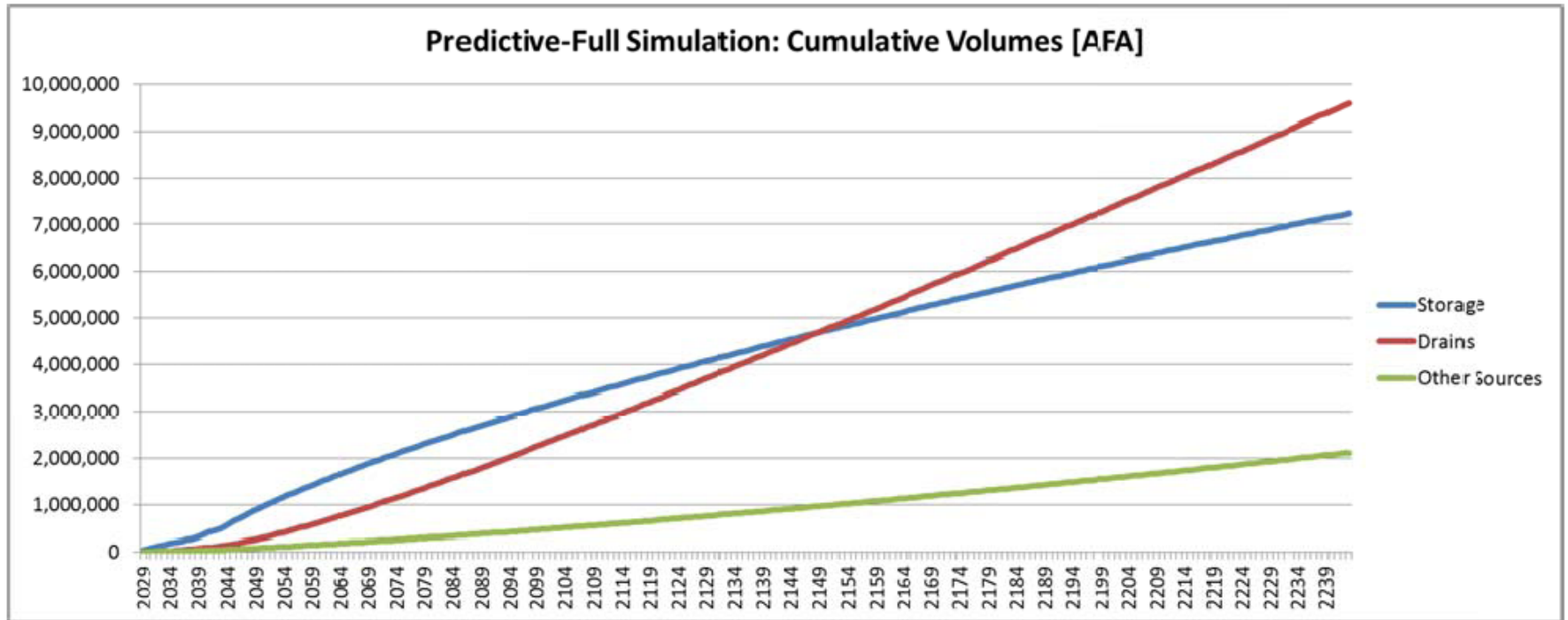


Figure 32 Cumulative Net Change in Volume for Source Categories for Predictive-Full Simulation.

System never reaches equilibrium  
Groundwater Mining!

# Incomplete ET Capture

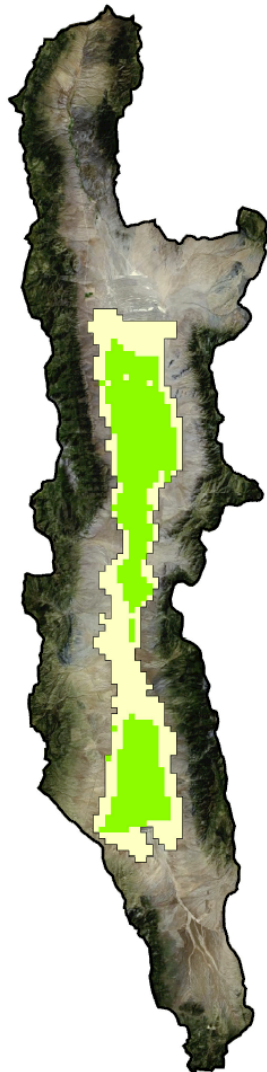


Figure 40. Active ET Drain Cells in Spring Valley, 2029.

Inactive Drain Cells

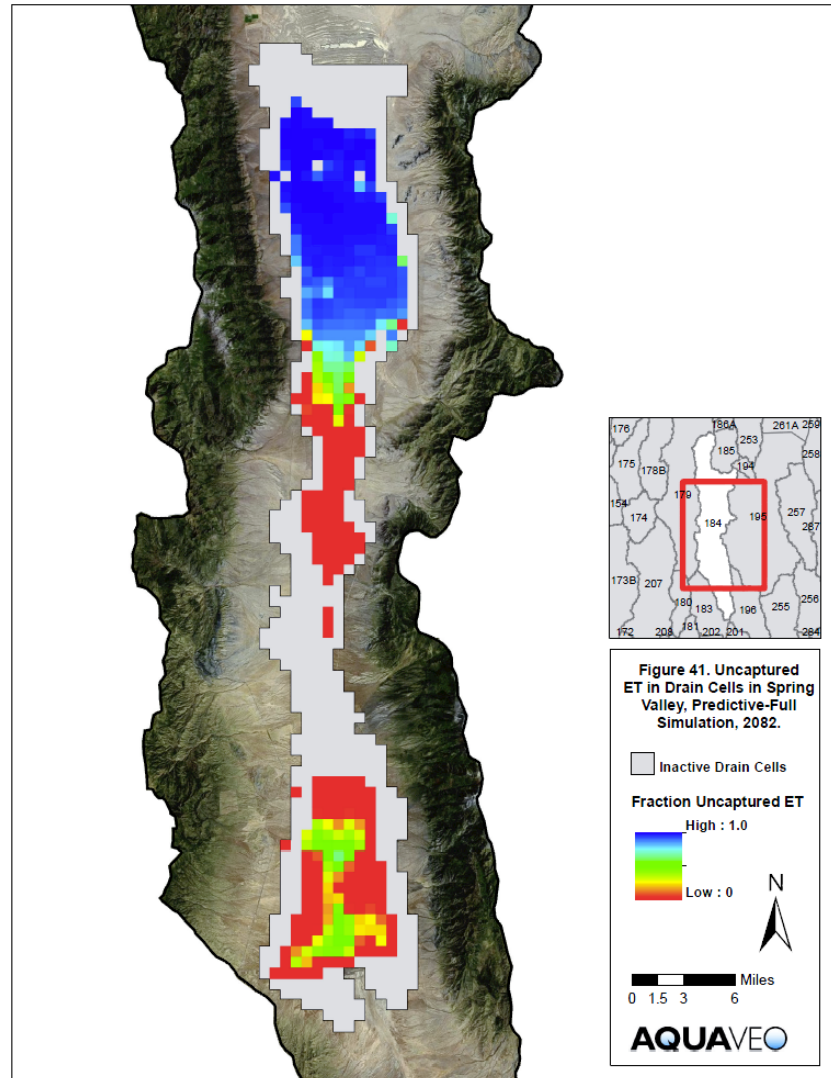


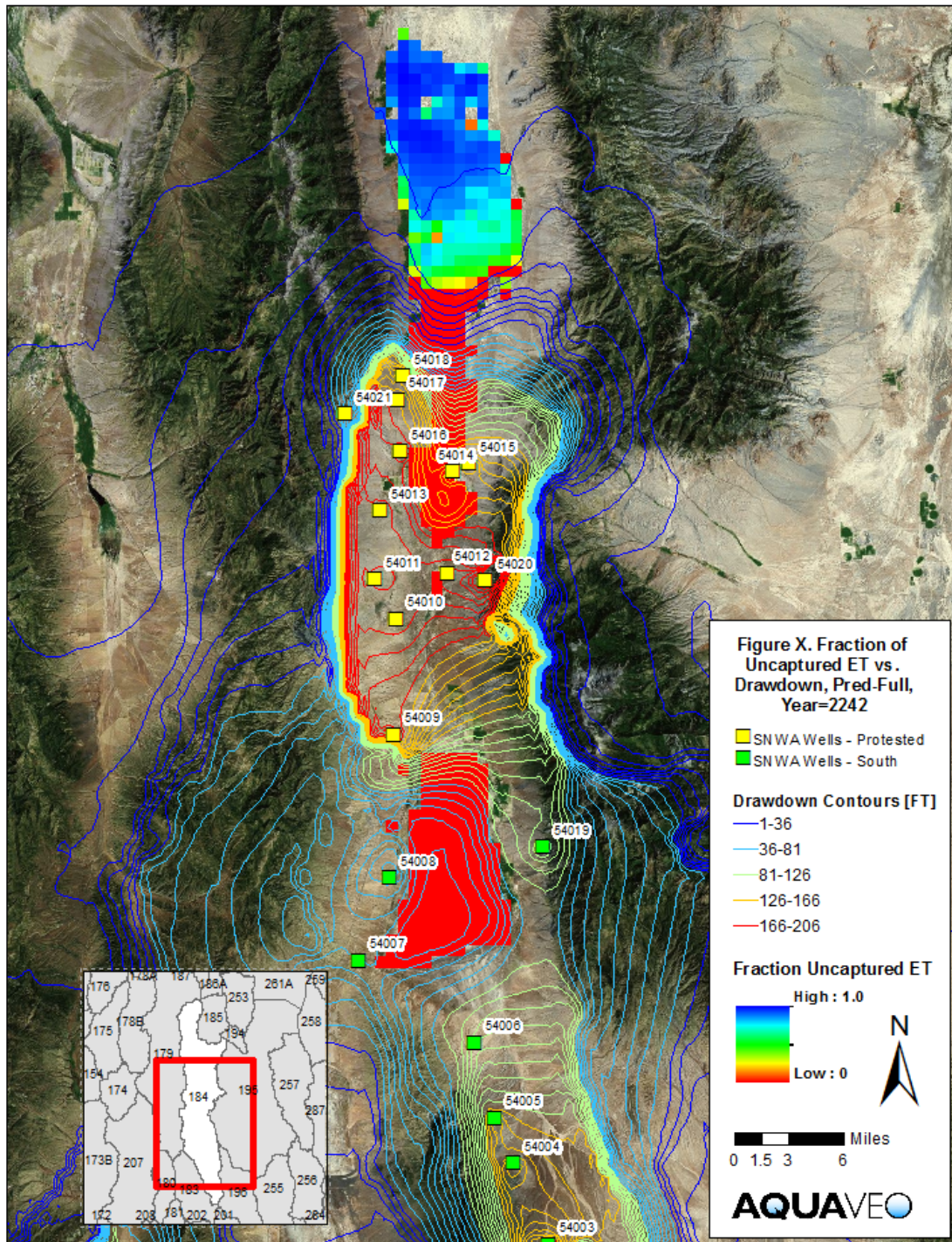
Active Drain Cells



0 3 6 12 Miles

AQUAVEO







# Opposition Arguments - Summary

- Project will result in a massive aggregate cone of depression
- All springs will go dry in a few years
- Groundwater mining will occur
- Forage and eco-system will be permanently damaged
- System should be redesigned for better ET capture with less impact on existing water rights

# State Engineer Ruling – 3/22/2012

- Four wells adjacent to Cleveland Ranch are denied
- All remaining wells are approved
- Project should be constructed in three stages with monitoring at each stage
- Drawdown at senior water rights locations will be manageable
- Groundwater mining issue ignored

# 2007 State Engineer Ruling

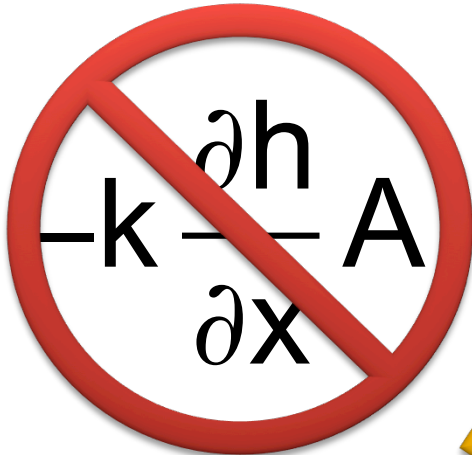
“Perennial yield is ultimately limited to the maximum amount of natural discharge that can be salvaged for beneficial use. .... If the perennial yield is exceeded, ground-water levels will decline and steady-state conditions will not be achieved, a situation commonly referred to as ground-water mining. Additionally, withdrawals of ground water in excess of the perennial yield may contribute to adverse conditions such as water quality degradation, storage depletion, diminishing yield of wells, increased economic pumping lifts, and land subsidence.”



# 2012 State Engineer Ruling

“The State Engineer finds that there is no requirement that the Applicant must show that the proposed well placement will actually be able to fully capture discharge. ... There is no practical way to require them to manage their groundwater operations collectively to reach full capture. ... The State Engineer finds that the Applicant is not required to prove capture of ET as a prerequisite to approval of the Applications.”

# Conclusions

$$q = -k \frac{\partial h}{\partial x} A$$




$$q = k \frac{\partial \phi}{\partial x} A$$

# Conclusions

