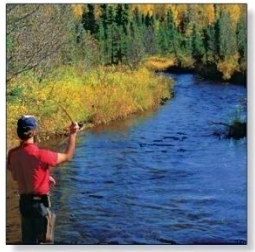
Calibration Run

Allan Wylie, IDWR

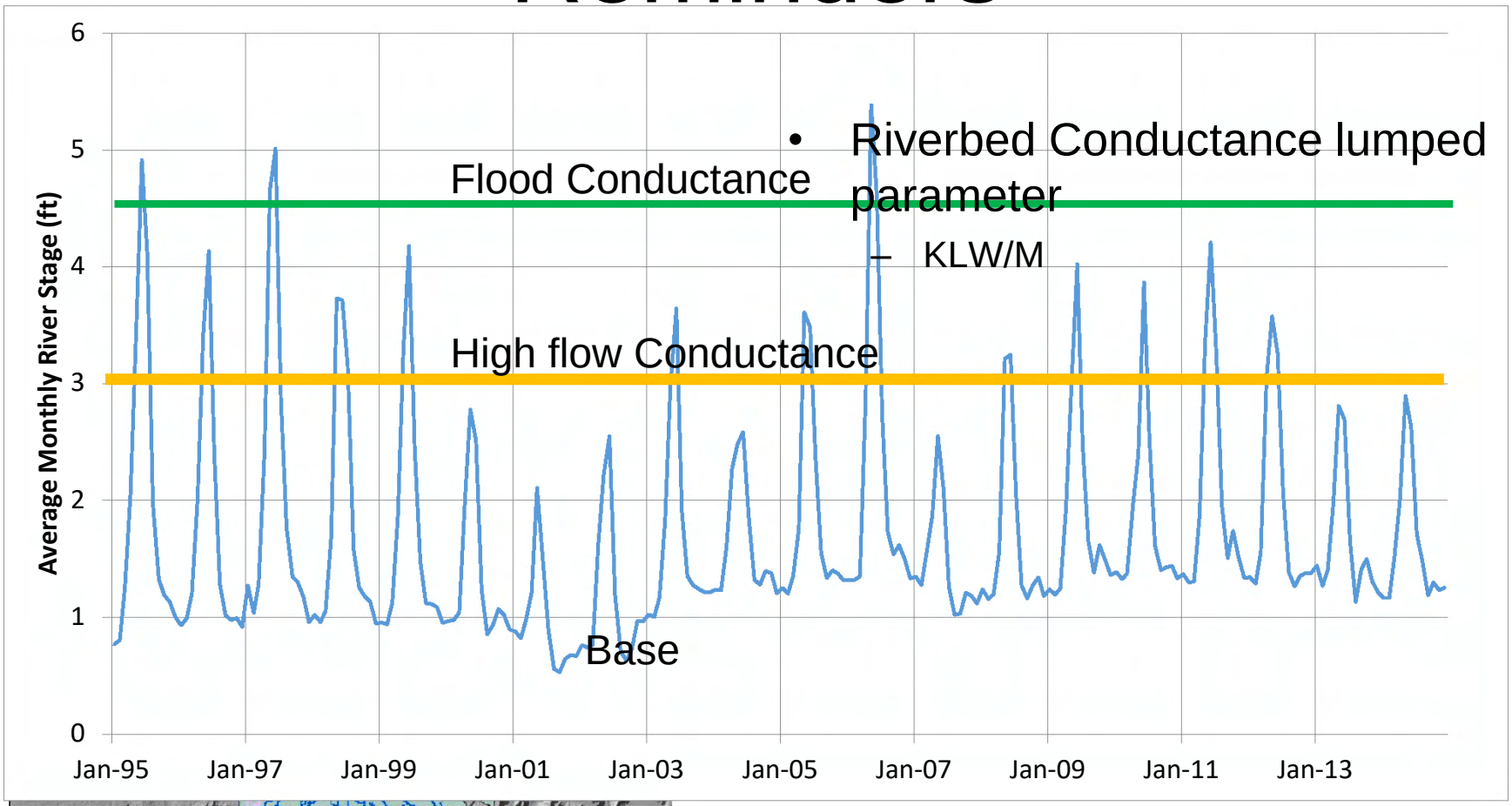
January, 2019

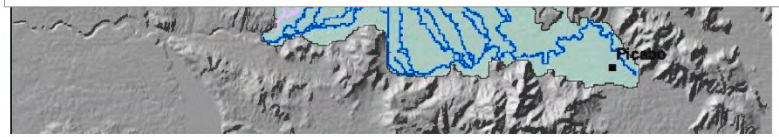


Reminders

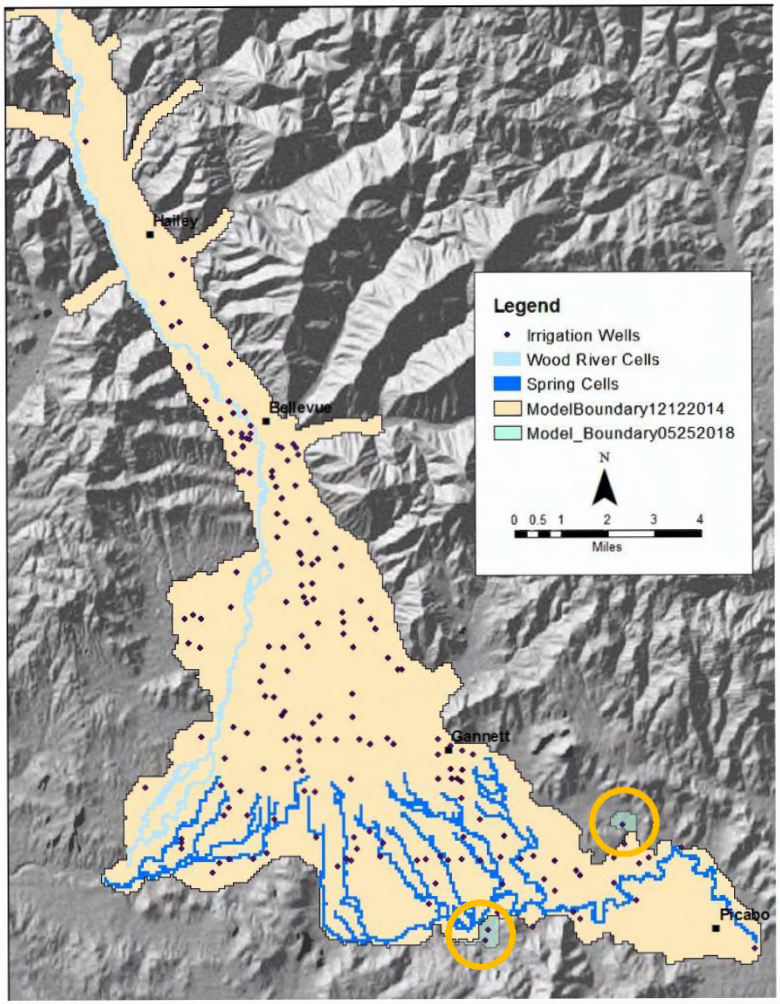
- Added geolocated driller wells
- Stage for Glendale Bridge - Wood River Ranch reach set to DEM elevation when it has water
- Water master records and Landsat photos to determine when Drybed and Wood River Ranch-Stanton Crossing reaches are dry
- Use stage at Hailey gage to switch between three different riverbed conductance parameters for Drybed

Reminders

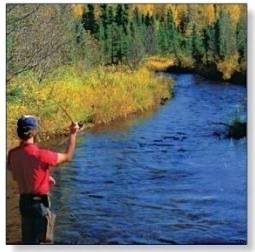

Average Monthly River Stage (ft)
6
5
4
3
2
1
0
Jan-95
Jan-97
Jan-99
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Flood Conductance
High flow Conductance
Base
• Riverbed Conductance lumped parameter
– KLW/M


Picabo

Reminders



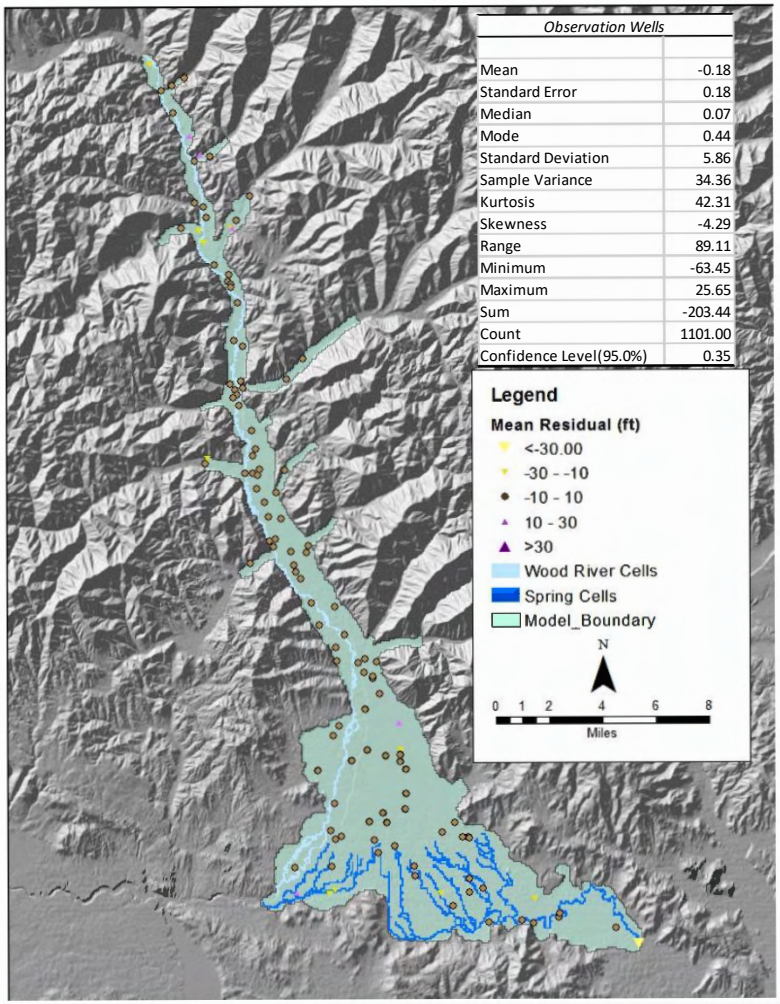
- Added area to include significant irrigation wells

New

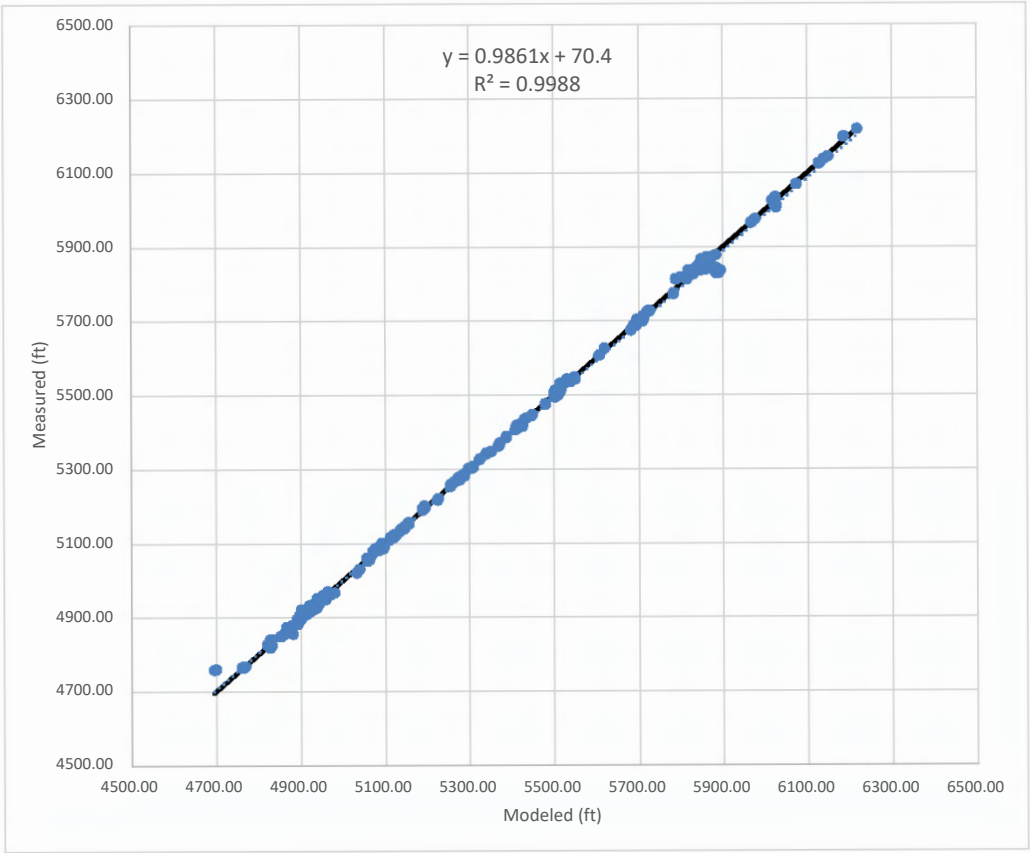
- After ESPA synoptic IDWR did QA check of IDWR water-level database
- Made some corrections
- Found some missing water level data
  - The August 2018 calibration run had 1022 water-levels in the Observation Well group
  - This calibration run has 1101 water-levels in the Observation Well group
  - About a 7% increase in the number of observations

Observation Wells



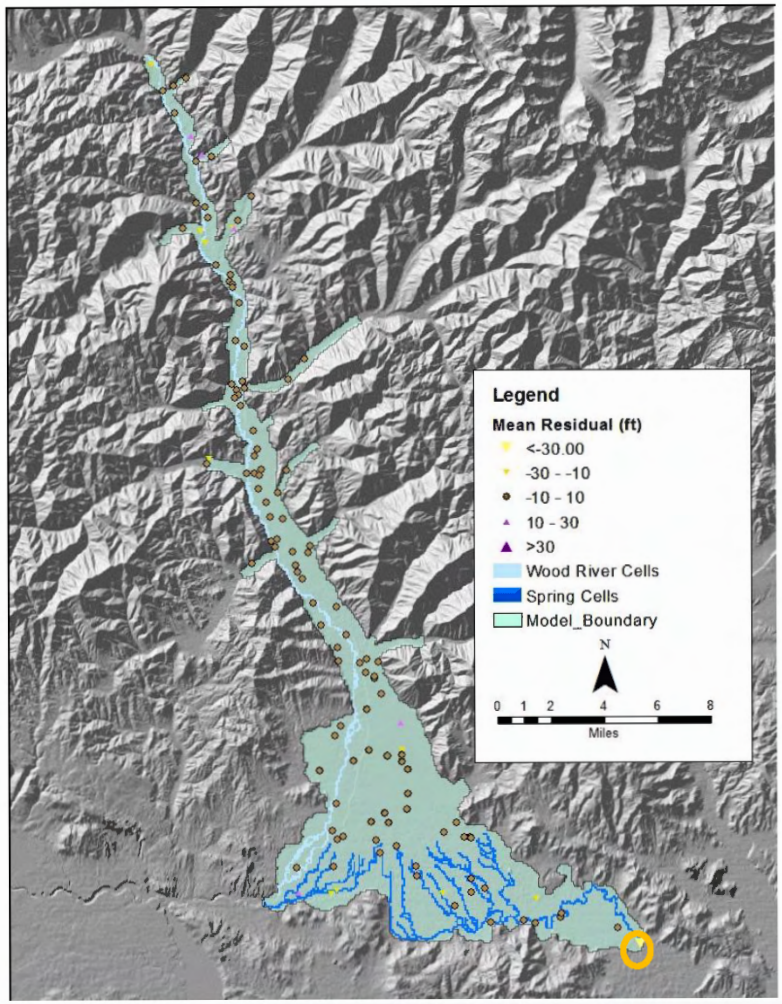
- Wells surveyed
- Measured multiple times
- Total head change from north to south is more than 1,100 ft
  - 30 ft mismatch ~ 2%
  - 95% C.I. = +/- 0.35
    - Between 0.16 & -0.53
    - Negative residual means modeled value is too high

Observation Wells



- Wells surveyed
- Every measured water level plotted
- If fit was perfect
  - Intercept = 0
  - Slope = 1
  - $R^2 = 1$

Observation Wells



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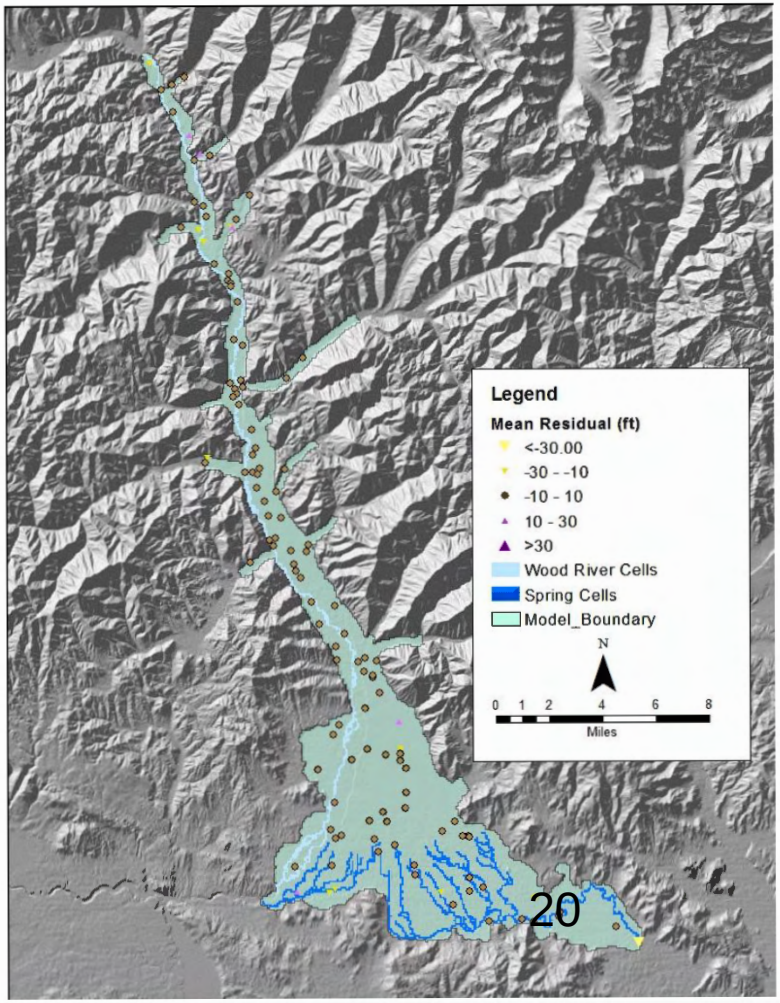

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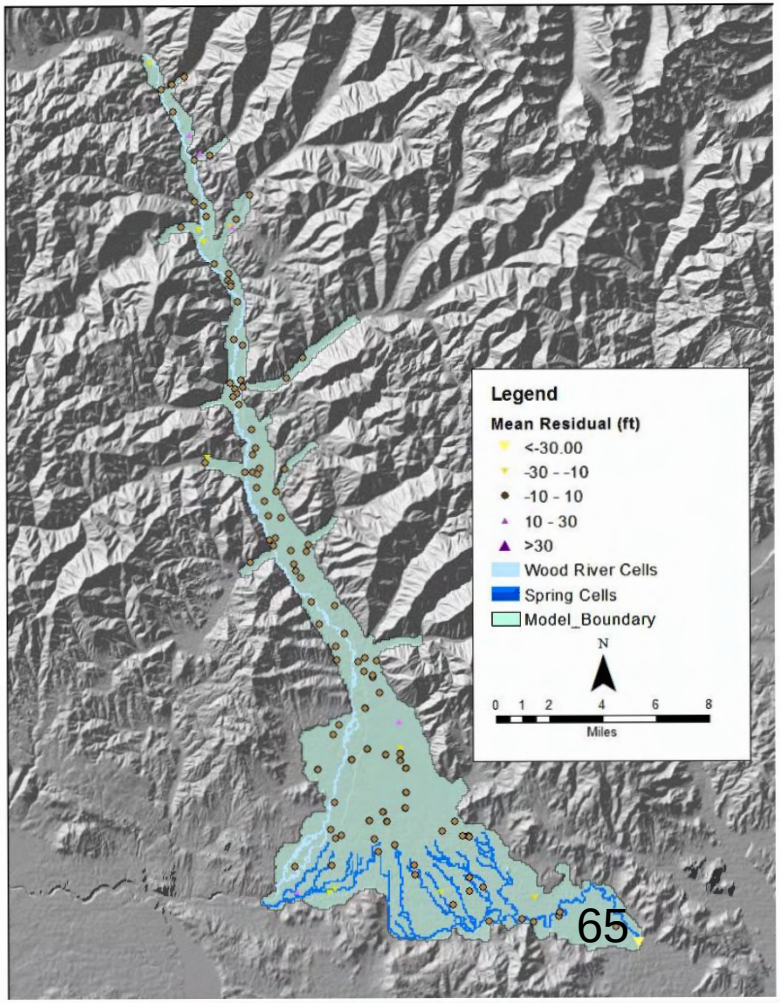

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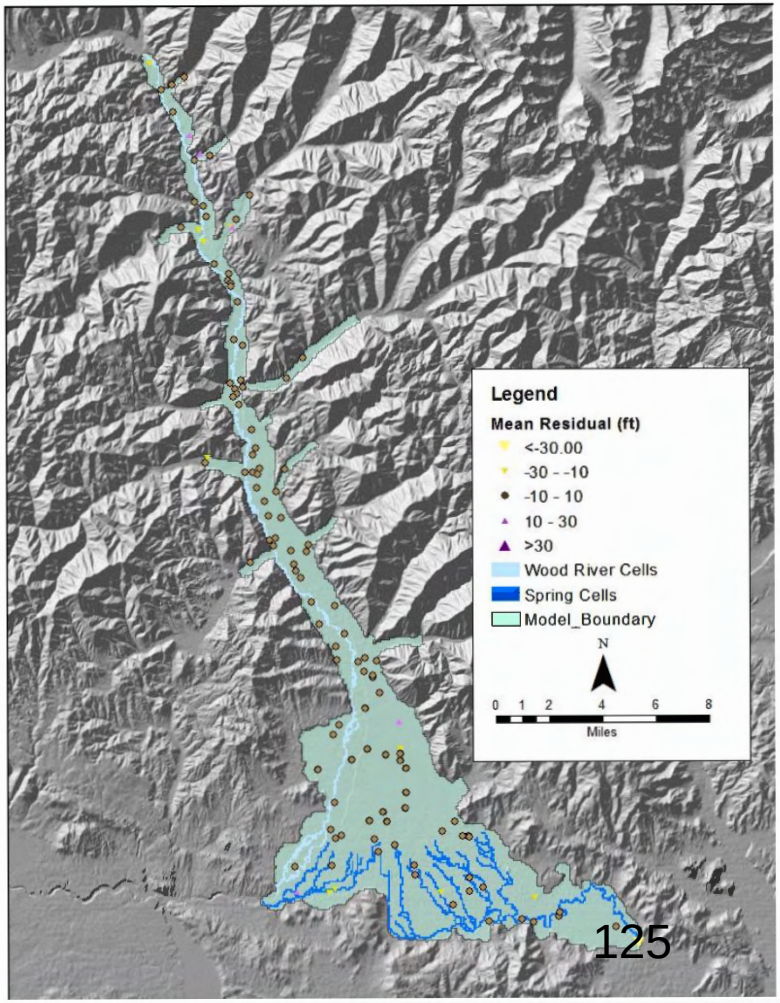

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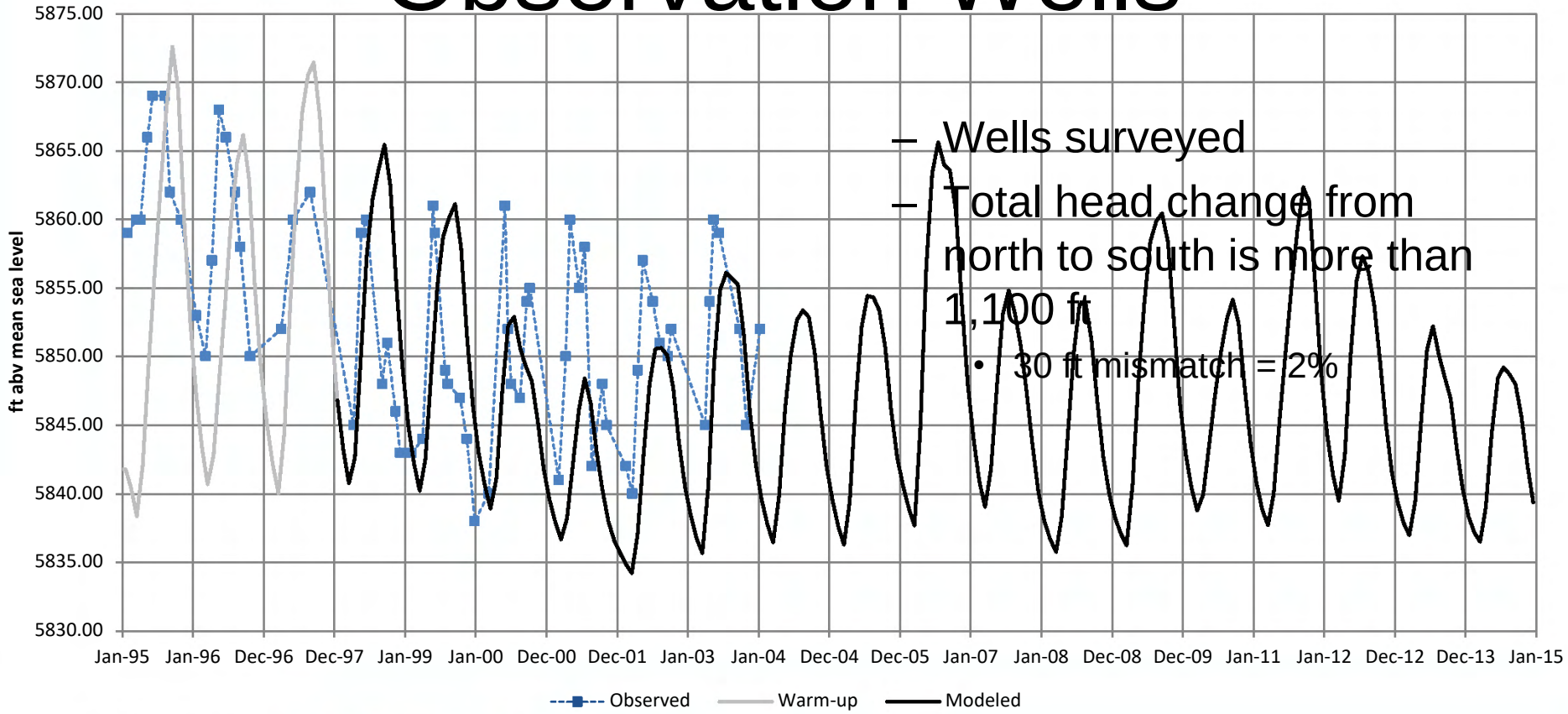

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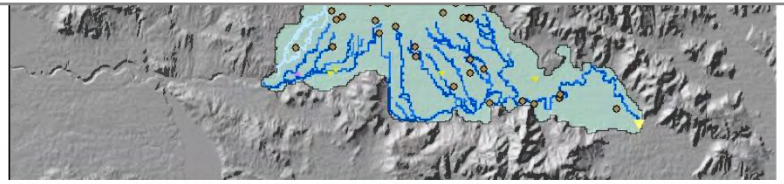

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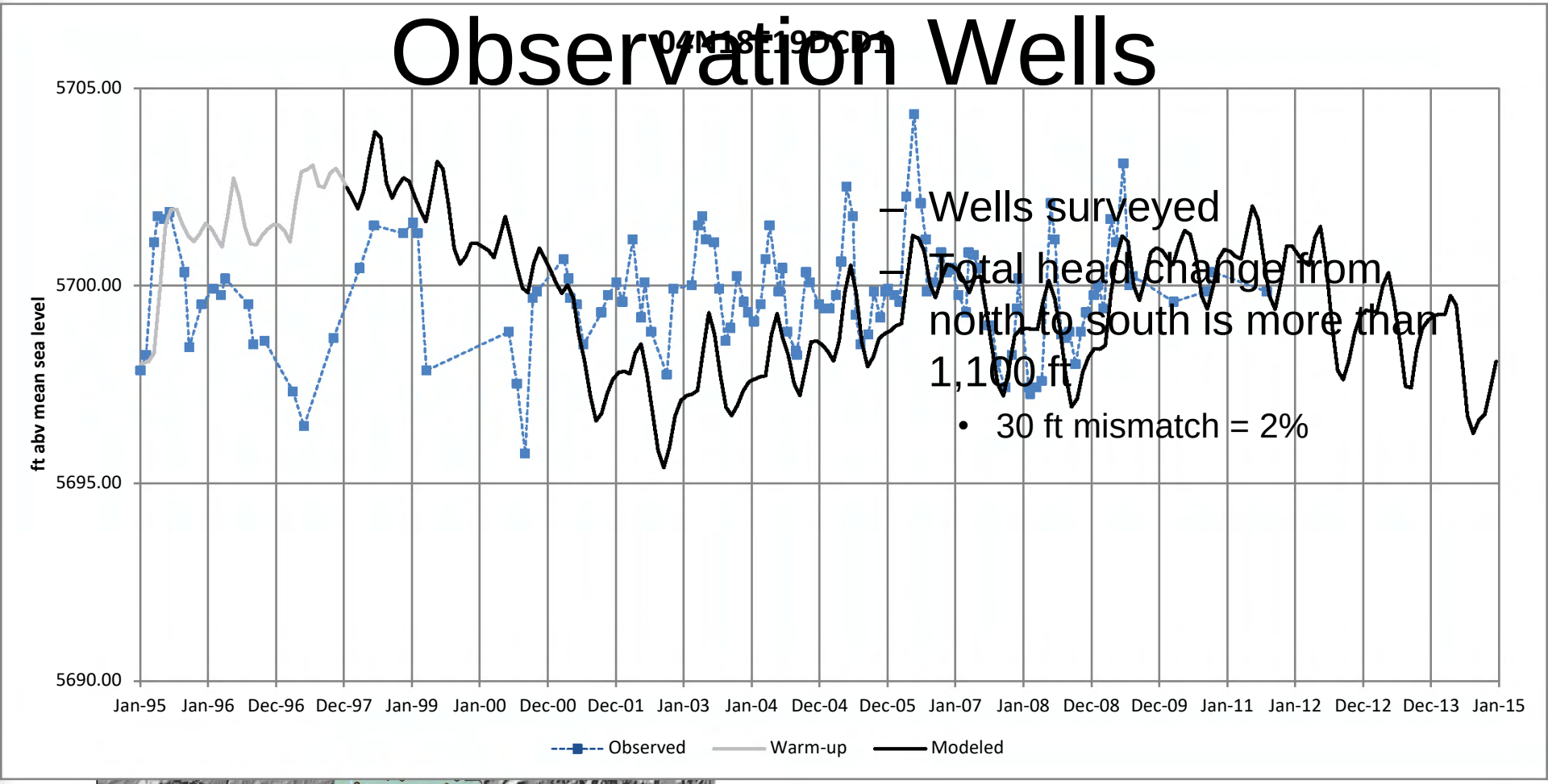

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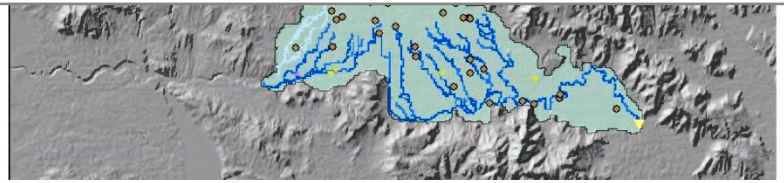

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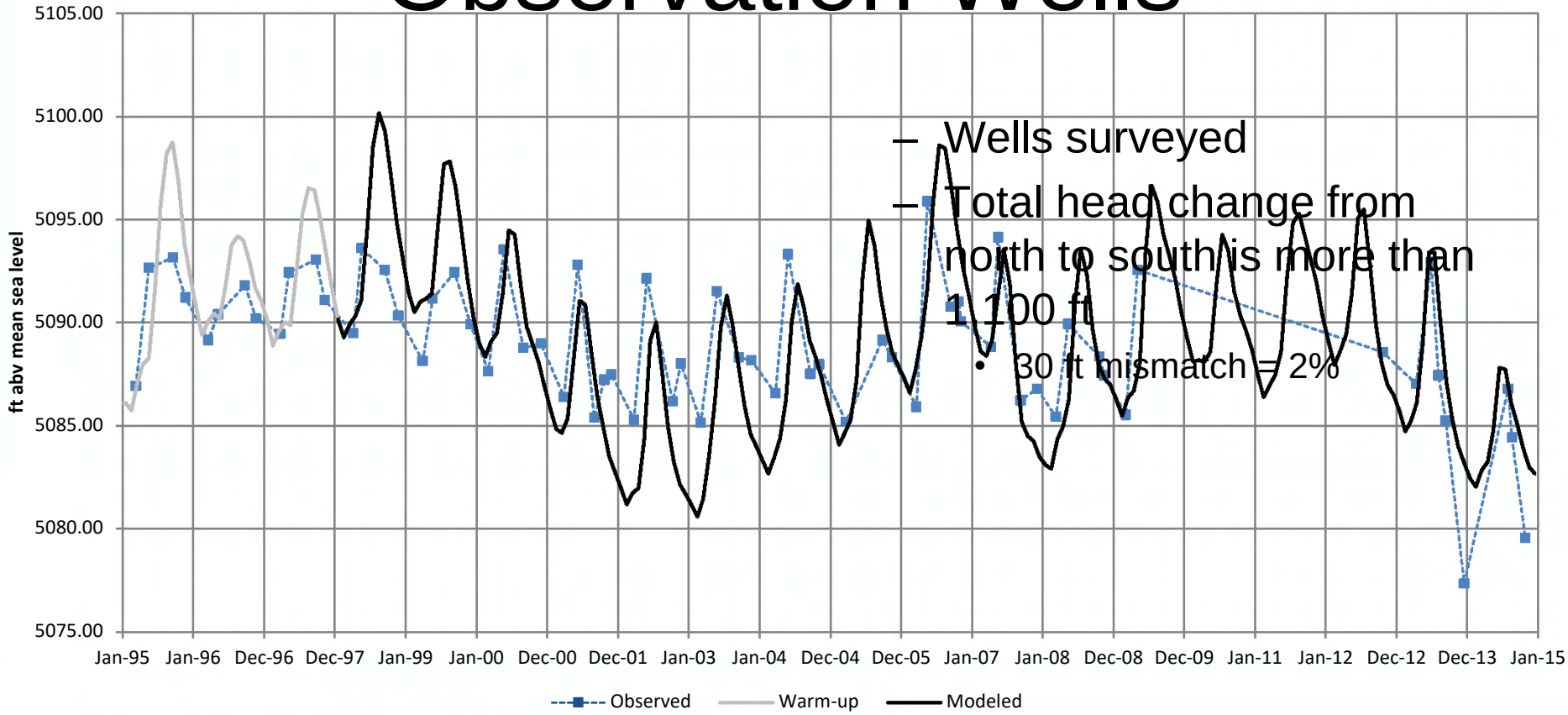

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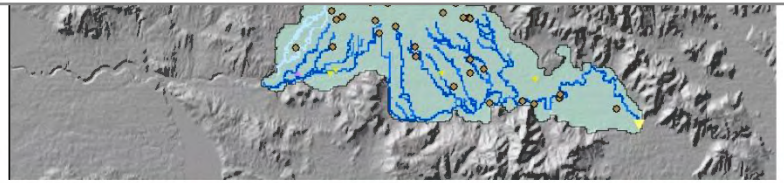

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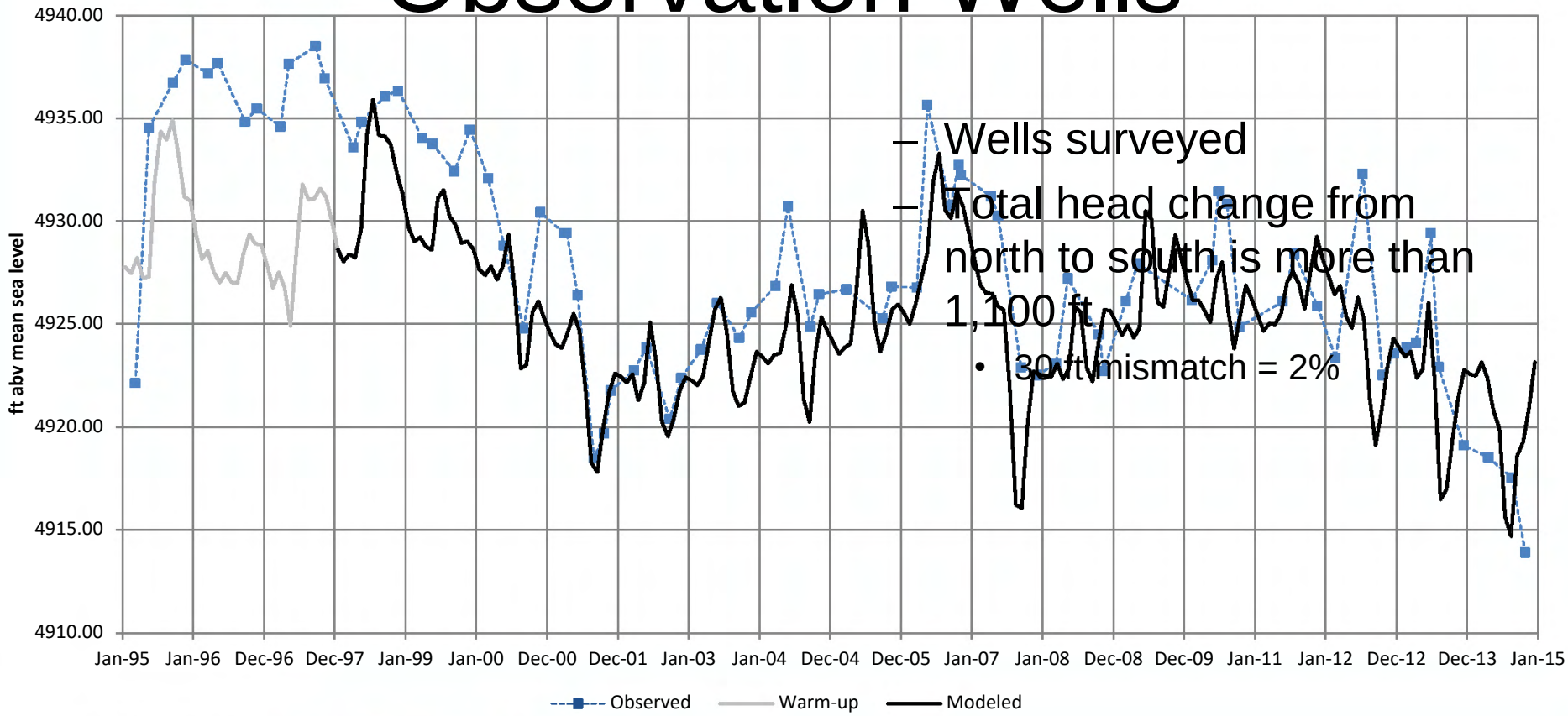

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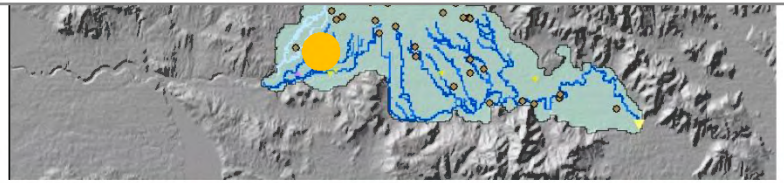

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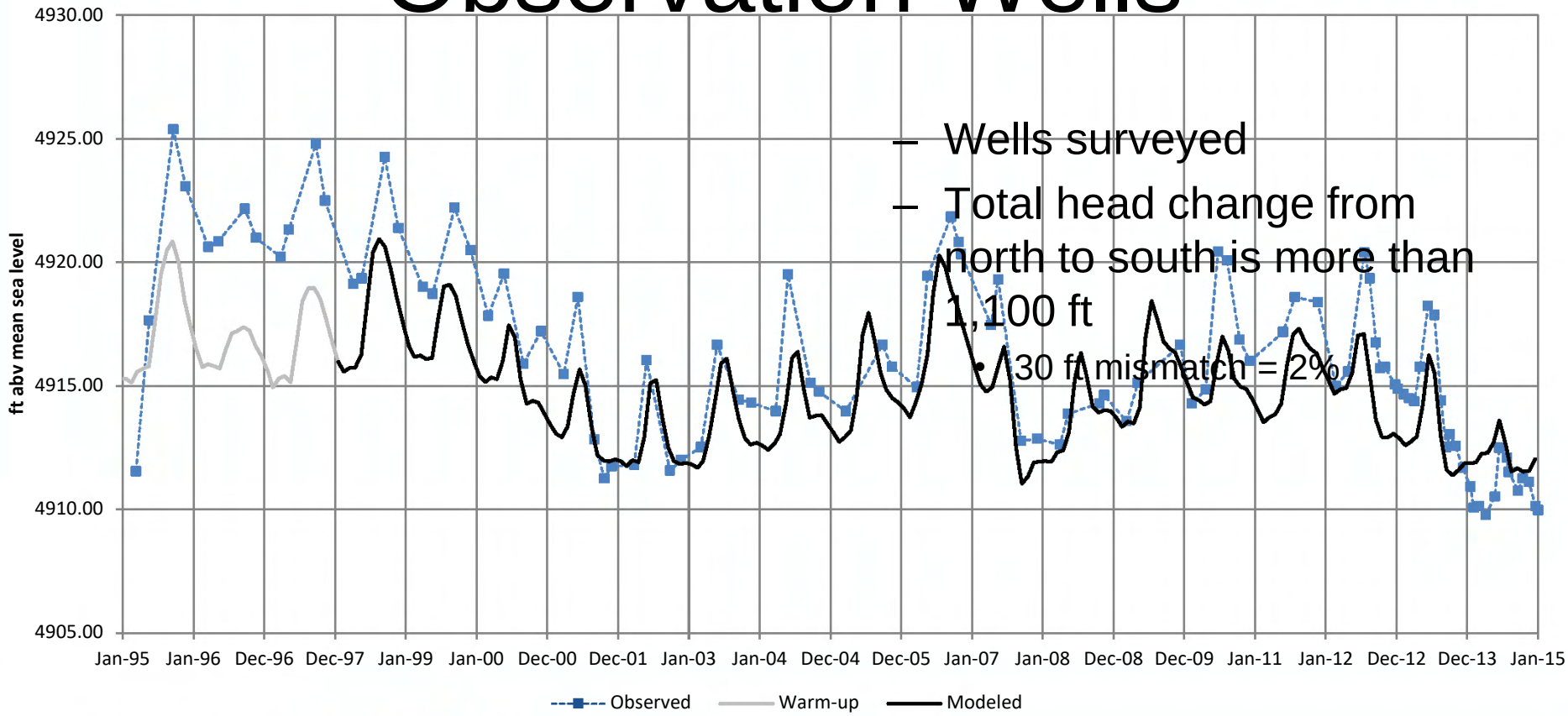

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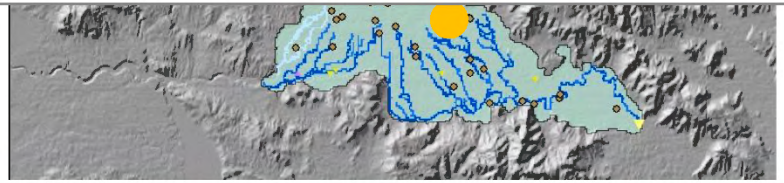

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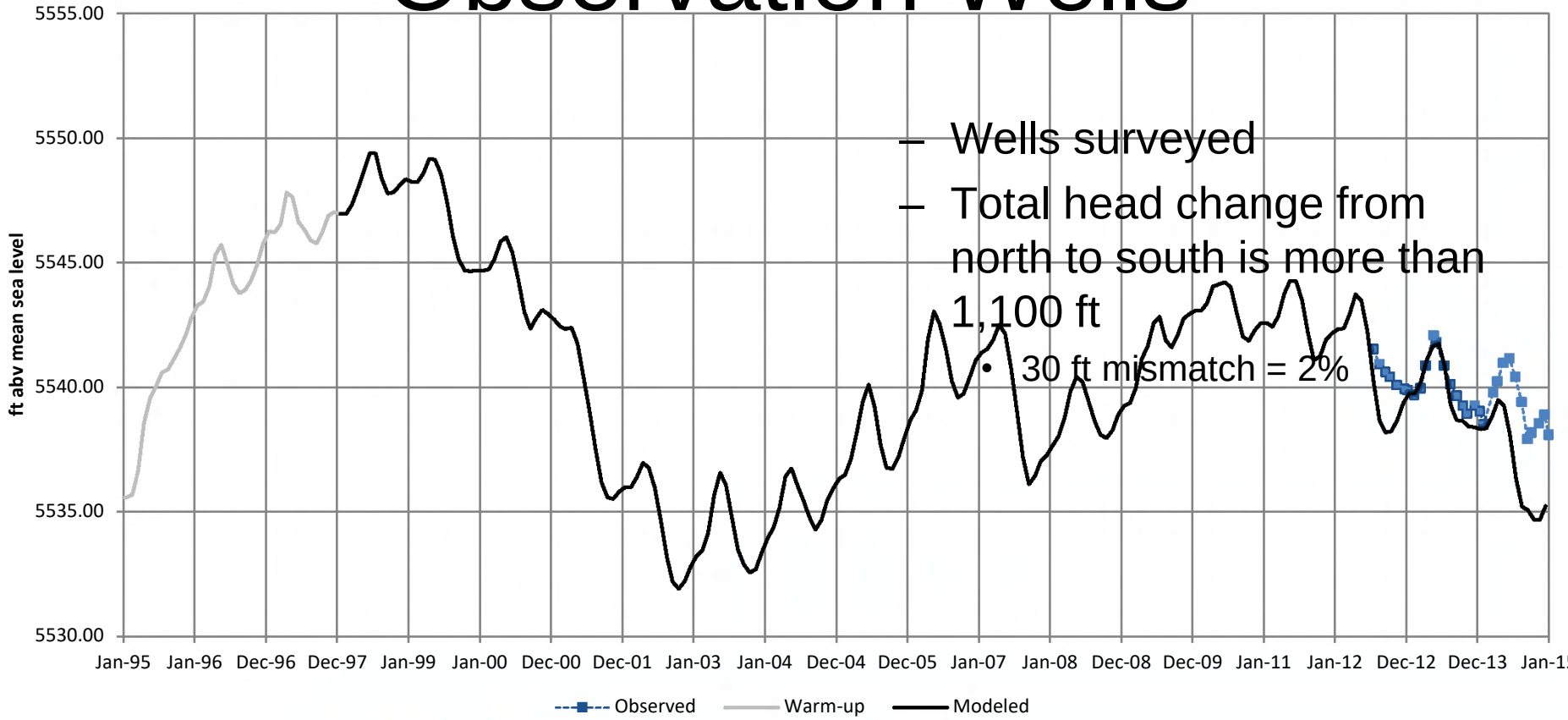

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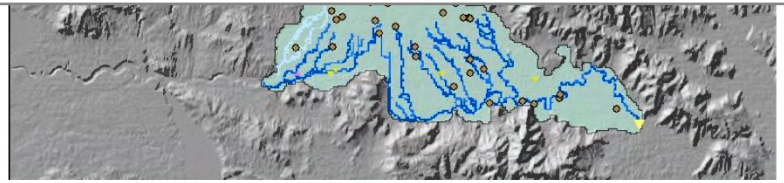

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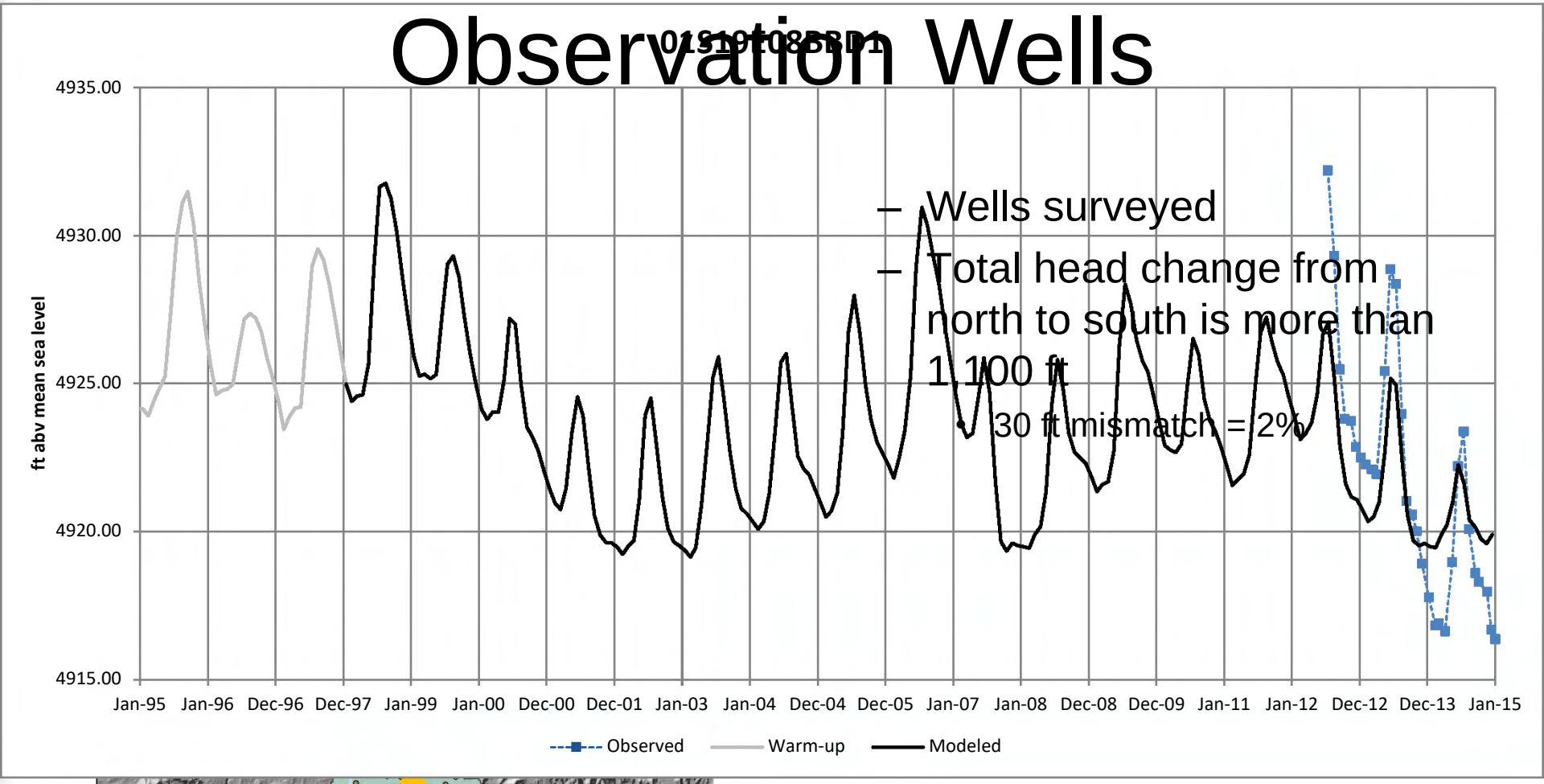

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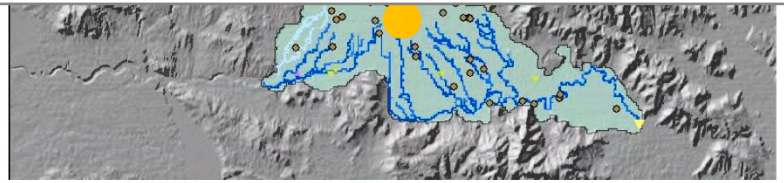

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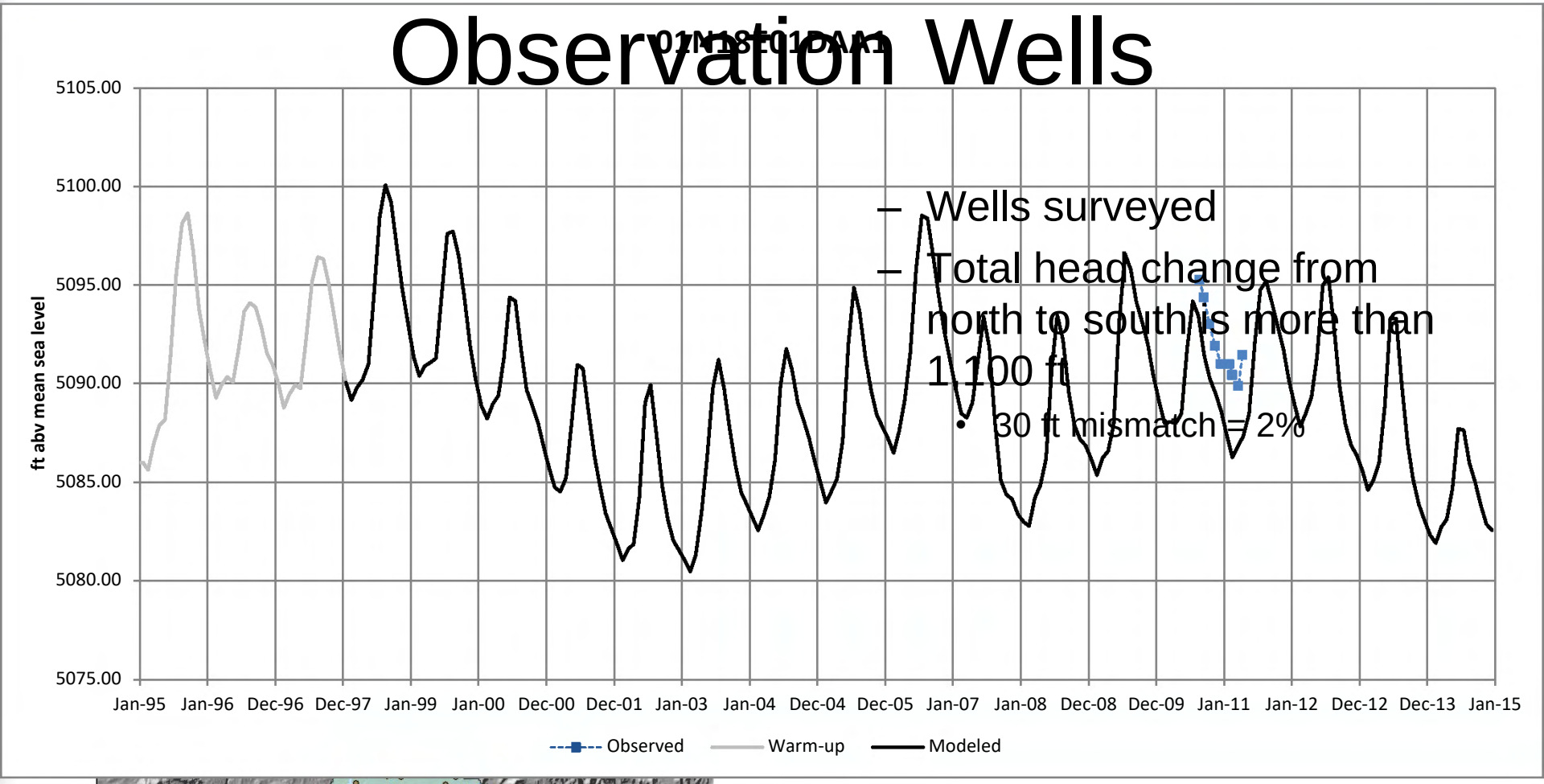

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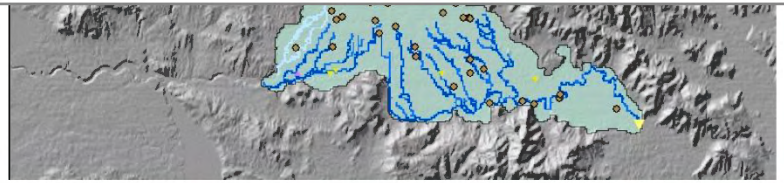
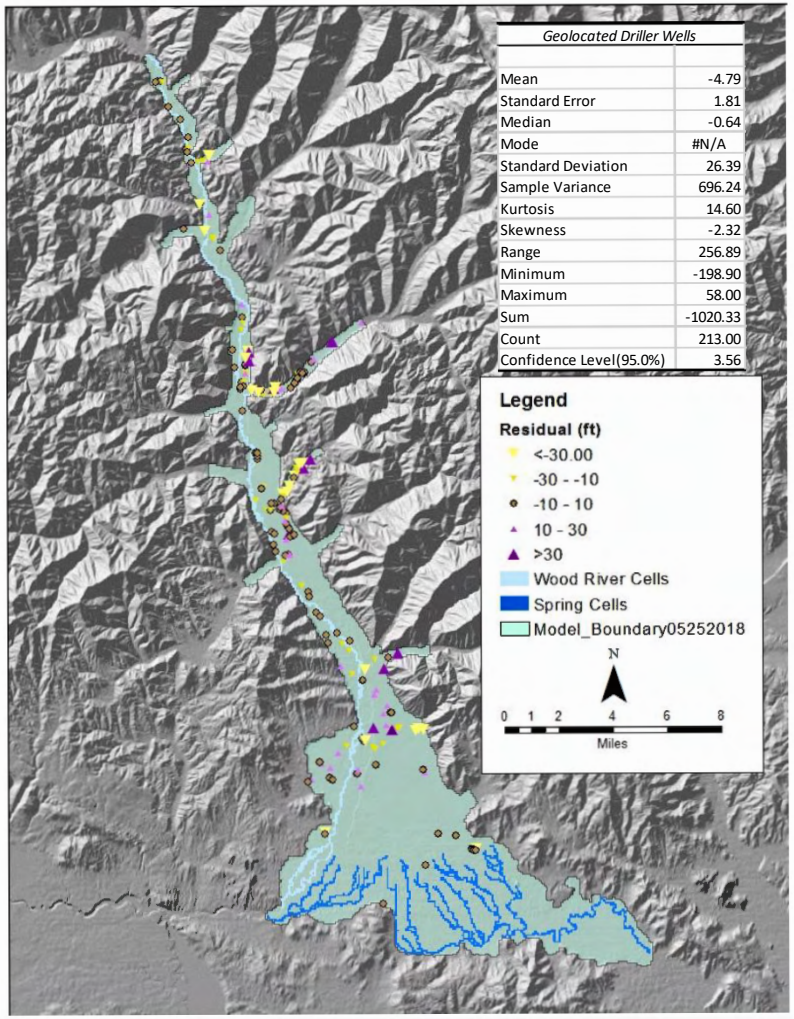
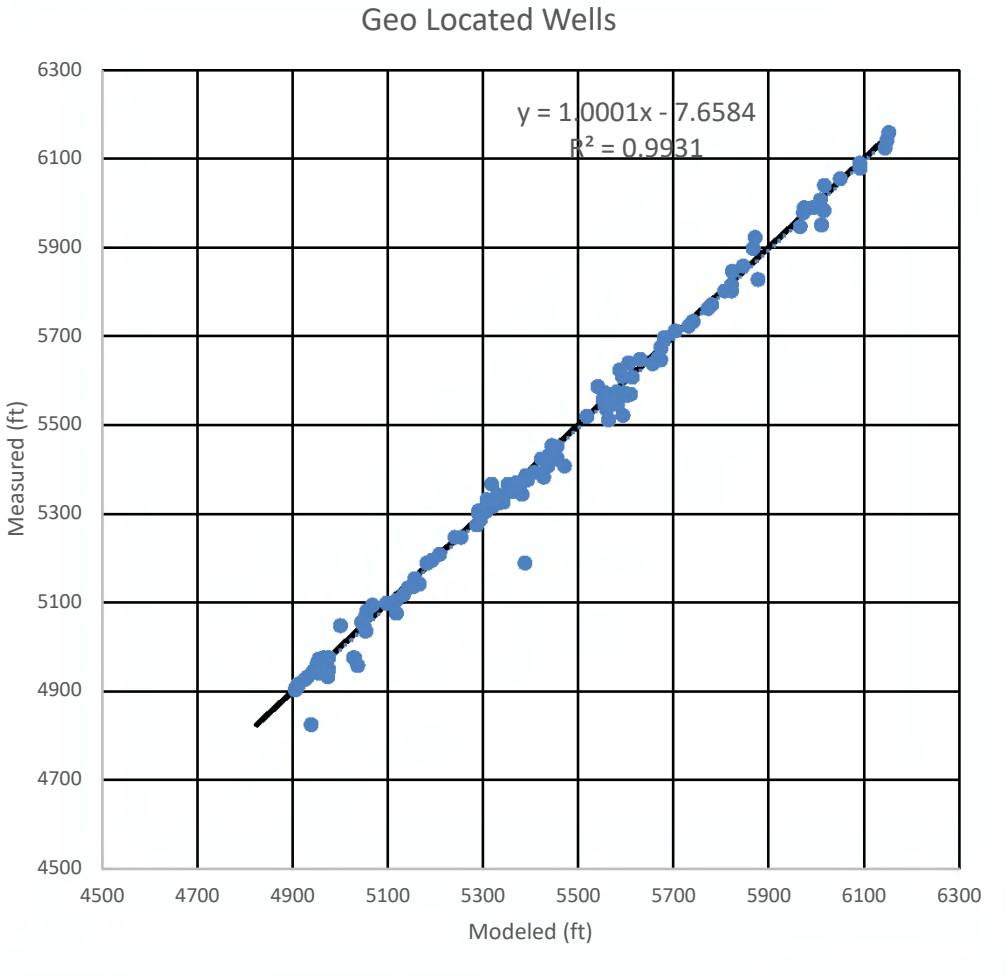


Geo Located Driller Wells



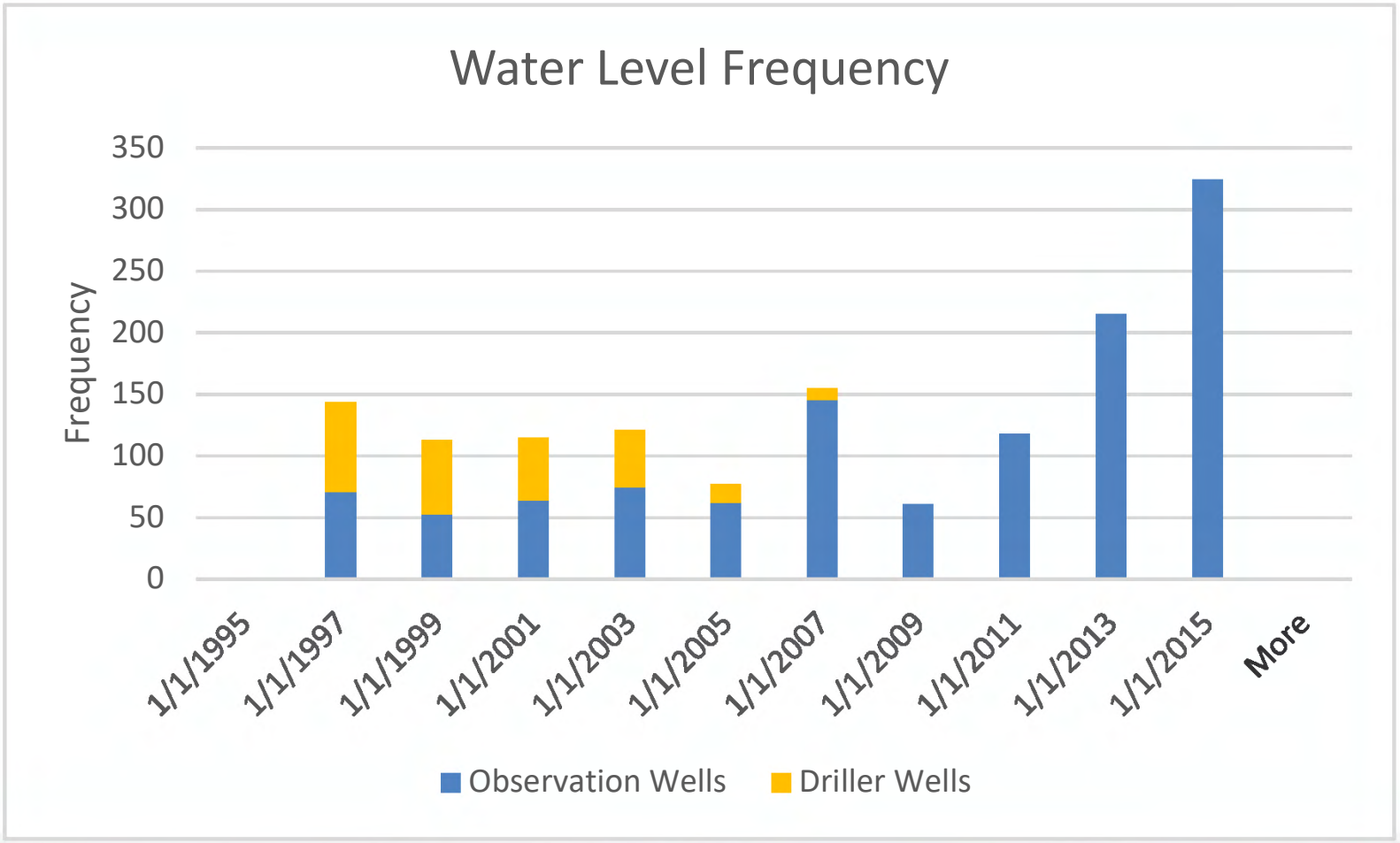
- Water-levels collected by driller
- Wells located by driller using GPS or address
- Measured by driller
- 95% C.I. = +/-3.56
  - Between -1.22 & -8.54
  - Negative residual means modeled value is too high

Driller Wells

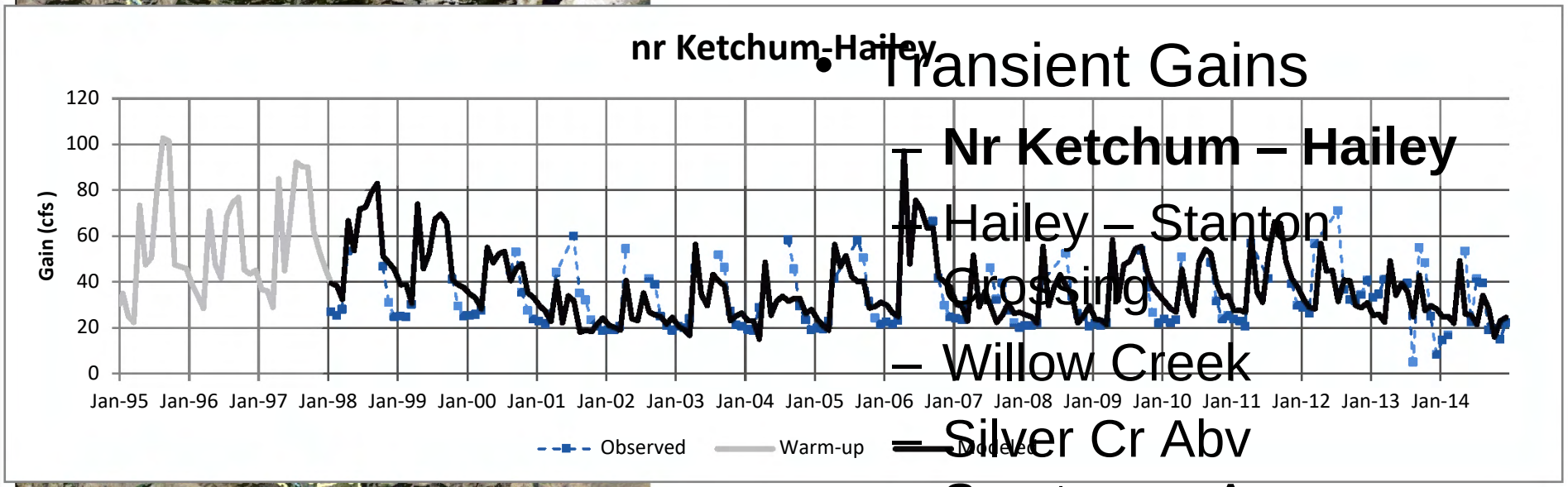


- Wells located by hand held GPS or address
- Measured by driller
- If fit was perfect
  - Intercept = 0
  - Slope = 1
  - $R^2 = 1$

Why the Geolocated Wells are Important

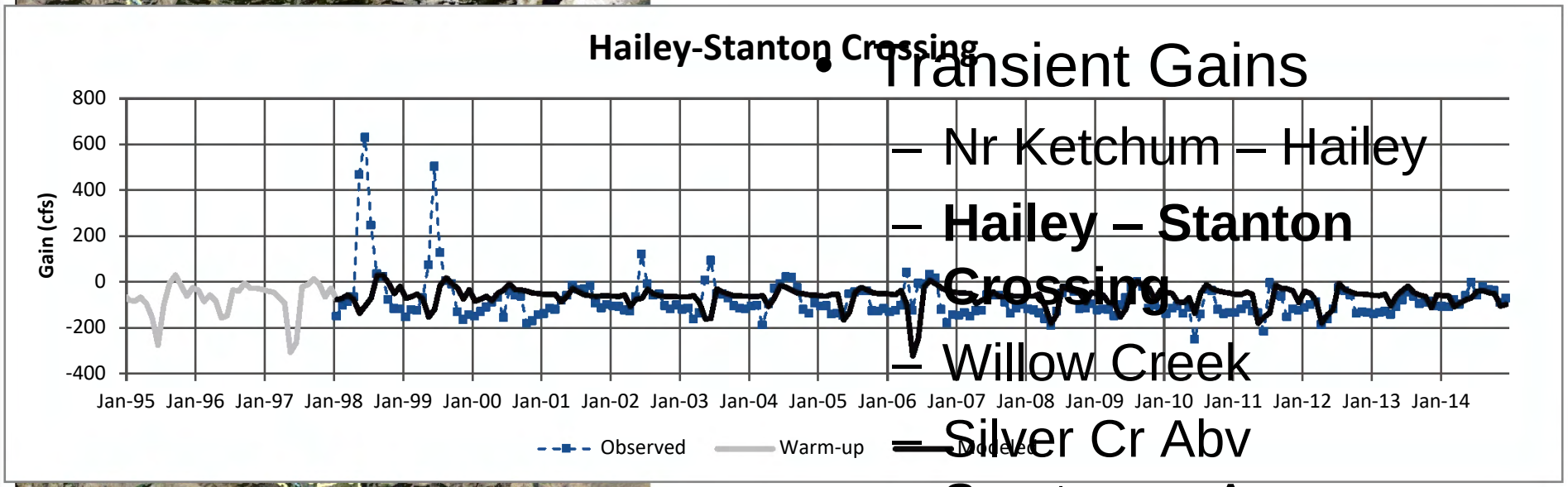


River Gains and Losses



- Transient Gains
  - **Nr Ketchum – Hailey**
  - Hailey – Stanton Crossing
  - – Willow Creek
  - – Silver Cr Abv Sportsman Access
  - – Silver Cr Blw Sportsman Access

River Gains and Losses



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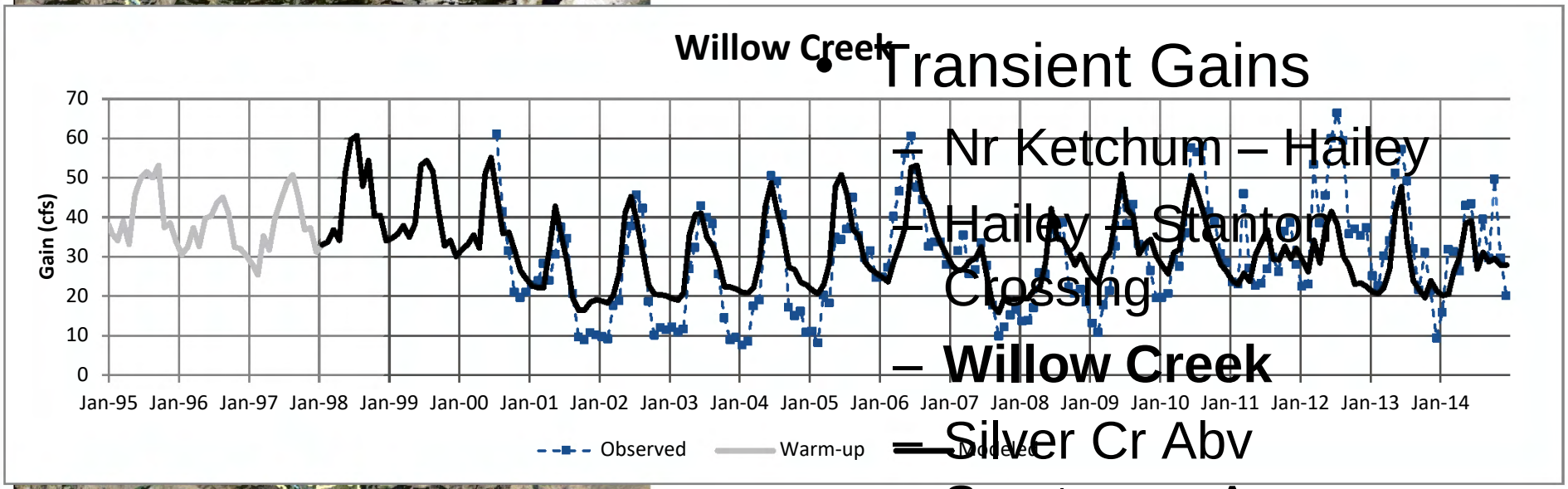
River Gains and Losses



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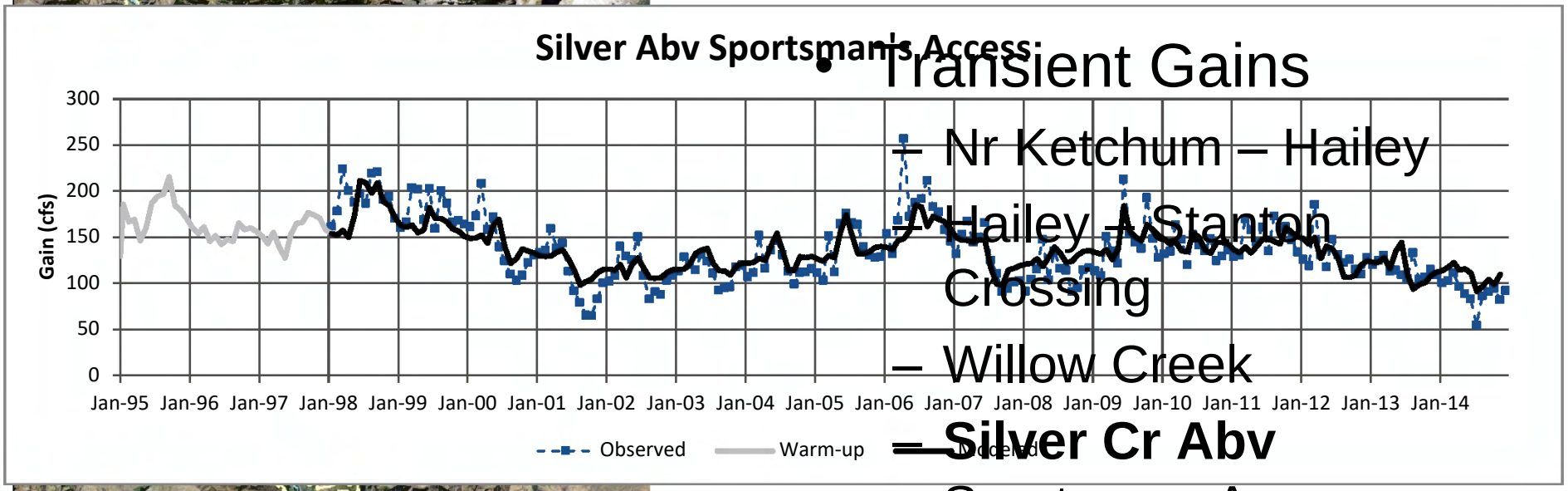
River Gains and Losses



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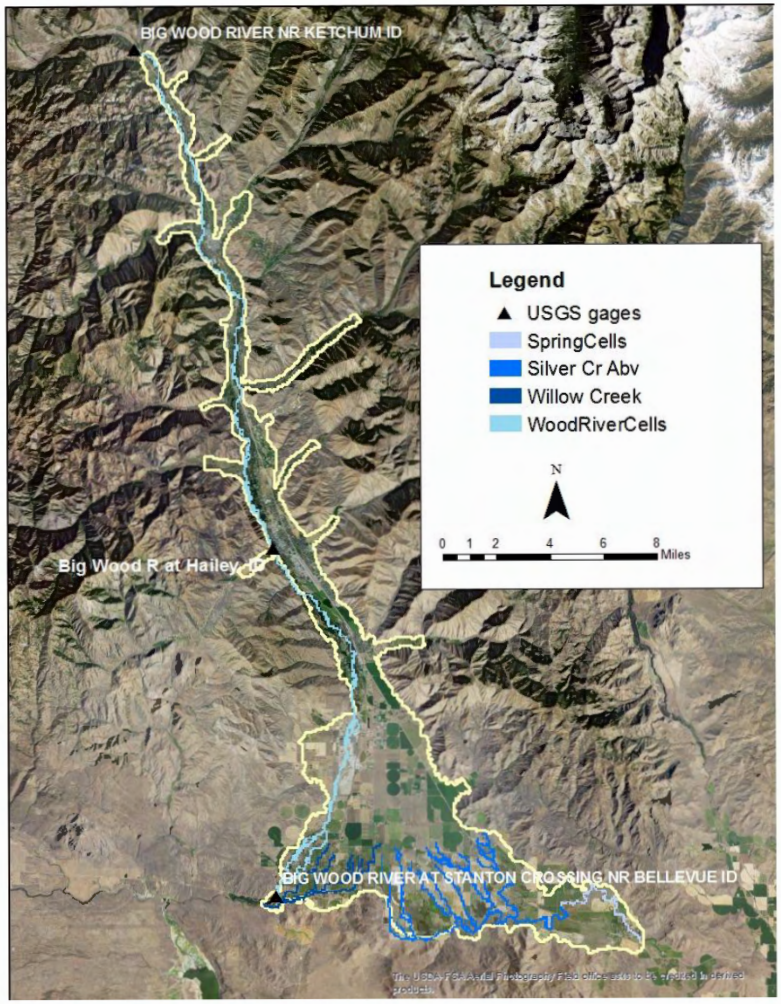
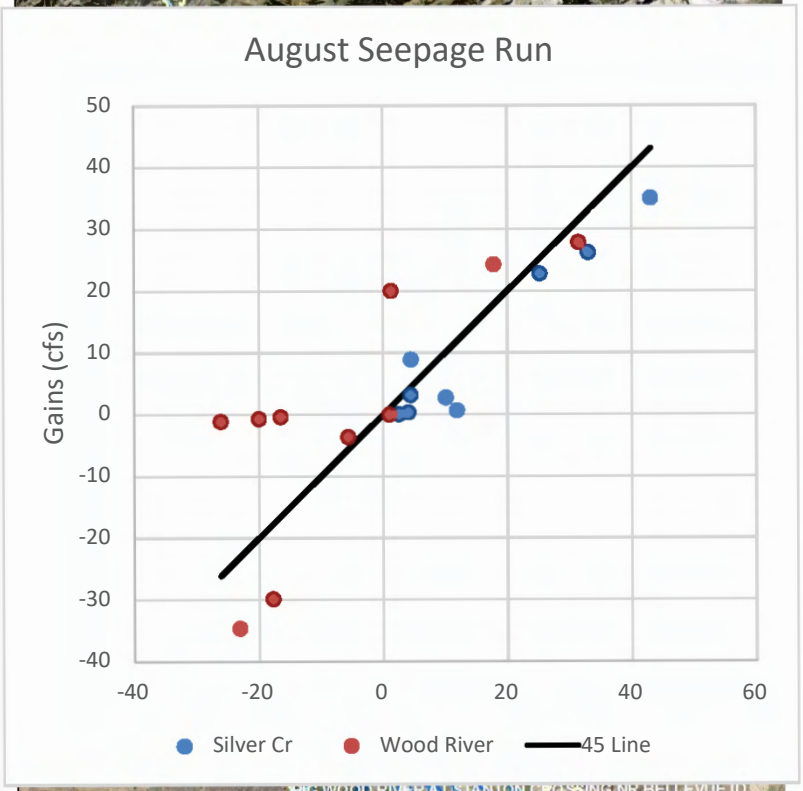
River Gains and Losses



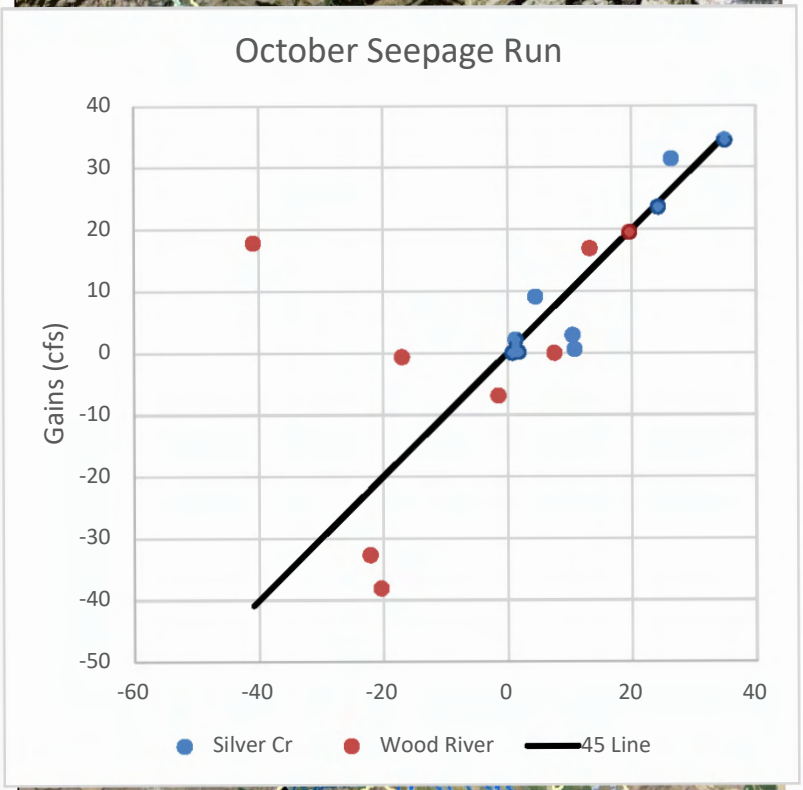
- Seepage Runs
  - Model input is average monthly diversions and returns
  - Seepage run responding to what is happening at that moment

River Gains and Losses



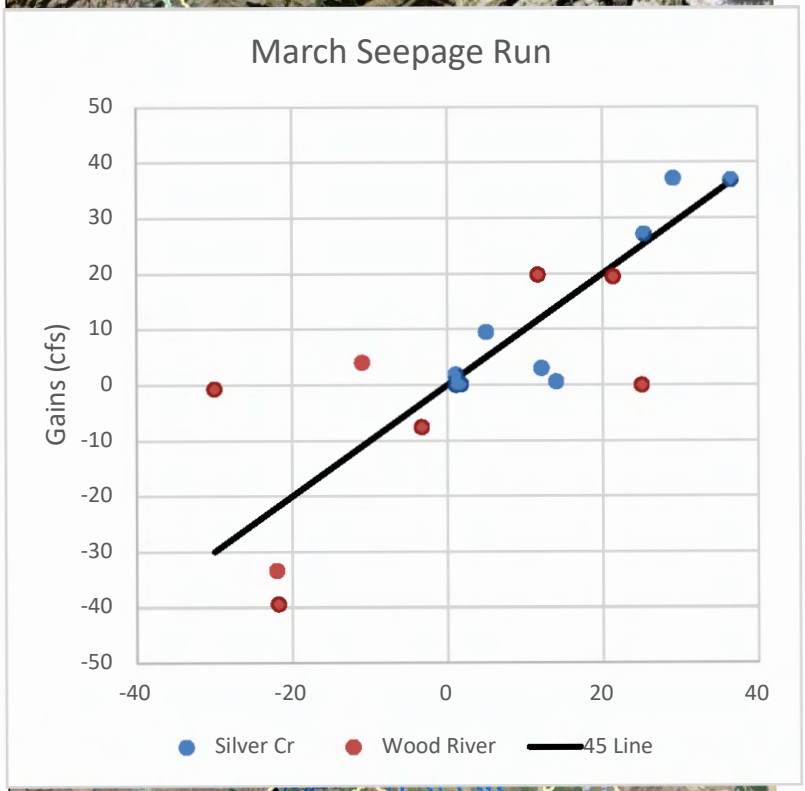
- August 2012 Seepage Run

River Gains and Losses



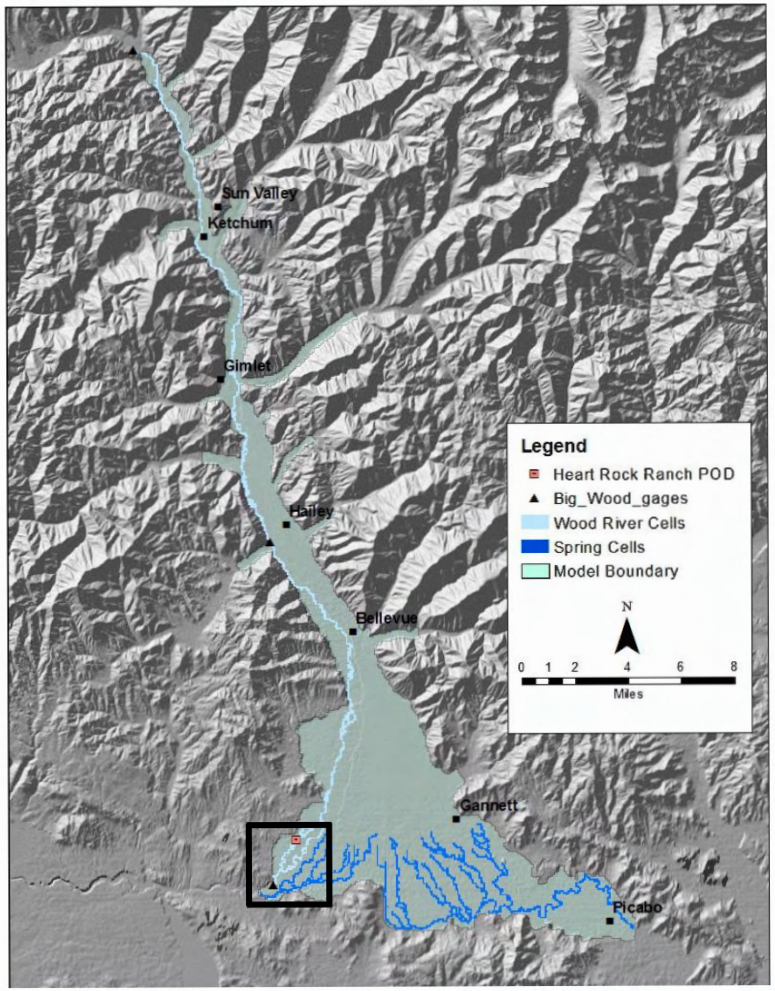
- October 2012 Seepage Run

River Gains and Losses



- March 2013 Seepage Run

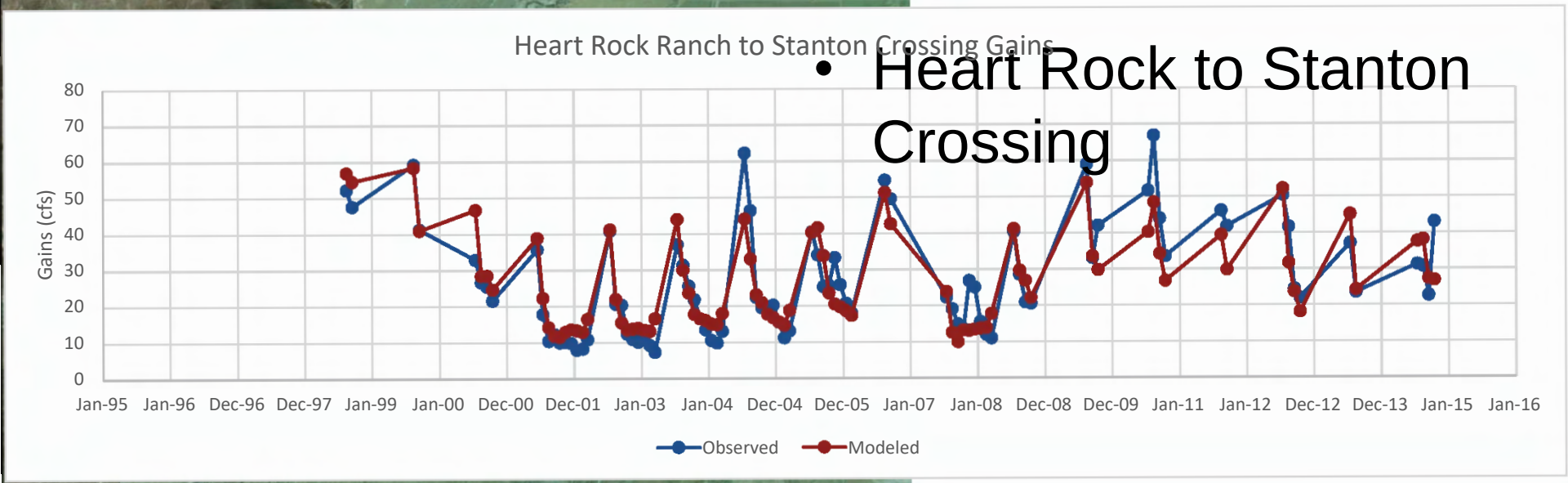
River Gains and Losses



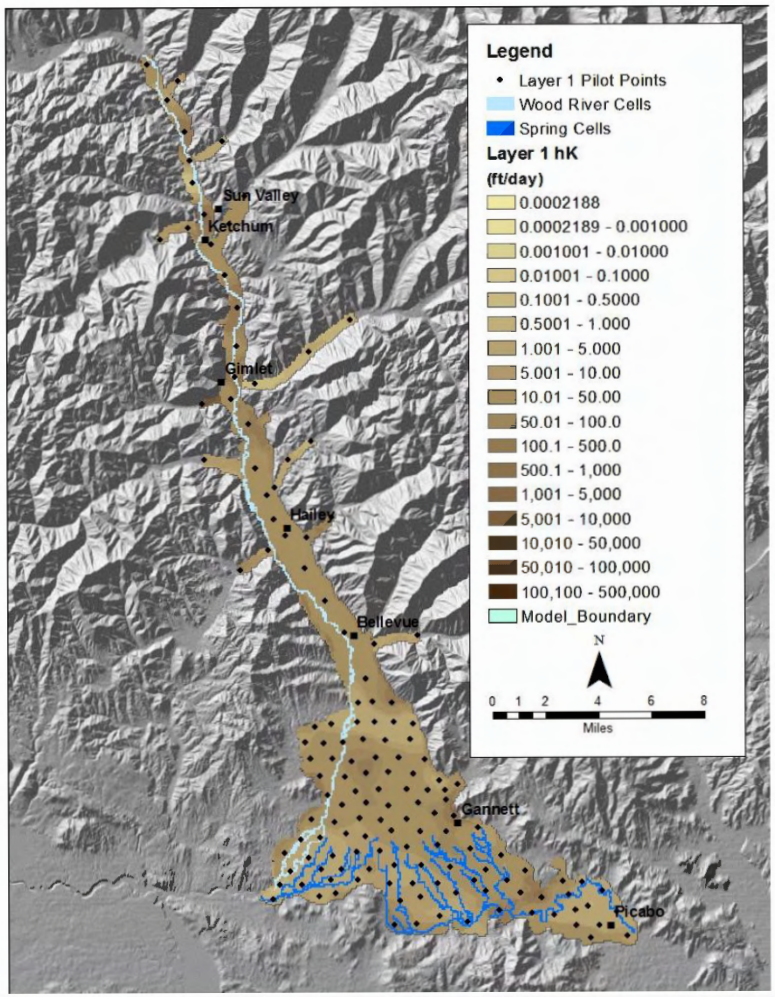
- Heart Rock Ranch to Stanton Crossing

River Gains and Losses

- Heart Rock to Stanton Crossing

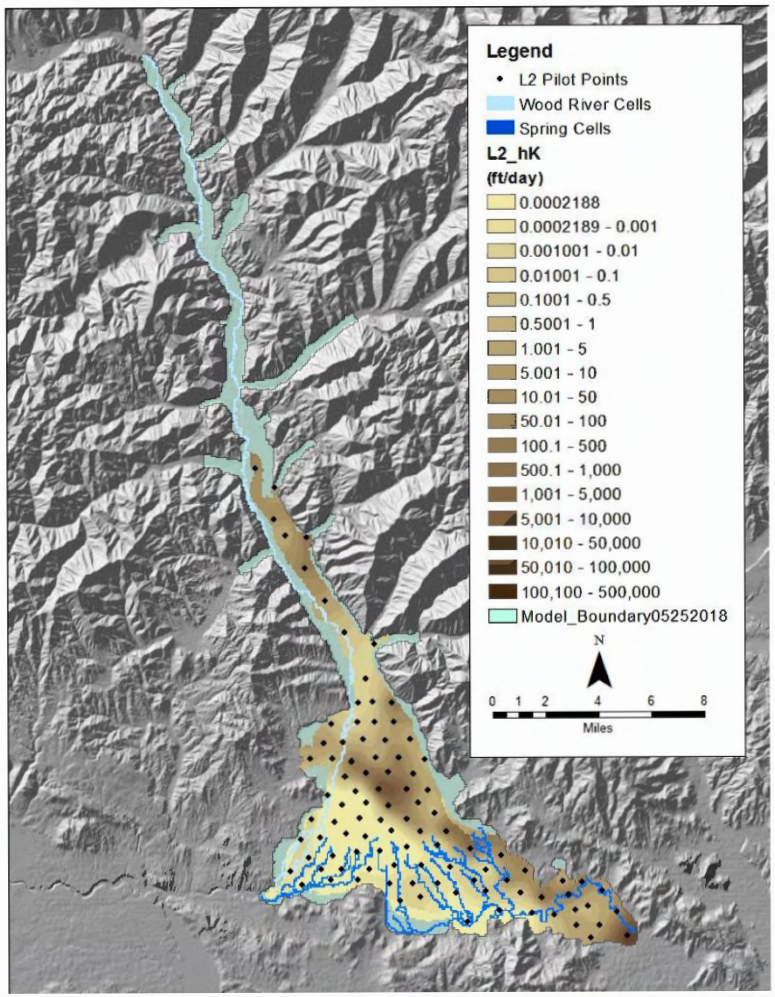


Layer 1 Hydraulic Conductivity



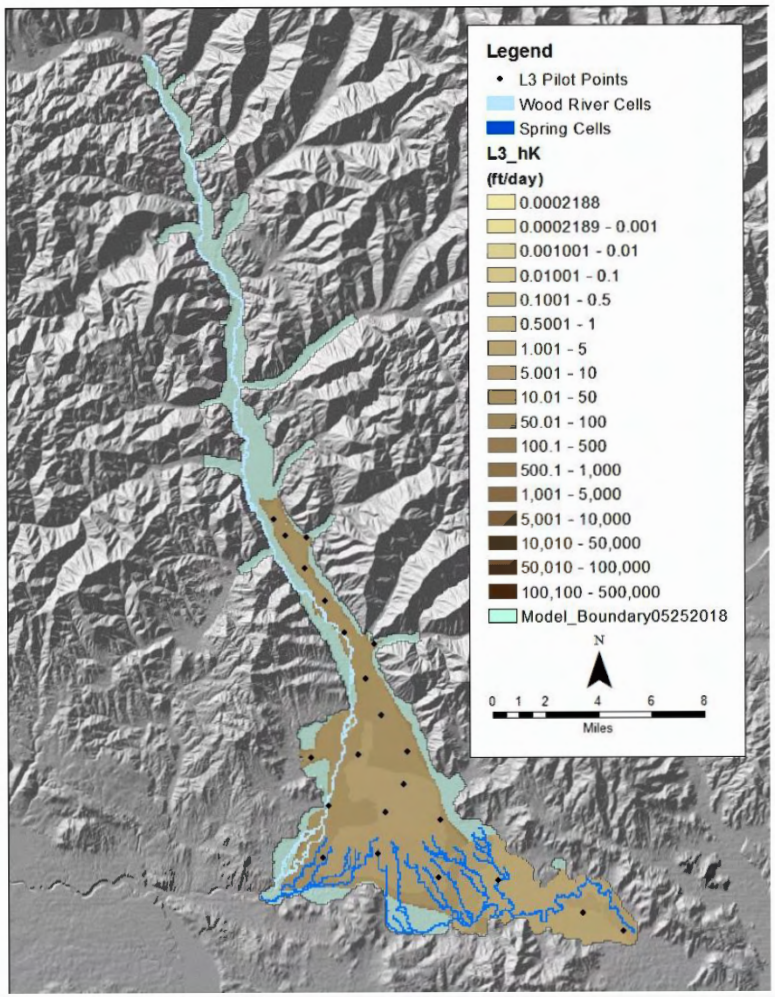
- Layer 1 modeled as non-time varying transmissivity
- Pilot points can be moved
- Number of pilot points not fixed
- Tributary valleys are in their own zones
- Statistics
  - Minimum = 0.04 ft/day
  - Maximum = 1,800 ft/day
  - Mean = 41.2 ft/day

Layer 2 Hydraulic Conductivity



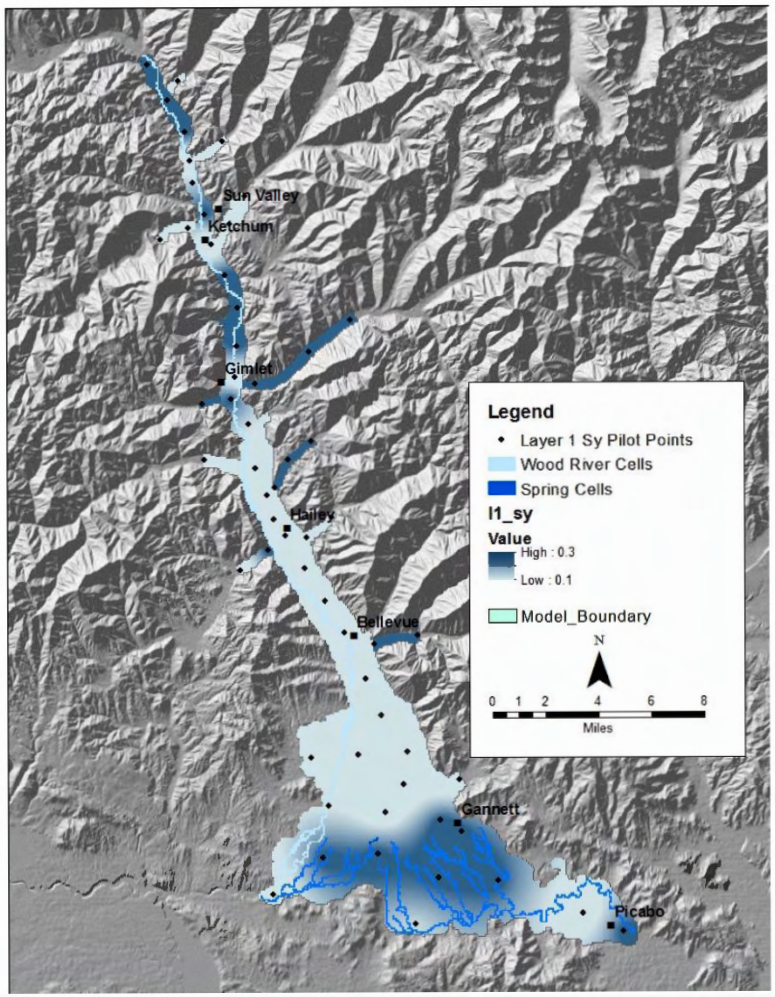
- Layer 2 modeled as confined
- No zones, allows PEST to select values
- Alluvium
  - Minimum = 0.000269 ft/day
  - Maximum = 74,900 ft/day
  - Mean = 443 ft/day
- Confining layer
  - Minimum = 0.000003 ft/day
  - Maximum = 0.645 ft/day
  - Mean = 0.00240 ft/day
- Basalt
  - Minimum = 0.000023 ft/day
  - Maximum = 930,000 ft/day
  - Mean = 6,850 ft/day

Layer 3 Hydraulic Conductivity



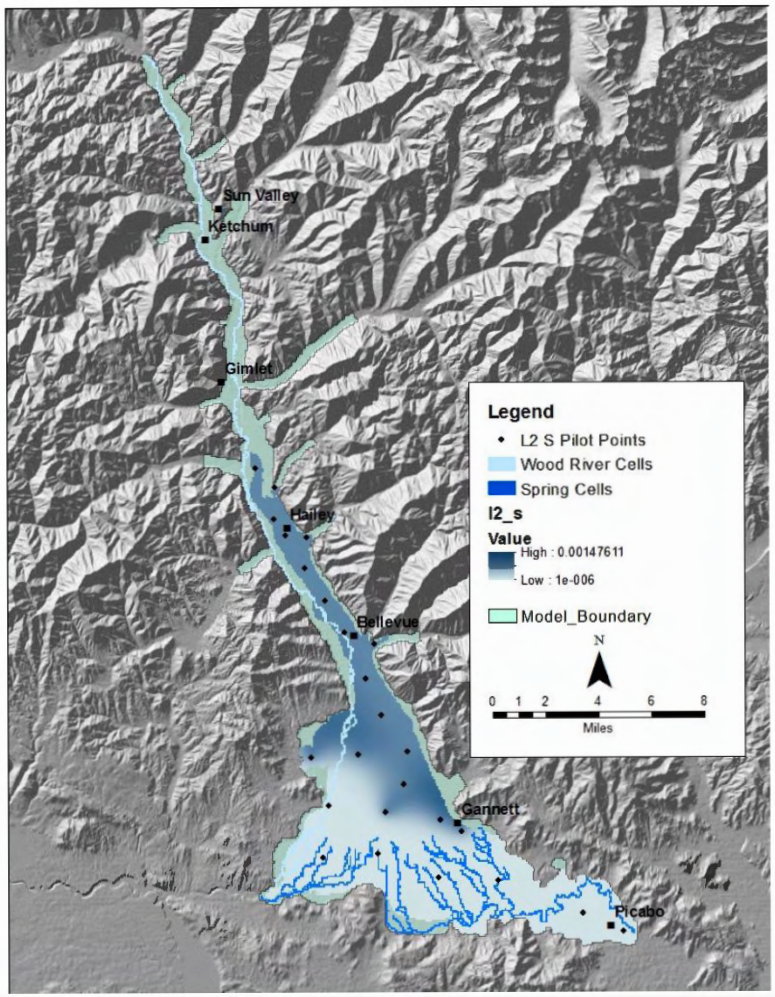
- Layer 3 modeled as confined
- Alluvial aquifer
  - Minimum = 4.99 ft/day
  - Maximum = 321 ft/day
  - Mean = 20.7 ft/day
- Basalt
  - Minimum = 2.37 ft/day
  - Maximum = 11.6 ft/day
  - Mean = 4.87 ft/day

Layer 1 Storage



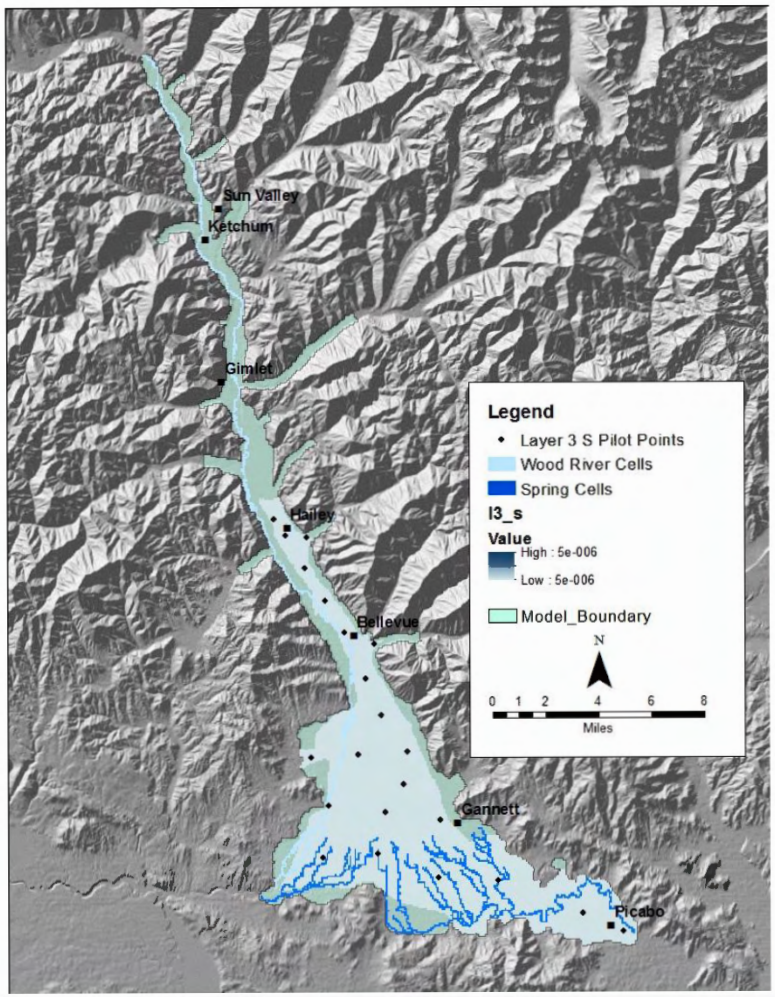
- Layer 1 modeled as non-time varying thickness
- Pilot points can be moved
- Number of pilot points not fixed

Layer 2 Storage



- Layer 2 modeled as storage
- Includes basalt in east
- Includes confining layer
- Pilot points can be moved
- Number of pilot points can be changed

Layer 3 Storage



- Layer 3 modeled as storage
- Includes basalt in east
- Pilot points can be moved
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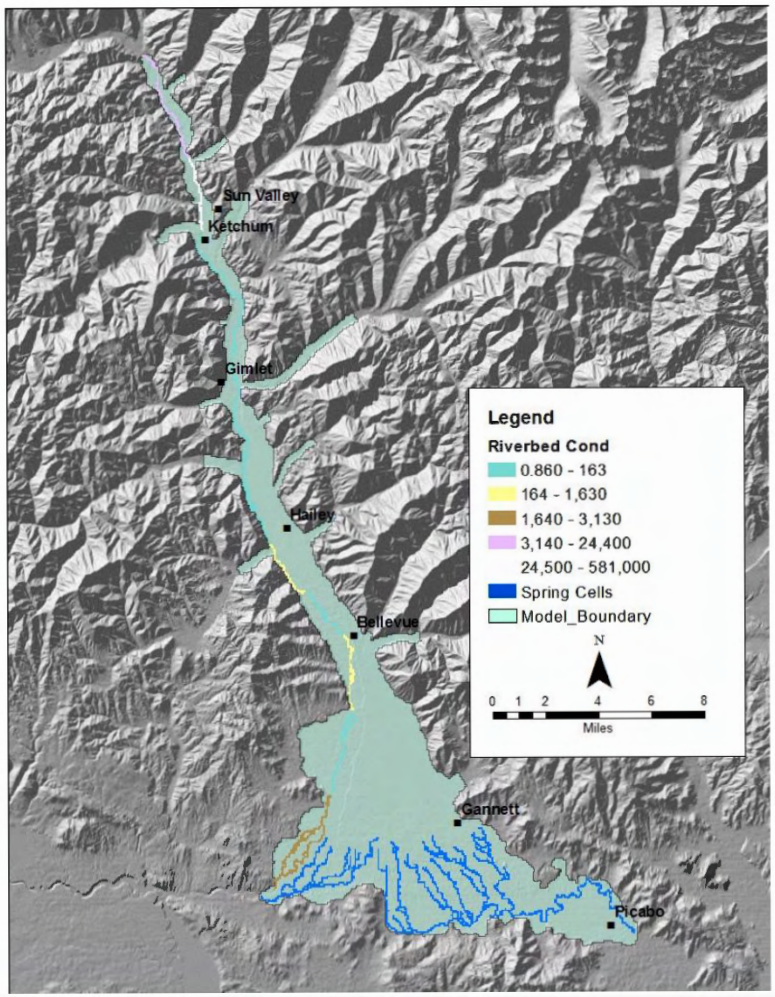
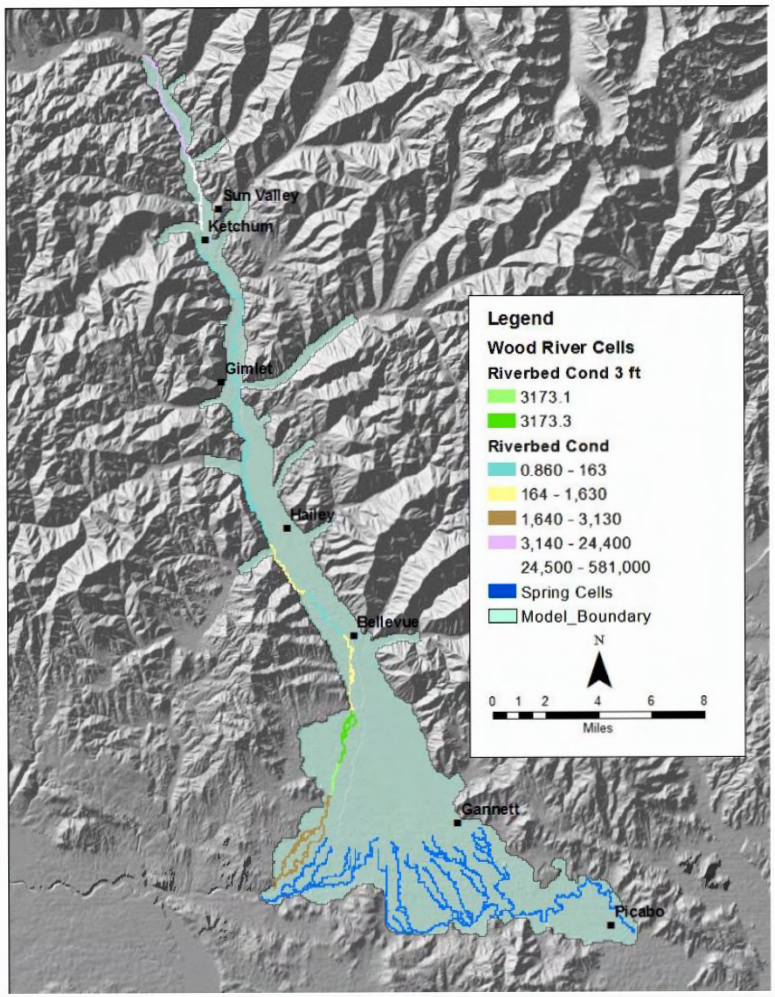
Riverbed Conductance



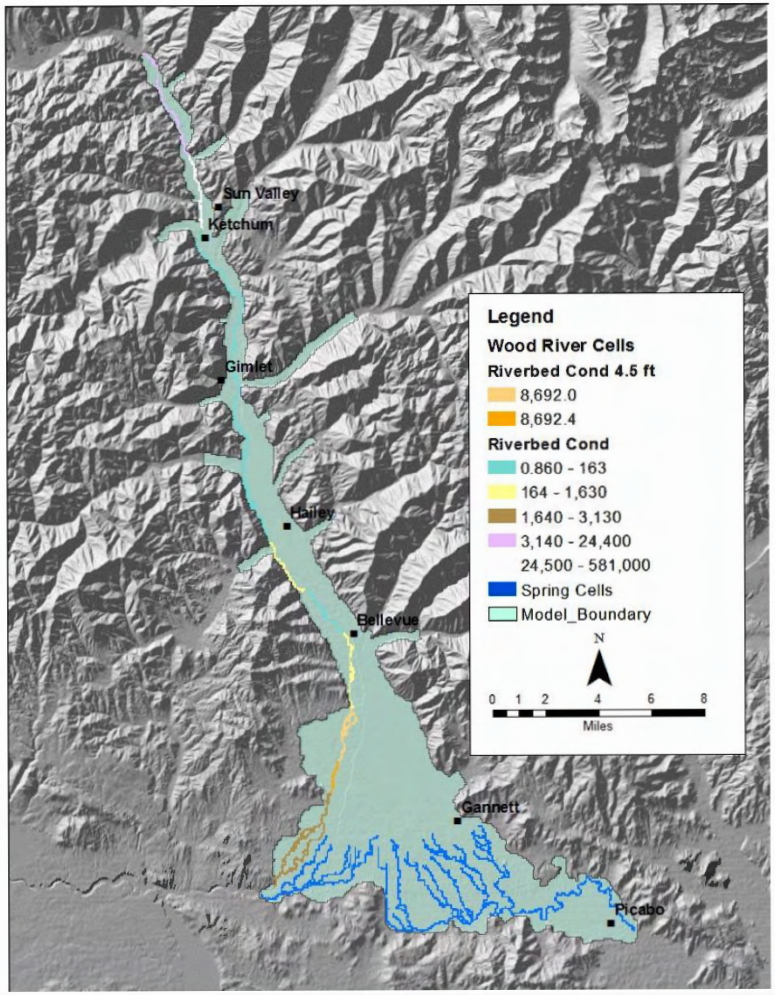
- Riverbed Conductance
  - lumped parameter
  - KLW/M

Riverbed Conductance



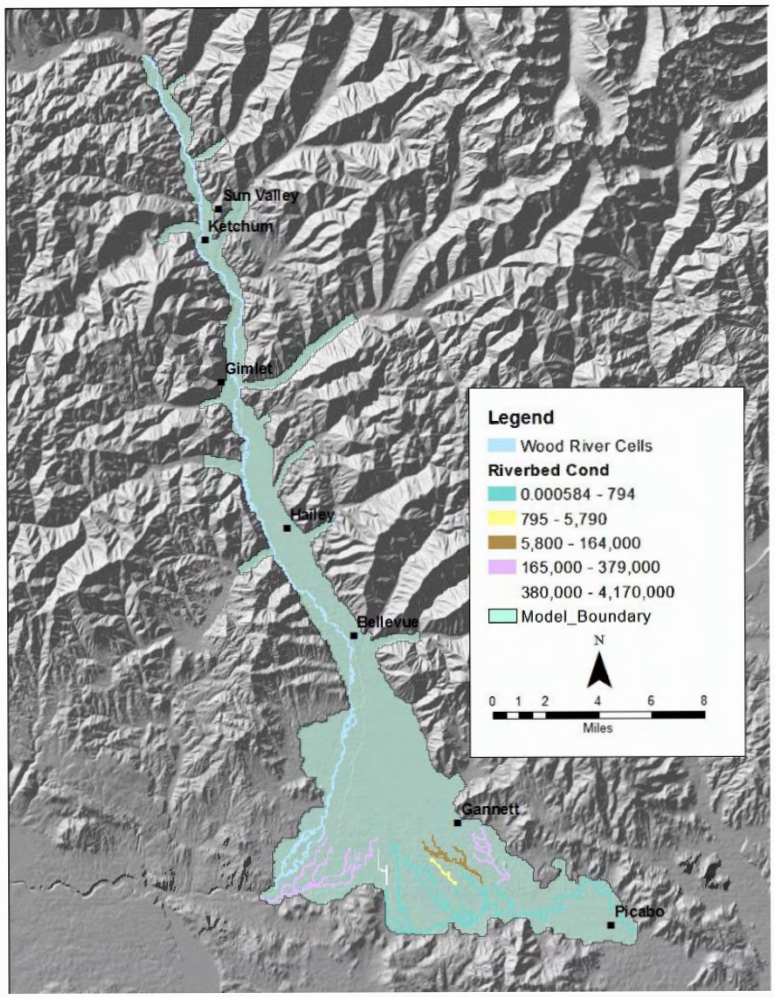
- High Flow Riverbed Conductance
  - Stage at Hailey between 3 and 4.5 ft
  - lumped parameter
  - KLW/M

Riverbed Conductance



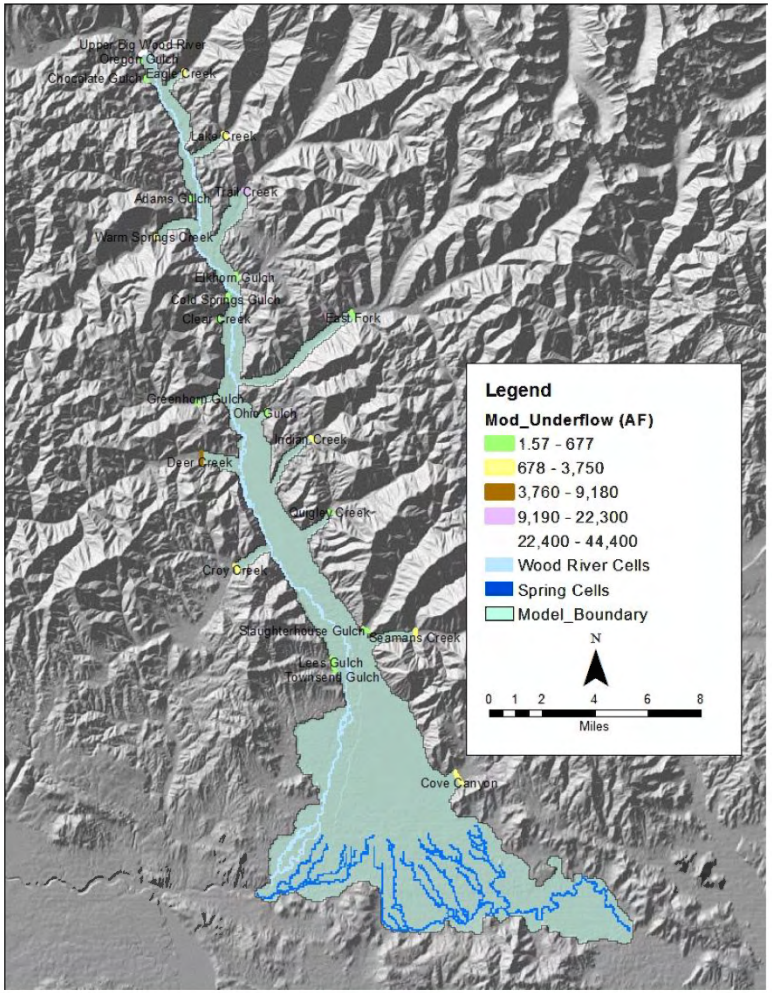
- Riverbed Conductance
  - Stage at Hailey greater than 4.5 ft
  - lumped parameter
  - KLW/M

Riverbed Conductance



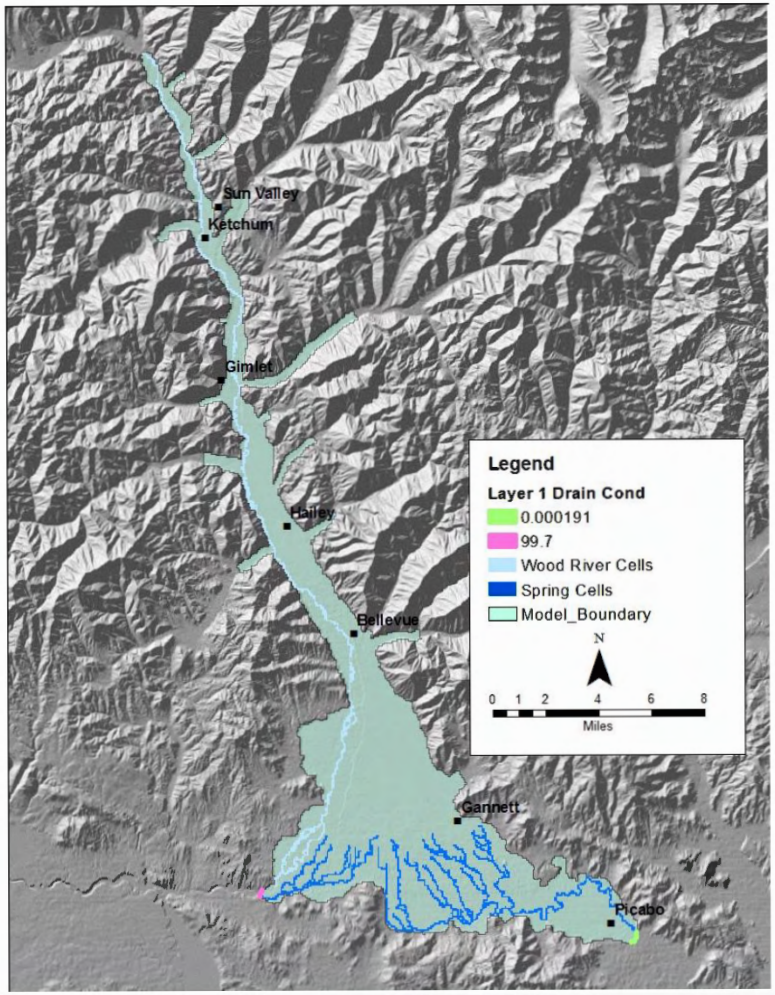
- Willow Creek
- Silver Creek

Tributary Underflow



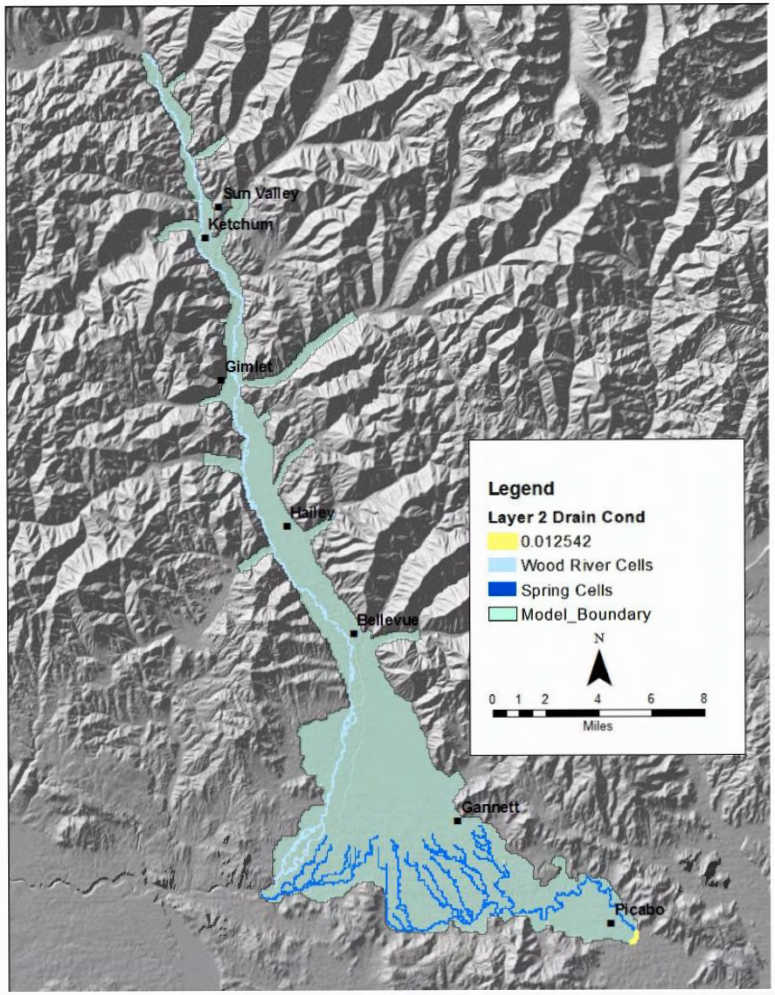
Tributary	Avg Precip (AF)	Underflow (AF)	Underflow/Avg
Adams Gulch	17,600	8.51	0.0005
Chocolate Gulch	864	172.80	0.2000
Cold Springs Gulch	3,341	7.05	0.0021
Clear Creek	2,288	457.60	0.2000
Cove Canyon	11,200	2,239.99	0.2000
Croy Creek	23,595	1,668.43	0.0707
Deer Creek	74,213	9,184.39	0.1238
Eagle Creek	17,248	3,449.60	0.2000
Elkhorn Gulch	12,757	1.57	0.0001
East Fork	120,629	642.29	0.0053
Greenhorn Gulch	30,464	6.82	0.0002
Indian Creek	10,149	2,029.80	0.2000
Lake Creek	17,280	3,456.00	0.2000
Lees Gulch	2,240	448.00	0.2000
Ohio Gulch	4,270	39.40	0.0092
Oregon Gulch	6,919	6.39	0.0009
Quigley Creek	15,504	677.43	0.0437
Seamans Creek	18,768	3,753.60	0.2000
Slaughterhouse Gulch	11,509	5.06	0.0004
Trail Creek	111,274	22,254.79	0.2000
Townsend Gulch	960	12.18	0.0127
Upper Big Wood River	313,278	44,381.10	0.1417
Warm Springs Creek	180,735	2,308.57	0.0128

Drains



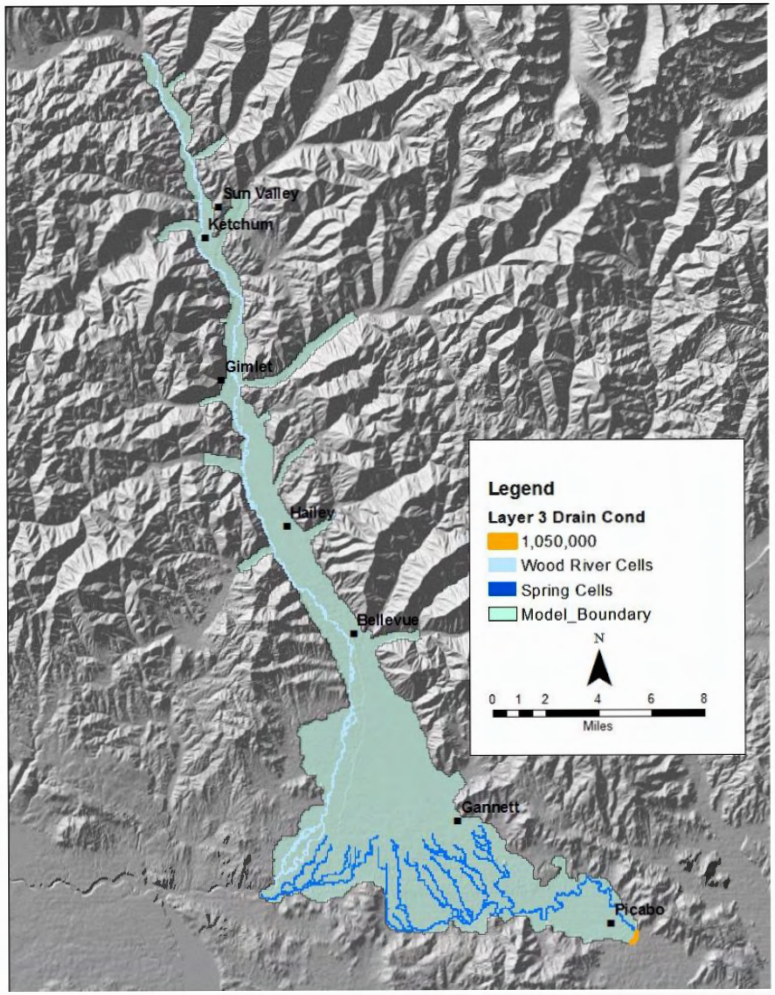
- Layer 1 drains

Drains



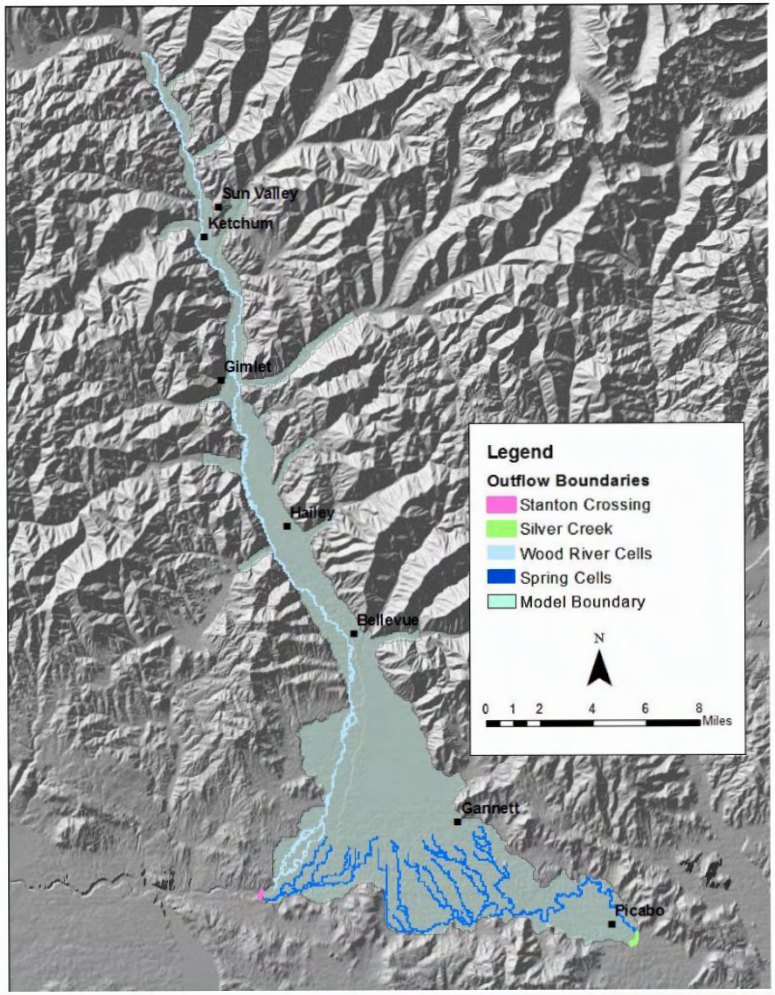
- Layer 2 drains

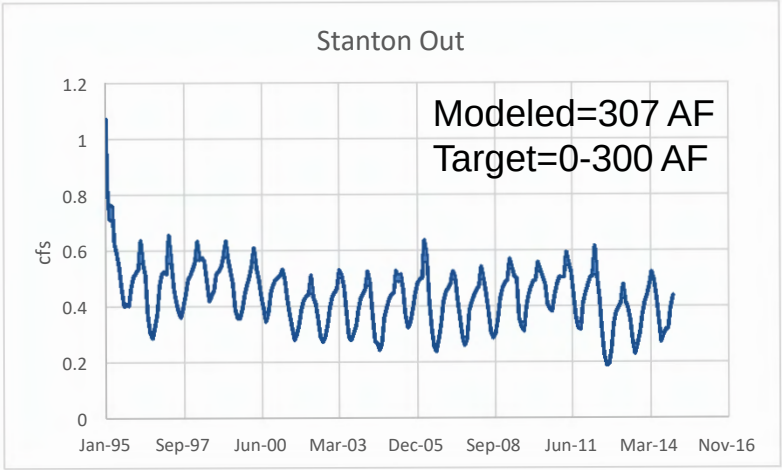
Drains

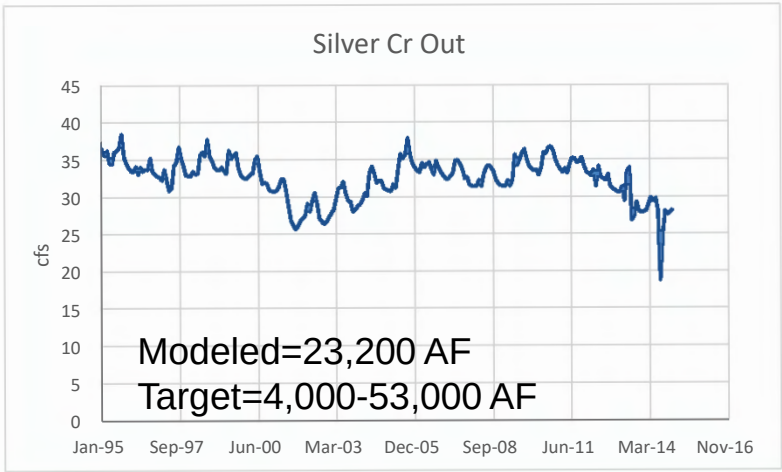


- Layer 3 drains

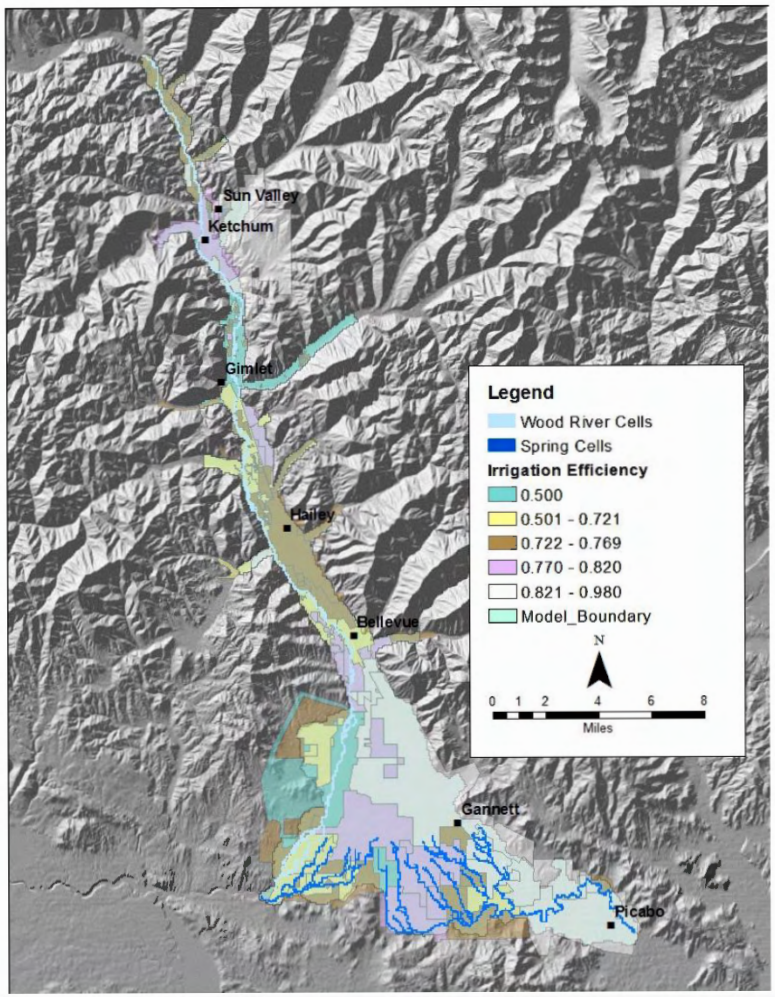
Aquifer Discharge



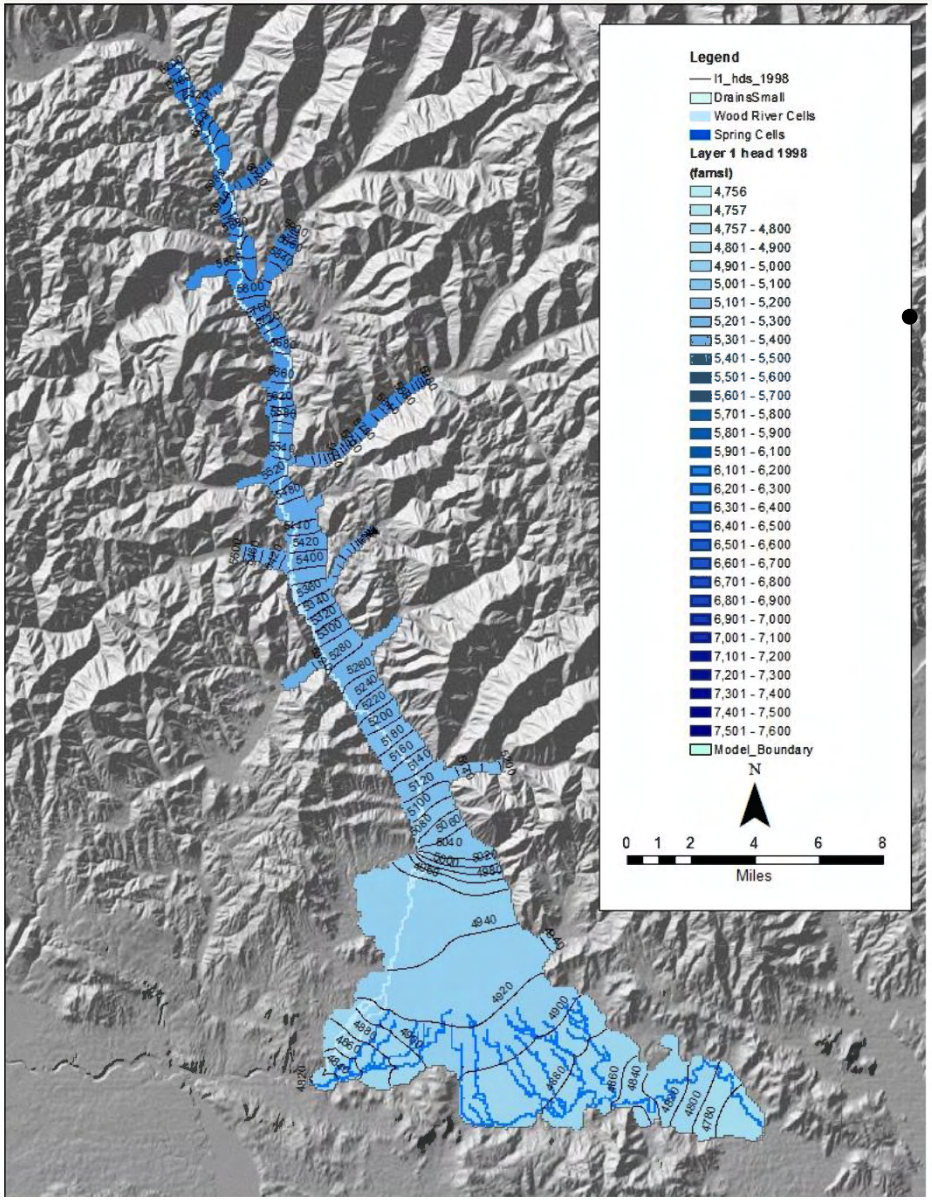




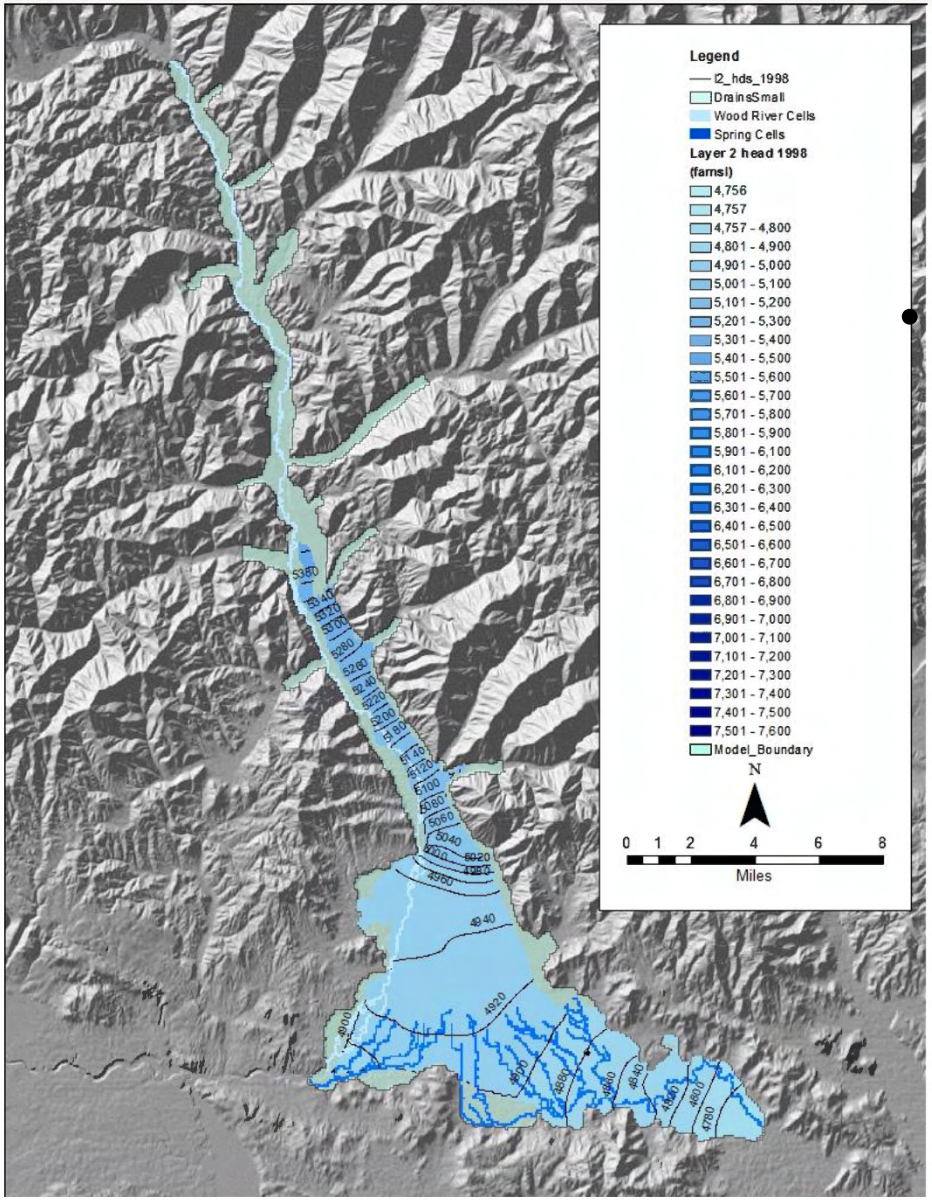
Irrigation Efficiency



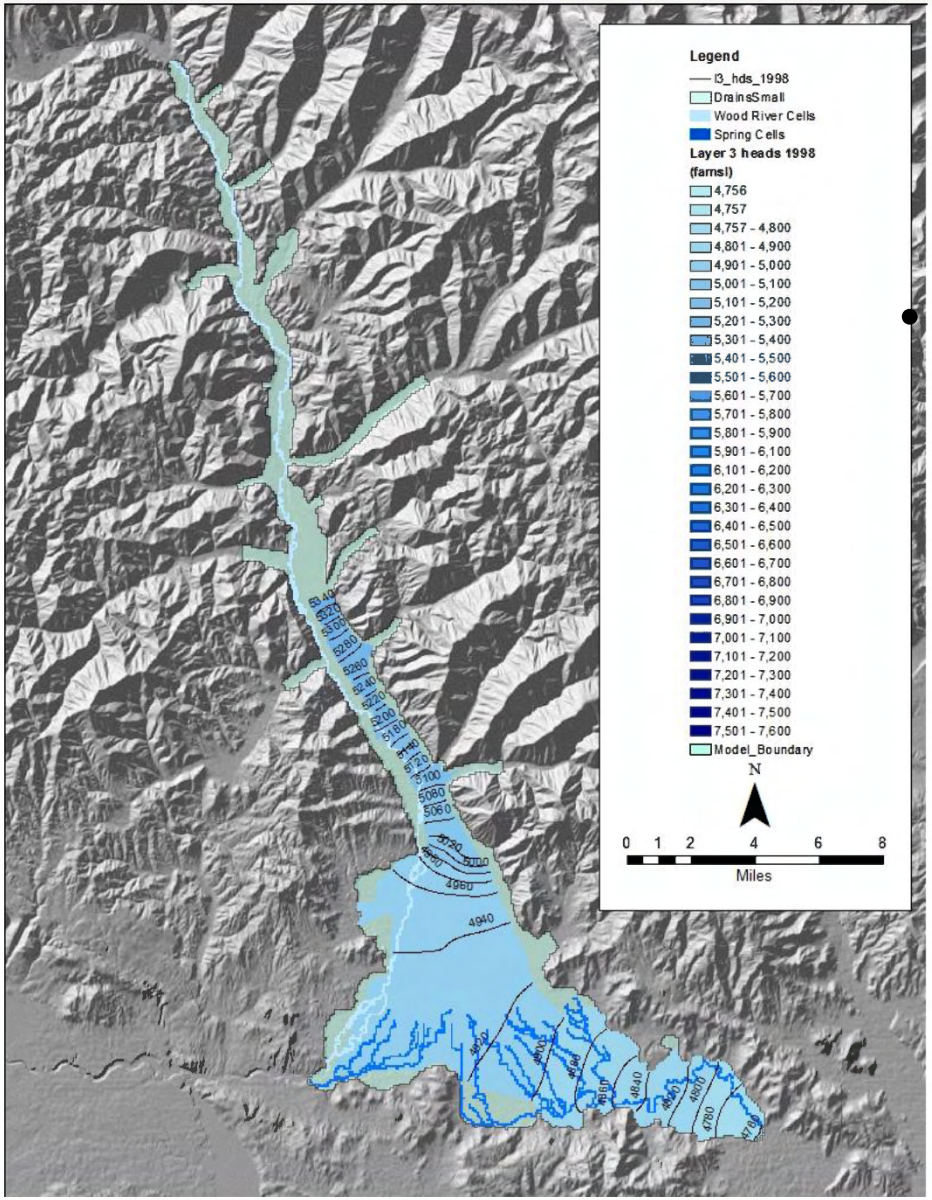
- Percent of diversion applied to crop consumptive use
- Some entities have explicitly modeled canals
  - Hiawatha
  - District 45
  - Baseline
- Seepage in modeled canals not included in Efficiency calculations



- Layer 1 Head January 1998

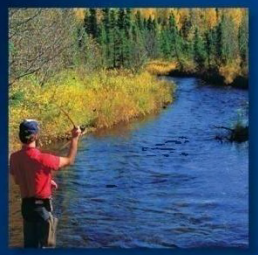


- Layer 2 Head January 1998



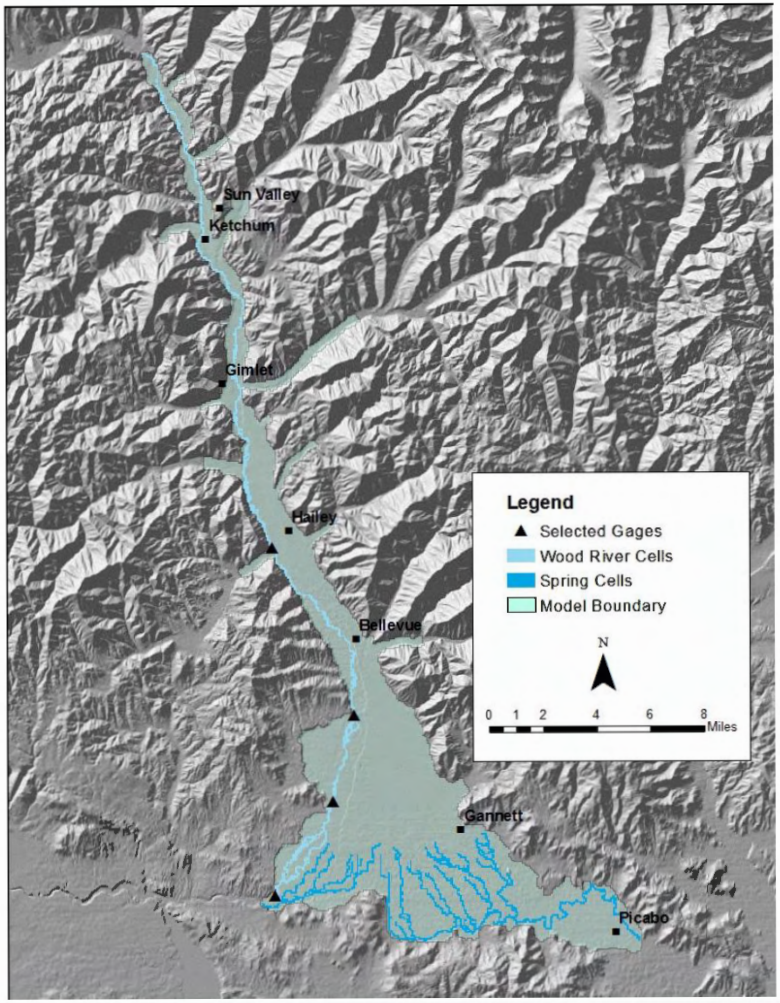
- Layer 3 Head January 1998

IDAHO Department of Water Resources

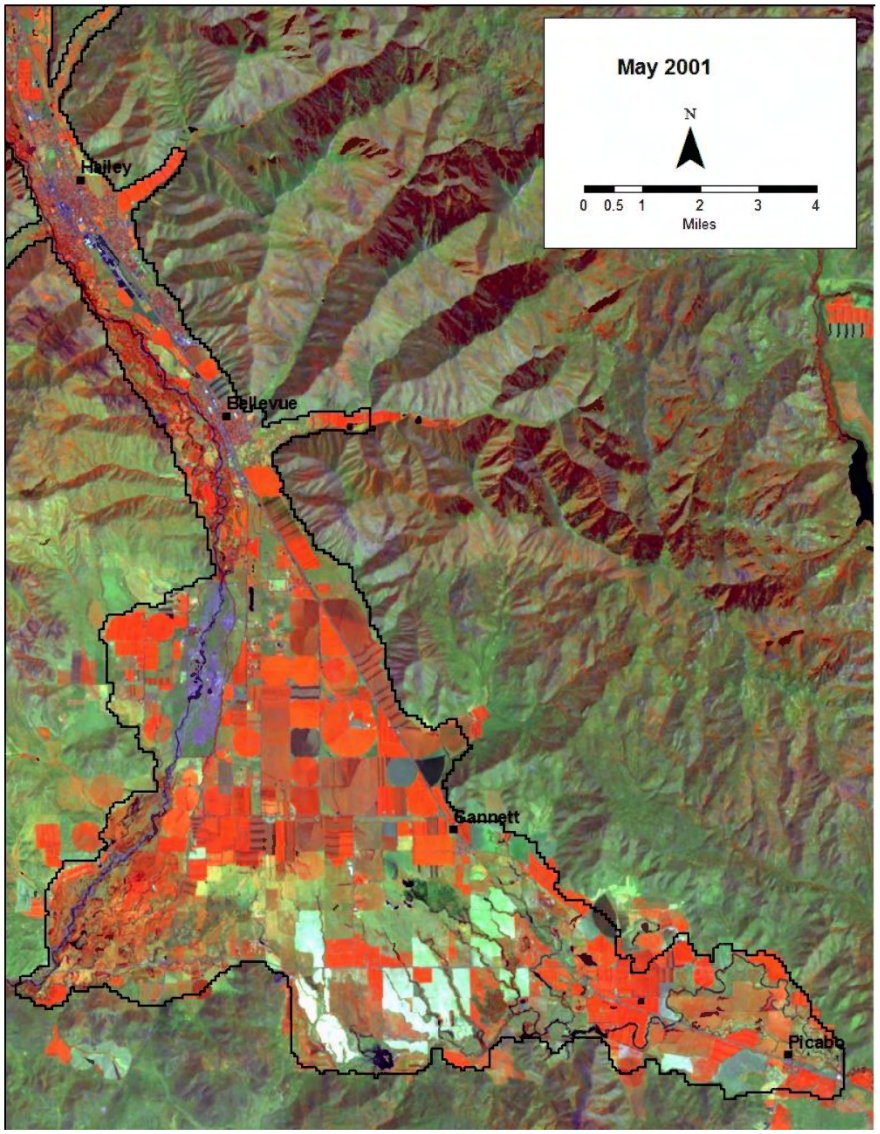


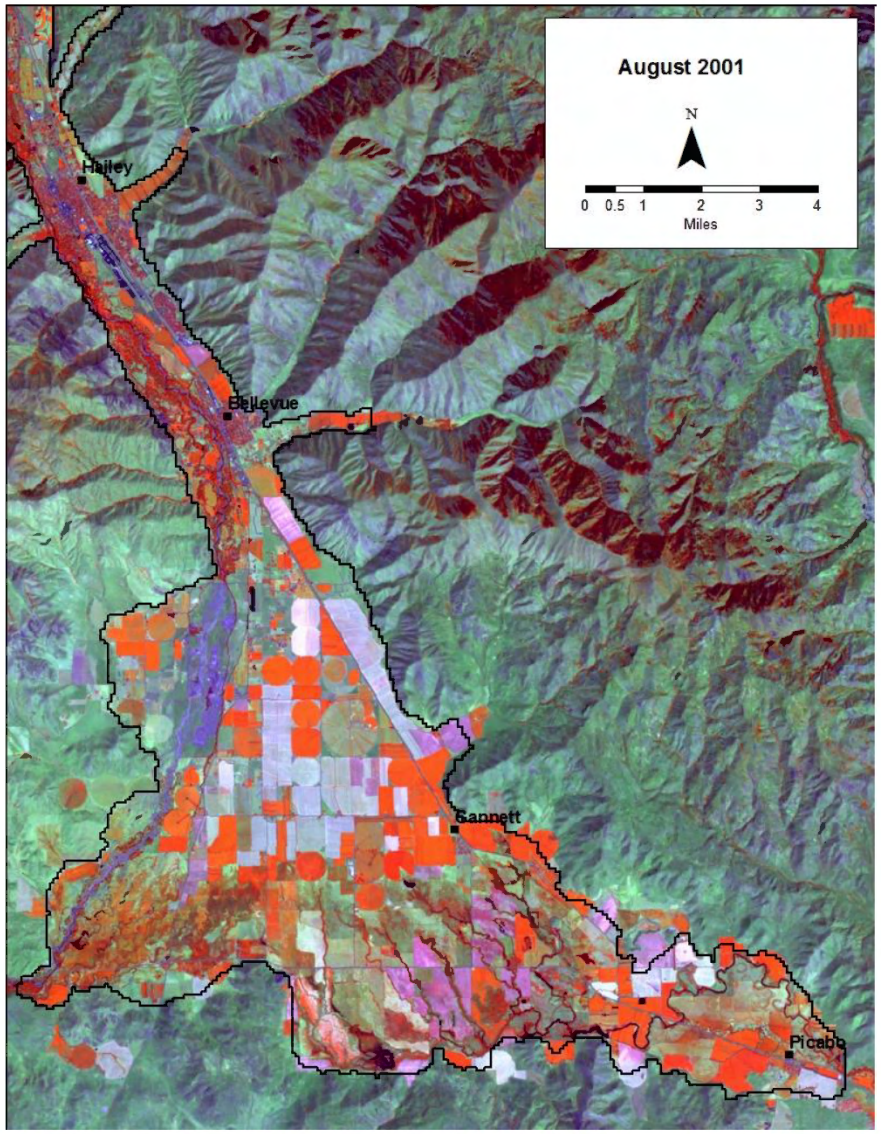
End

Changes in River file



- During irrigation season Glendale Rd to Wood River Ranch dry when water master records indicate it is dry.
  - Remains dry until Landsat photos show it has water
- Wood River Ranch to Stanton Crossing dry when Landsat photos show it is dry


May 2001
N
0 0.5 1 2 3 4
Miles
Hailey
Bellevue
Gannett
Picabo


August 2001
N
0 0.5 1 2 3 4
Miles
Hailey
Bellevue
Gannett
Picabo

Riverbed Conductance