Calibration Run E120106A001

Allan Wylie IDWR

Reach Gain and Spring Discharge Targets

- Monthly Stress Periods
  - Using
    - MKMOD81.exe
      - Using On-Farm algorithm
    - E120106A
      - AFRD2 and Malad River seepage fixed
    - No steady state targets
    - Aquifer head
      - 1985-2008
    - Seasonal
      - Head difference on selected wells
    - Snake reach gain and loss targets
      - Updated through 2008 to match recharge data
      - 1985-2008
    - Spring discharge
      - Updated through 2008 to match recharge data
      - 1985-2008
    - Returns targets
      - Egin, Liberty, Great Feeder Group, Butte-Market Lake, Aberdeen-Springfield, BID, MID, and NSCCo

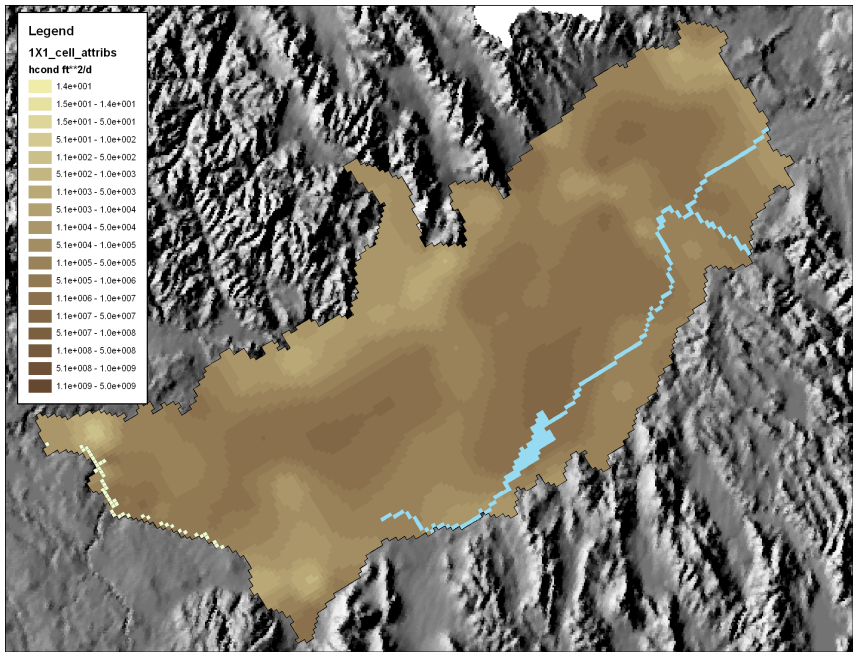
Reach Gain and Spring Discharge Targets

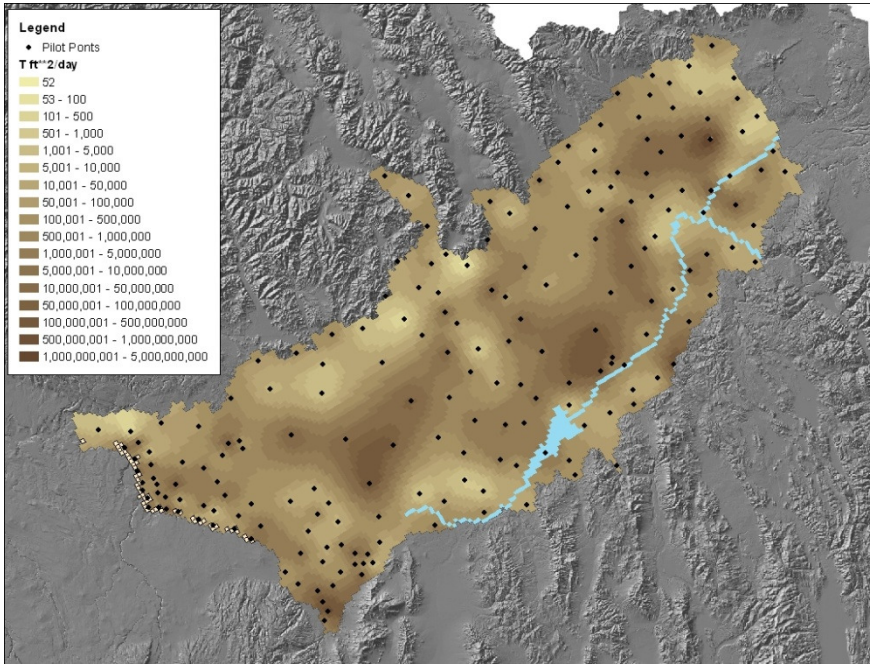
- Adjustable Parameters
  - Transmissivity
    - Pilot Points
      - 1e-10 – 1e+10
  - Specific Yield
    - Pilot Points
      - 0.05 – 0.30
  - Riverbed Conductance
    - By reach
      - 1.0 – 1e+10
  - Drain Conductance
    - By drain cell
      - Up to 2 drain cells per model cell
      - 1e-10 - 3e+8
  - Canal seepage
    - Uniform by entity
      - 1.05 – 0.95
  - Non-irrigated recharge
    - Thin Thick and Lava
    - 2.0 – 1.0e-6
  - ET
    - Surface Water Entity
      - Sprinkler and Gravity
      - +/-5%
    - Groundwater Entity
      - Sprinkler and Gravity
      - +/-5%
  - Perched River Seepage
    - River reach
    - +/-20%
  - Tributary Underflow
    - 2 – 0.5
    - Split Cam/Bev and Hnry Fork
      - 8 – 1e-6

2008 Reach Gain and Spring Discharge Targets

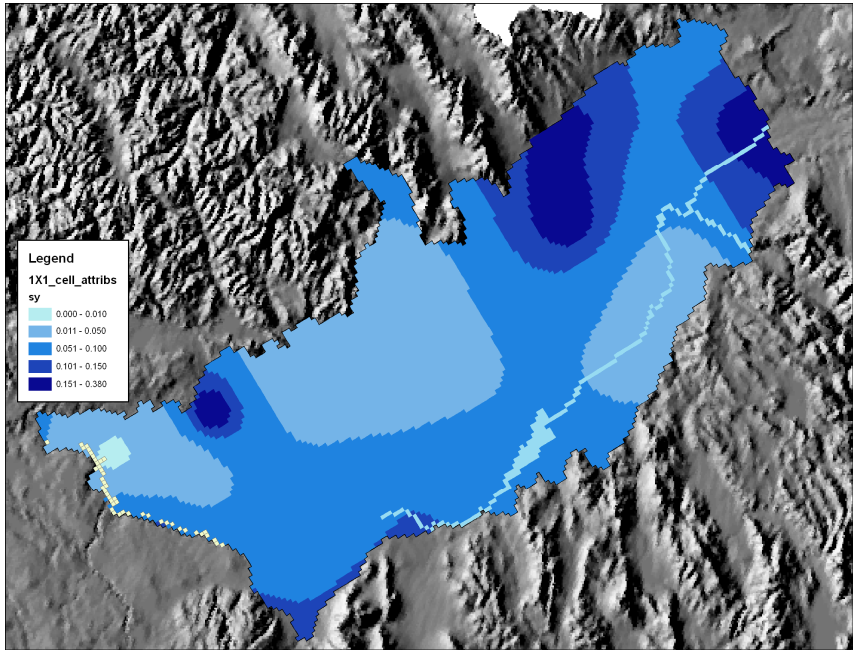
- Adjustable Parameters (cont)
  - On Farm Parameters
    - EffSp
      - Fixed 0.85
    - EffGr
      - Fixed 0.8
    - DPin
      - 0.98 – 0.6
    - DPex
      - 0.98 – 0.6
    - Entities with no returns DPin and DPex fixed at 1.0

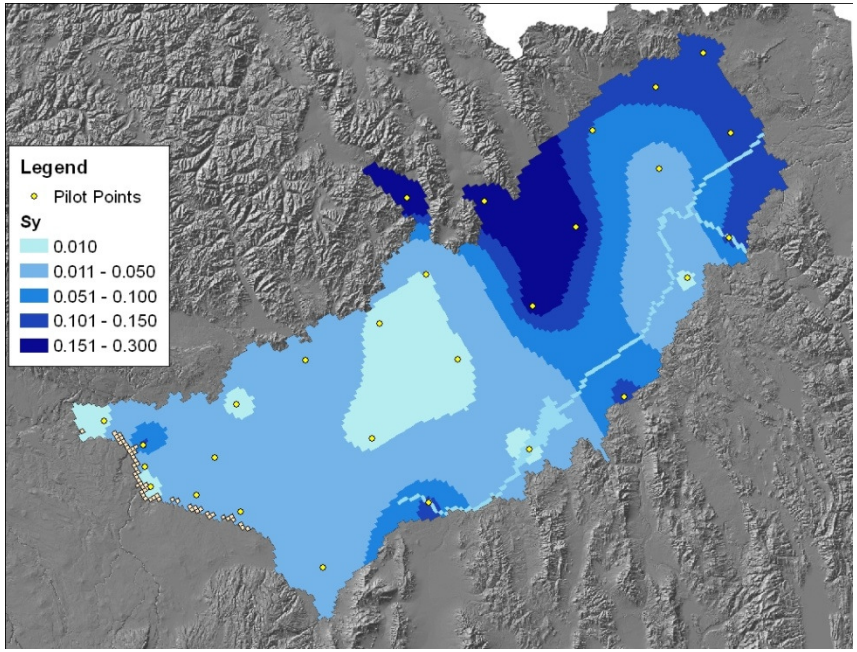
V 1.1


Legend
1X1_cell_attribs
hcond ft**2/d
1.4e+001
1.5e+001 - 1.4e+001
1.5e+001 - 5.0e+001
5.1e+001 - 1.0e+002
1.1e+002 - 5.0e+002
5.1e+002 - 1.0e+003
1.1e+003 - 5.0e+003
5.1e+003 - 1.0e+004
1.1e+004 - 5.0e+004
5.1e+004 - 1.0e+005
1.1e+005 - 5.0e+005
5.1e+005 - 1.0e+006
1.1e+006 - 1.0e+007
1.1e+007 - 5.0e+007
5.1e+007 - 1.0e+008
1.1e+008 - 5.0e+008
5.1e+008 - 1.0e+009
1.1e+009 - 5.0e+009

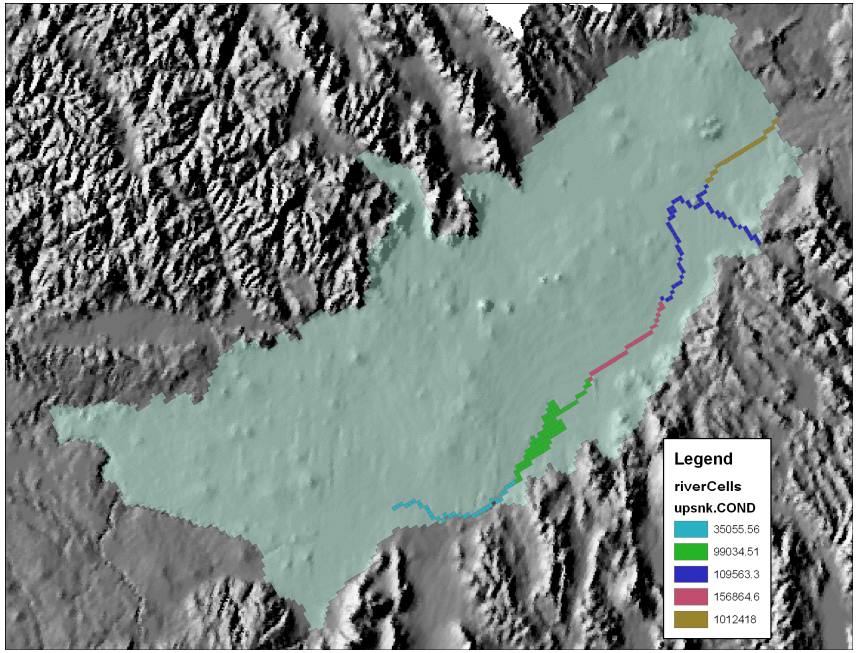

Legend
Pilot Ponts
T ft**2/day
52
53 - 100
101 - 500
501 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 500,000
500,001 - 1,000,000
1,000,001 - 5,000,000
5,000,001 - 10,000,000
10,000,001 - 50,000,000
50,000,001 - 100,000,000
100,000,001 - 500,000,000
500,000,001 - 1,000,000,000
1,000,000,001 - 5,000,000,000

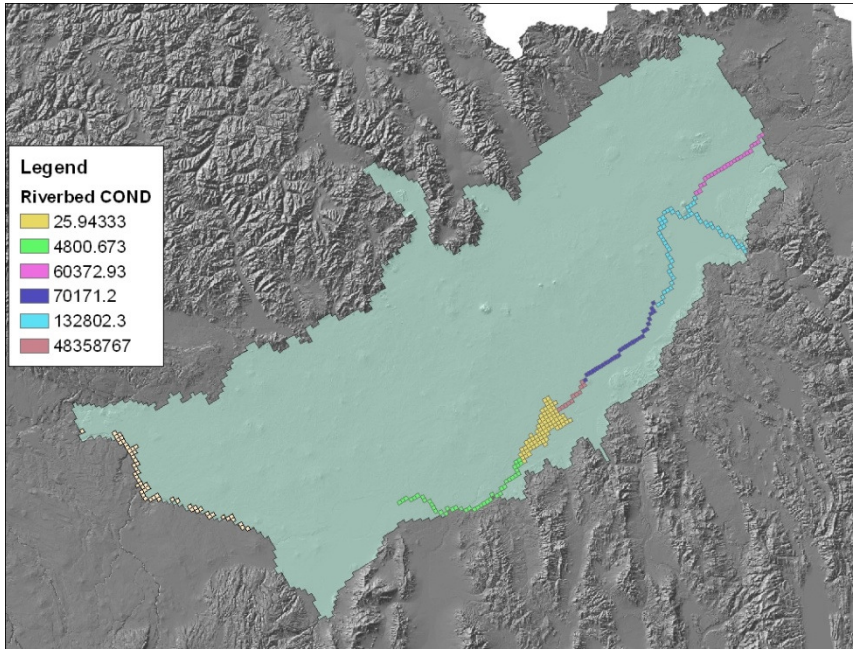
V 1.1


Legend
1X1_cell_attribs
sy
0.000 - 0.010
0.011 - 0.050
0.051 - 0.100
0.101 - 0.150
0.151 - 0.380

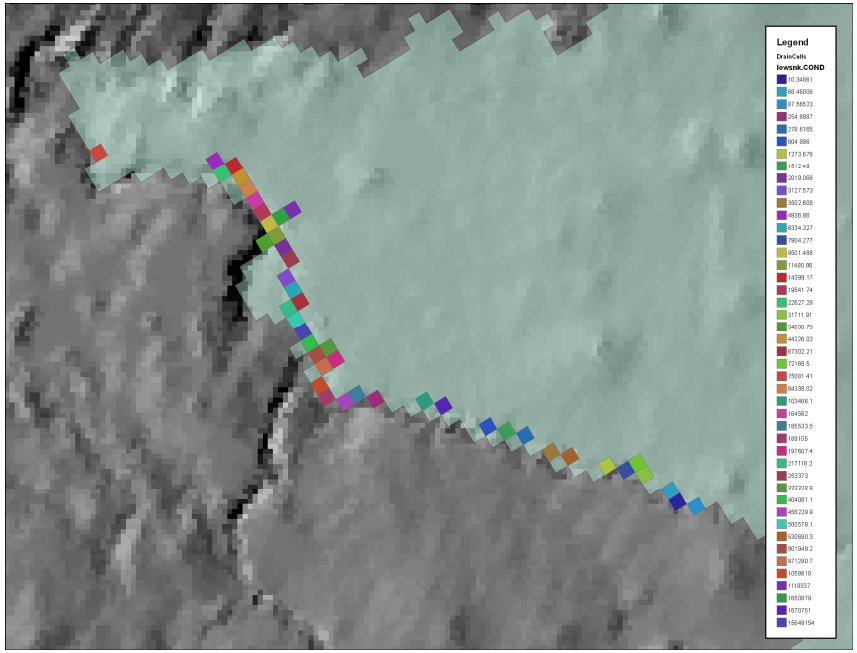

Legend
Pilot Points
Sy
0.010
0.011 - 0.050
0.051 - 0.100
0.101 - 0.150
0.151 - 0.300

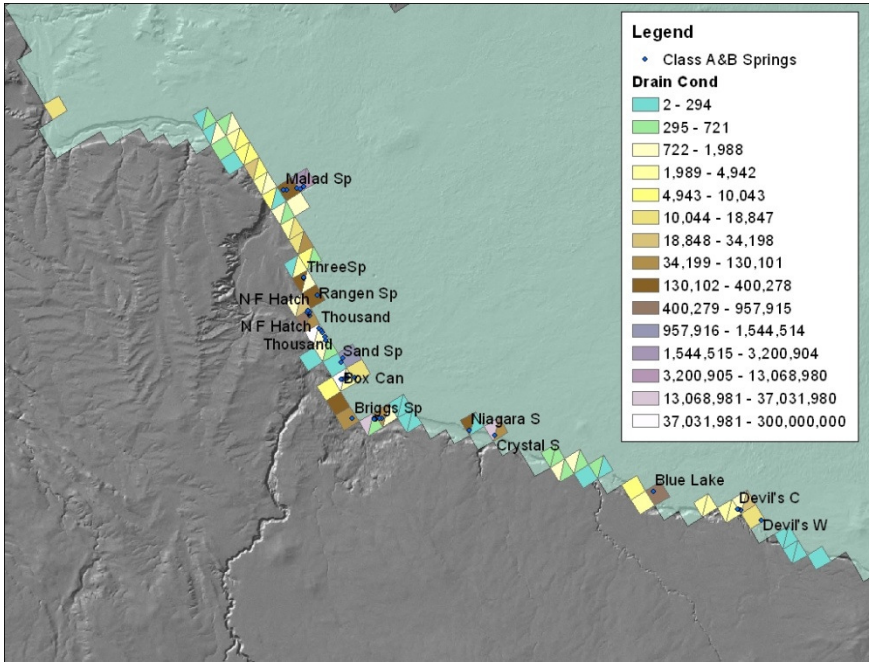
V 1.1


Legend
riverCells
upsnk.COND
35055.56
99034.51
109563.3
156864.6
1012418

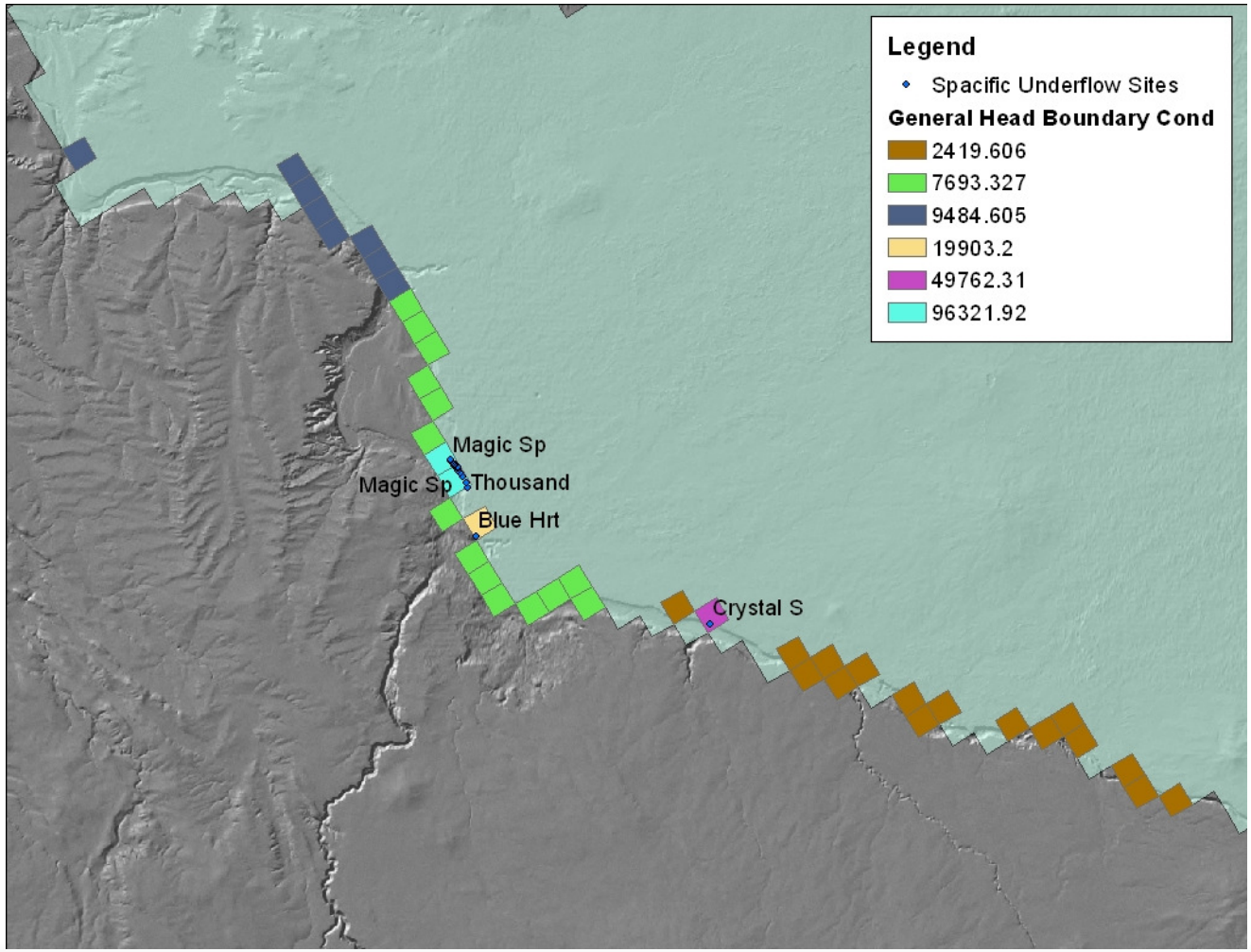

Legend
Riverbed COND
25.94333
4800.673
60372.93
70171.2
132802.3
48358767

V 1.1

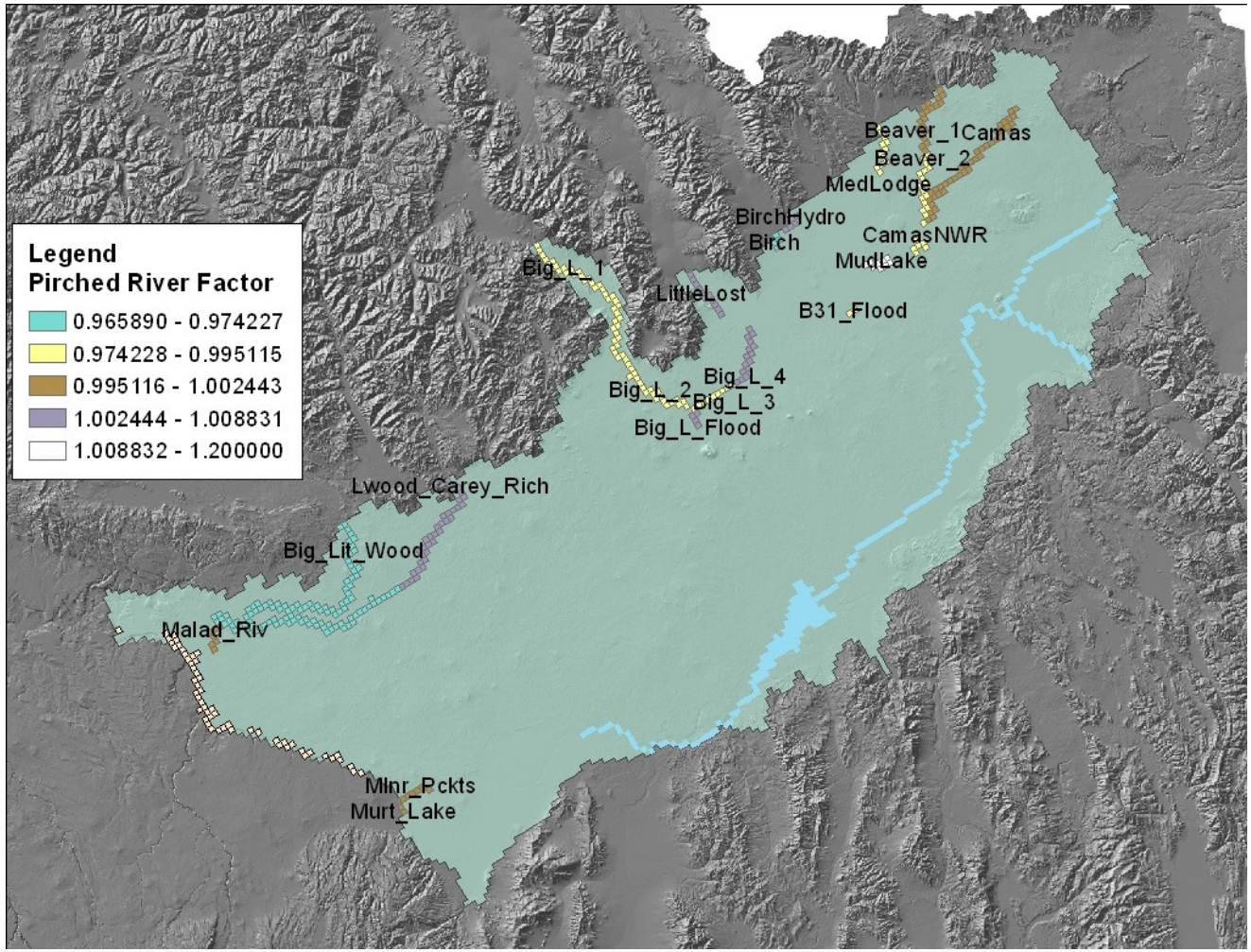

Legend
DrainCells
lowsnk.COND


Legend
Class A&B Springs
Drain Cond
2 - 294
295 - 721
722 - 1,988
1,989 - 4,942
4,943 - 10,043
10,044 - 18,847
18,848 - 34,198
34,199 - 130,101
130,102 - 400,278
400,279 - 957,915
957,916 - 1,544,514
1,544,515 - 3,200,904
3,200,905 - 13,068,980
13,068,981 - 37,031,980
37,031,981 - 300,000,000
Malad Sp
ThreeSp
N F Hatch
Rangen Sp
Thousand
N F Hatch
Thousand
Sand Sp
Box Can
Briggs Sp
Niagara S
Crystal S
Blue Lake
Devil's C
Devil's W

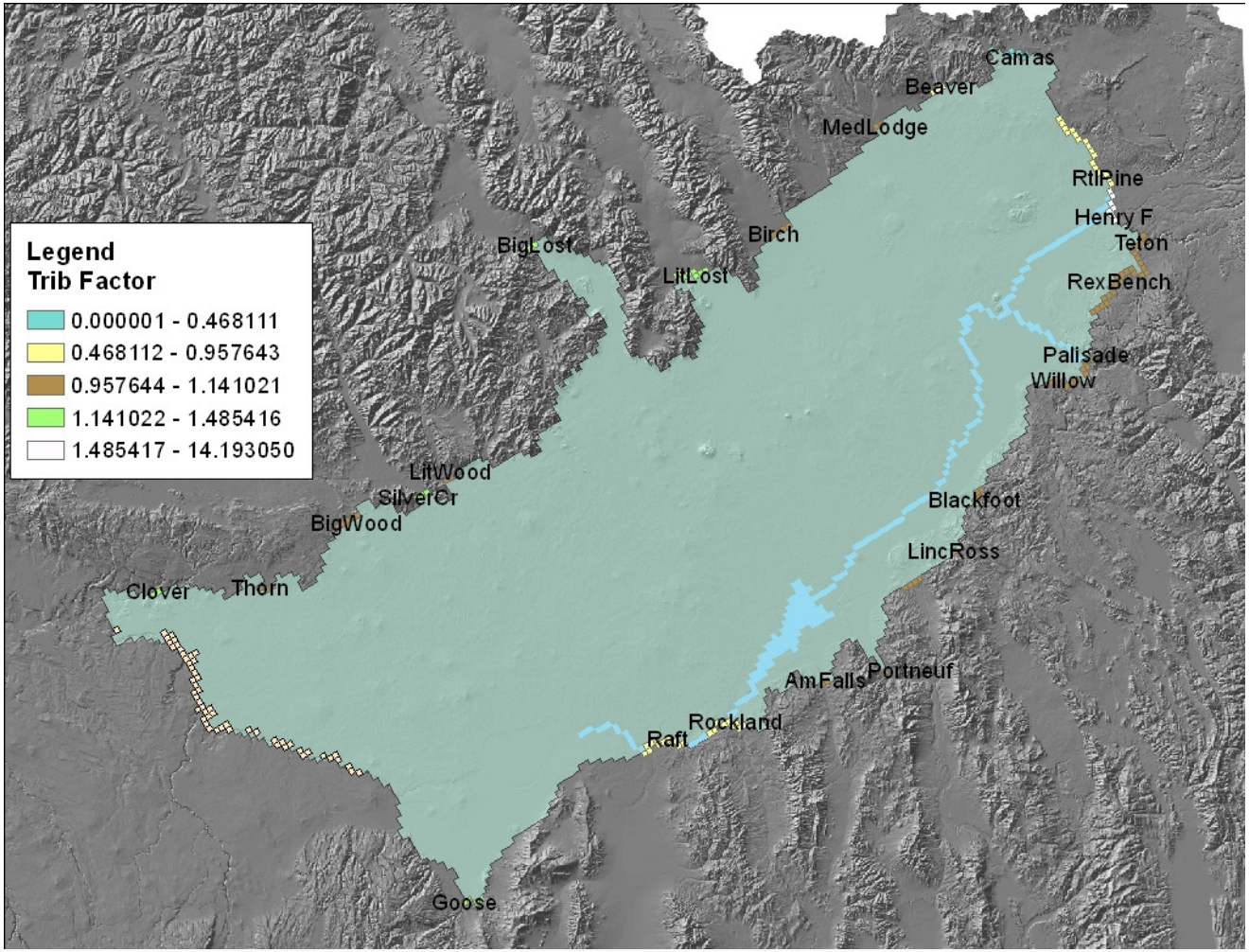
General Head Boundary



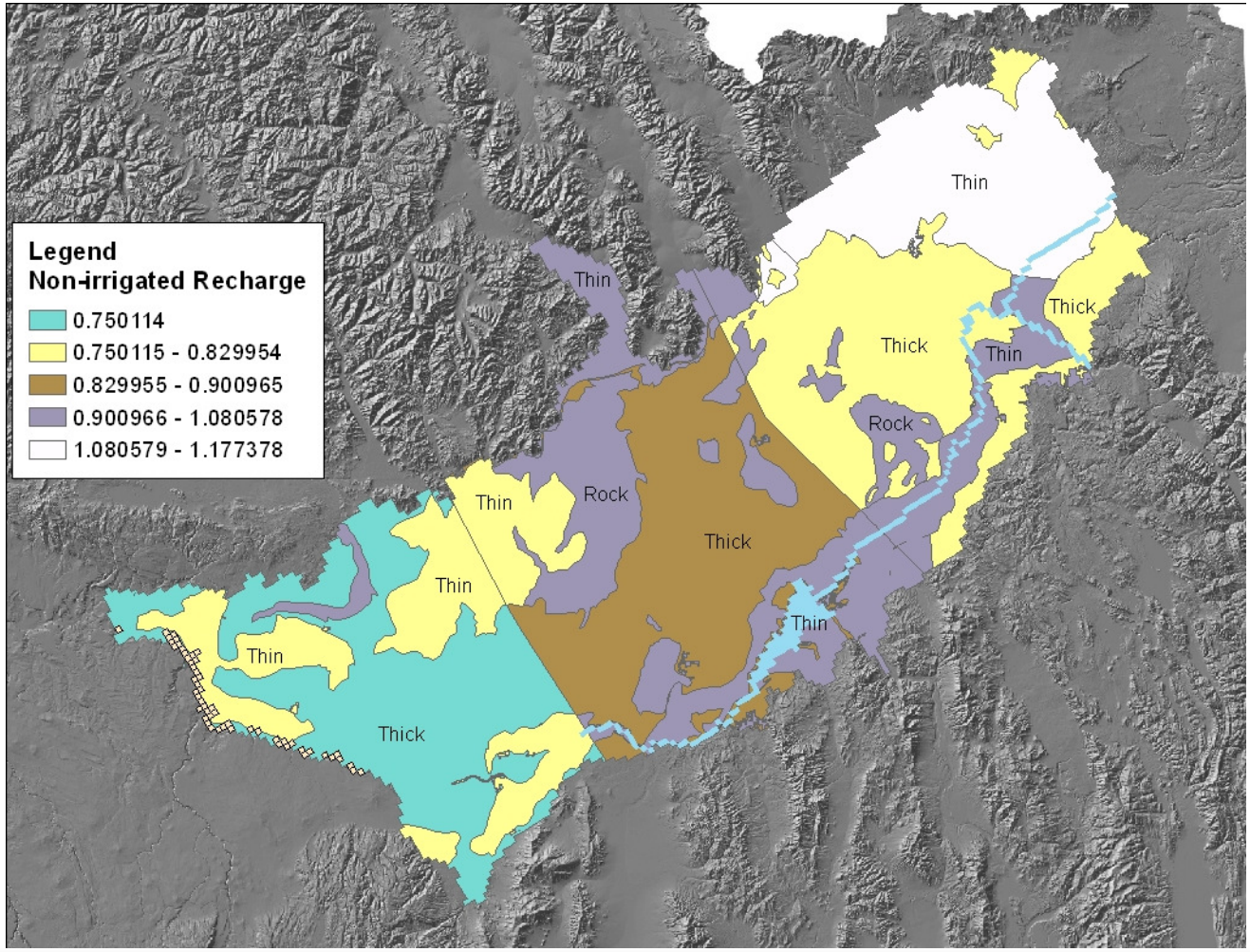
Perched River Seepage



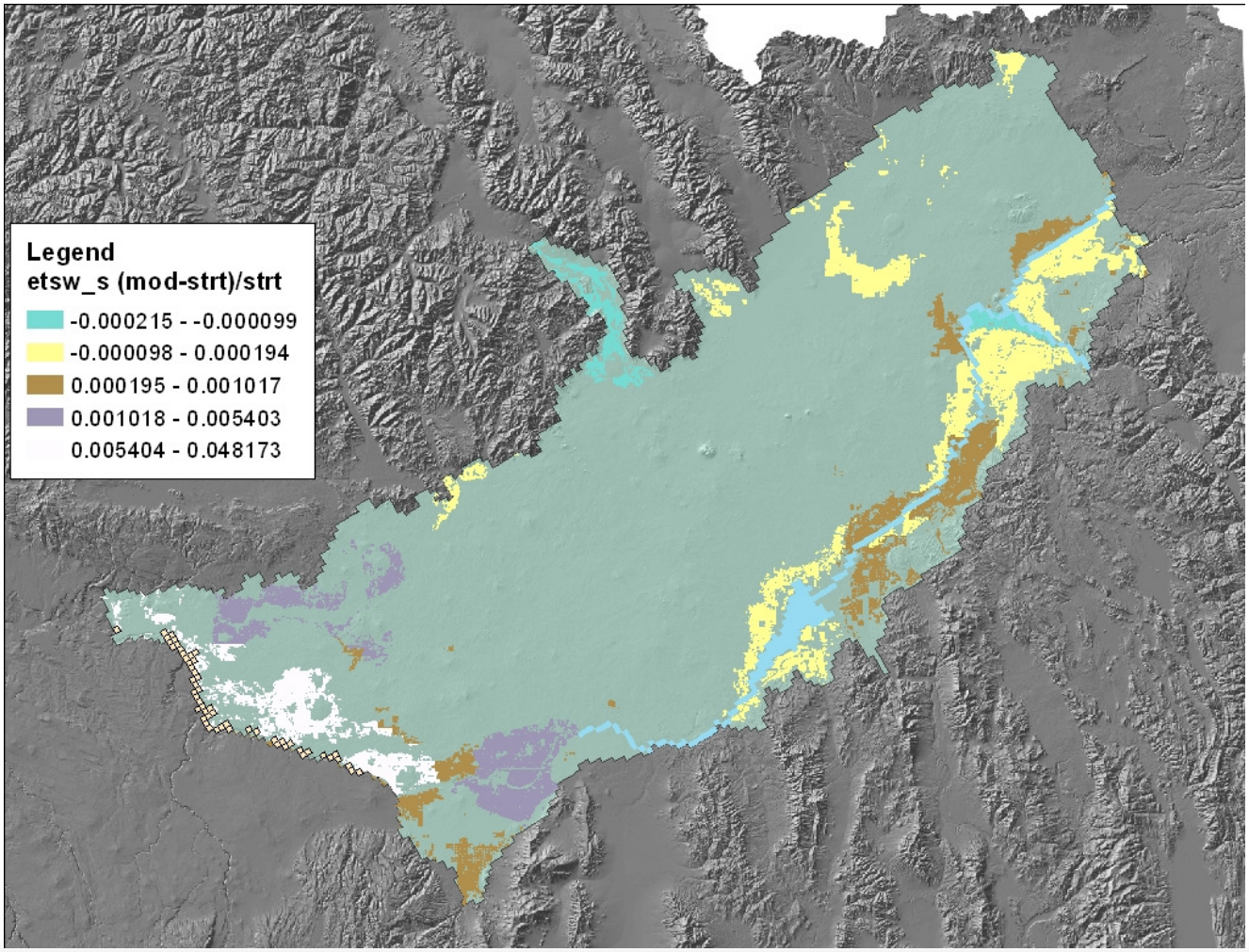
Tributary Underflow



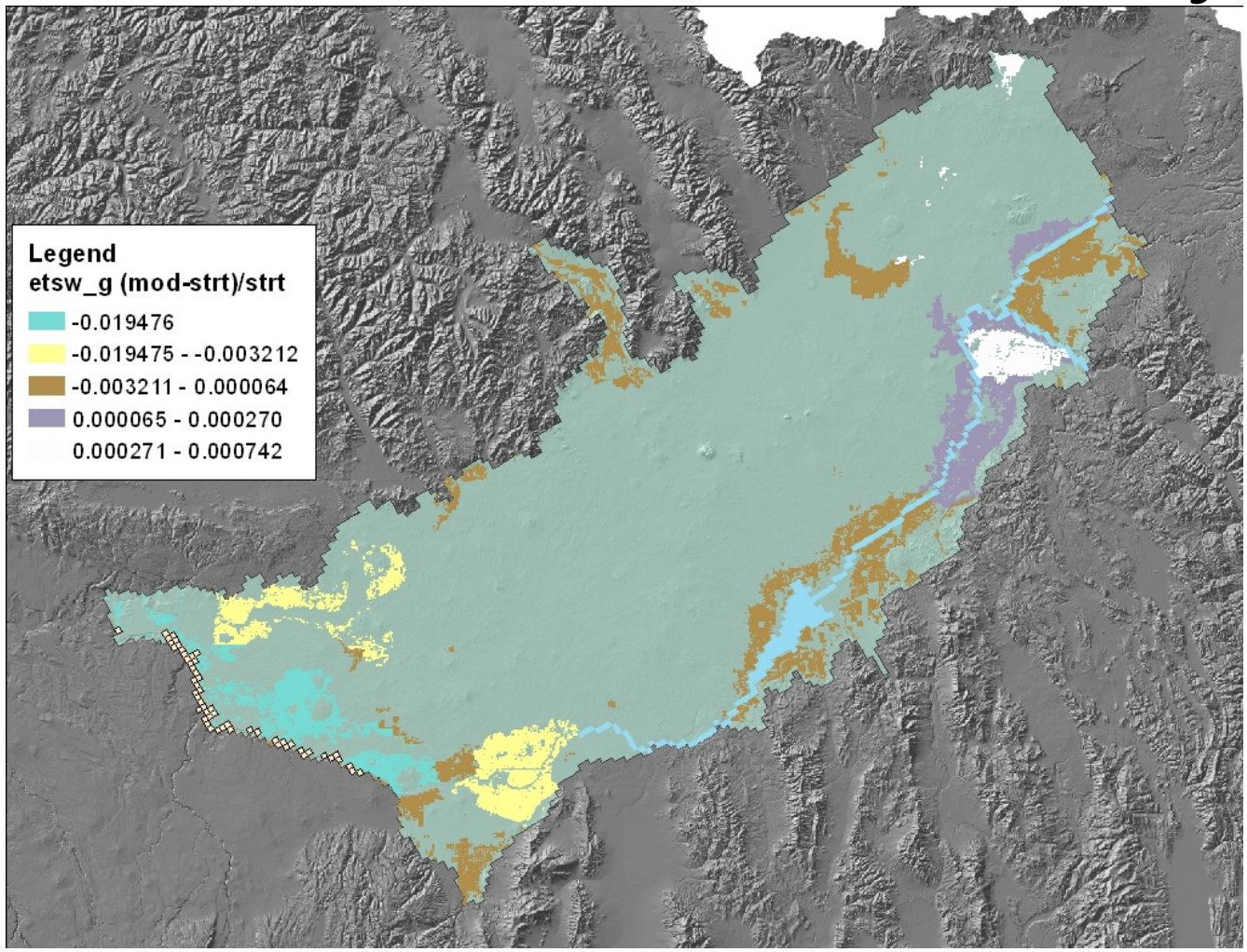
Non-irrigated Recharge



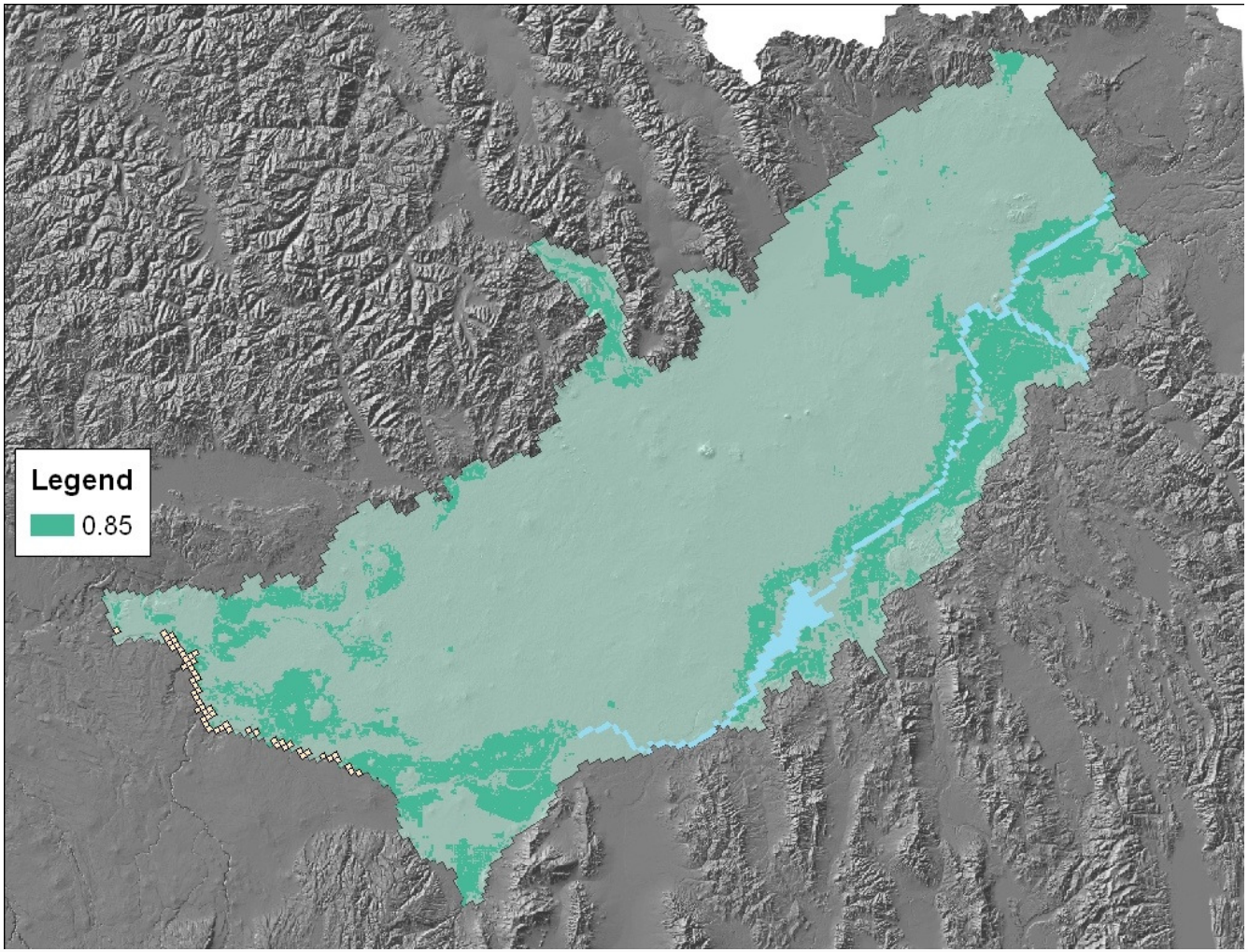
ET Surface Water Sprinkler



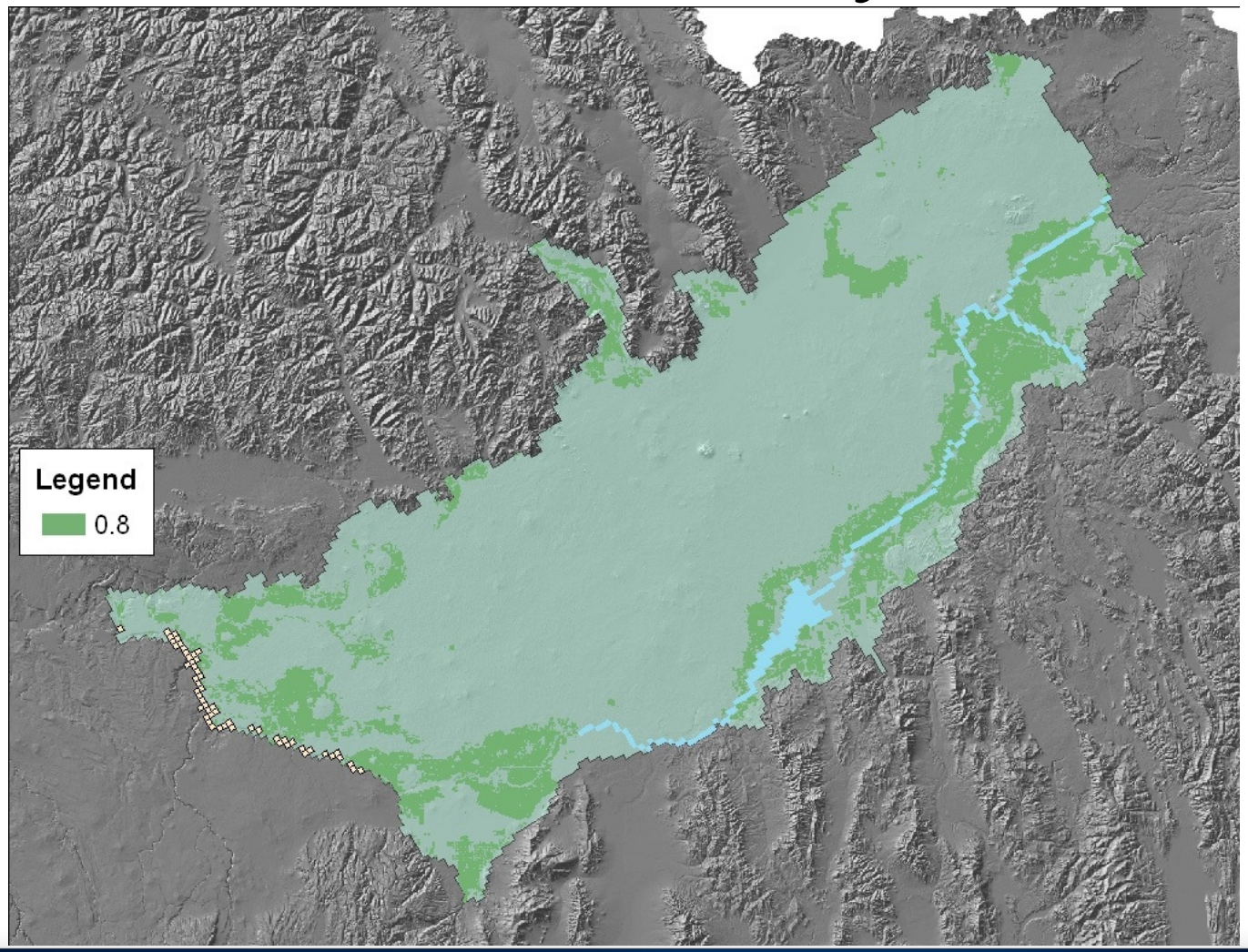
ET Surface Water Gravity

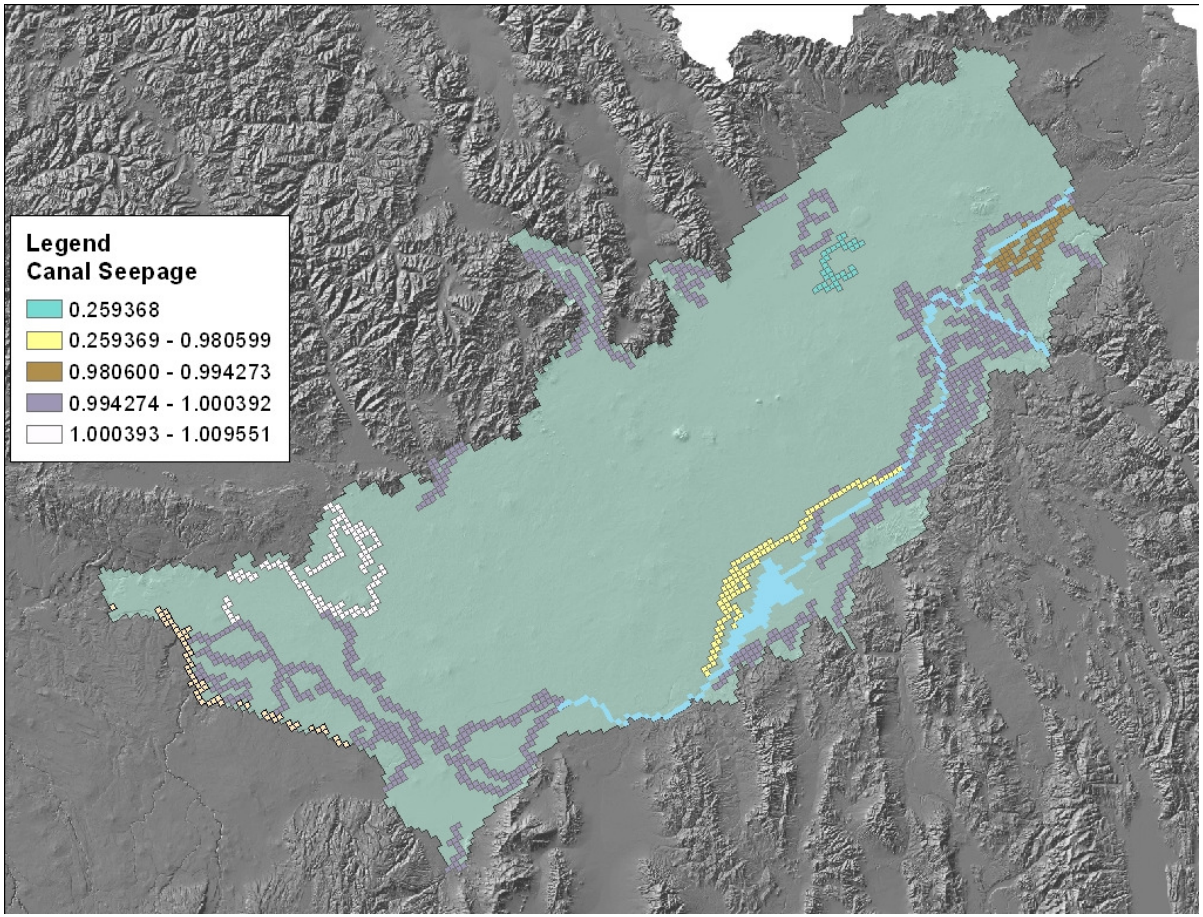


Surface Water Sprinkler Efficiency

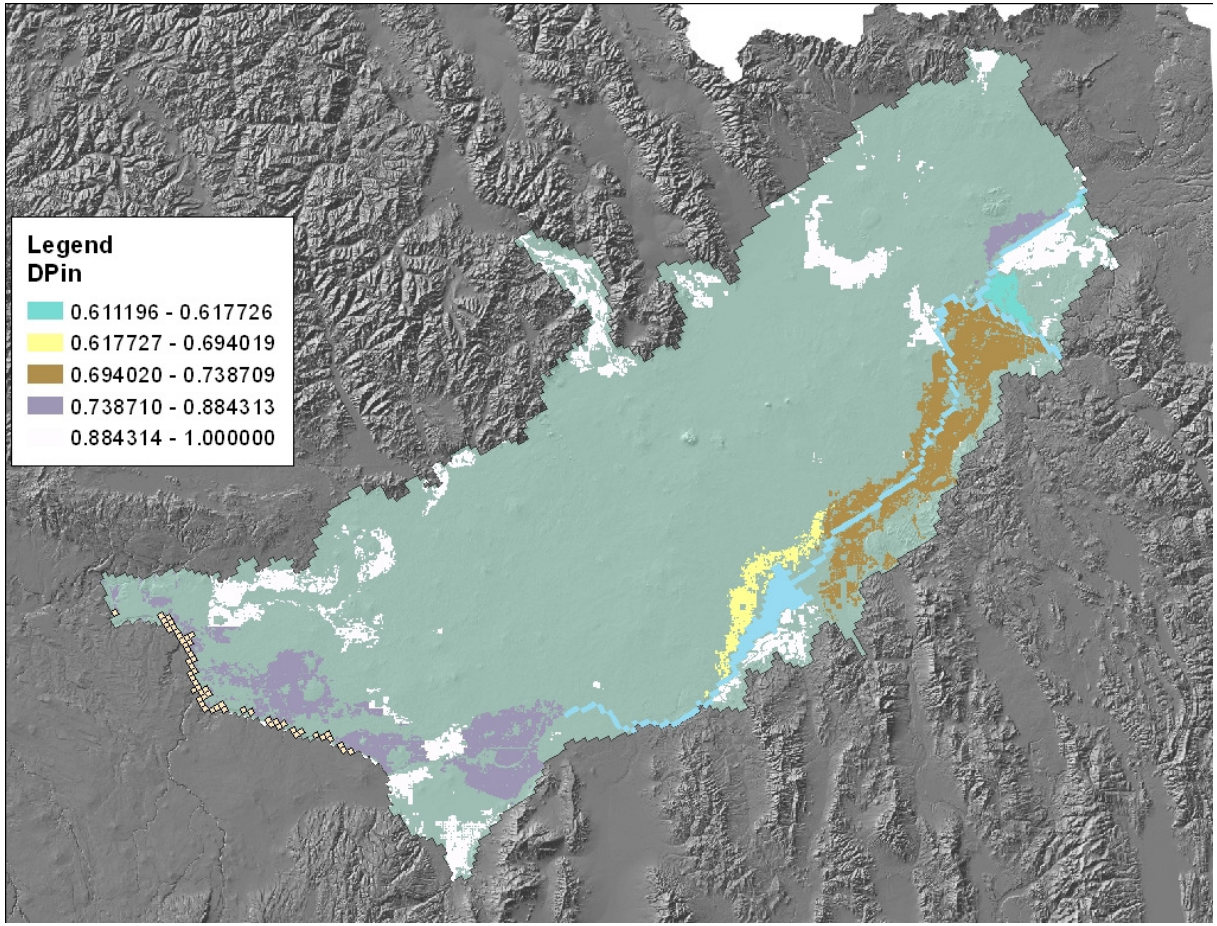


Surface Water Gravity Efficiency

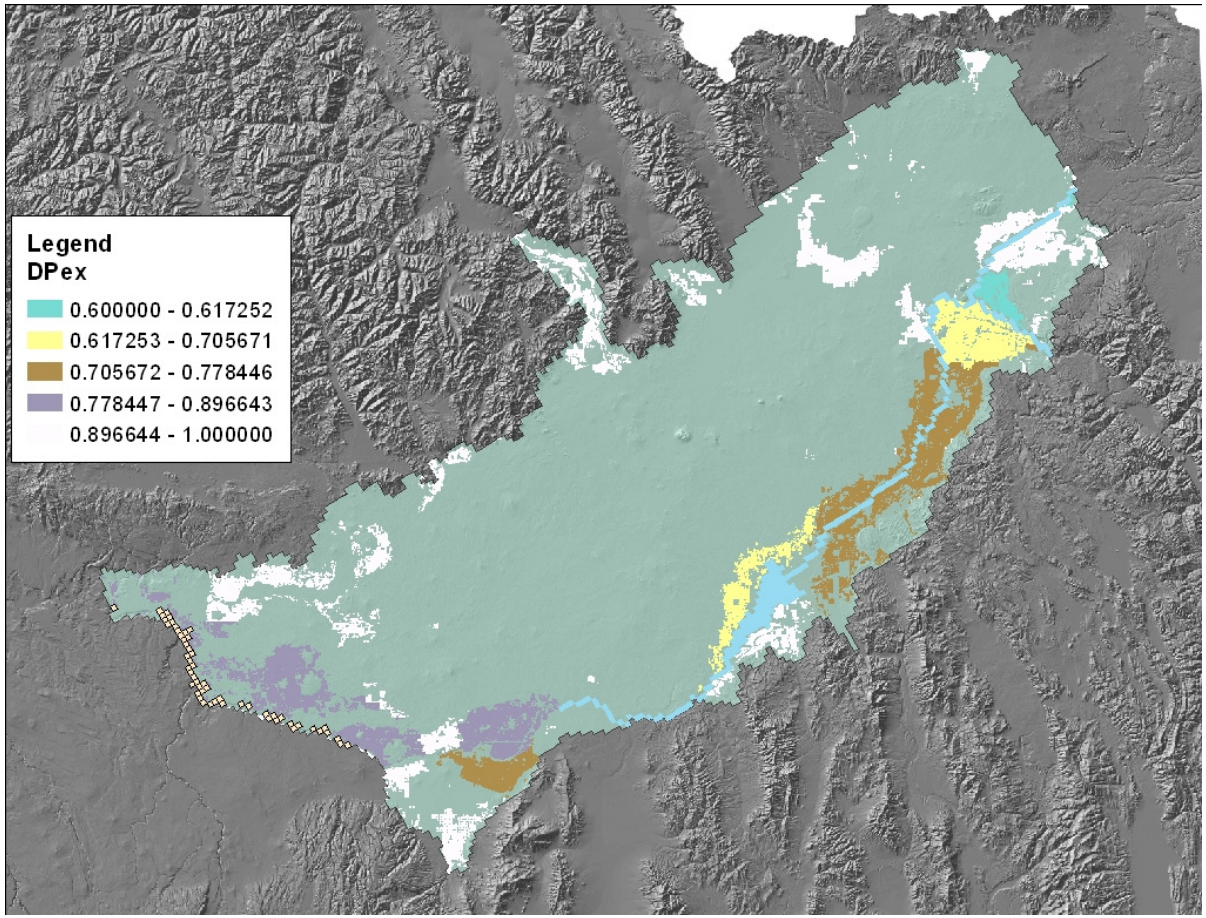




- Canal Seepage
  - CNL fraction * .DIV diversions
  - PEST only allowed to adjust non-coalition entities +/- 5%

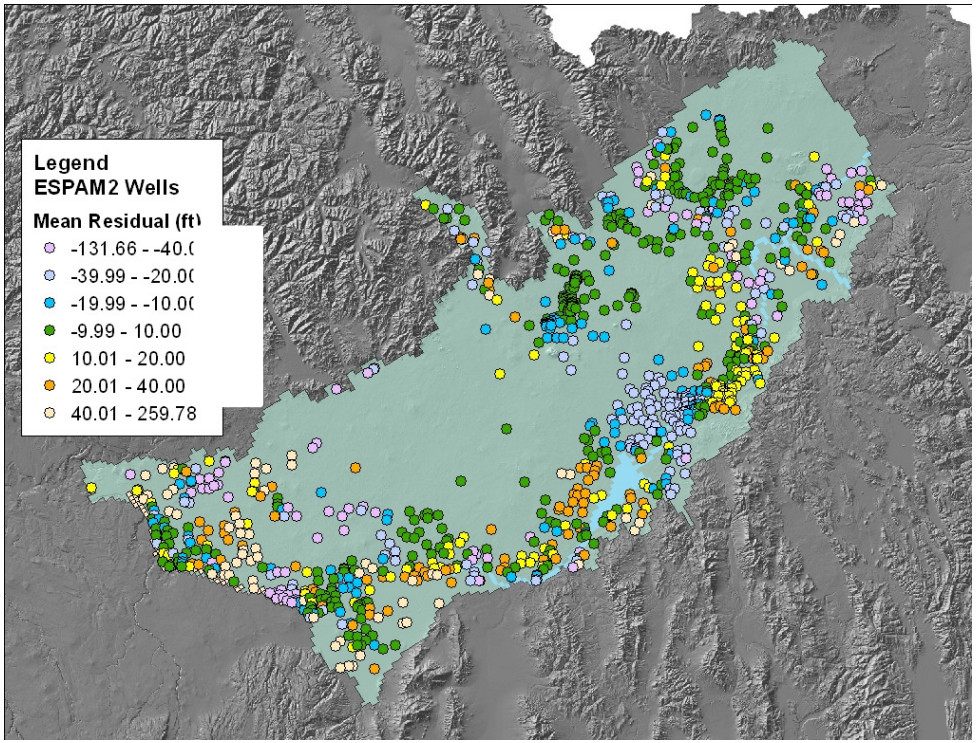


- DPin
  - fraction of the initial irrigation loss (1-eff) that percolates below the root zone
  - Fixed at 1.0 for non-Snake entities and some others
  - PEST allowed to adjust between 0.6-0.98

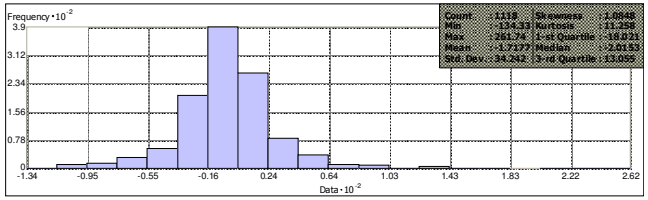


- DPex
  - fraction of delivery exceeding CIR that percolates below the root zone
  - Fixed at 1.0 for non-Snake entities and some others
  - PEST allowed to adjust between 0.6-0.98

Transient Heads

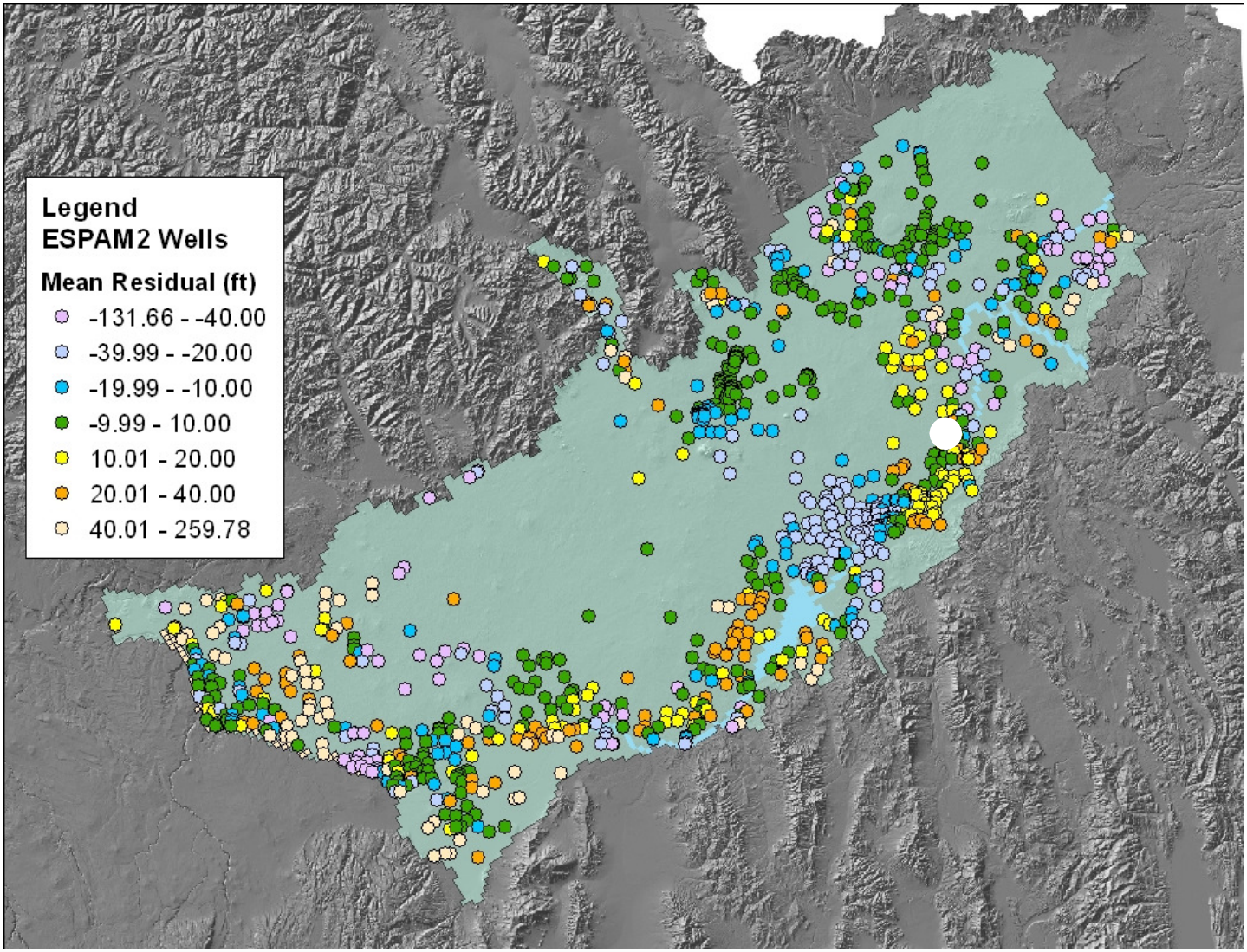


Histogram
Transformation: None

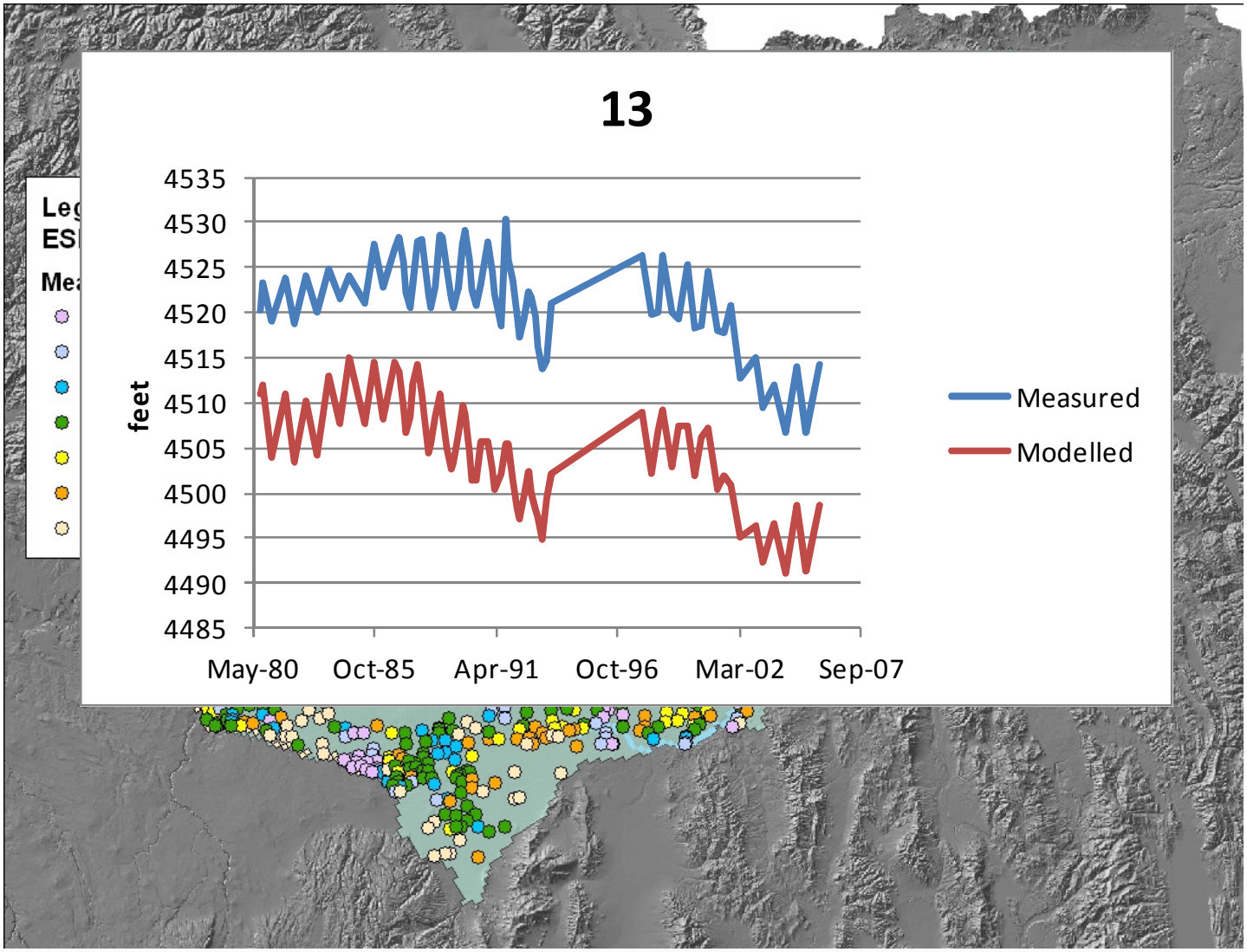


Data Source: ESPAM2_Wells Attribute: Mean

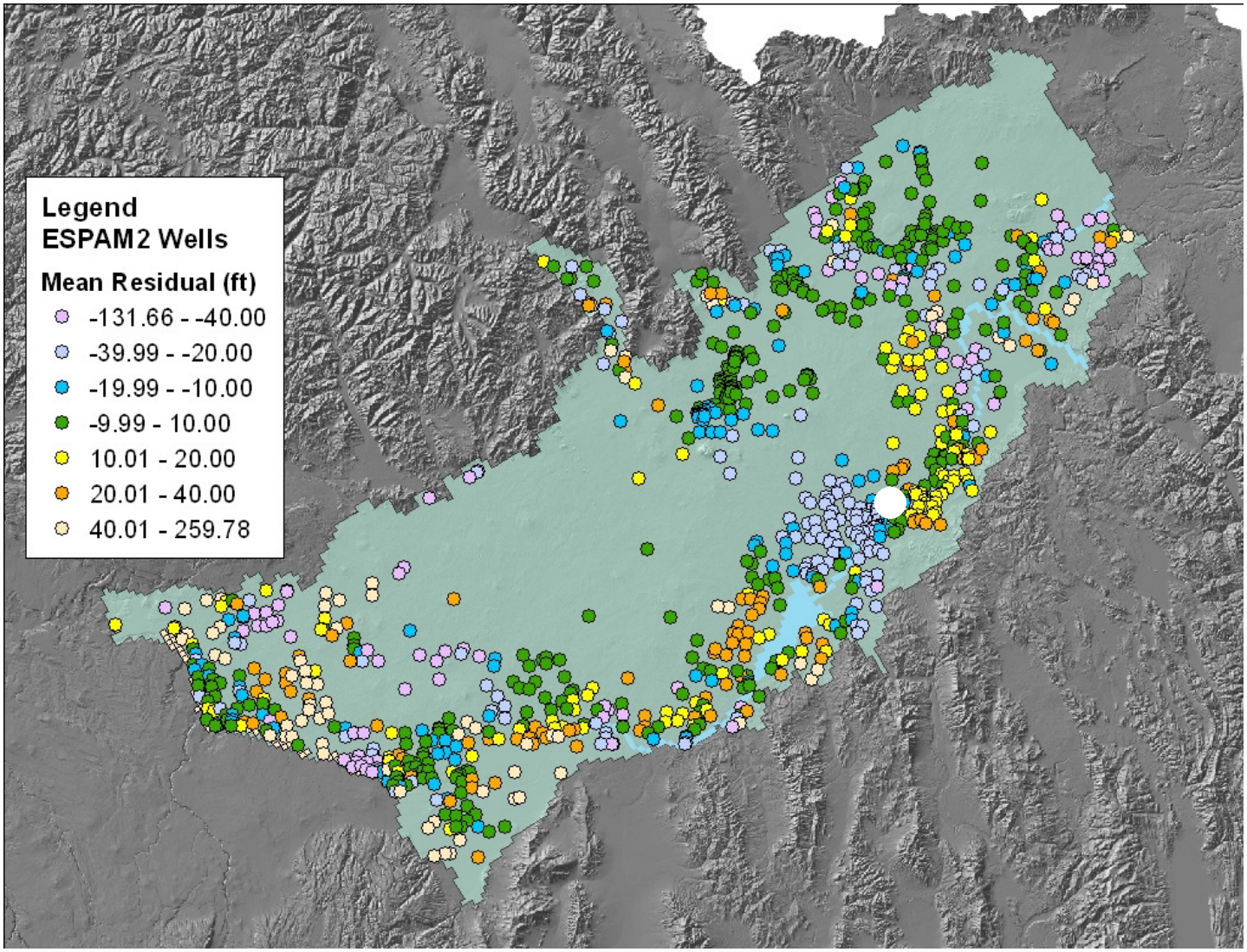
Transient Heads



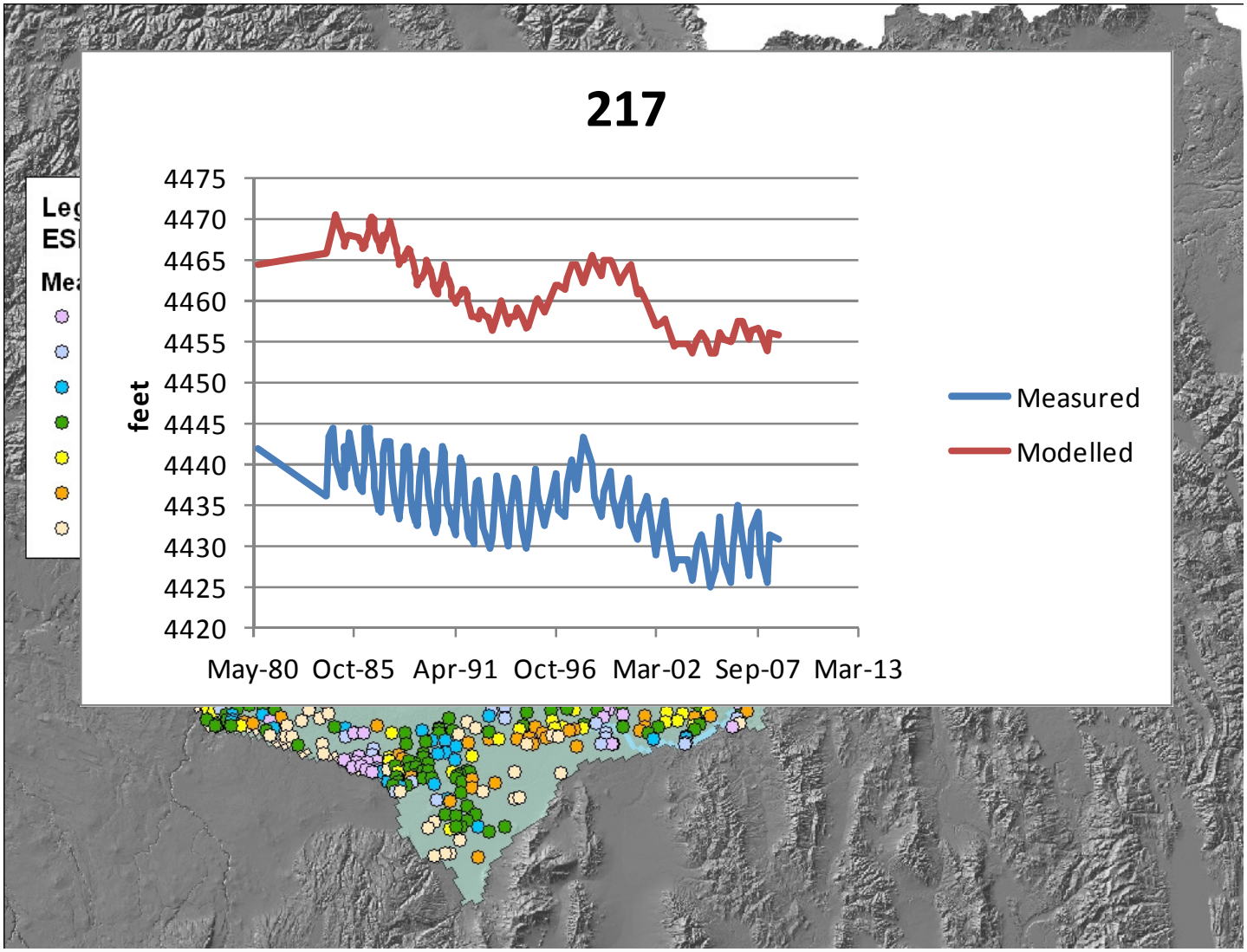
Transient Heads



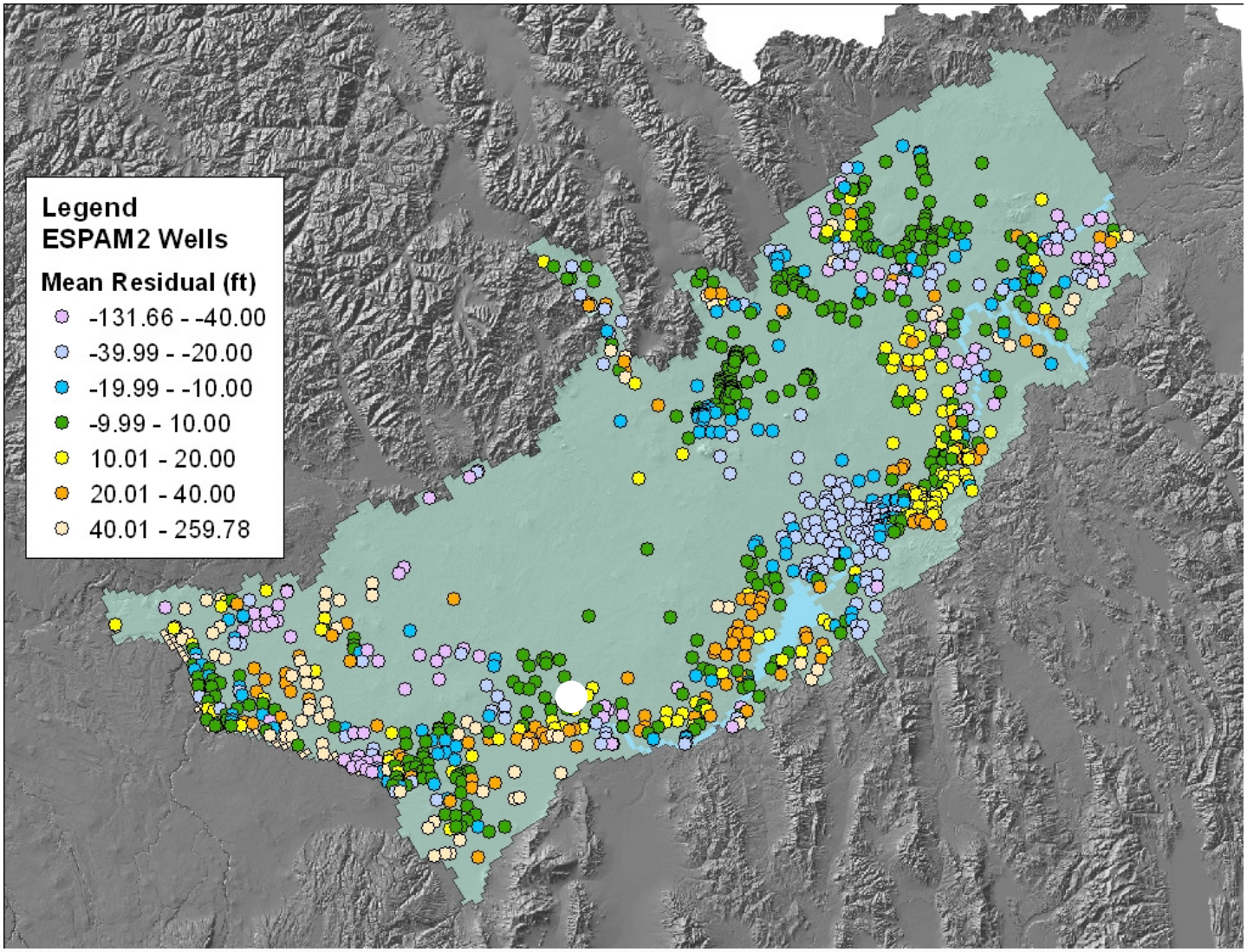
Transient Heads



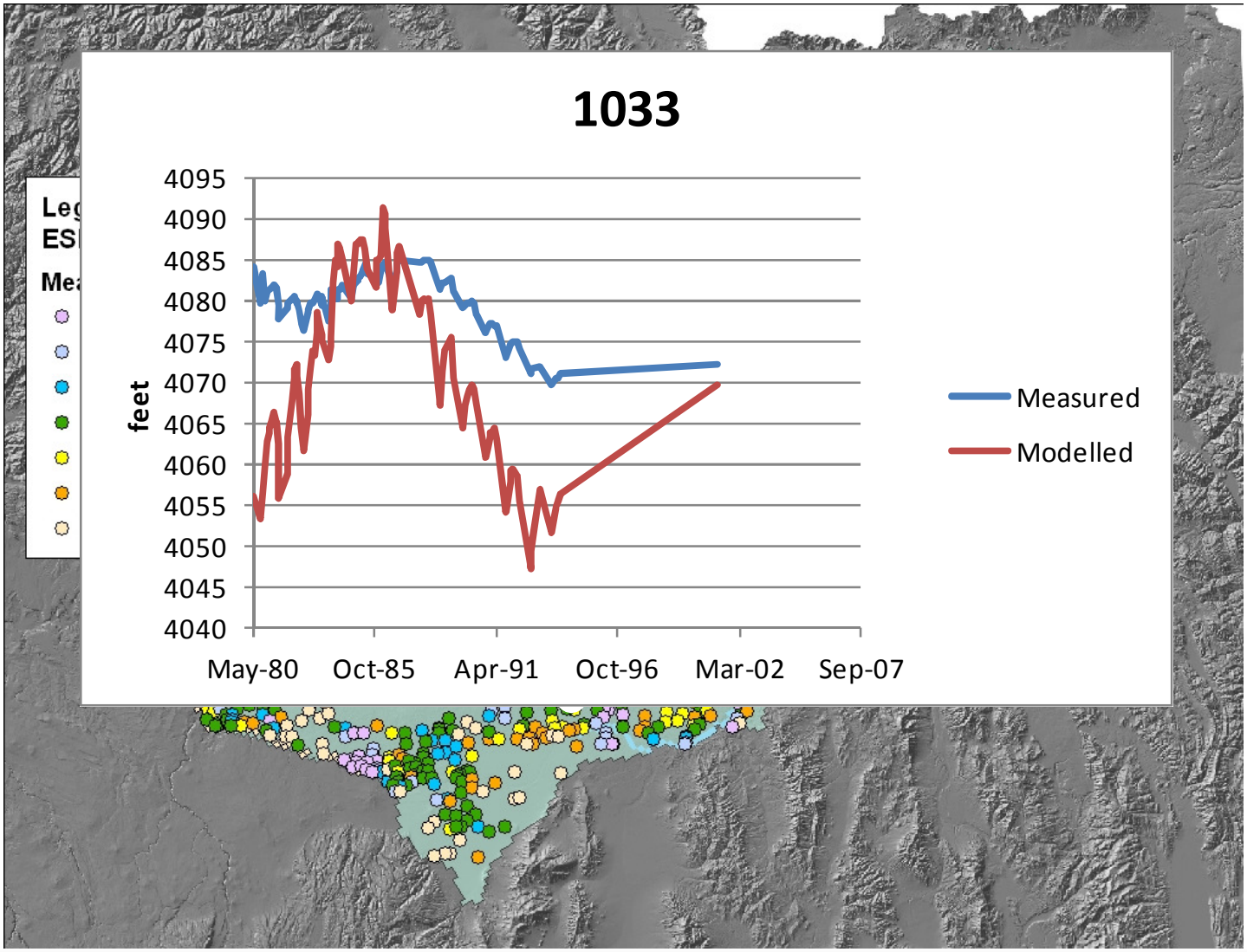
Transient Heads



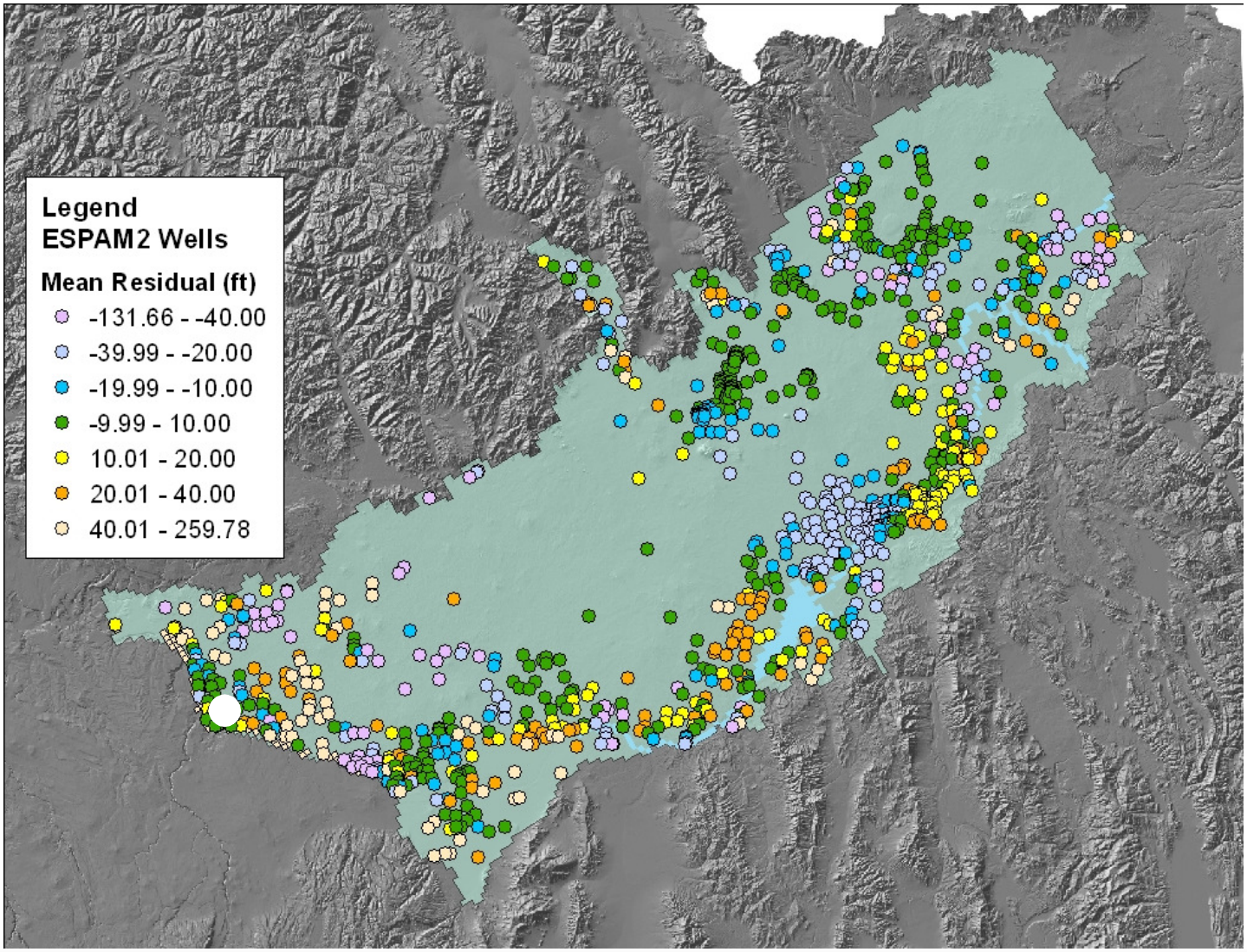
Transient Heads



Transient Heads



Transient Heads



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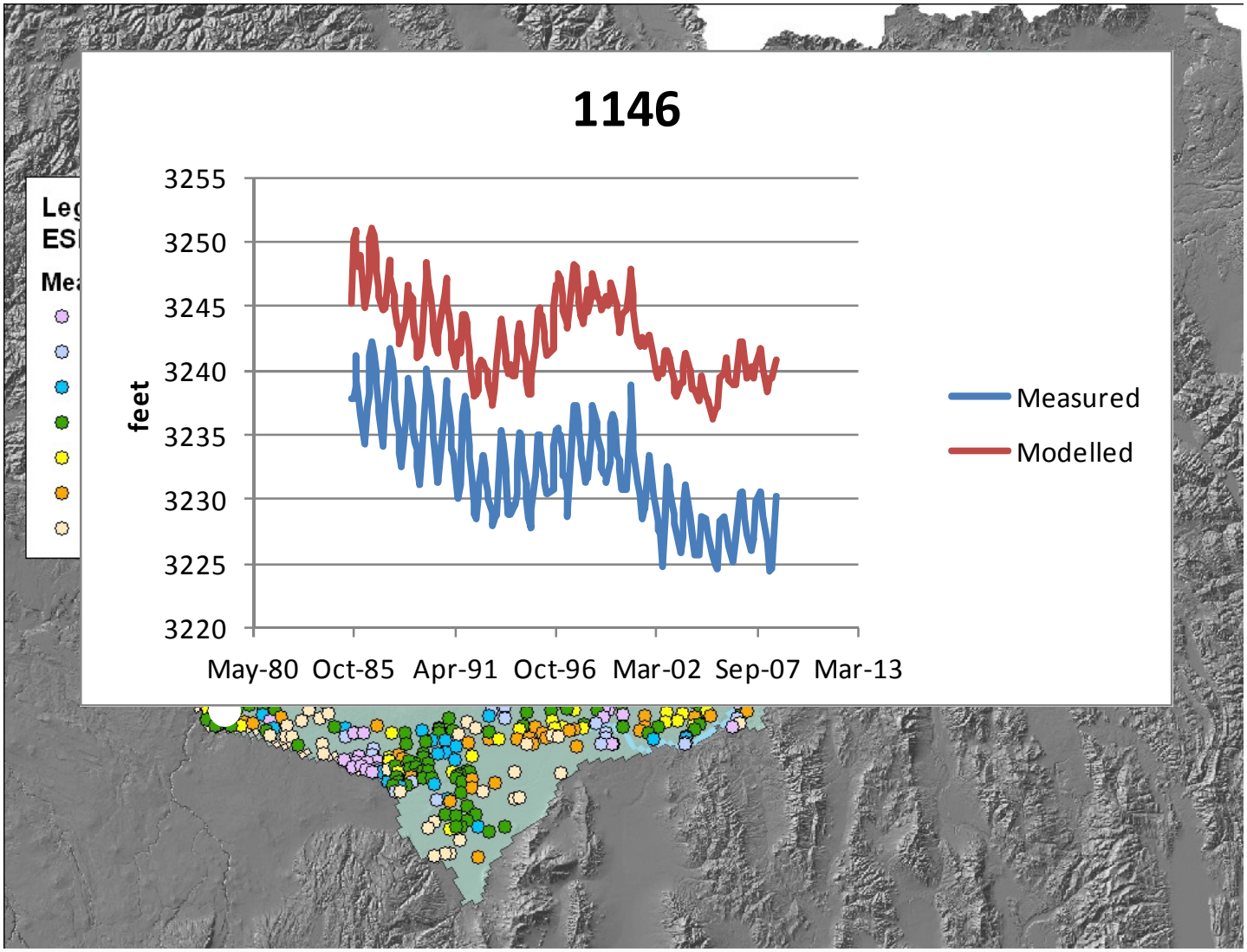
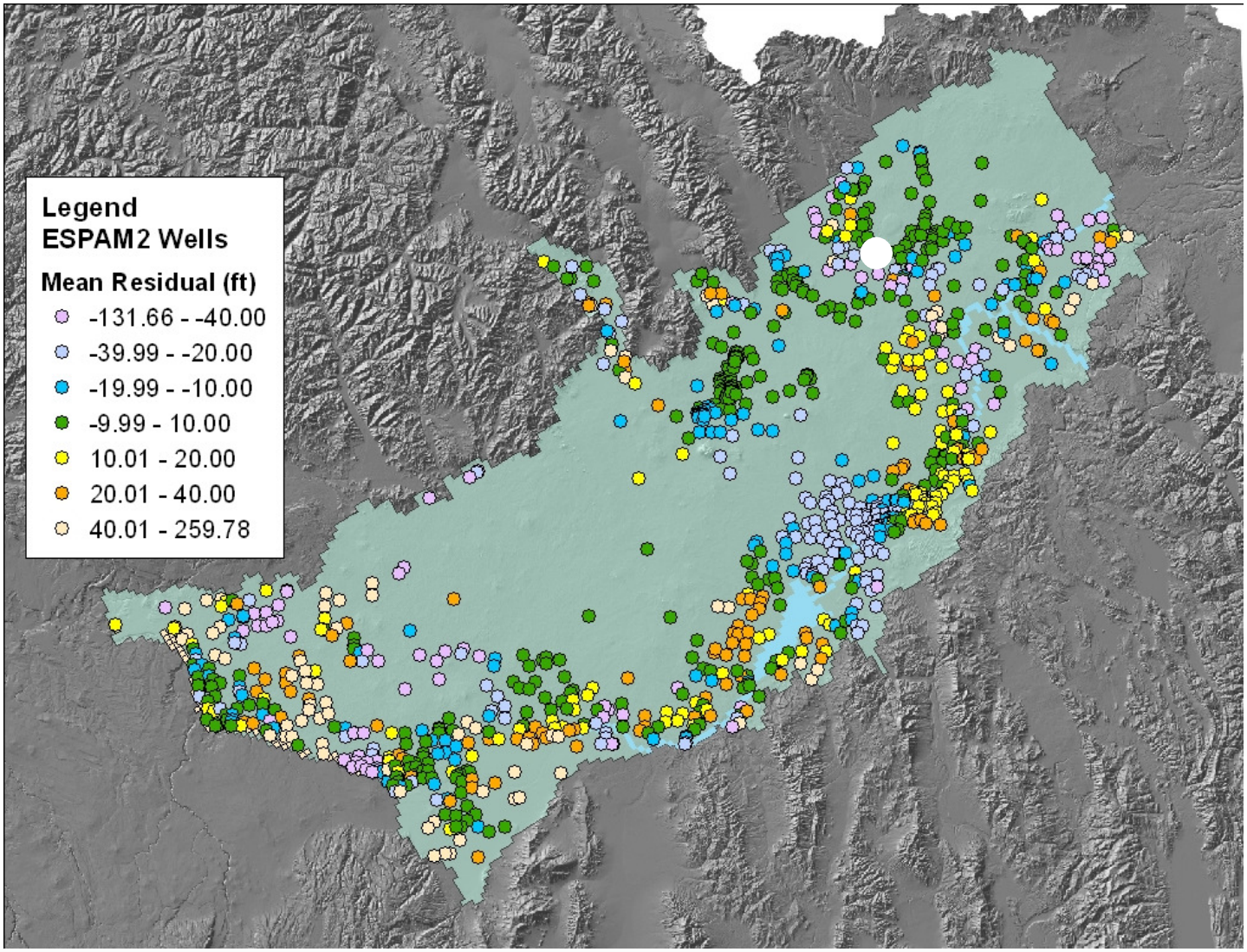
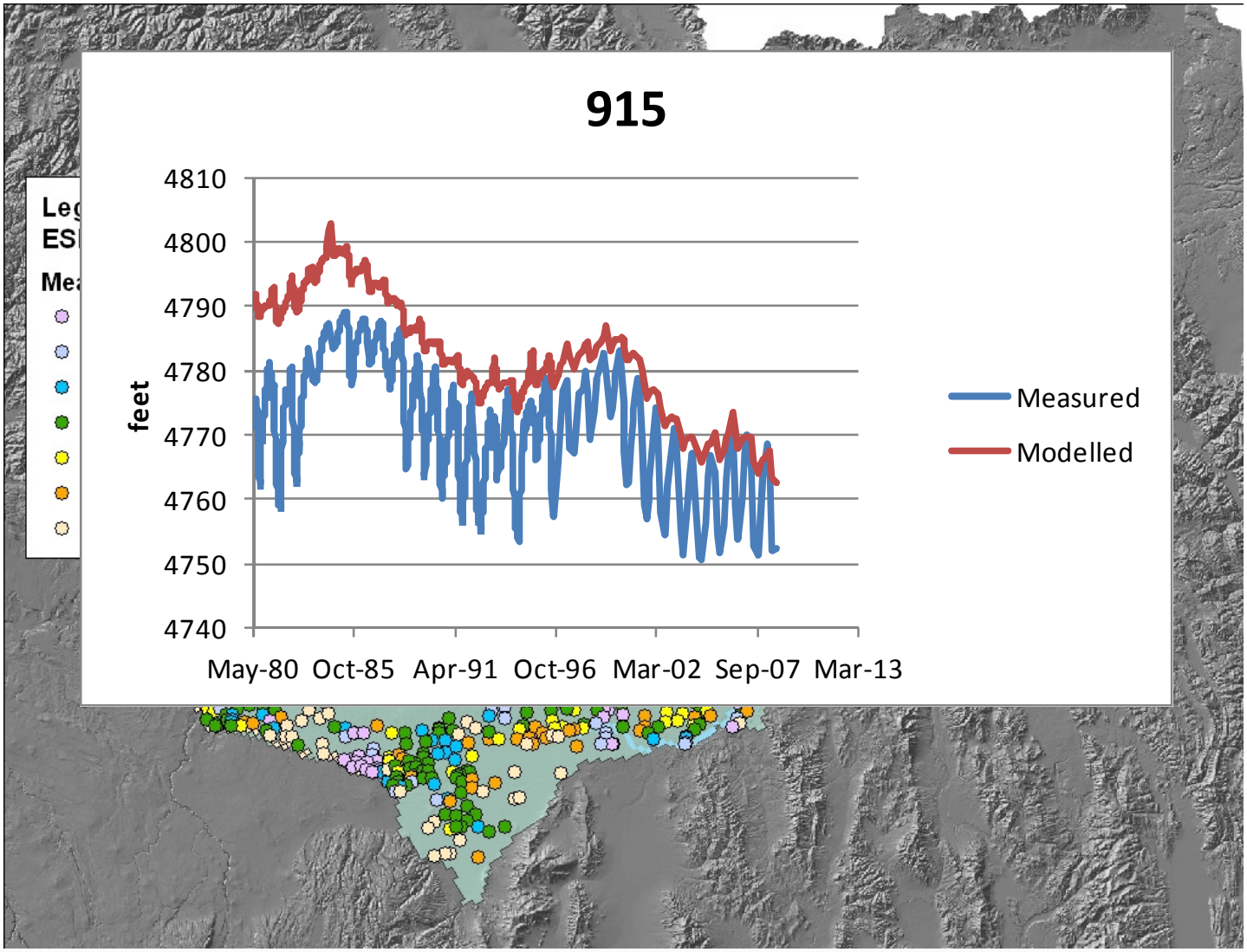


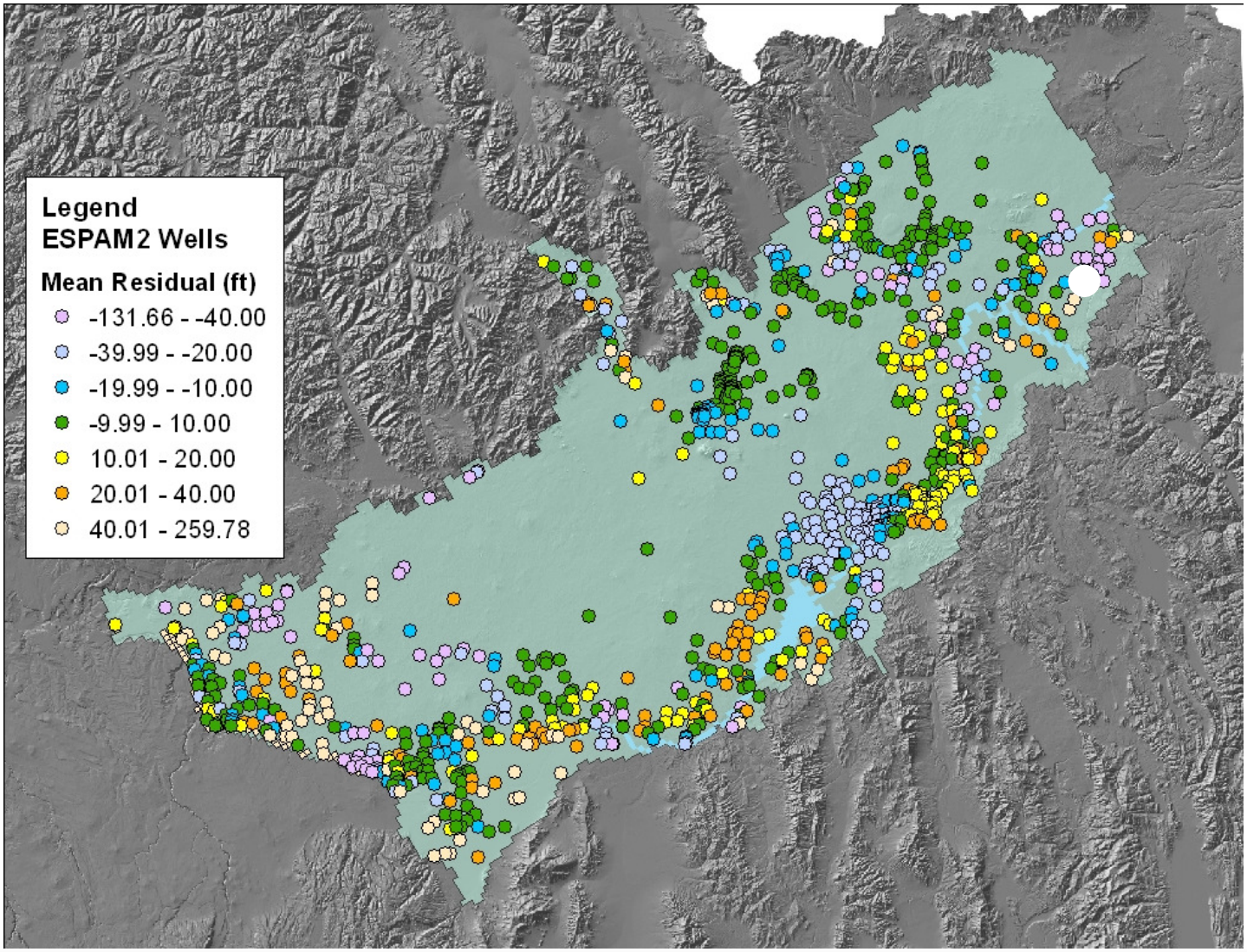
Transient Heads



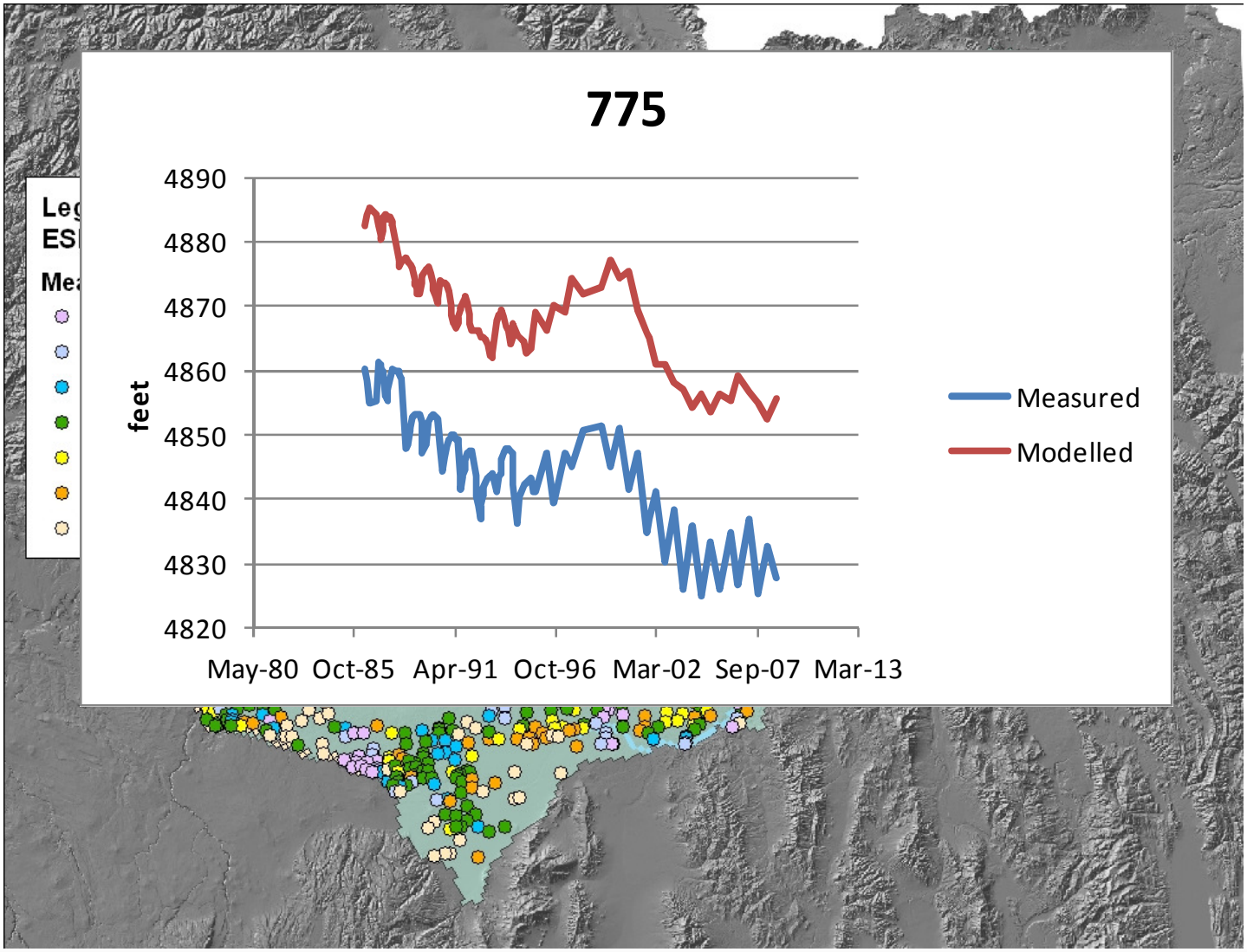
Transient Heads



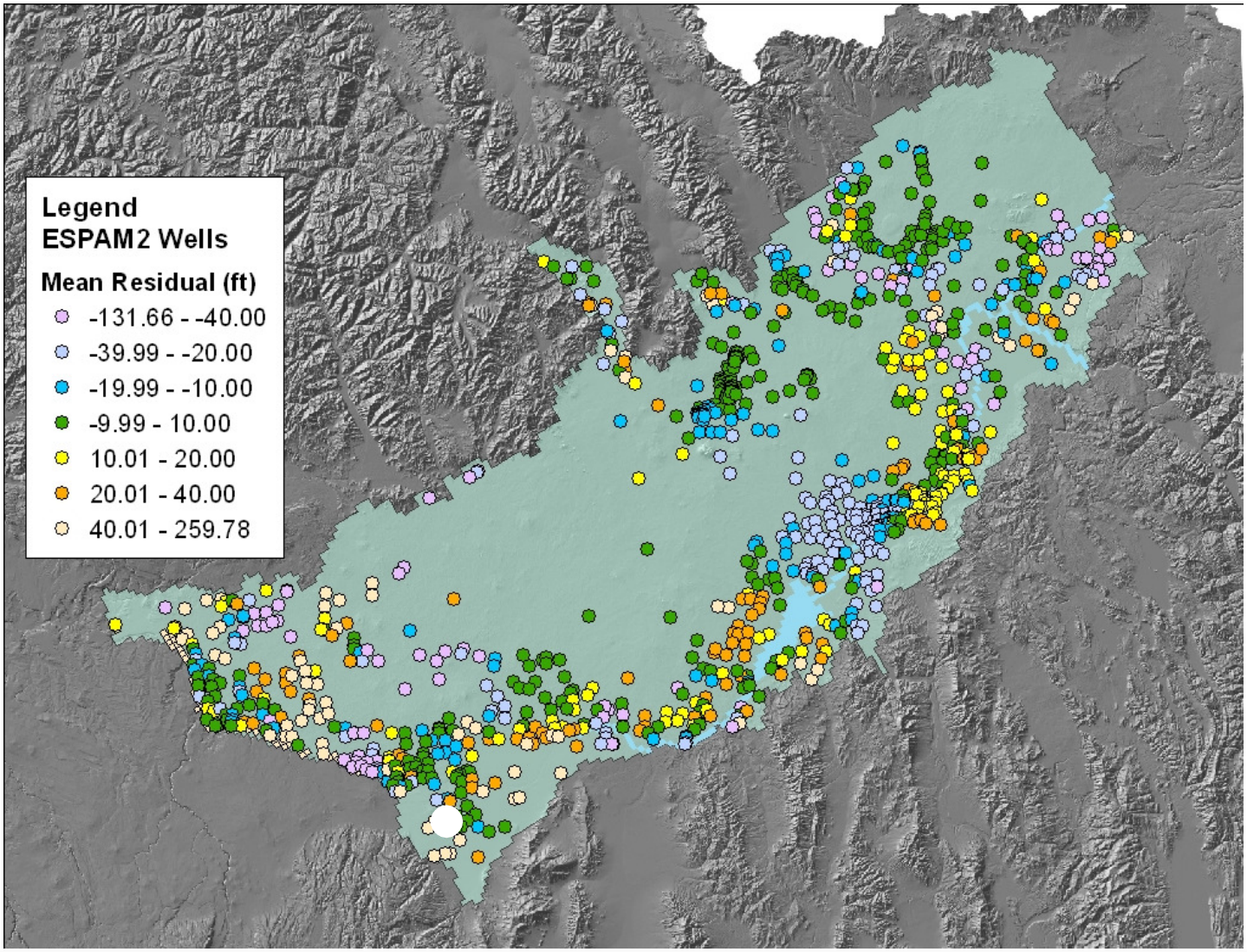
Transient Heads



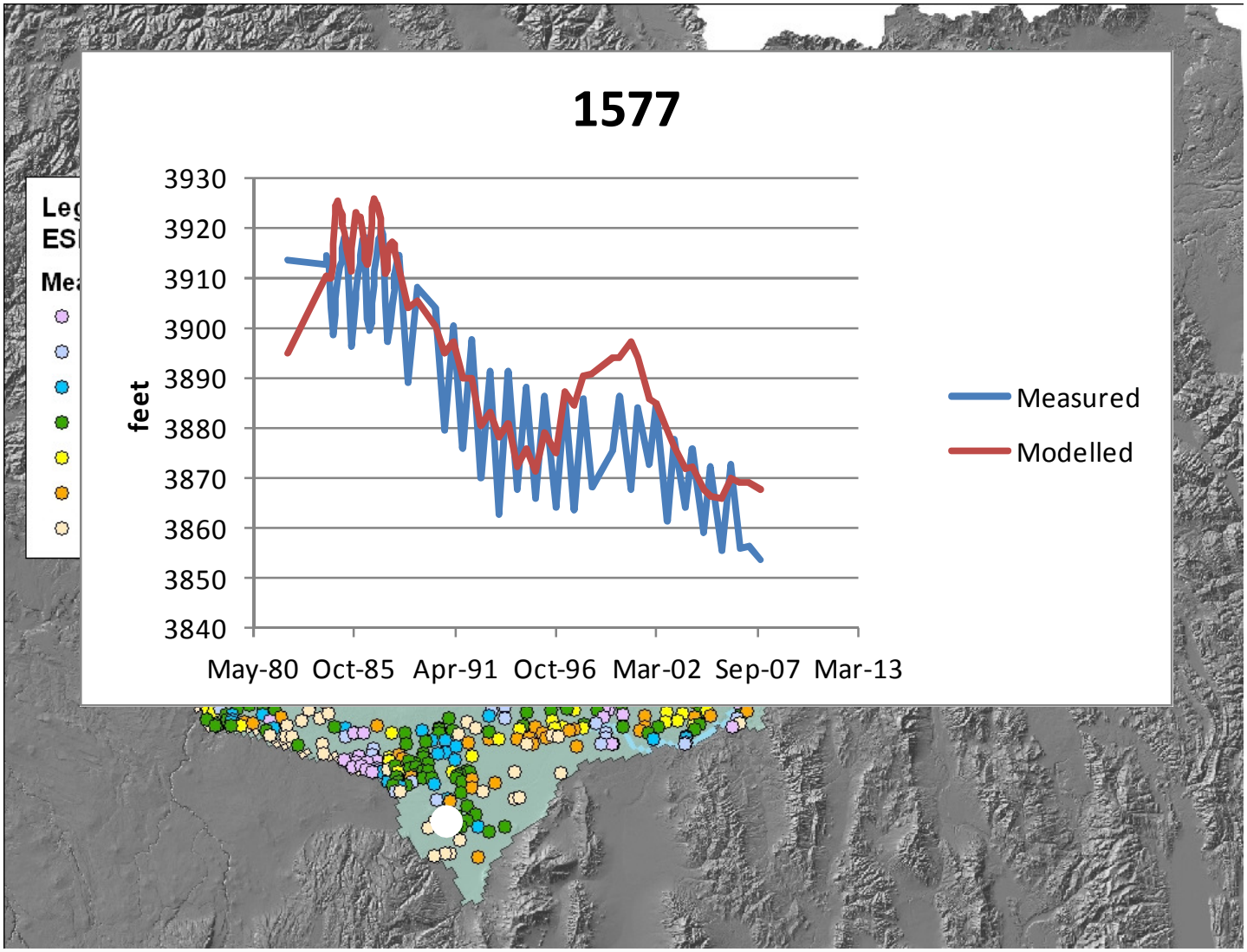
Transient Heads



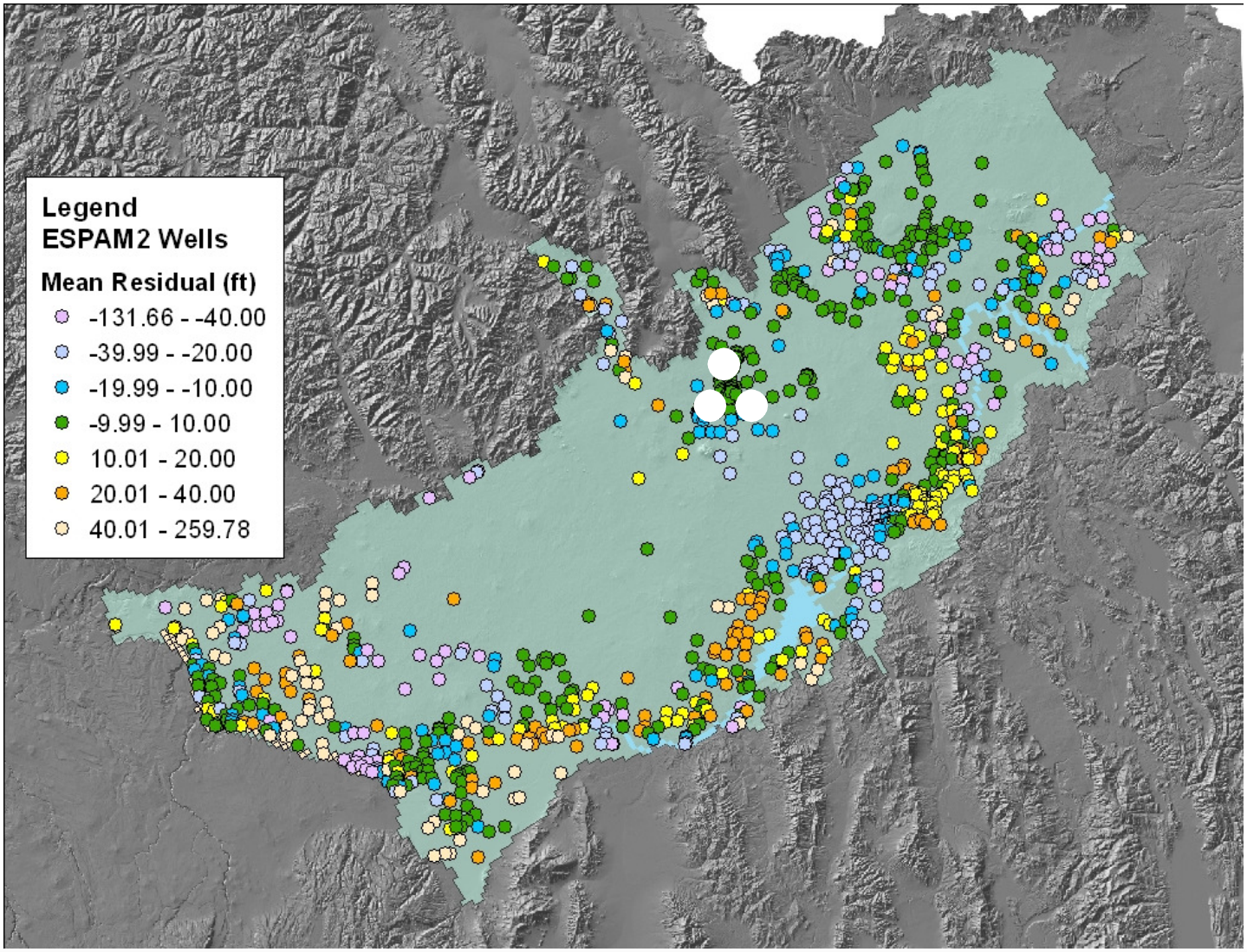
Transient Heads



Transient Heads



Transient Heads



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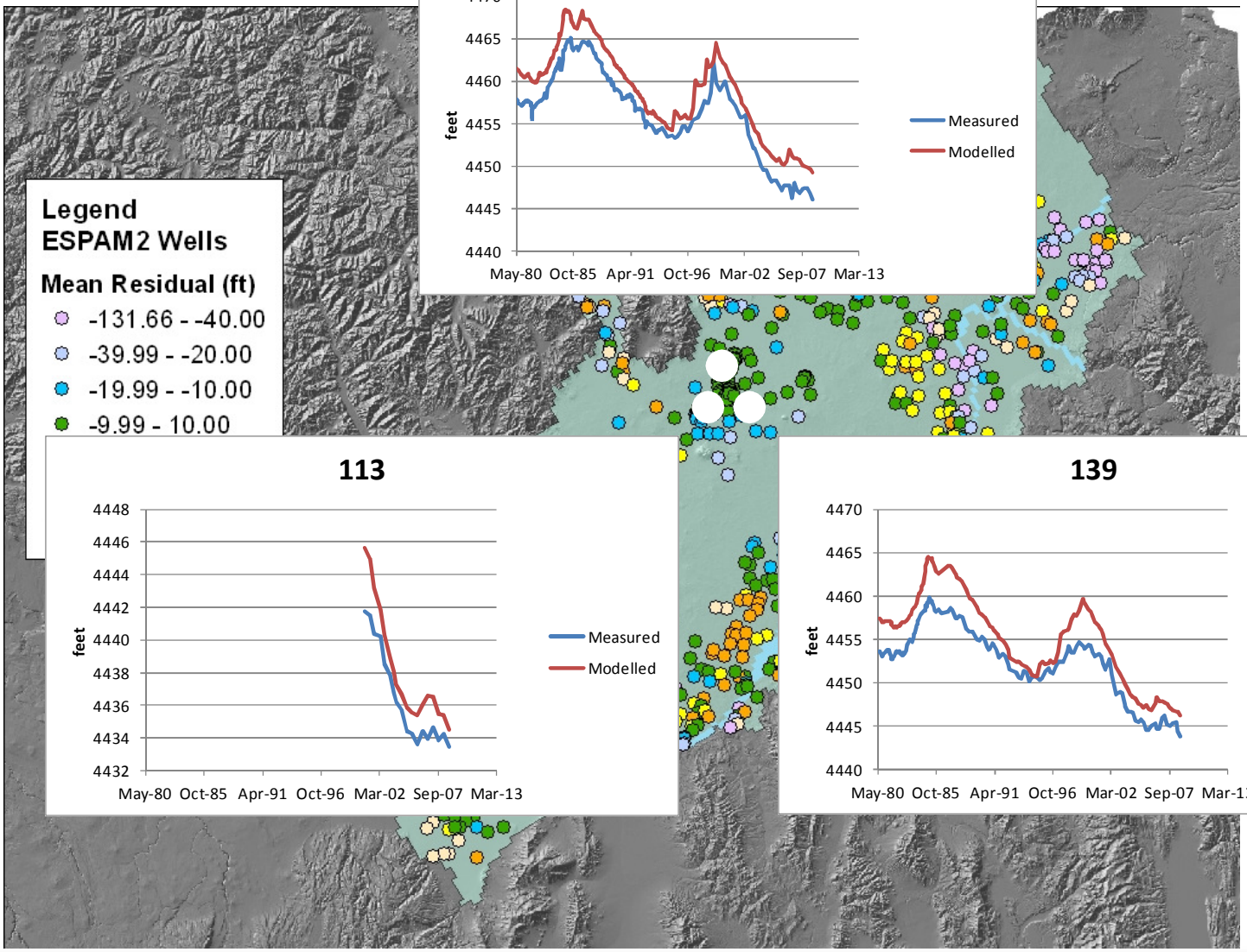
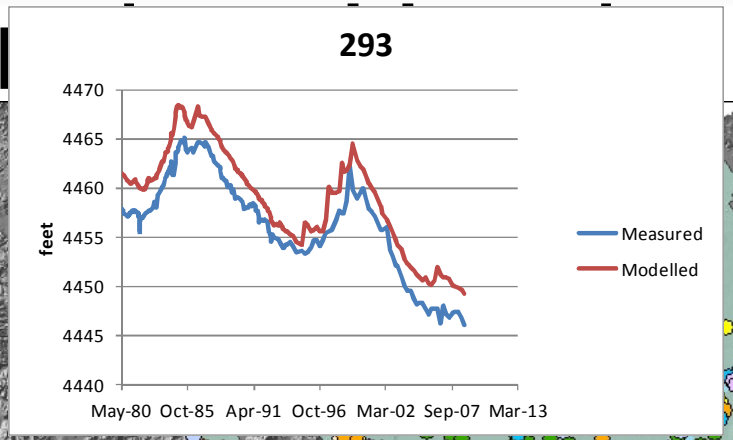
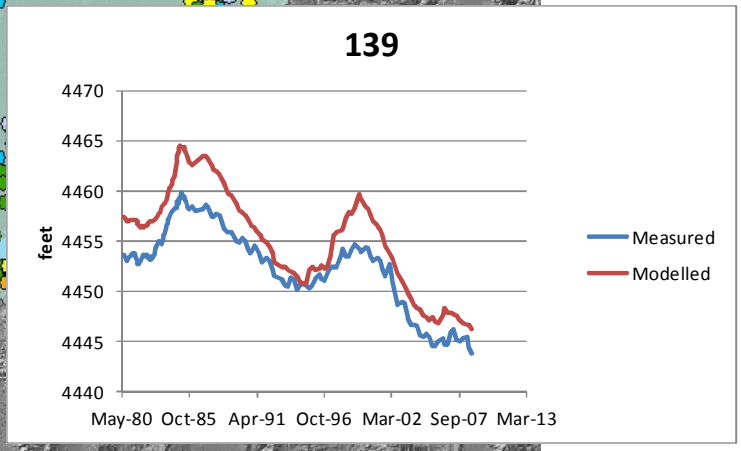
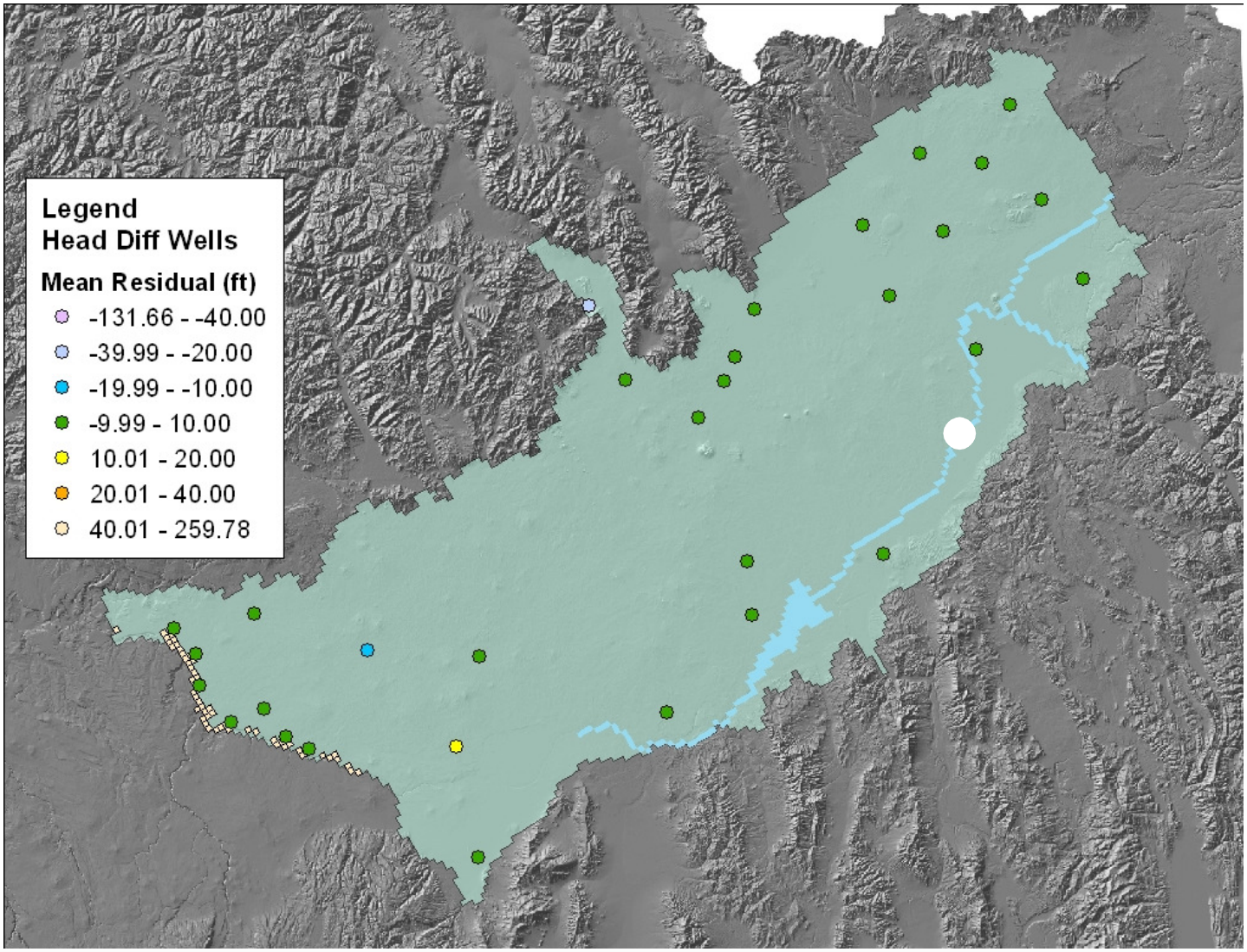

Legend
ESPAM2 Wells
Mean Residual (ft)
-131.66 - -40.00
-39.99 - -20.00
-19.99 - -10.00
-9.99 - 10.00


293
feet
4470
4465
4460
4455
4450
4445
4440
May-80 Oct-85 Apr-91 Oct-96 Mar-02 Sep-07 Mar-13
Measured
Modelled

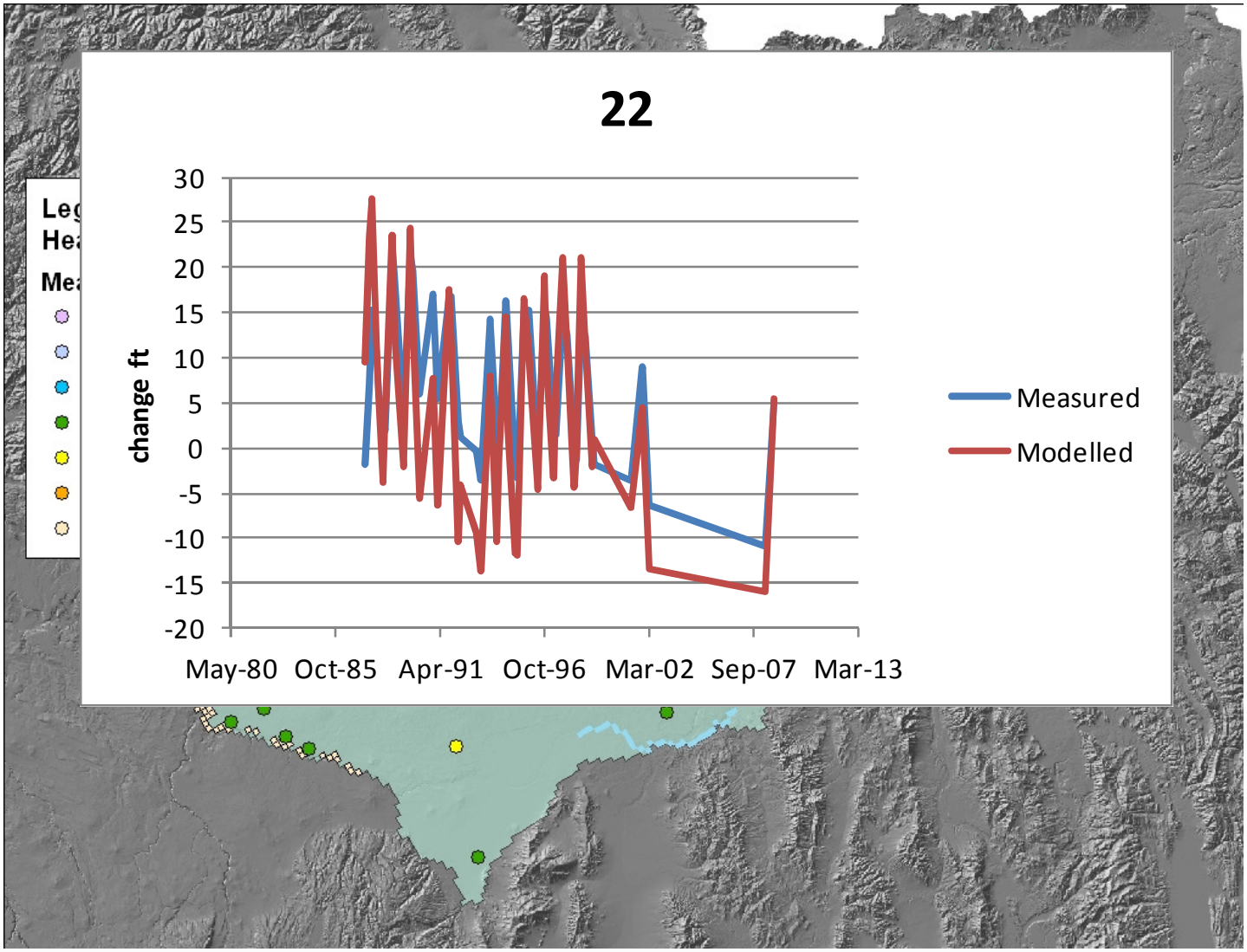
113
feet
4448
4446
4444
4442
4440
4438
4436
4434
4432
May-80 Oct-85 Apr-91 Oct-96 Mar-02 Sep-07 Mar-13
Measured
Modelled


139
feet
4470
4465
4460
4455
4450
4445
4440
May-80 Oct-85 Apr-91 Oct-96 Mar-02 Sep-07 Mar-13
Measured
Modelled

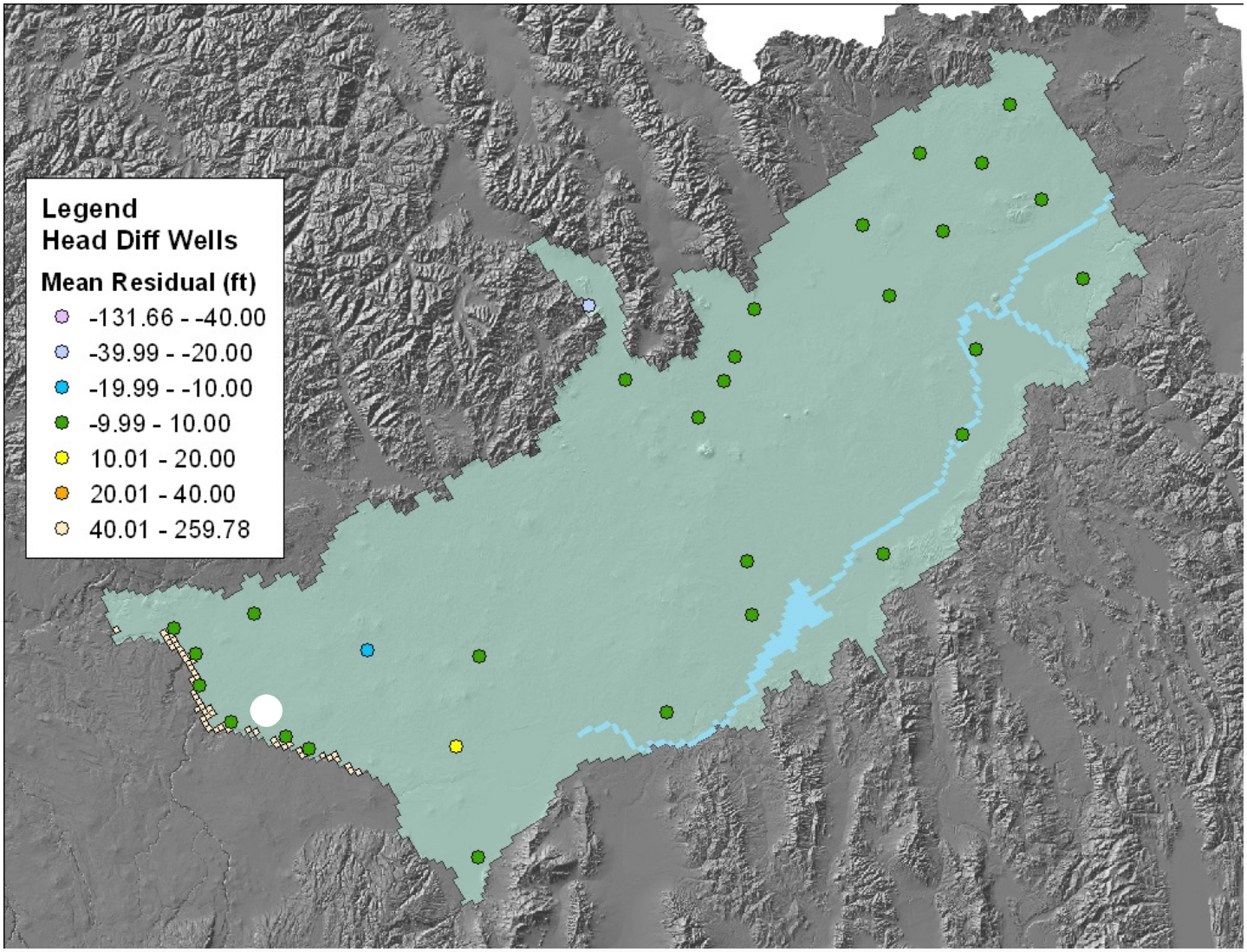
Transient Heads



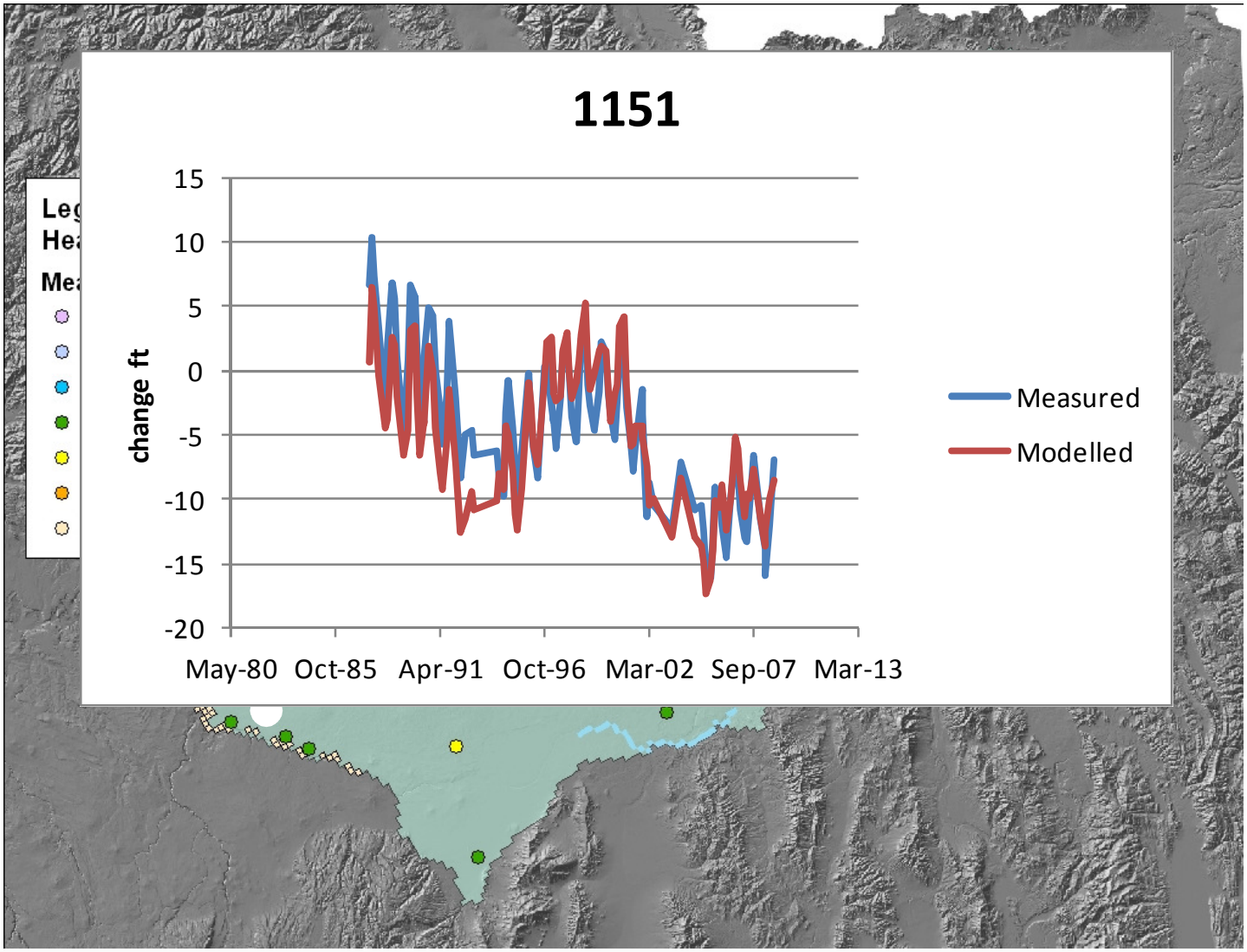
Transient Heads



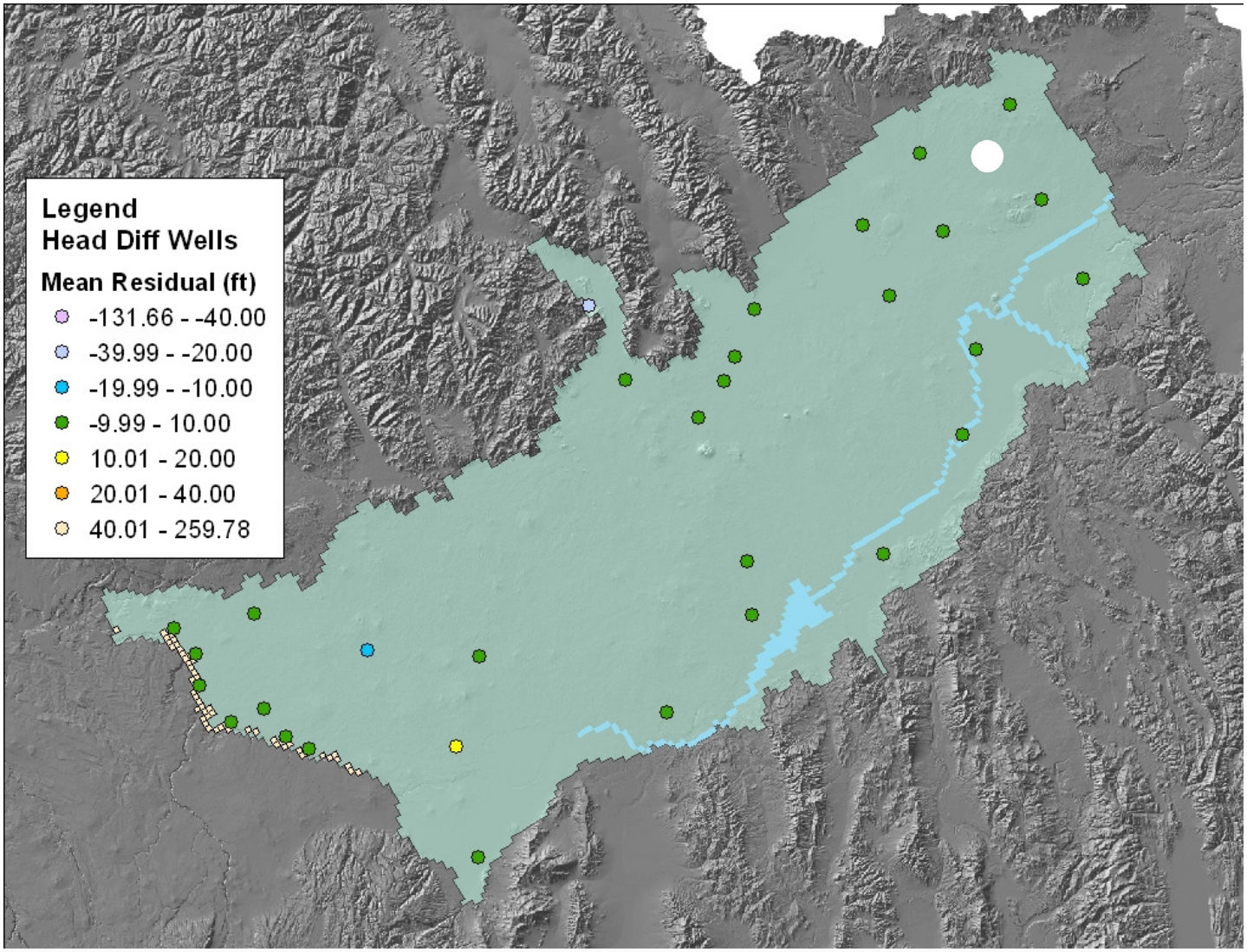
Transient Heads



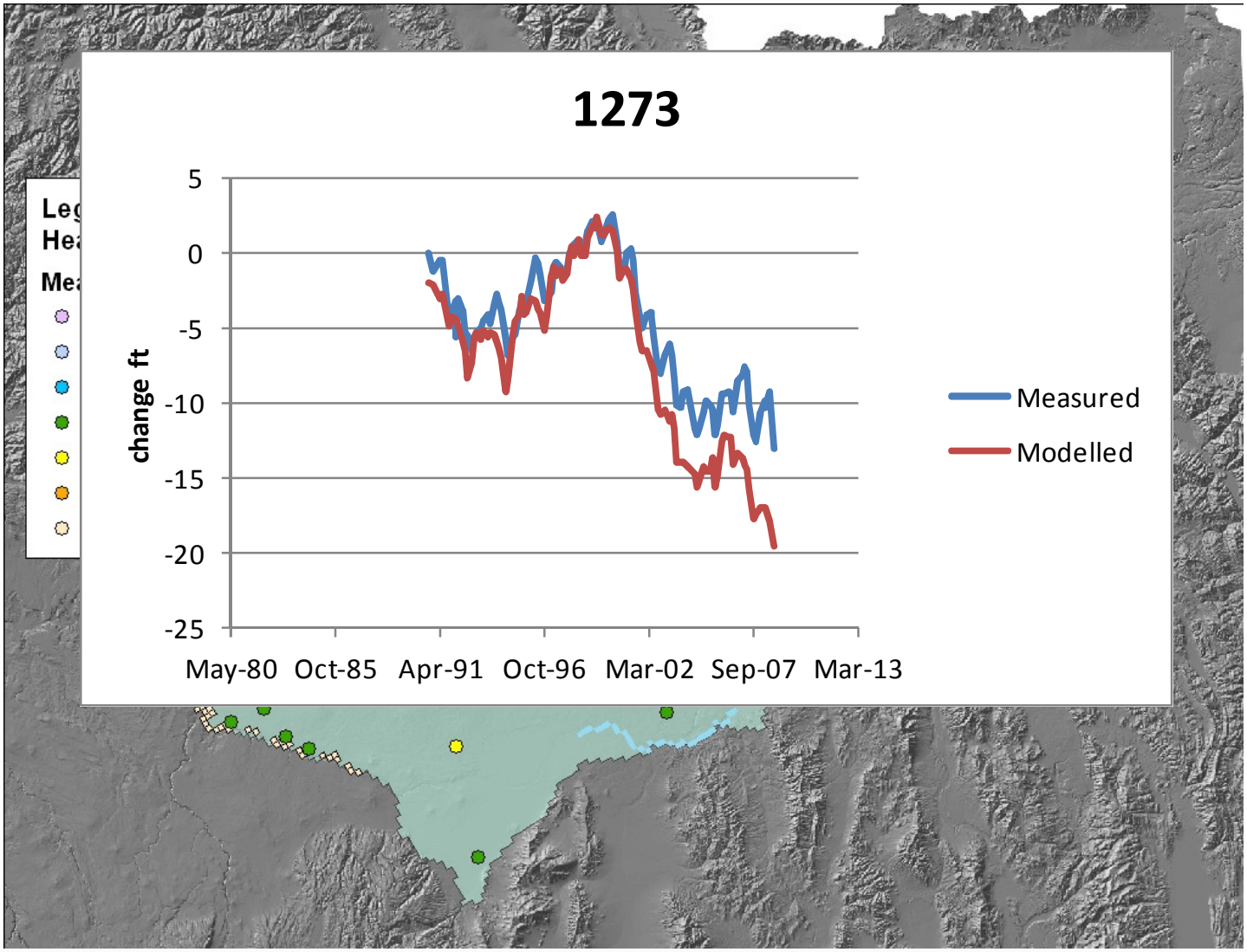
Transient Heads



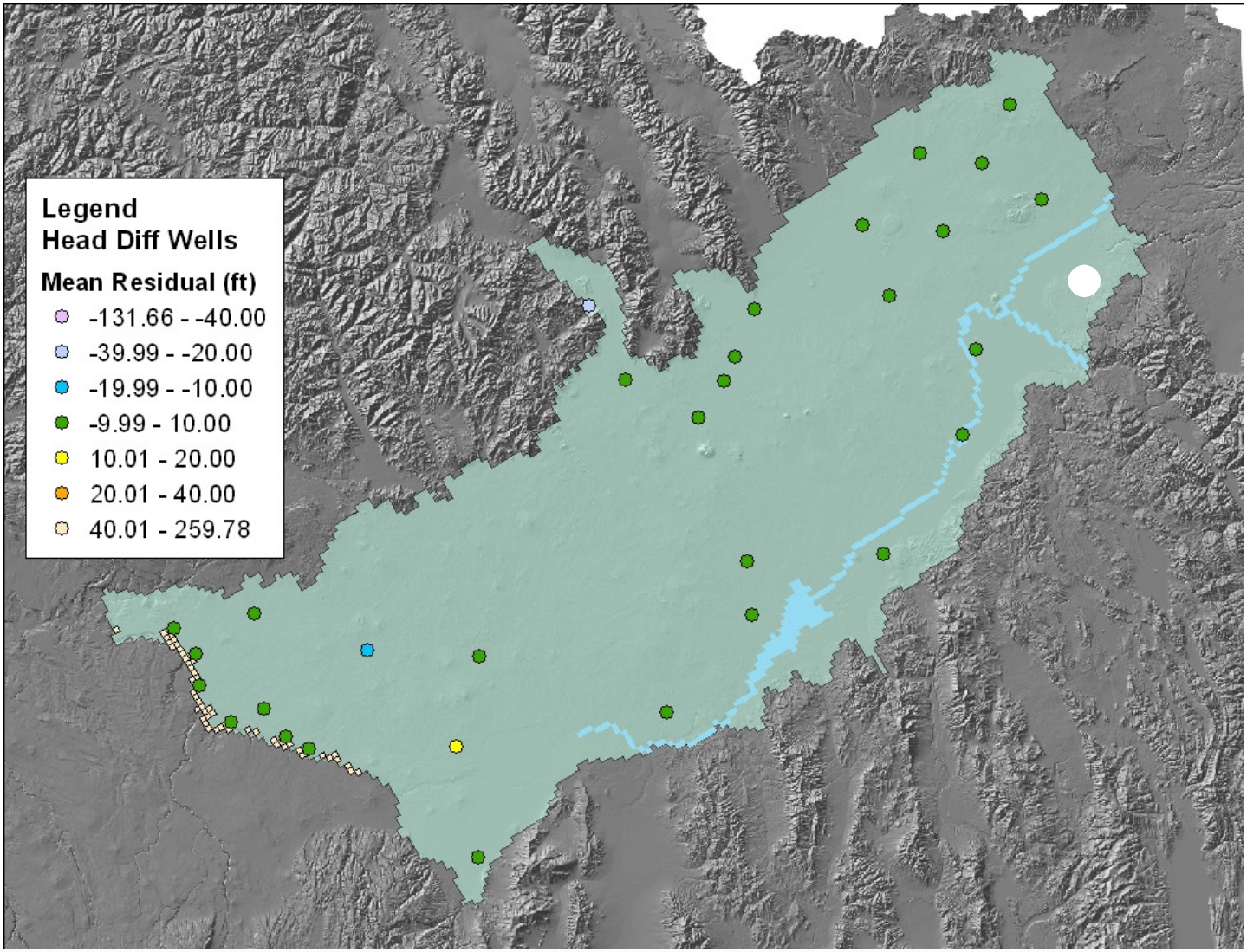
Transient Heads



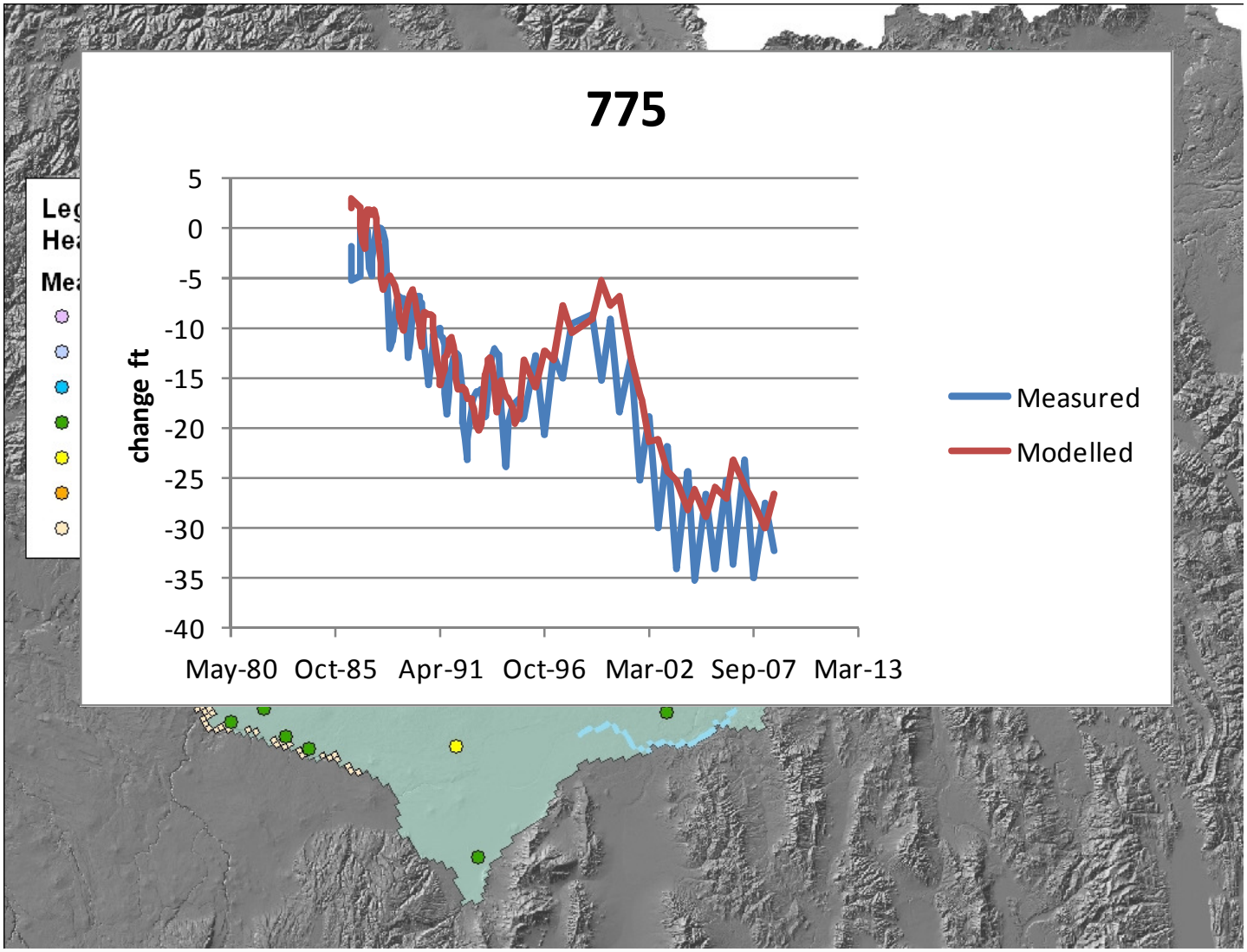
Transient Heads

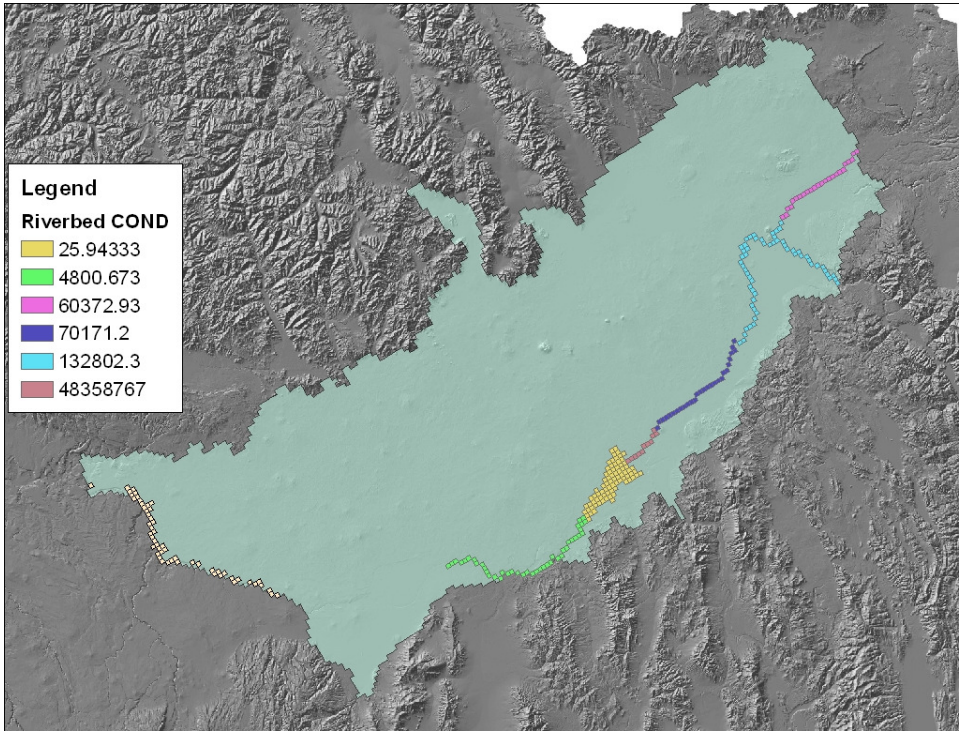


Transient Heads



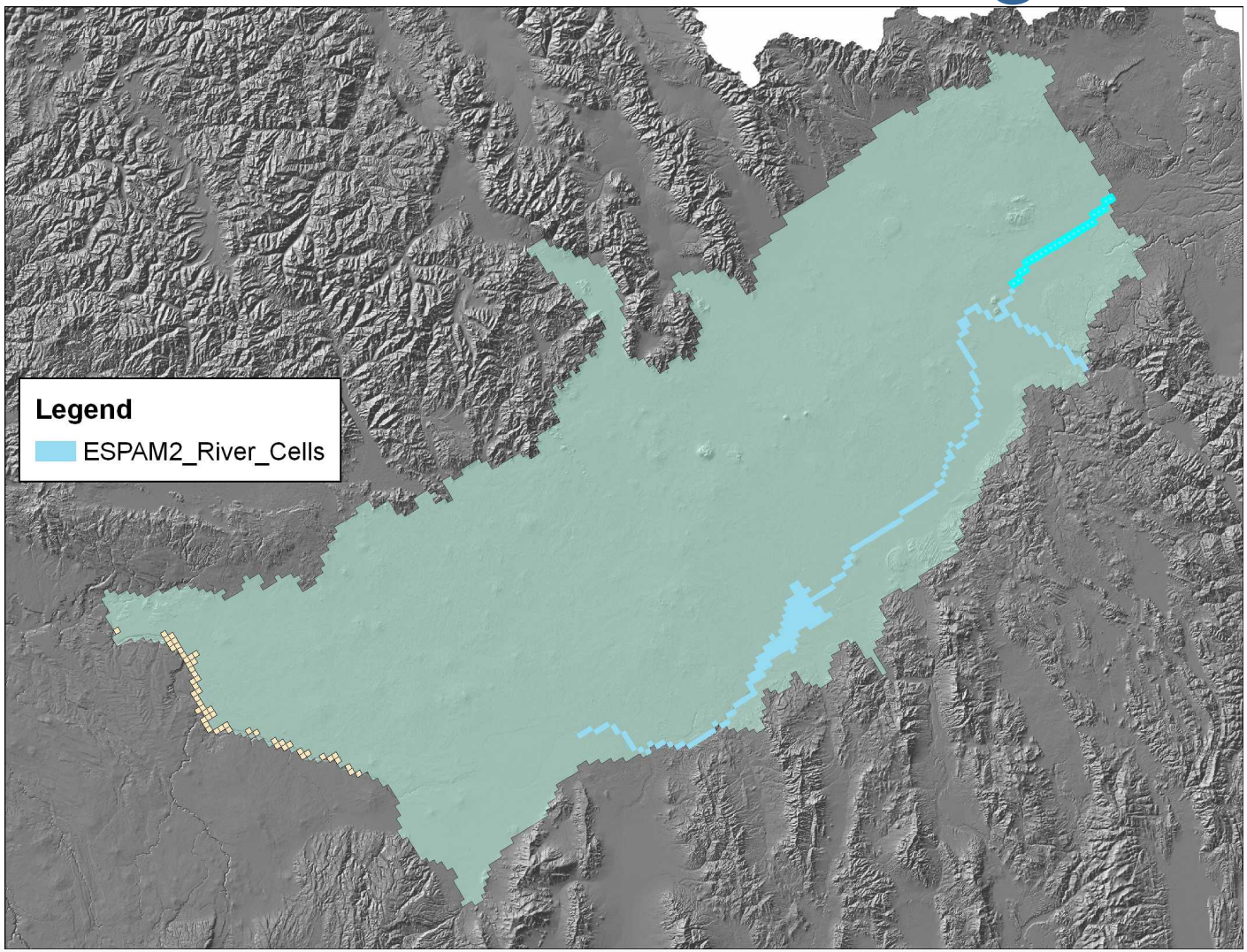
Transient Heads



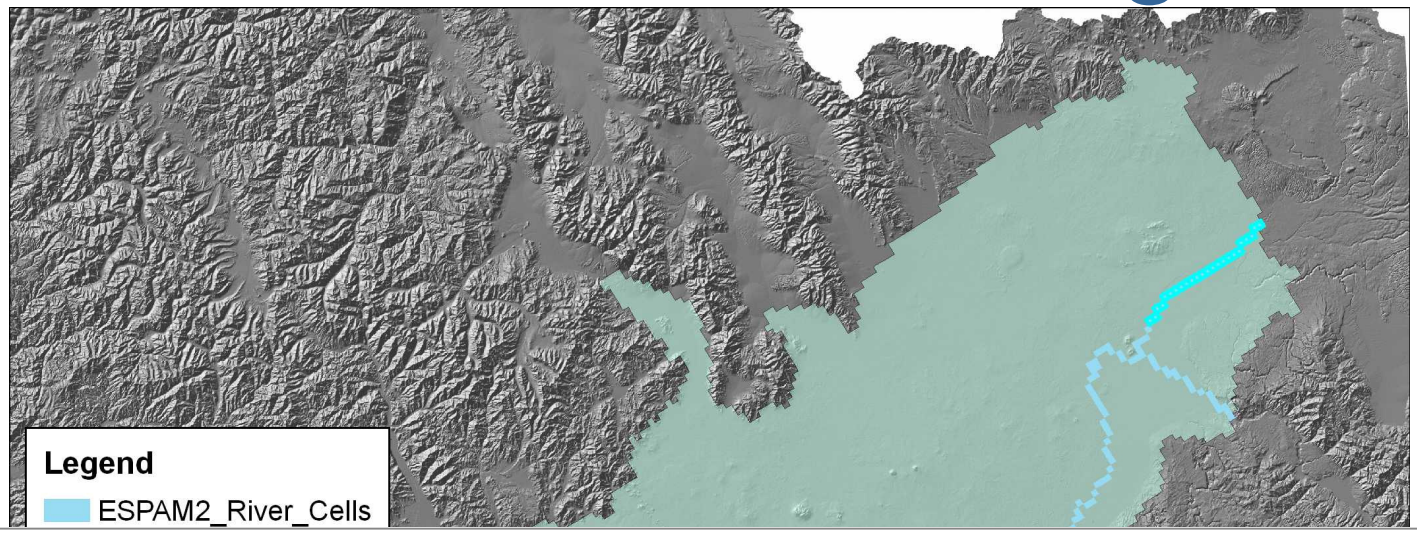


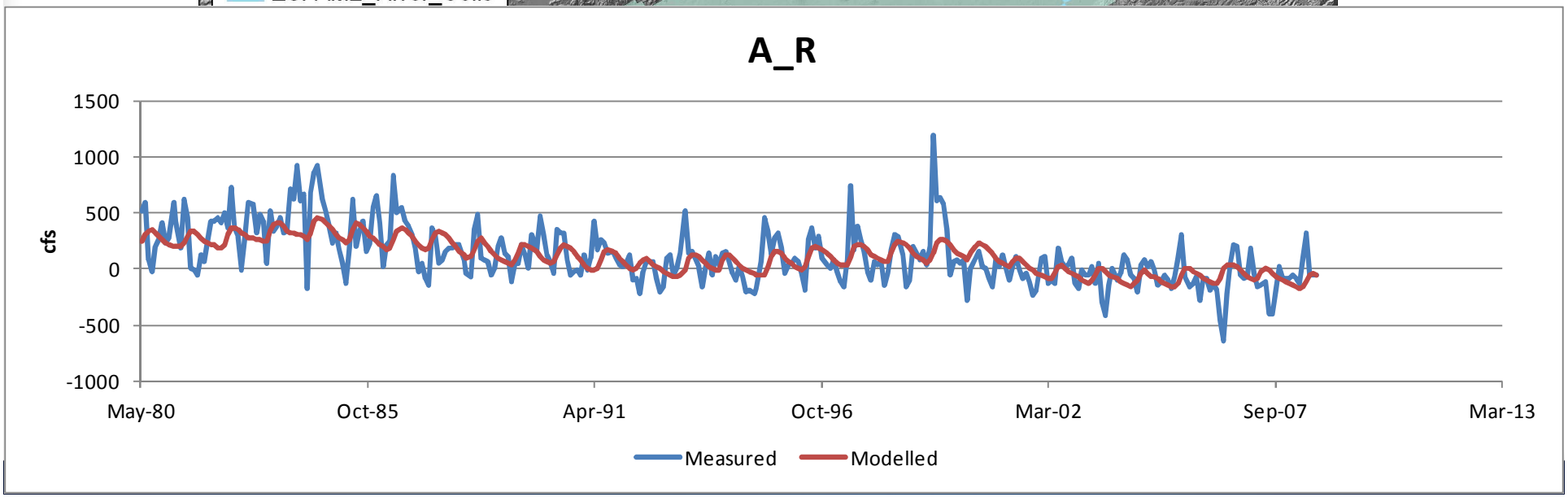
- Snake River reaches

Ashton - Rexburg

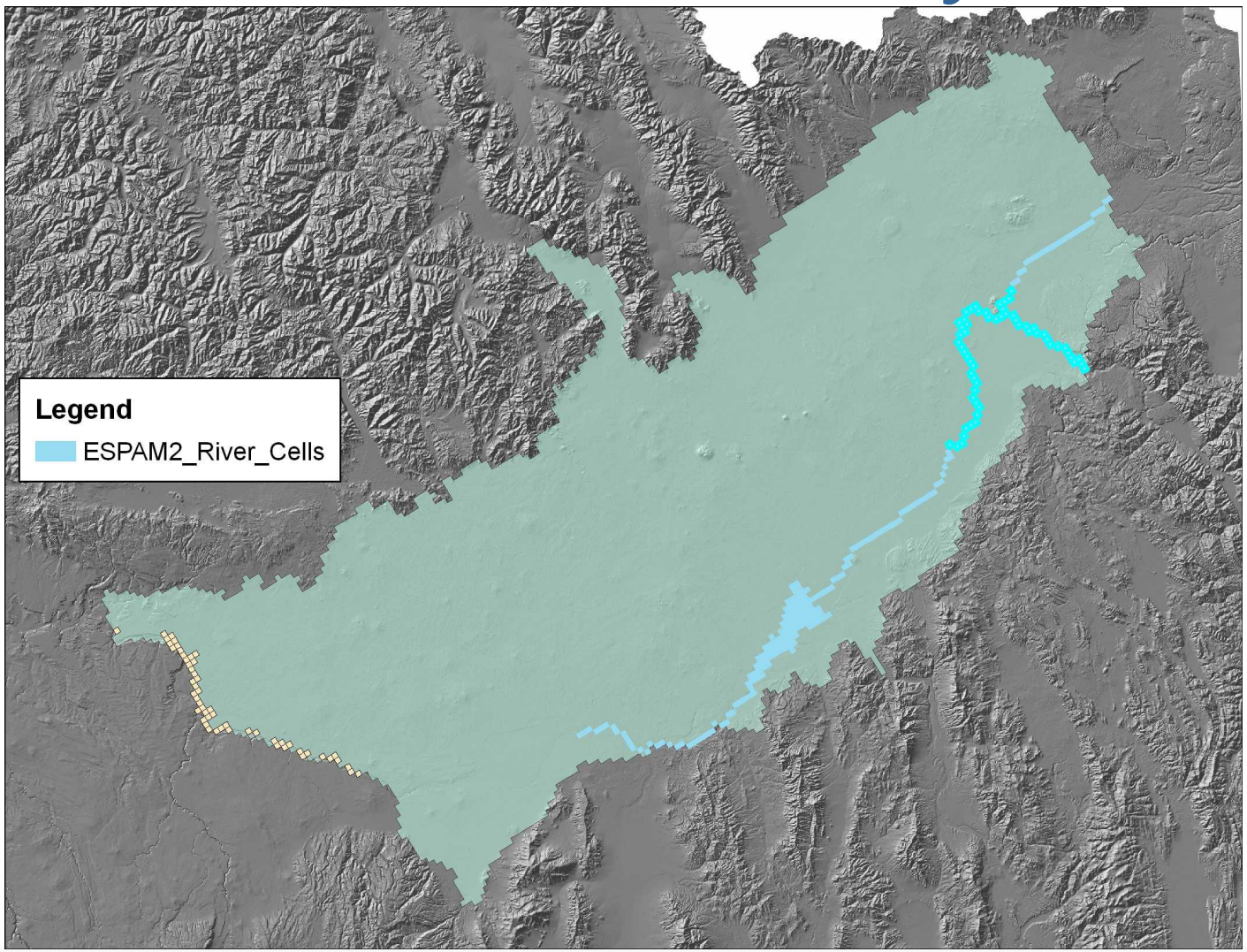


Ashton - Rexburg

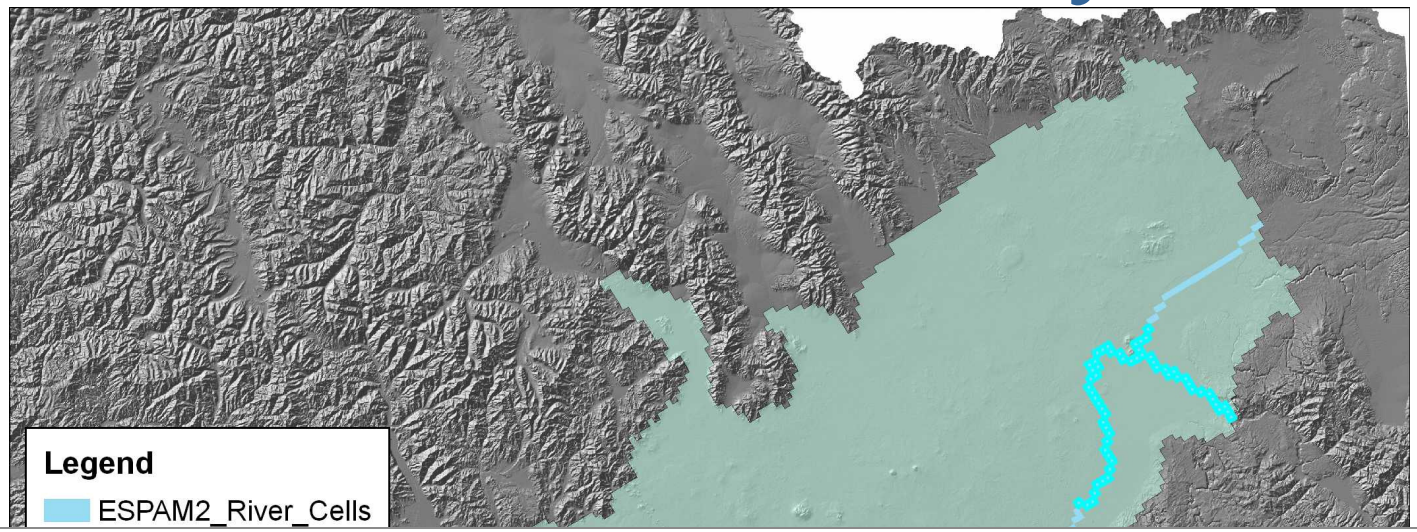


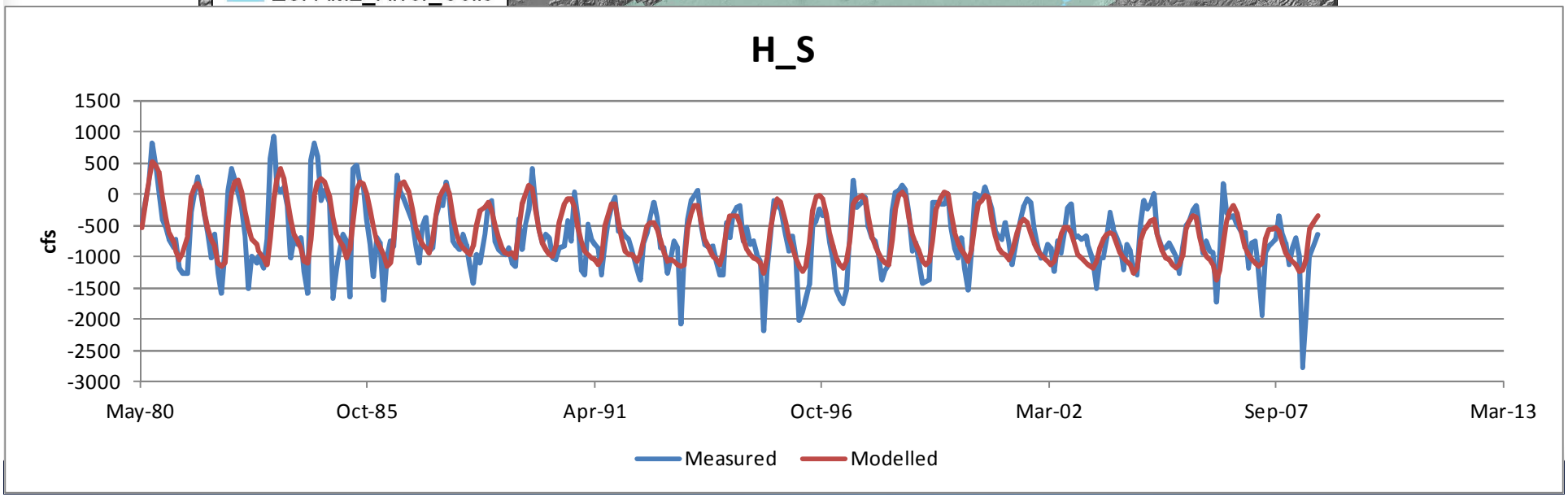


Heise - Shelley

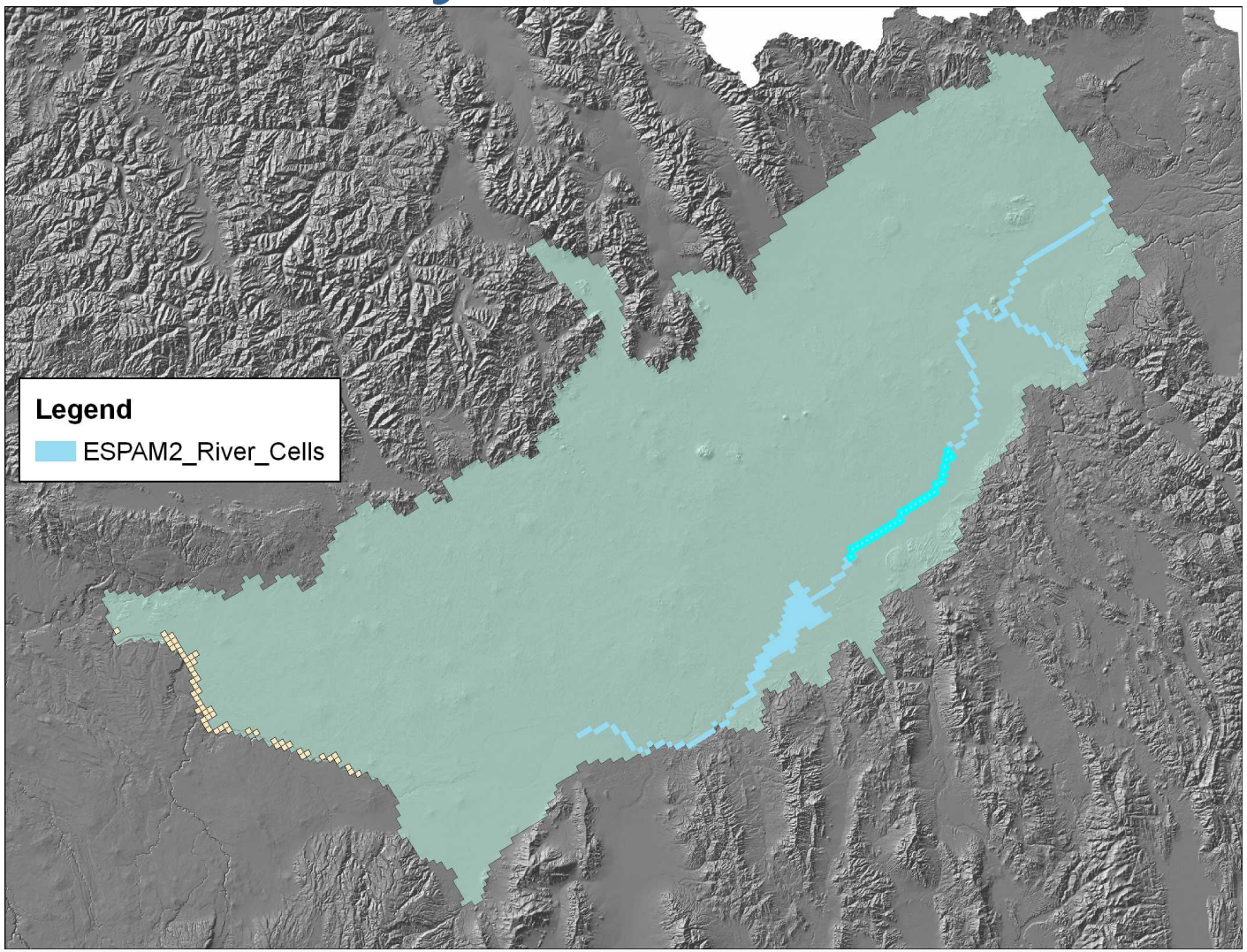


Heise - Shelley





Shelley – nr Blackfoot



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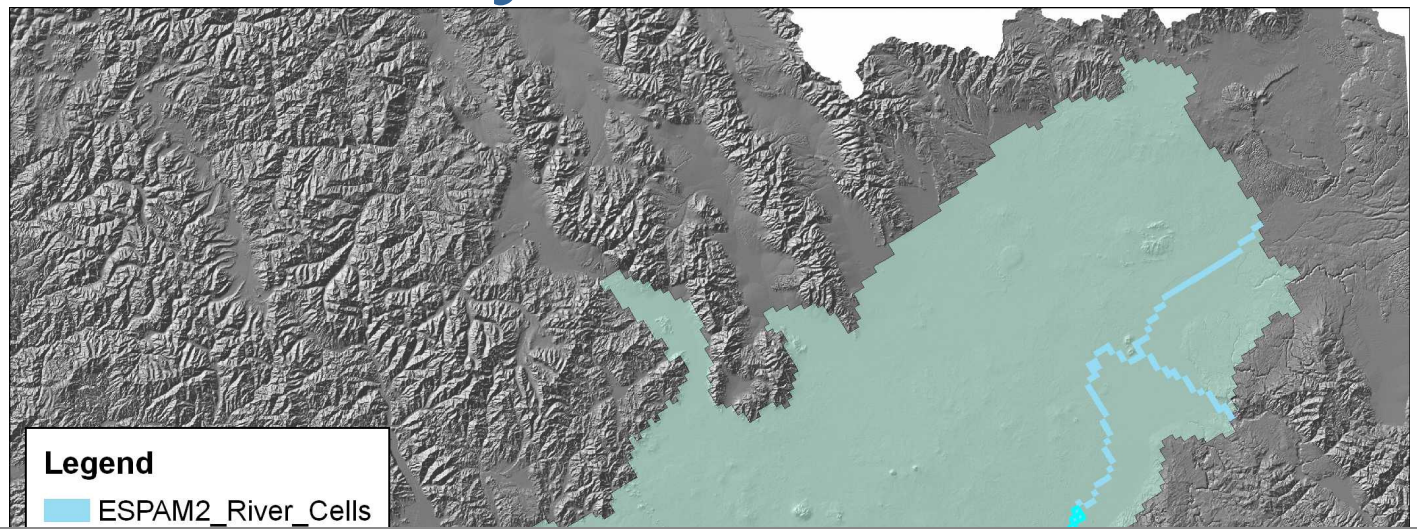
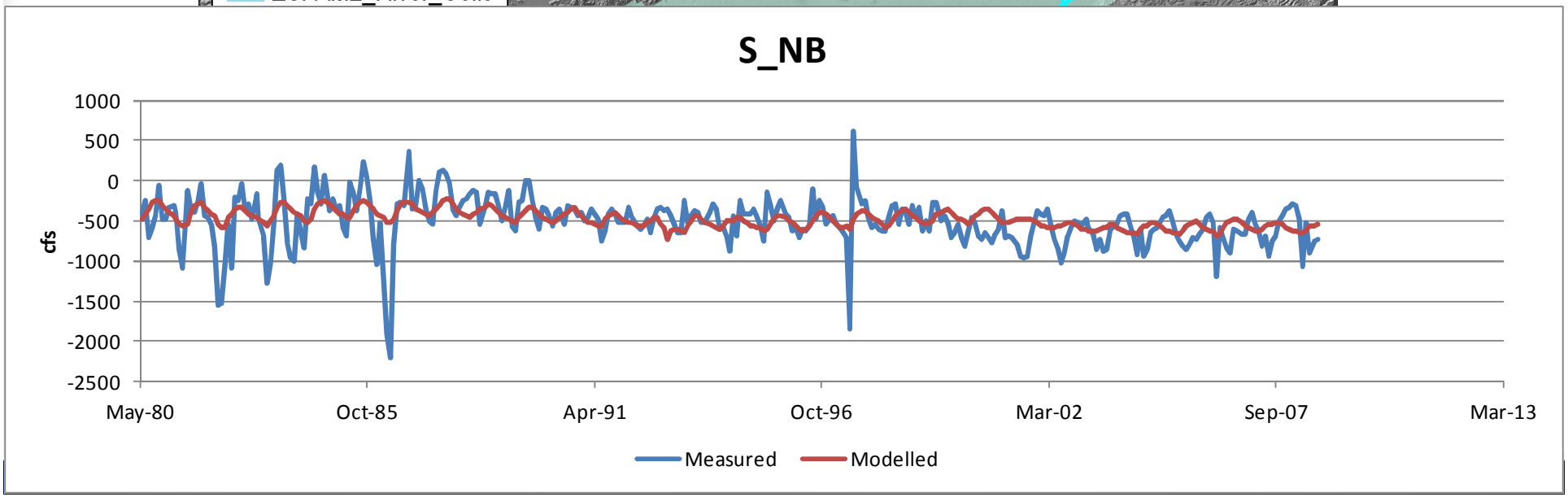
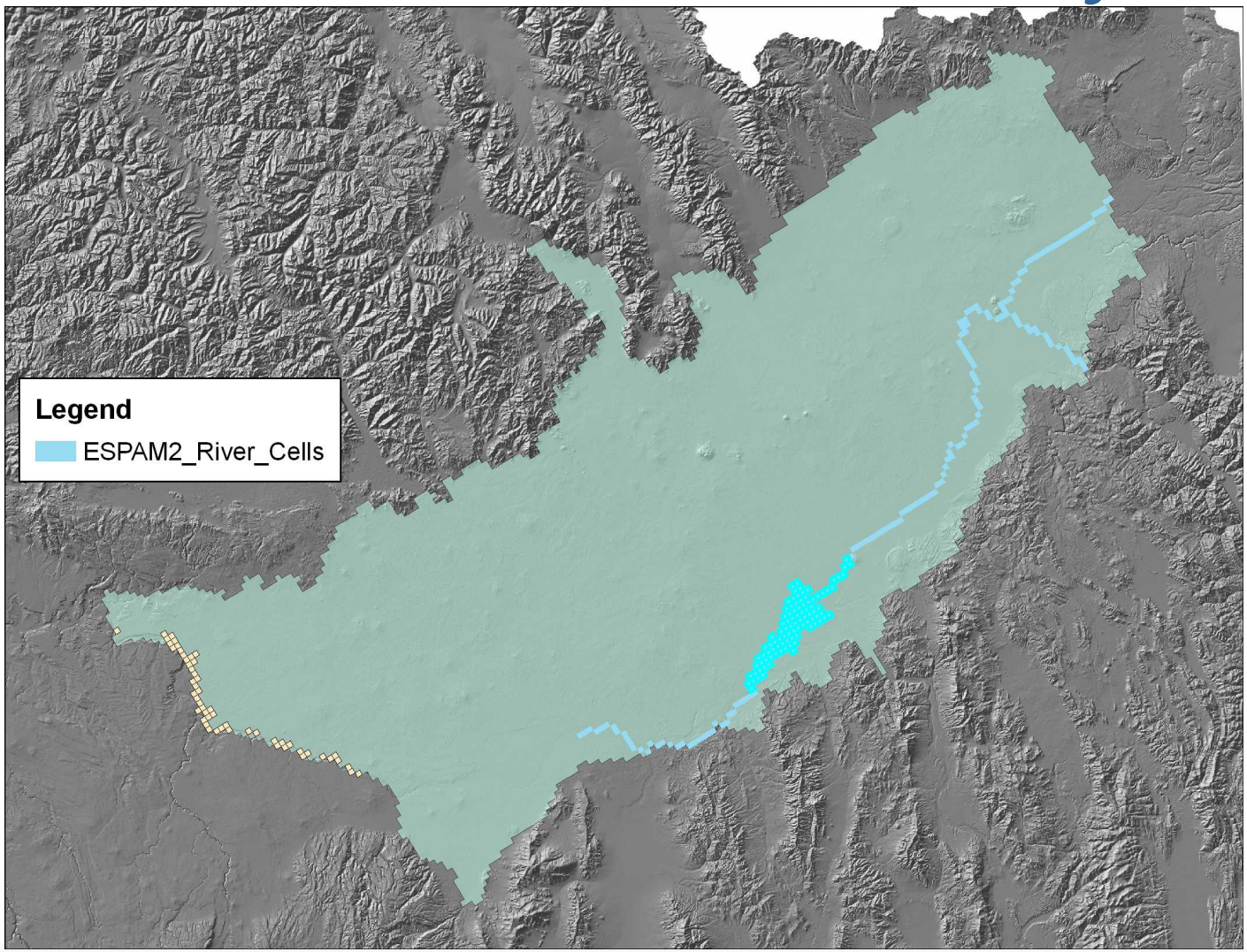
Shelley – nr Blackfoot

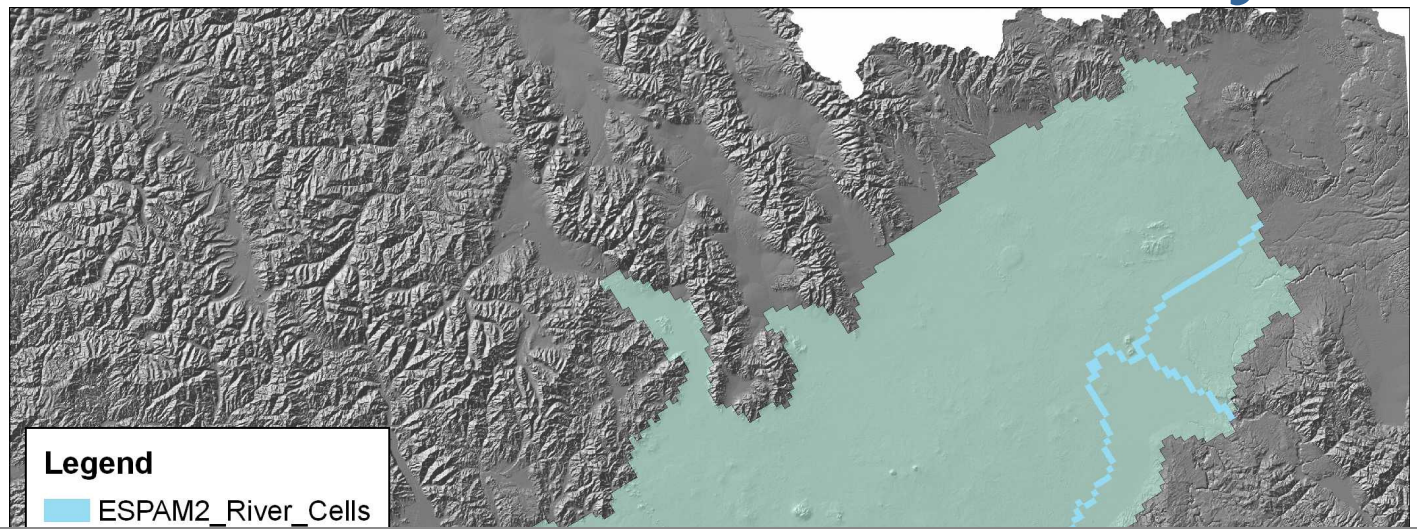


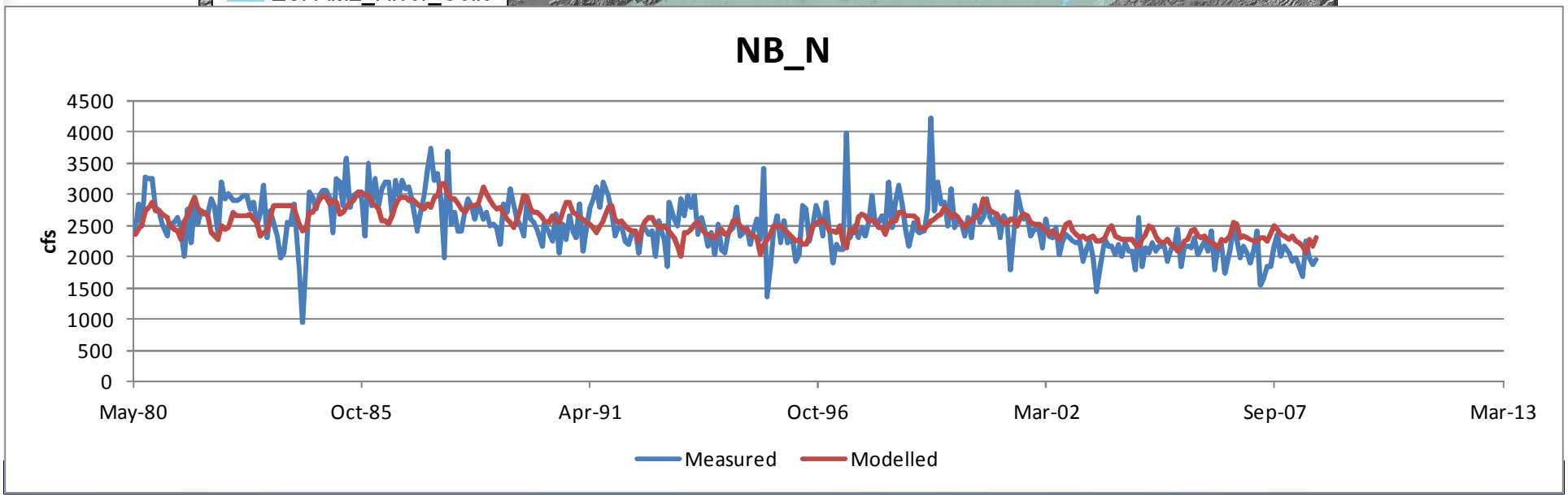


Nr Blackfoot - Neeley

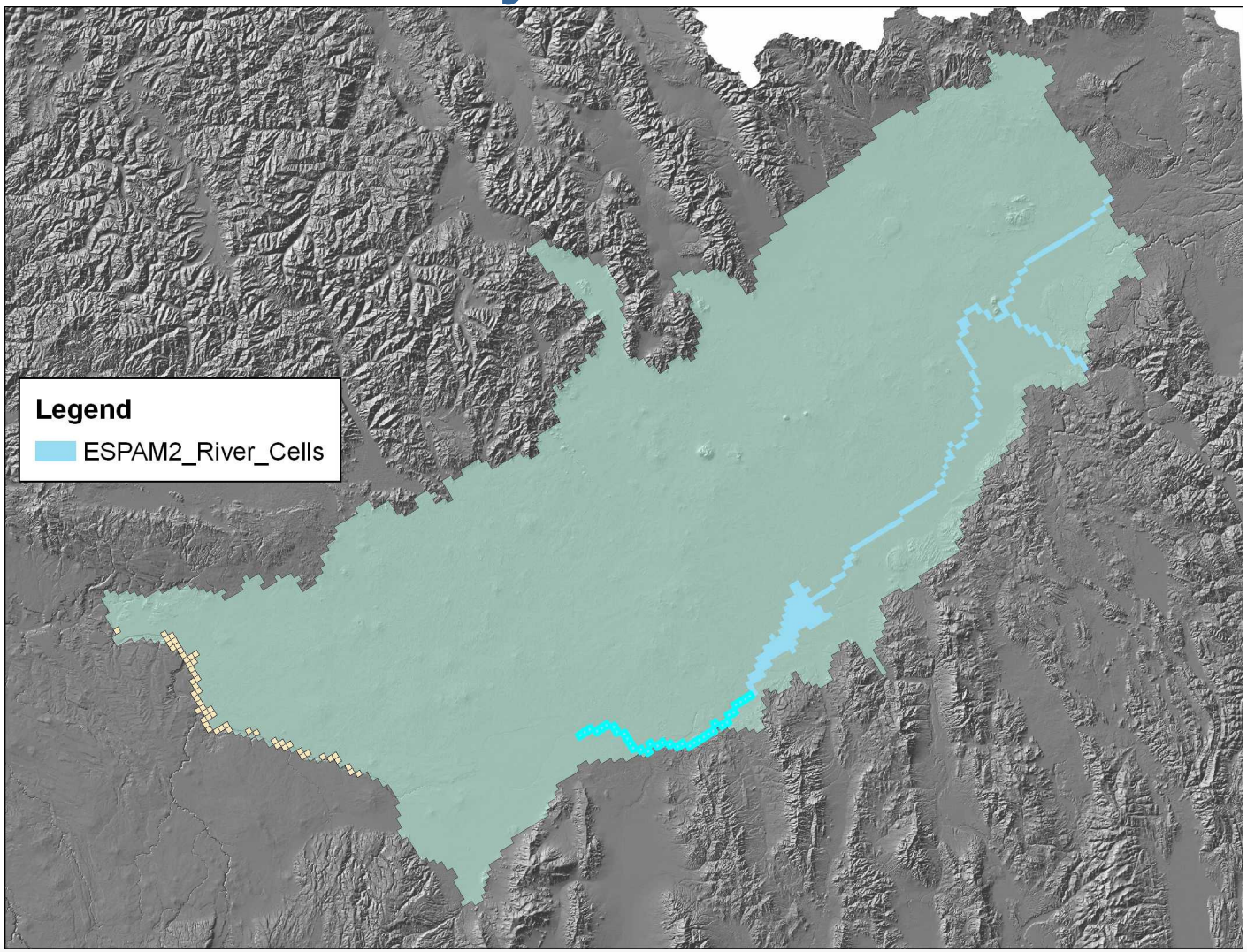


Nr Blackfoot - Neeley

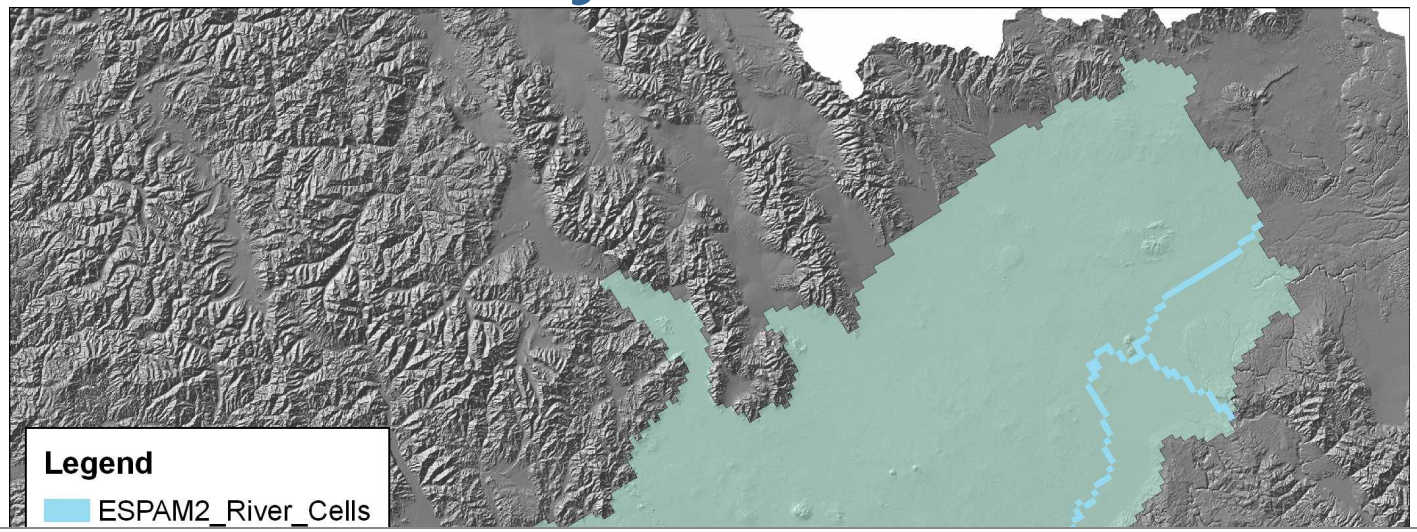


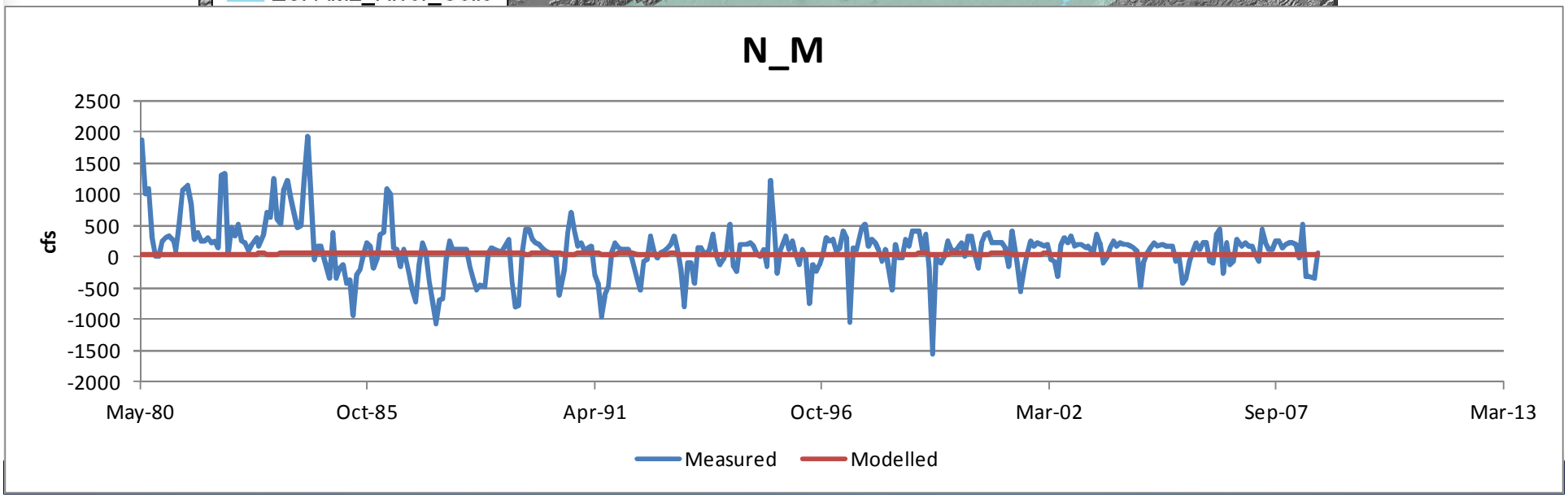


Neeley - Minidoka

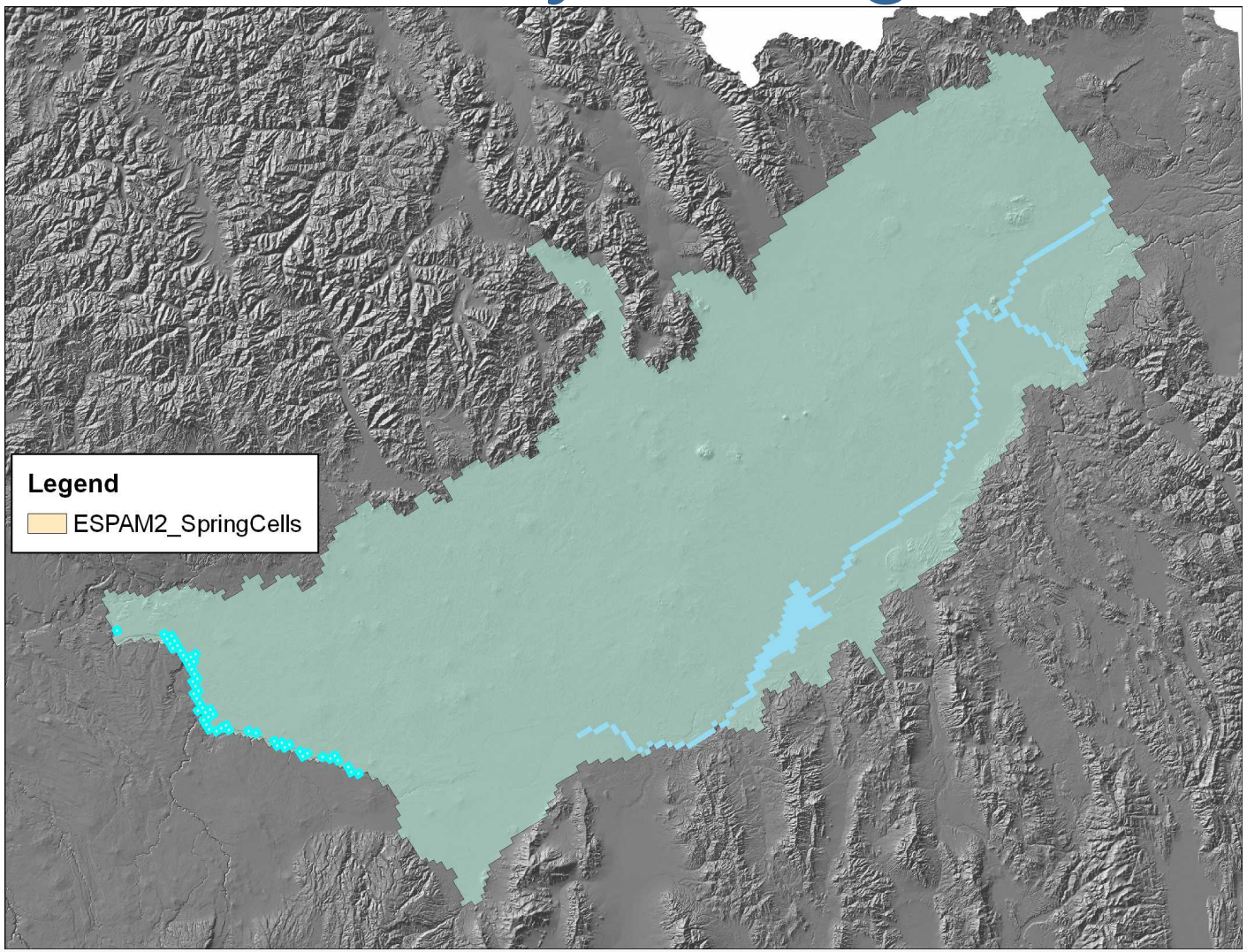


Neeley - Minidoka





Kimberly – King Hill



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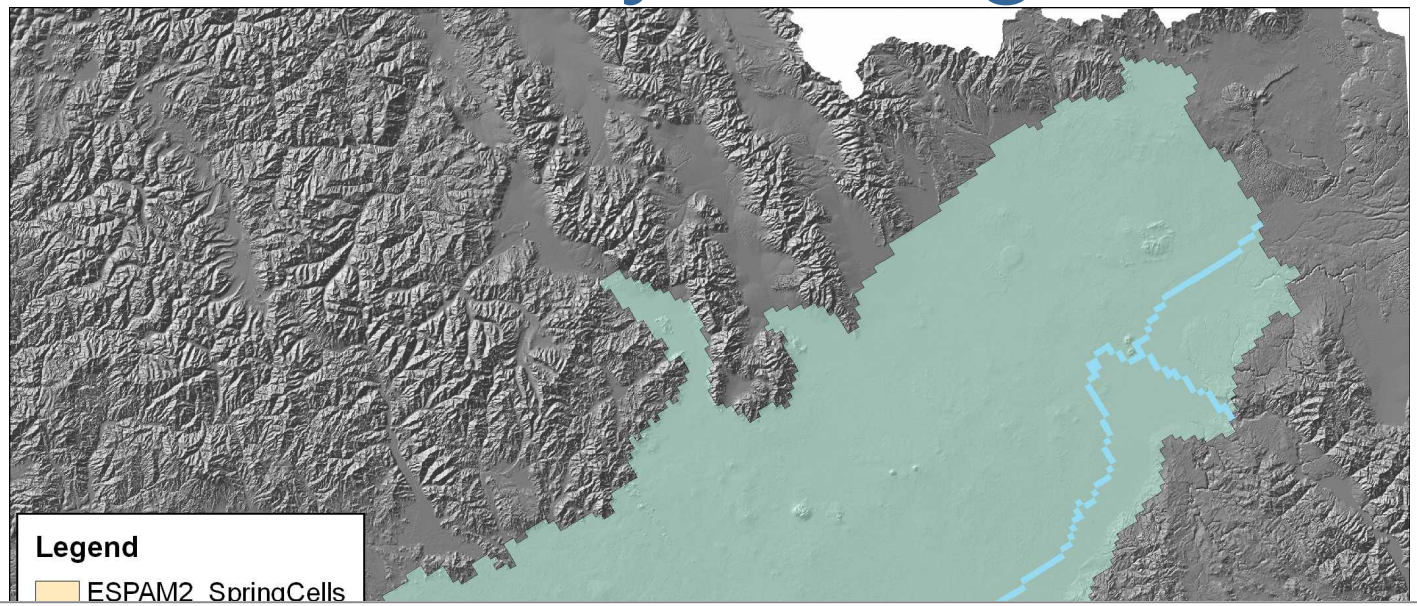
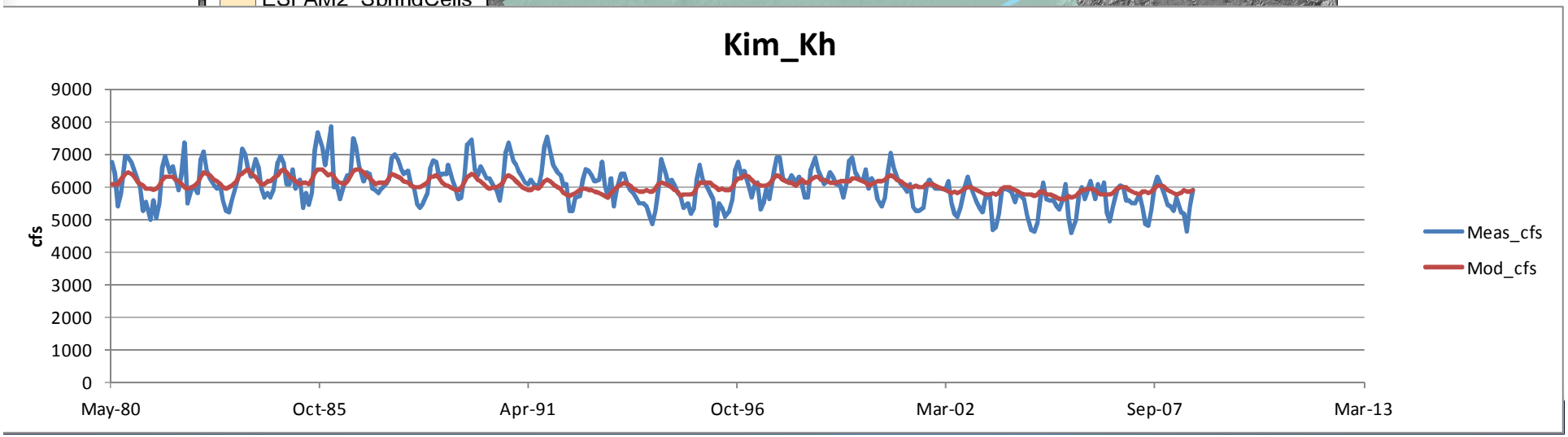
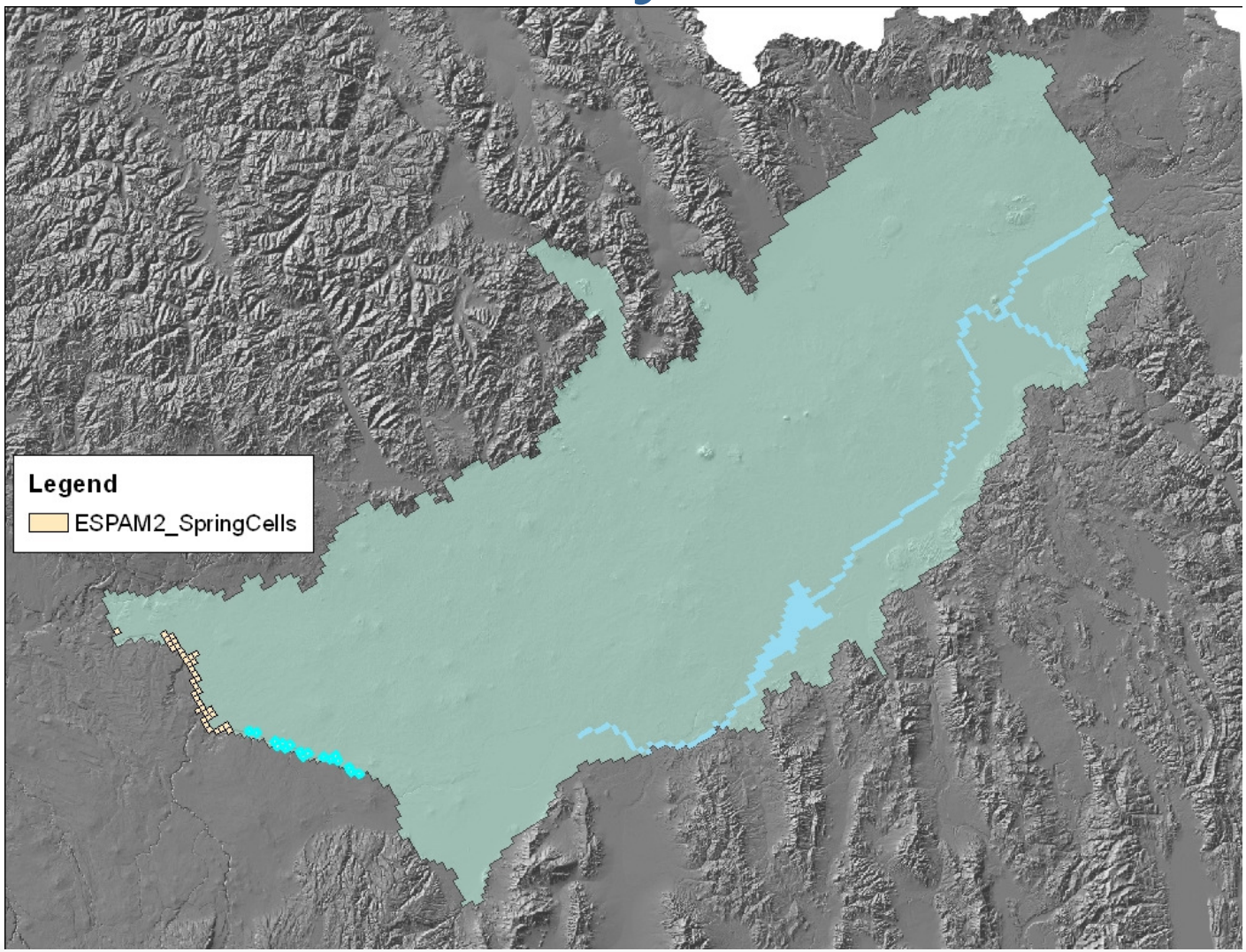
Kimberly – King Hill

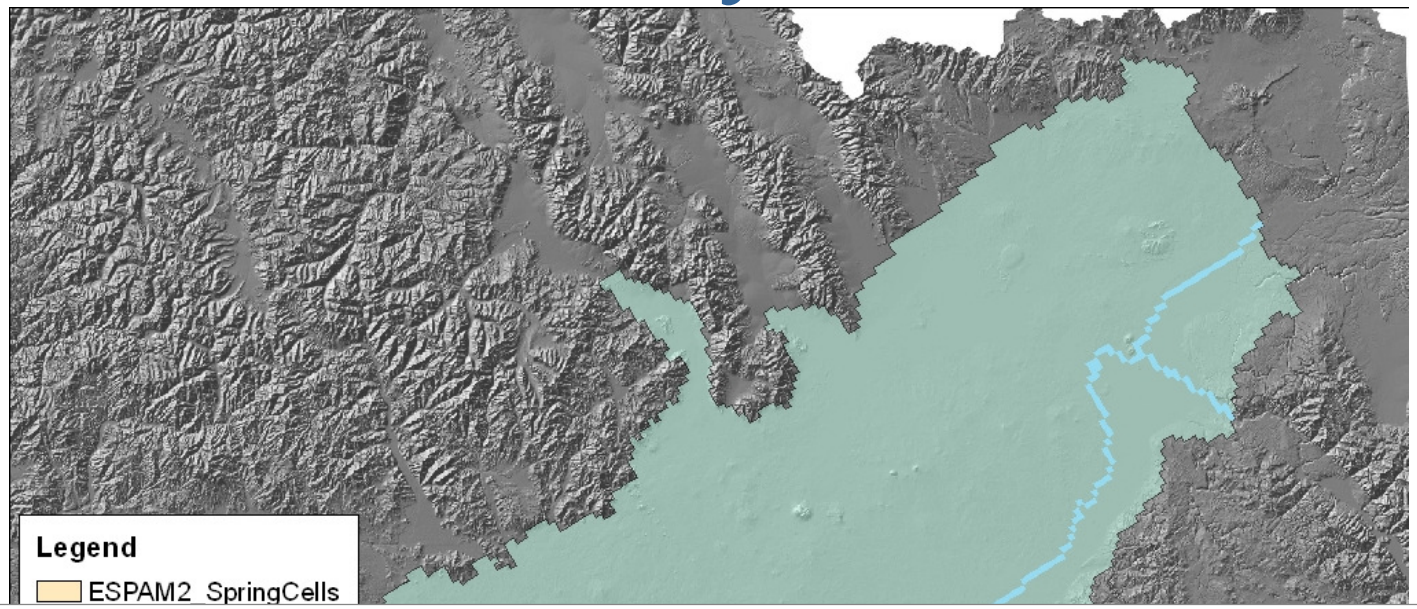


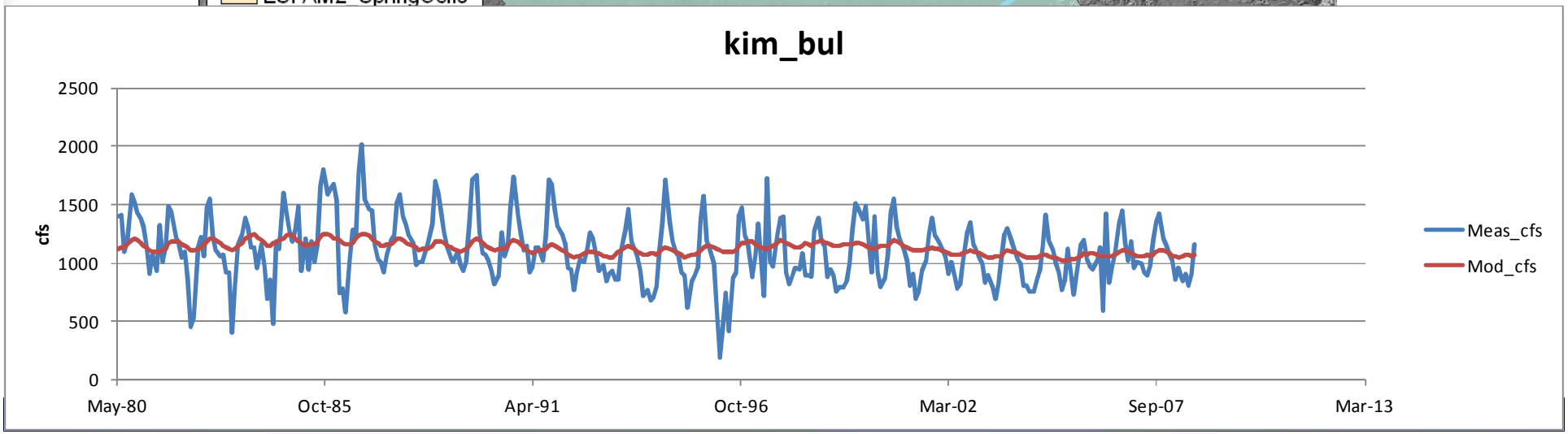


Kimberly – Buhl

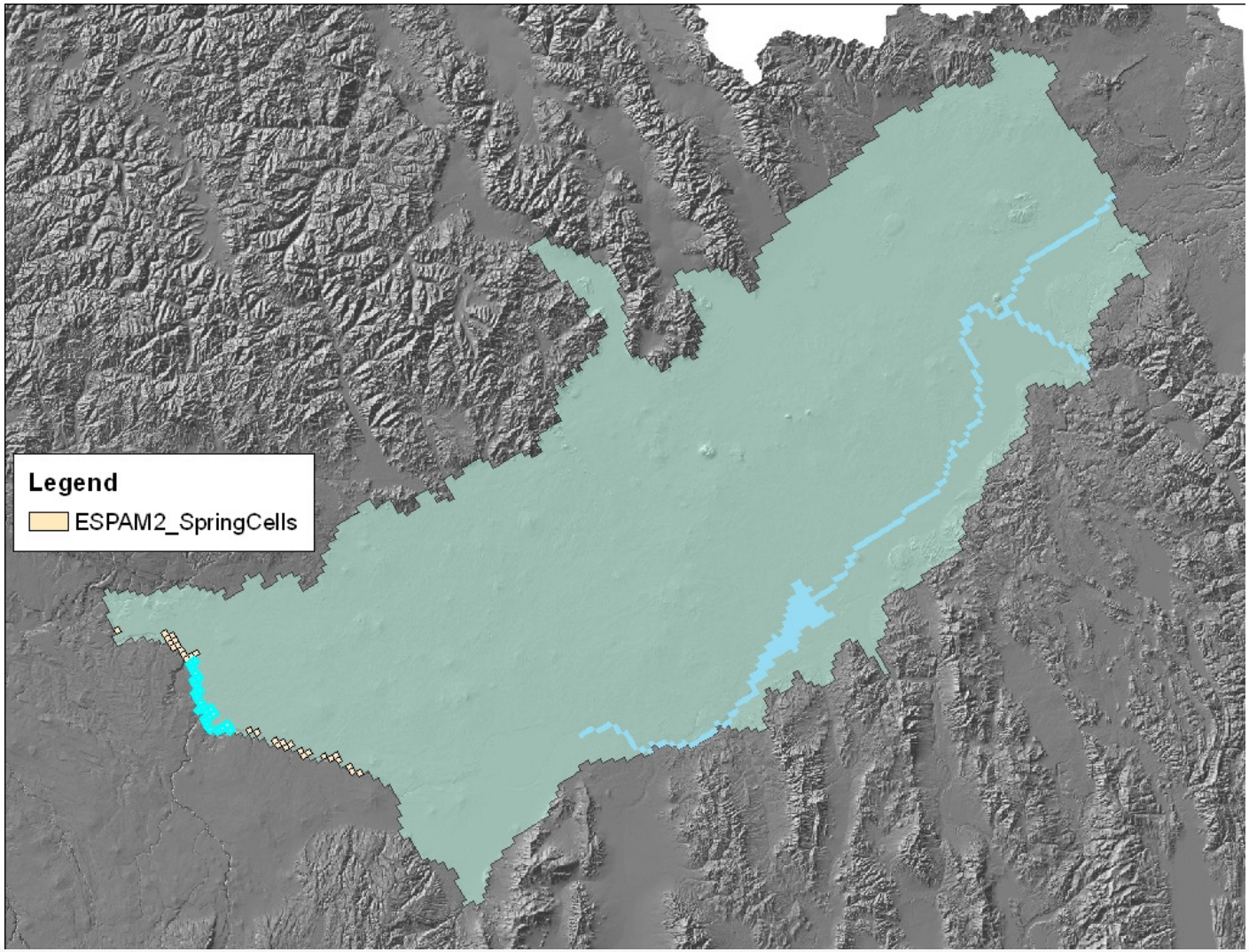


Kimberly – Buhl





Buhl-Lower Salmon Falls



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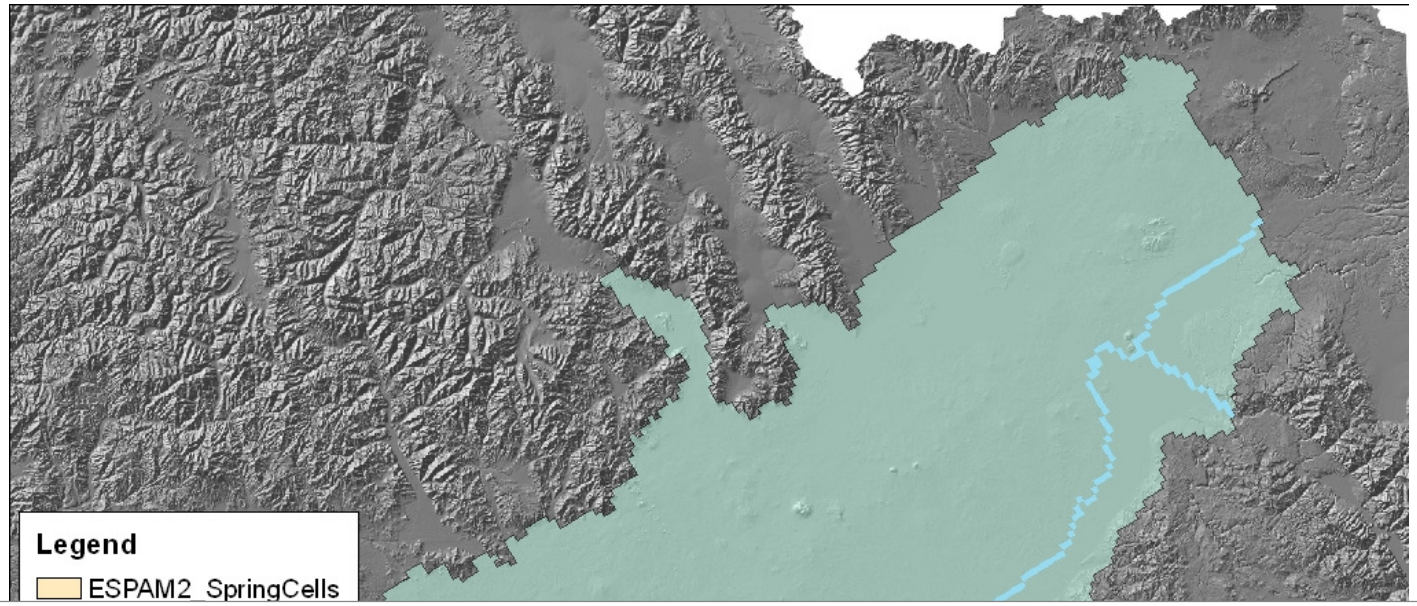
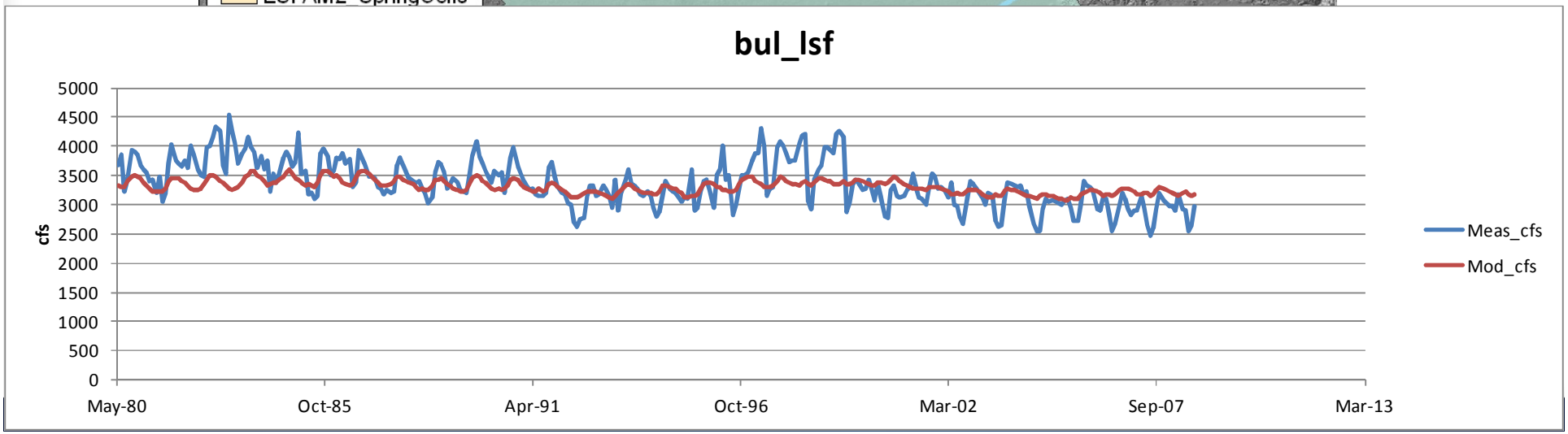
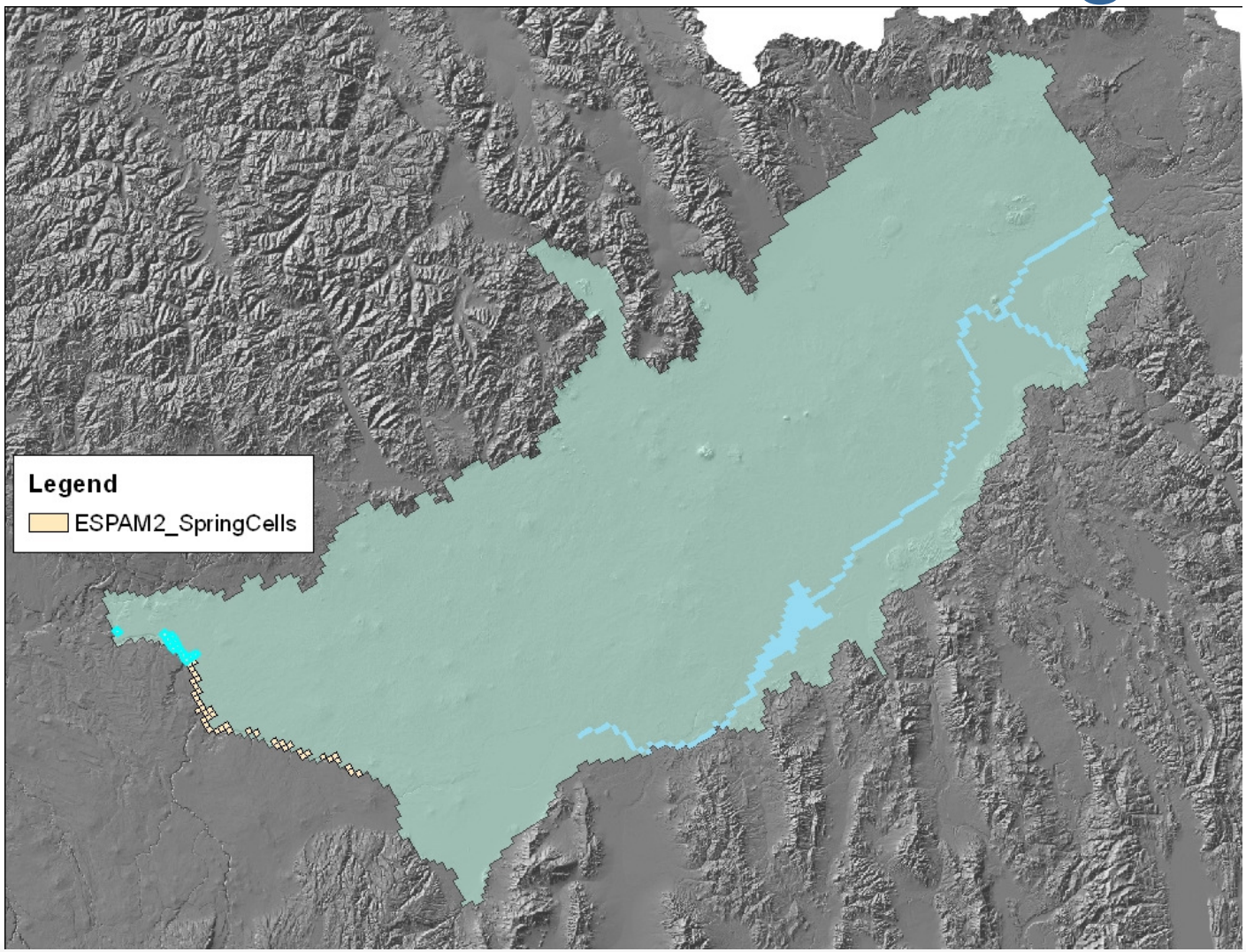
Buhl-Lower Salmon Falls





Lower Salmon Falls-King Hill



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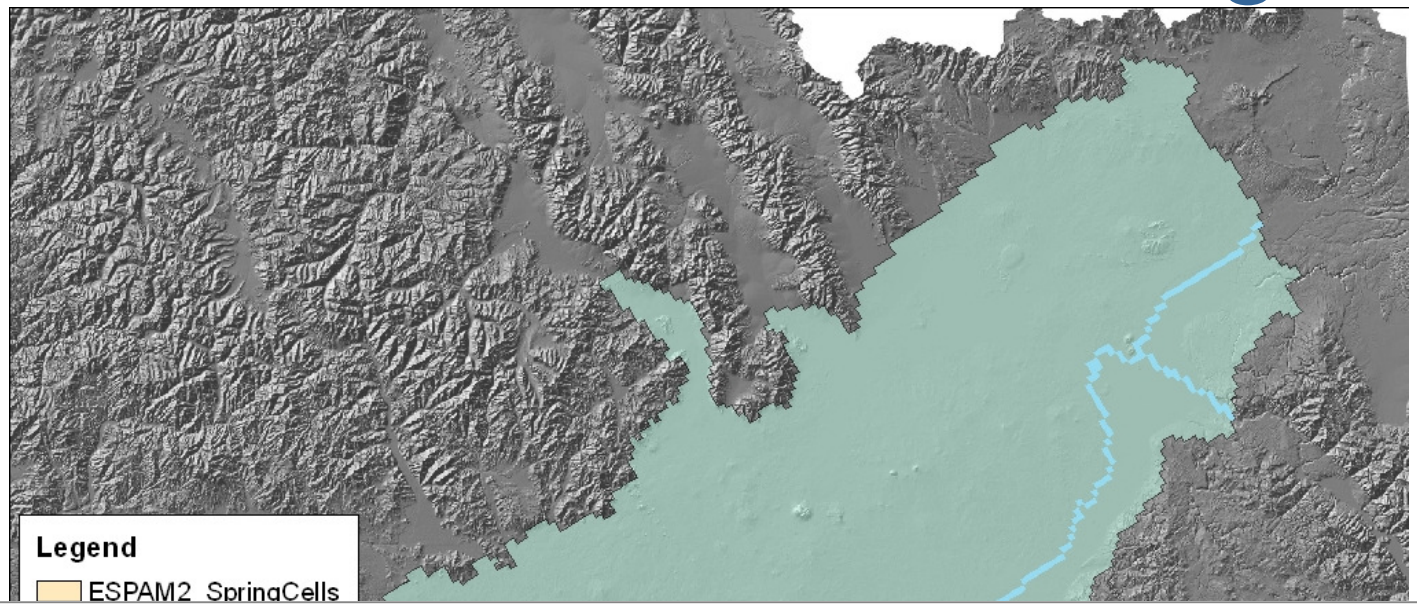
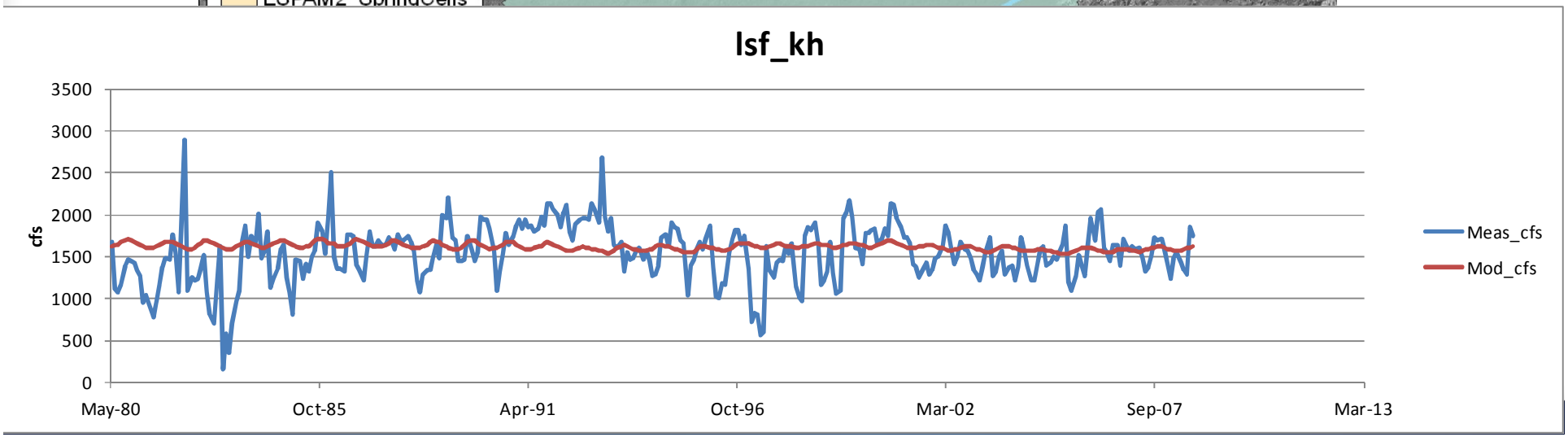
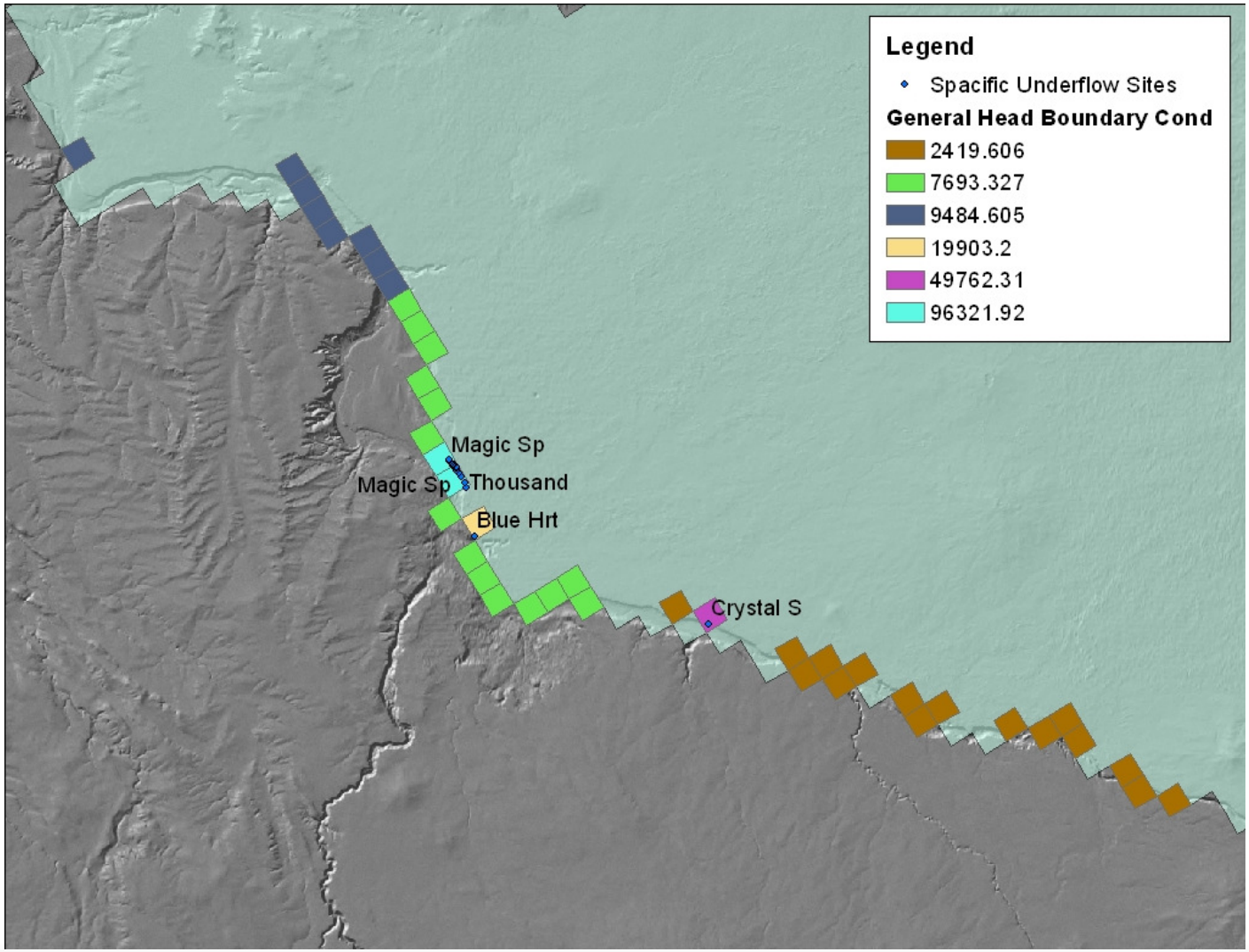
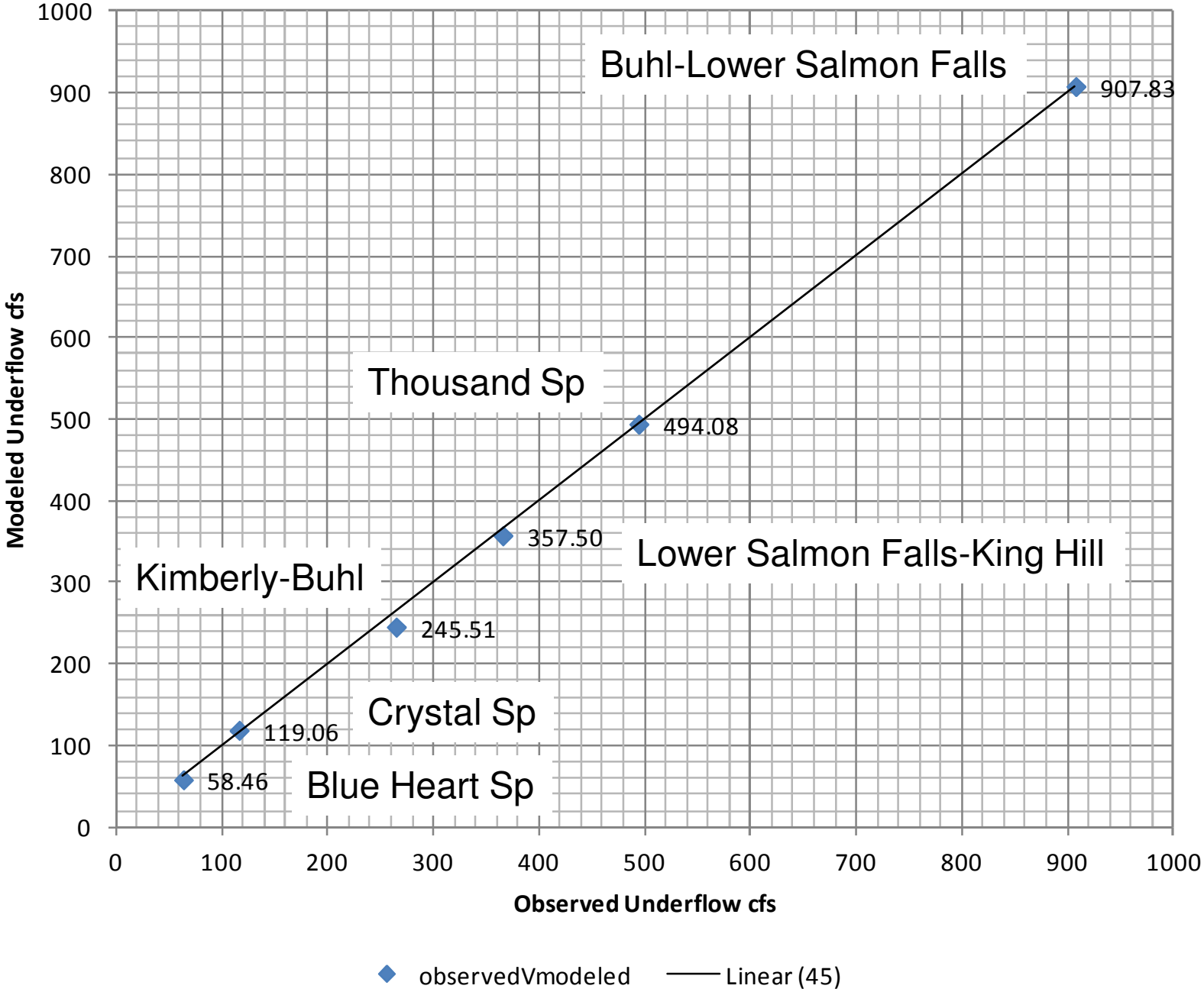
Lower Salmon Falls-King Hill

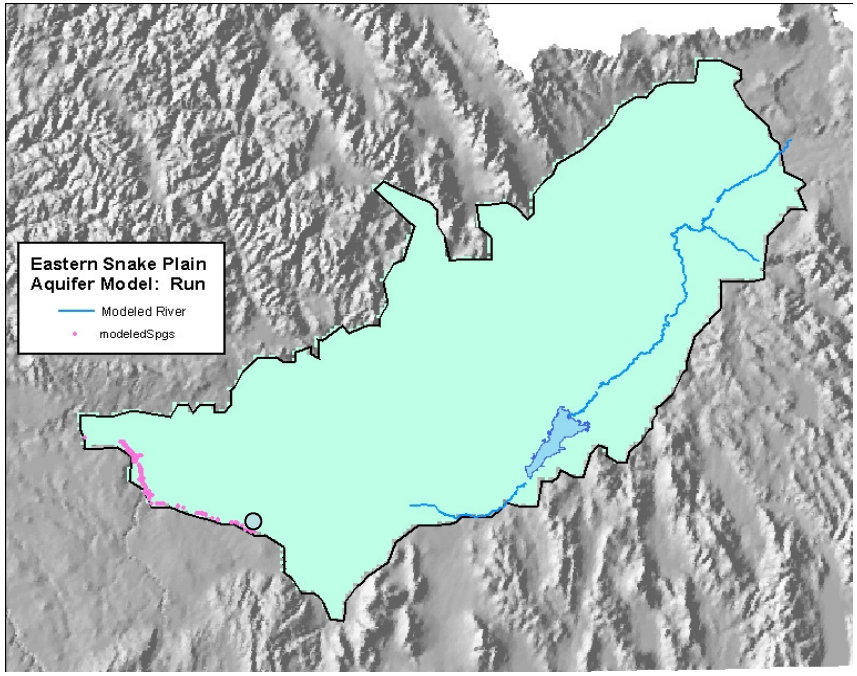




Underflow

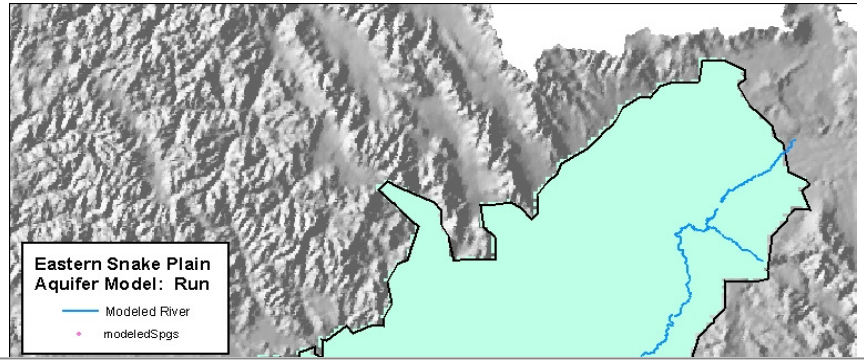

Legend
Spacific Underflow Sites
General Head Boundary Cond
2419.606
7693.327
9484.605
19903.2
49762.31
96321.92
Magic Sp
Magic Sp
Thousand
Blue Hrt
Crystal S

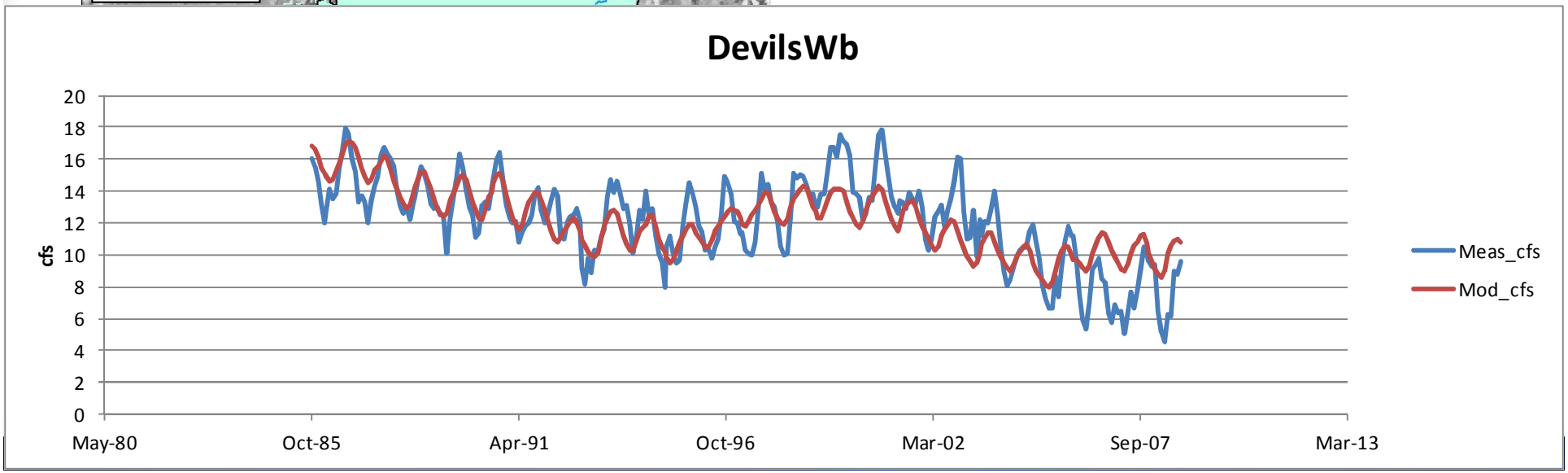

Buhl-Lower Salmon Falls
907.83
Thousand Sp
494.08
357.50
Lower Salmon Falls-King Hill
Kimberly-Buhl
245.51
Crystal Sp
119.06
58.46
Blue Heart Sp
Modeled Underflow cfs
Observed Underflow cfs
0
100
200
300
400
500
600
700
800
900
1000
observedVmodeled
Linear (45)

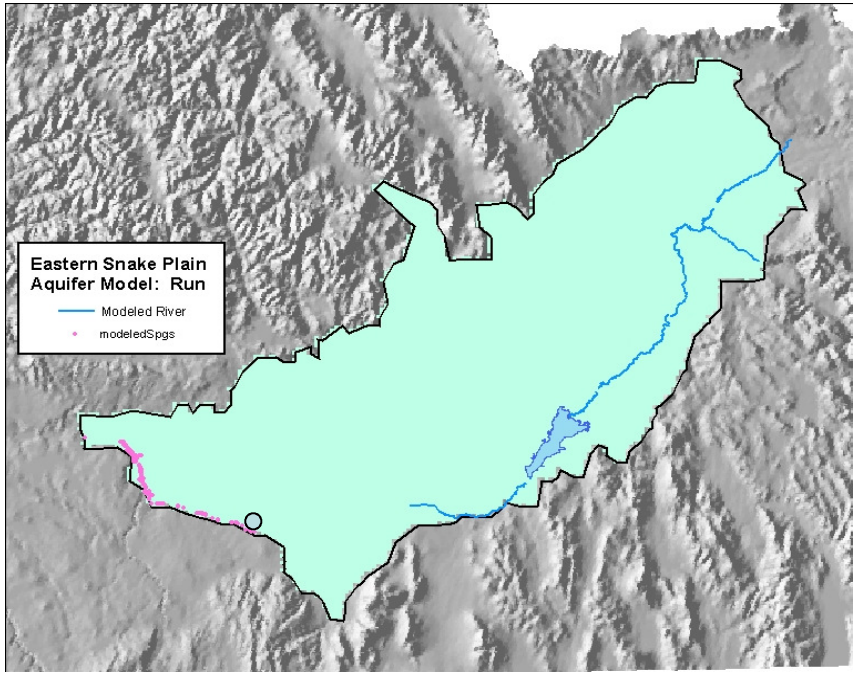


- Devils Washbowl

- Devils Washbowl

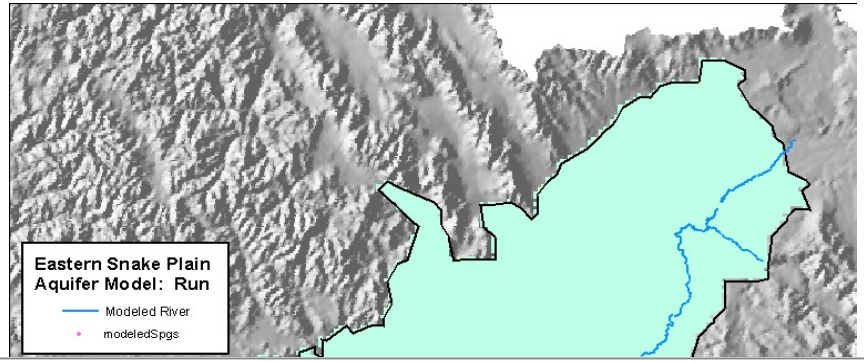


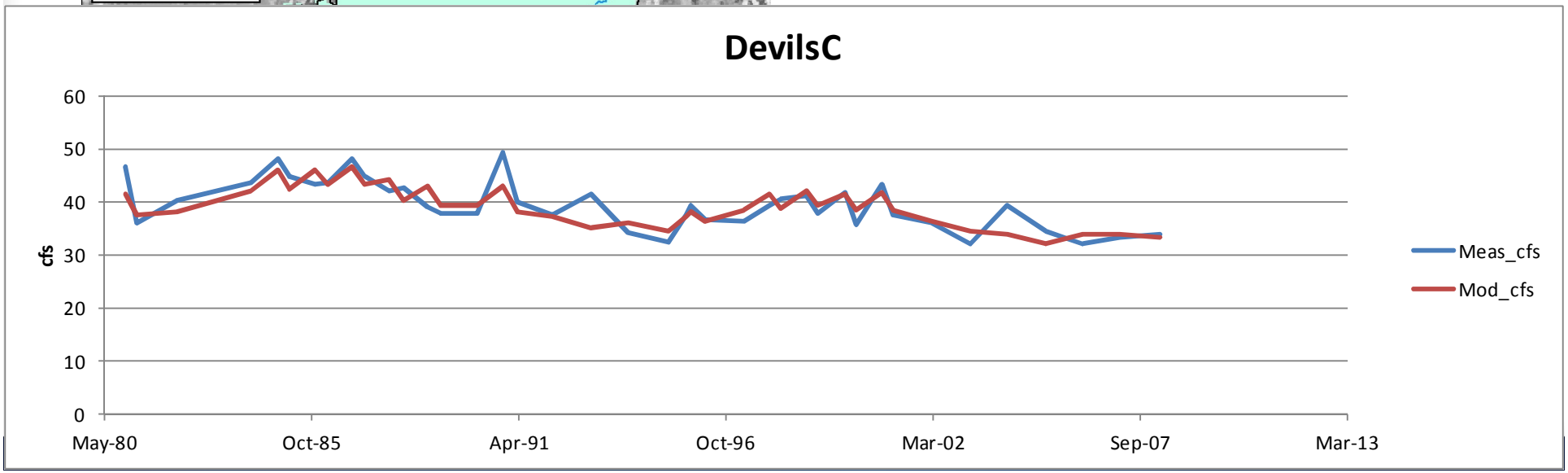


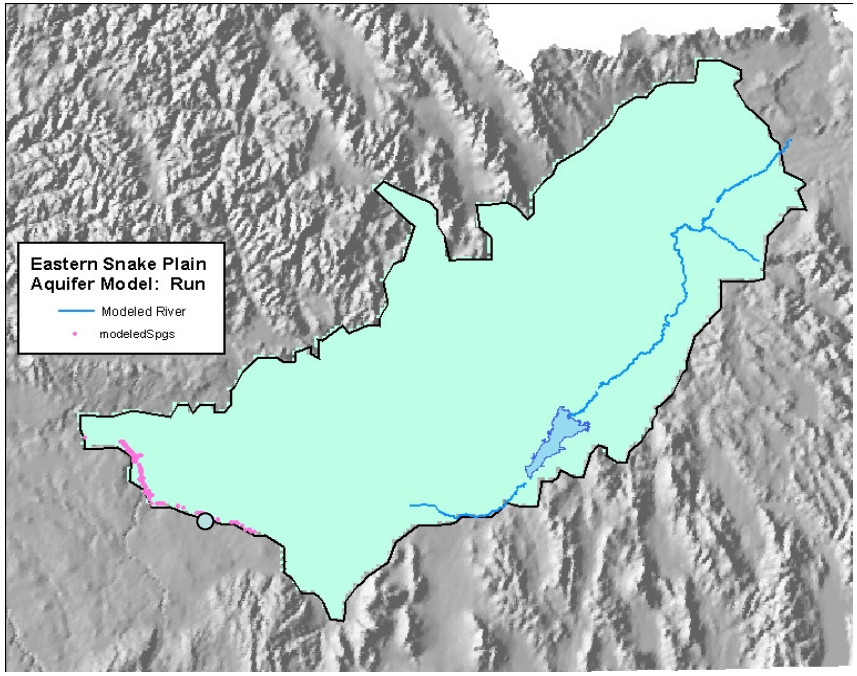


- Devils Corral

- Devils Corral

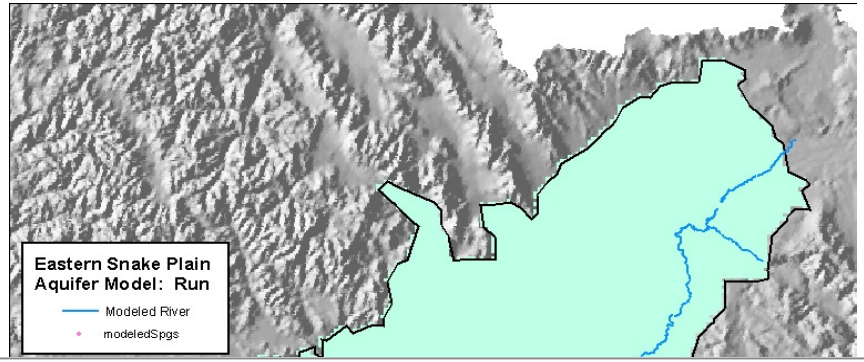


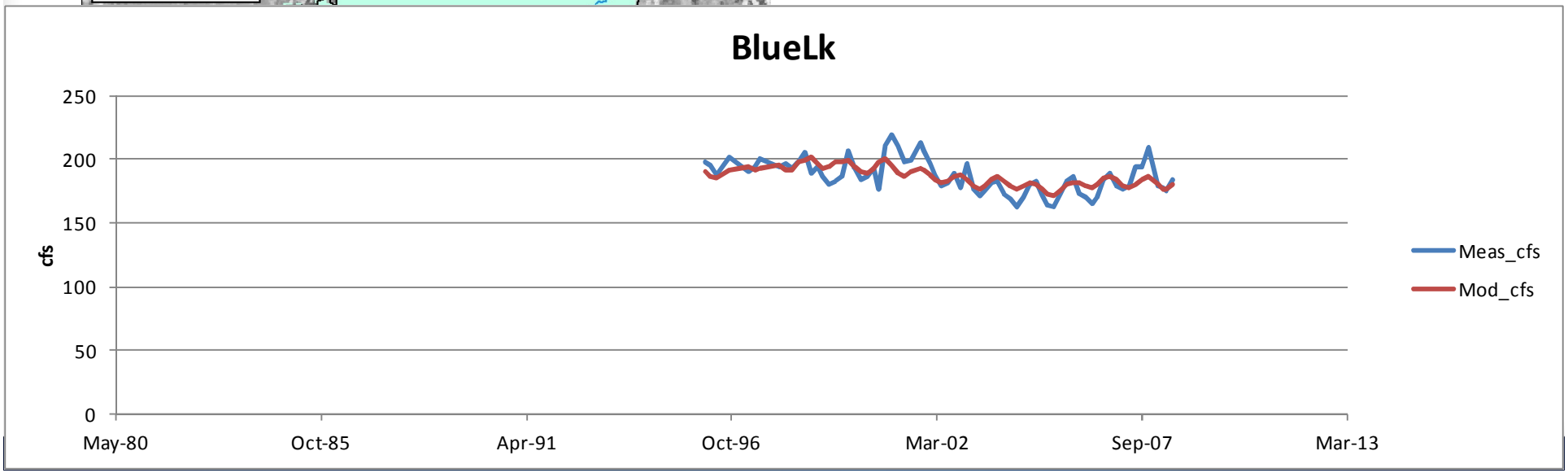


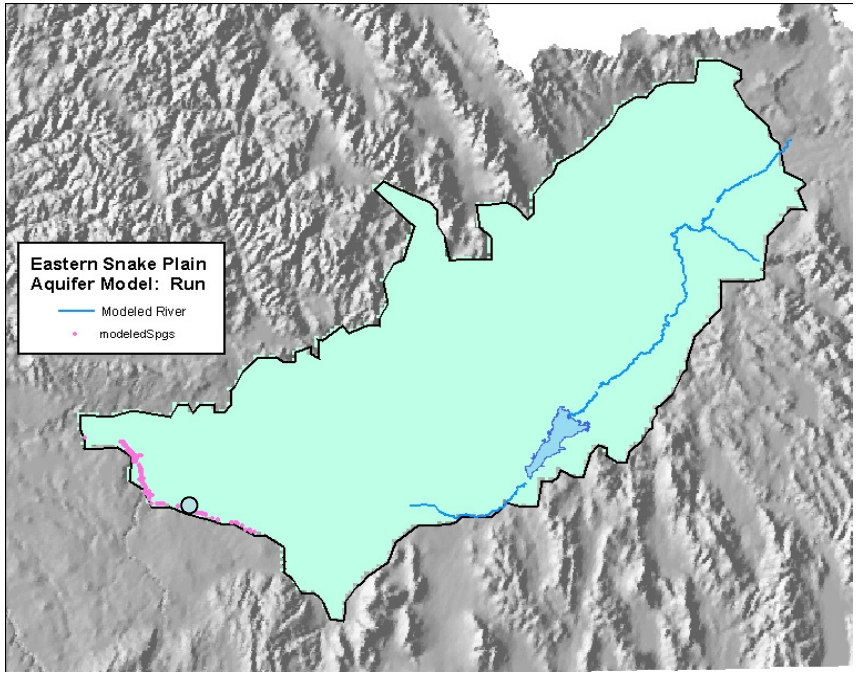

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Blue Lakes

- Blue Lakes

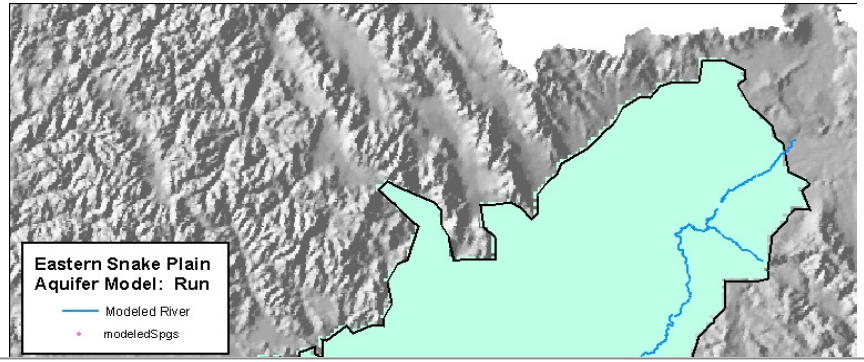

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

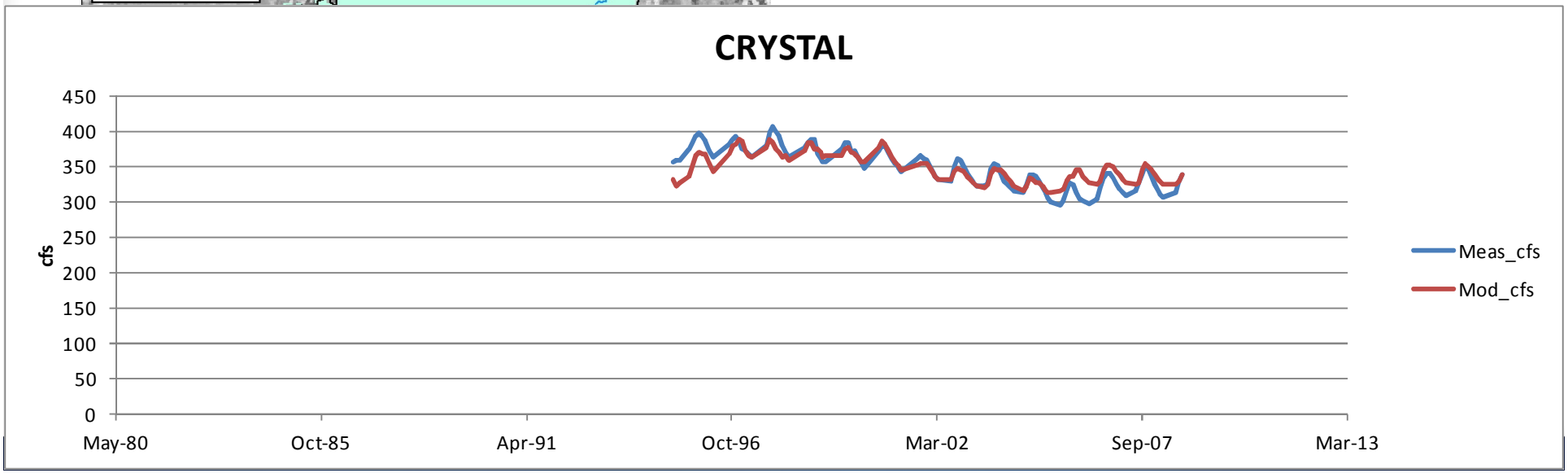

BlueLk
250
200
150
100
50
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Meas_cfs
Mod_cfs

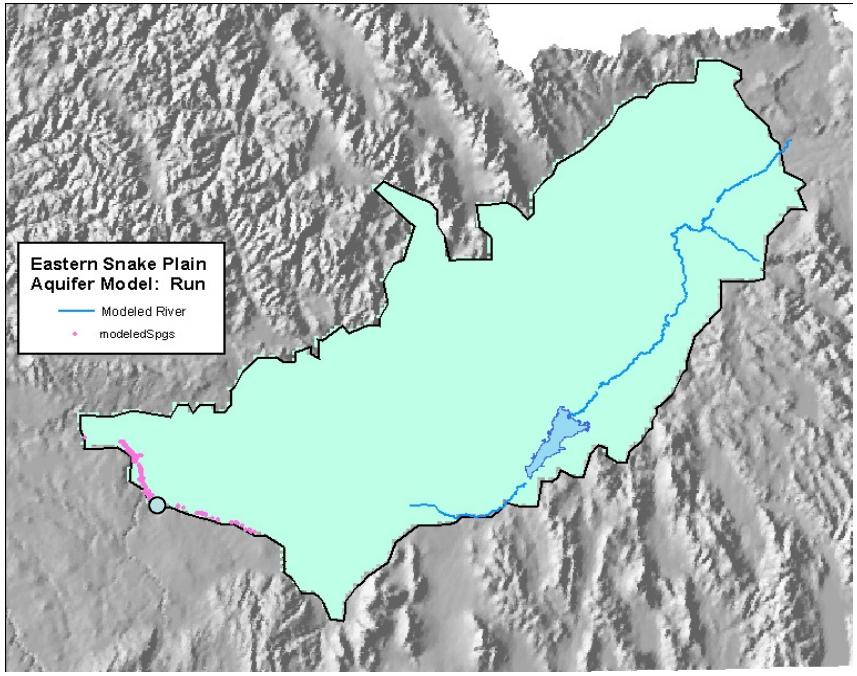


- Crystal Springs

- Crystal Springs

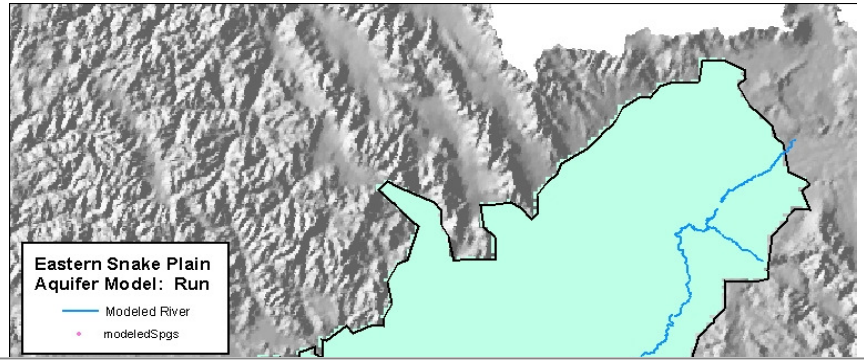


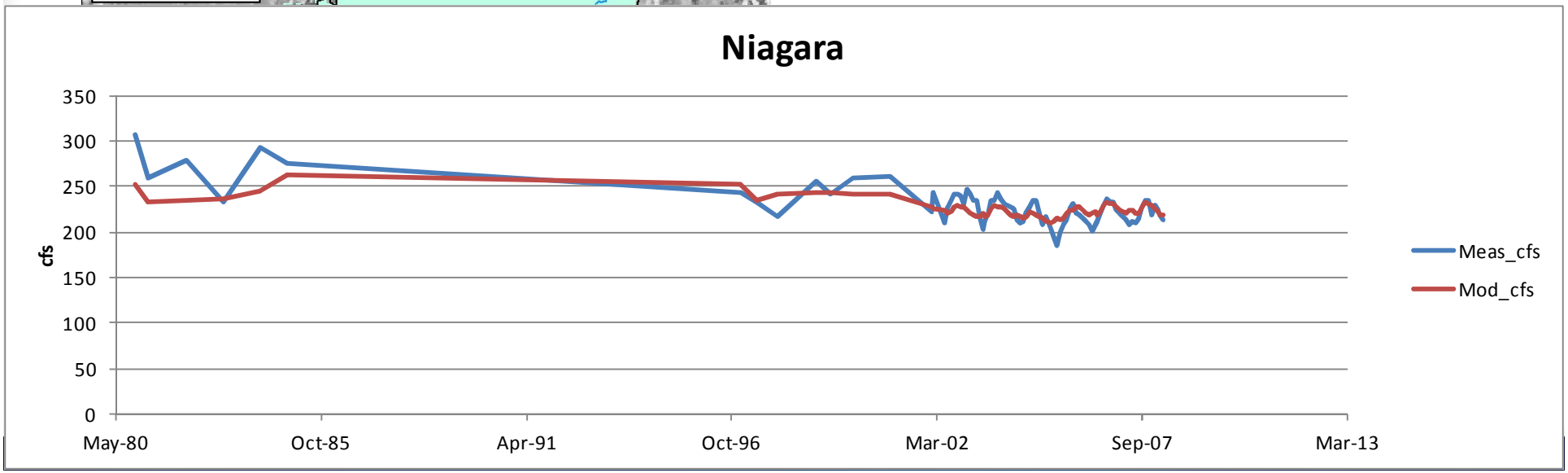


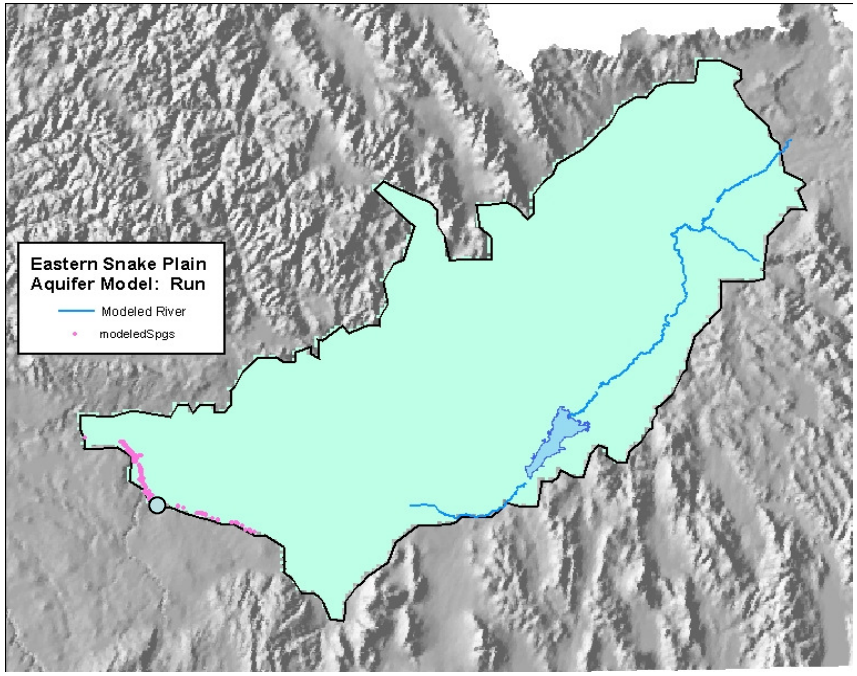

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Niagara

- Niagara

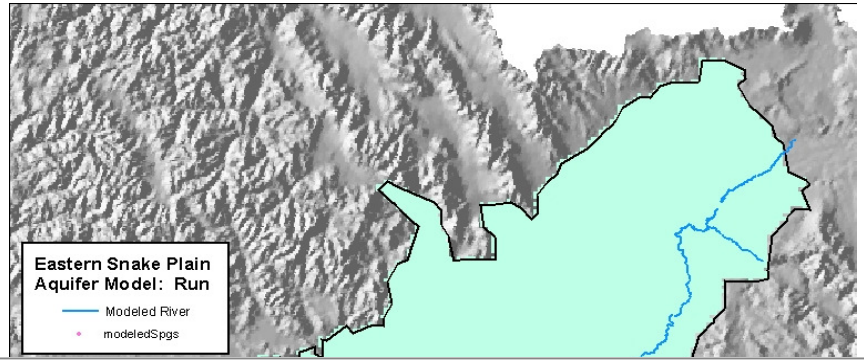

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

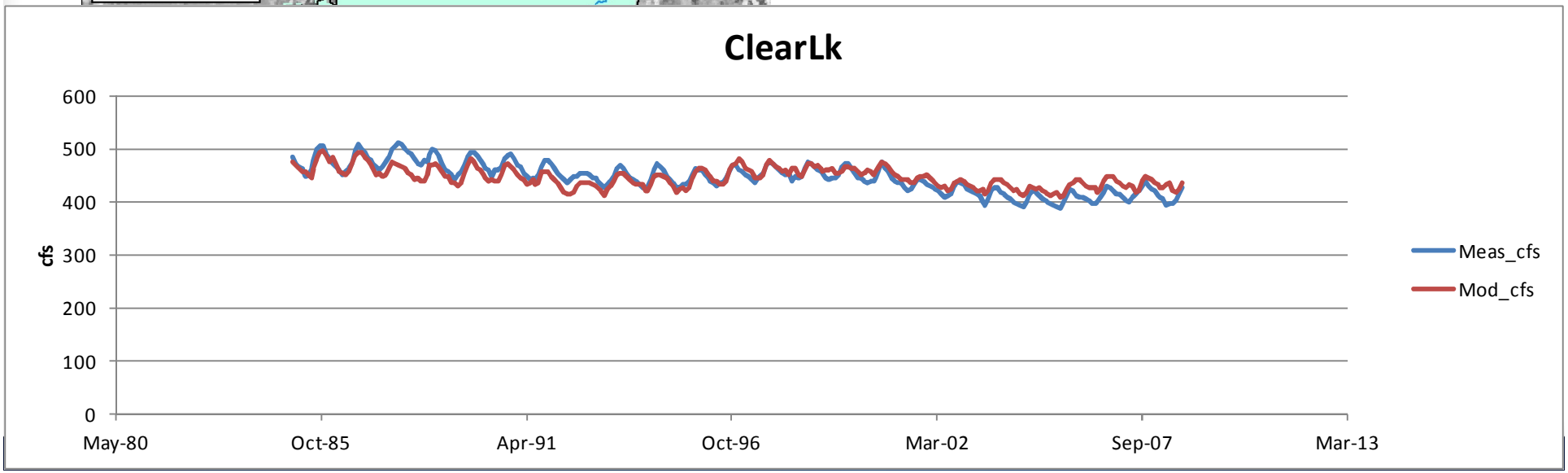

Niagara
cfs
350
300
250
200
150
100
50
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Meas_cfs
Mod_cfs


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Clear Lakes

- Clear Lakes


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs


ClearLk
600
500
400
300
200
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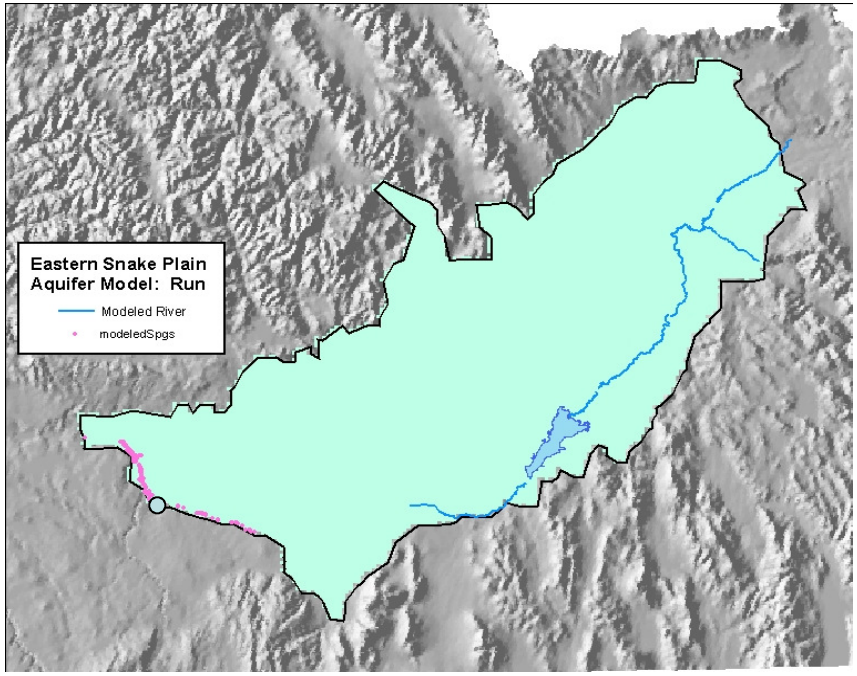
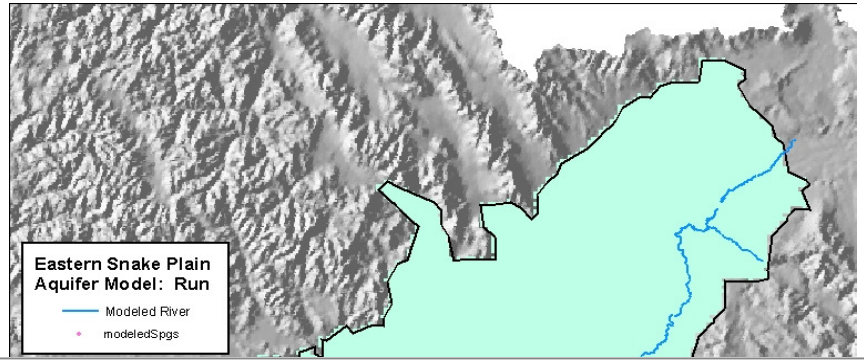
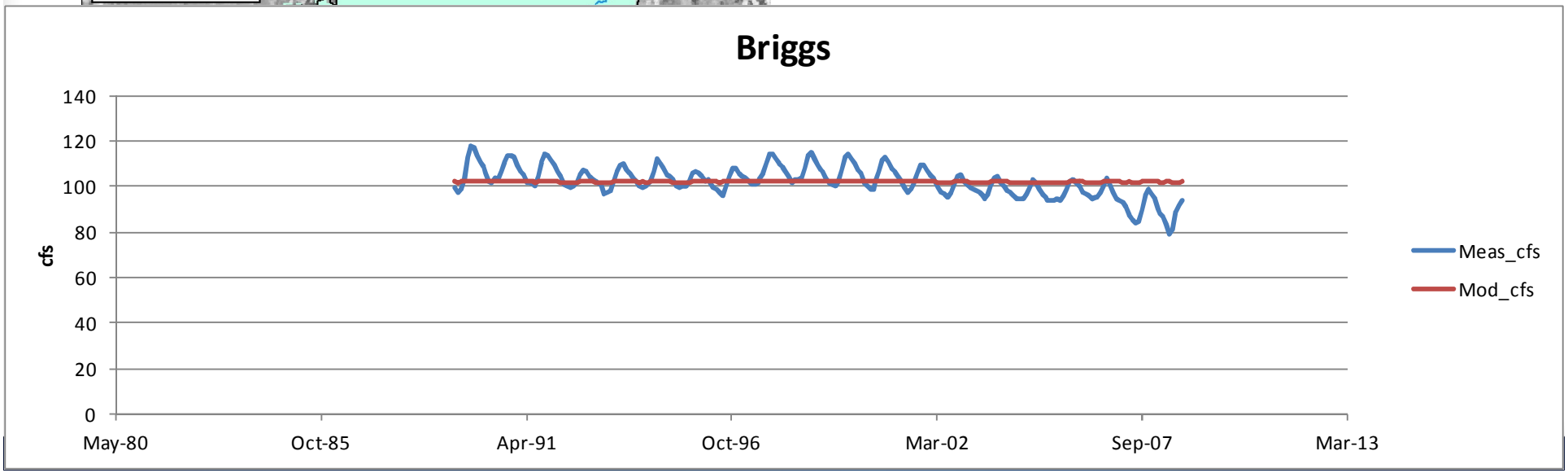
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Meas_cfs
Mod_cfs

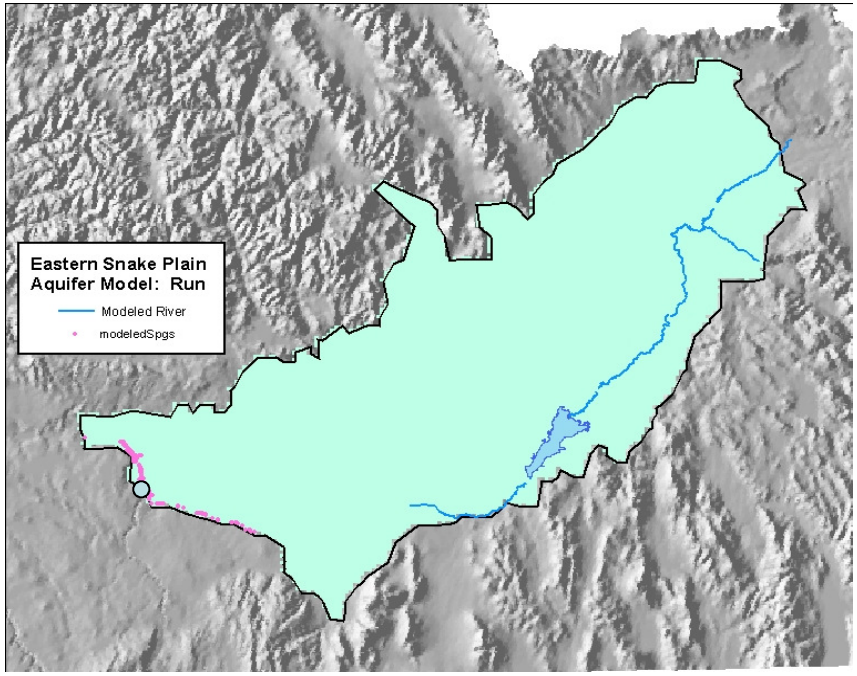


- Briggs Spring

- Briggs Spring

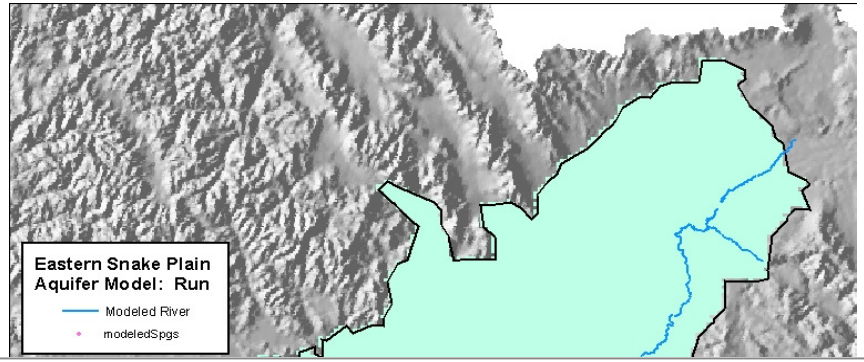


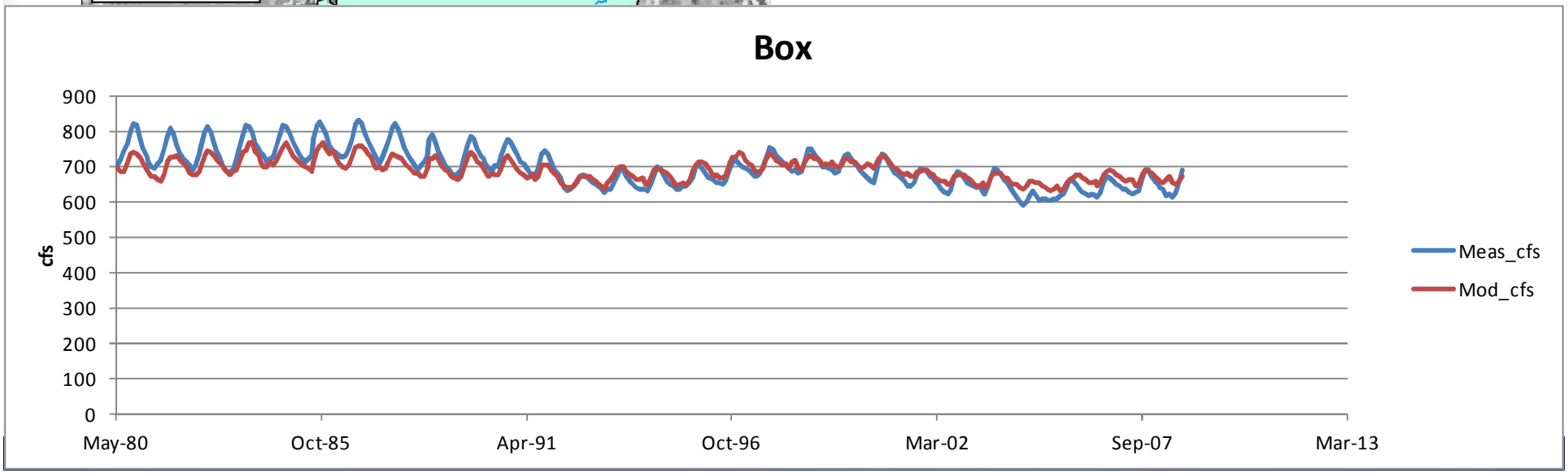


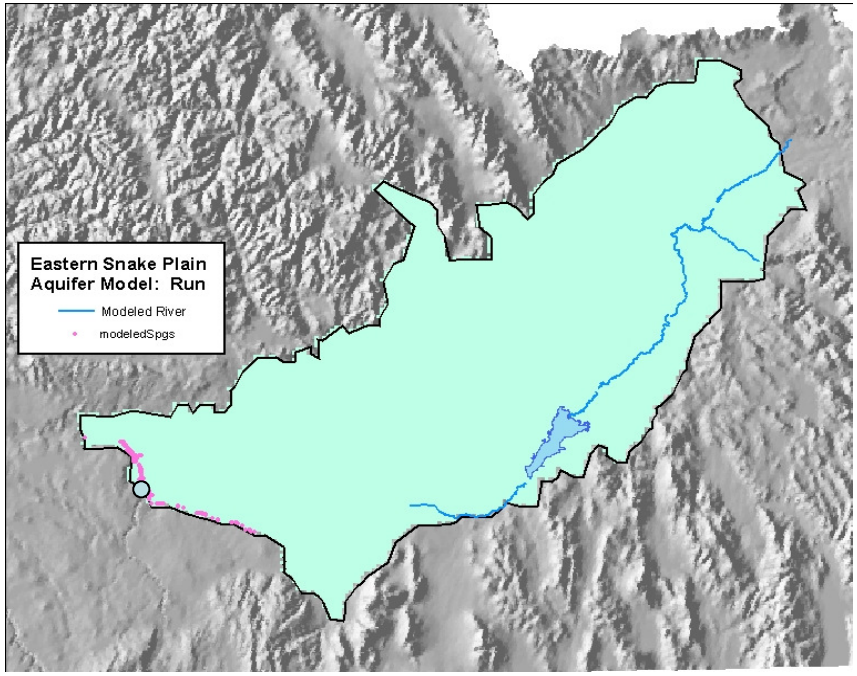


- Box Canyon Spring

- Box Canyon Spring

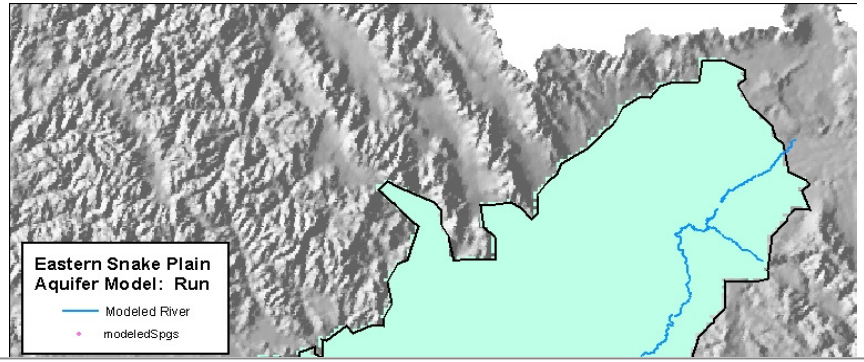


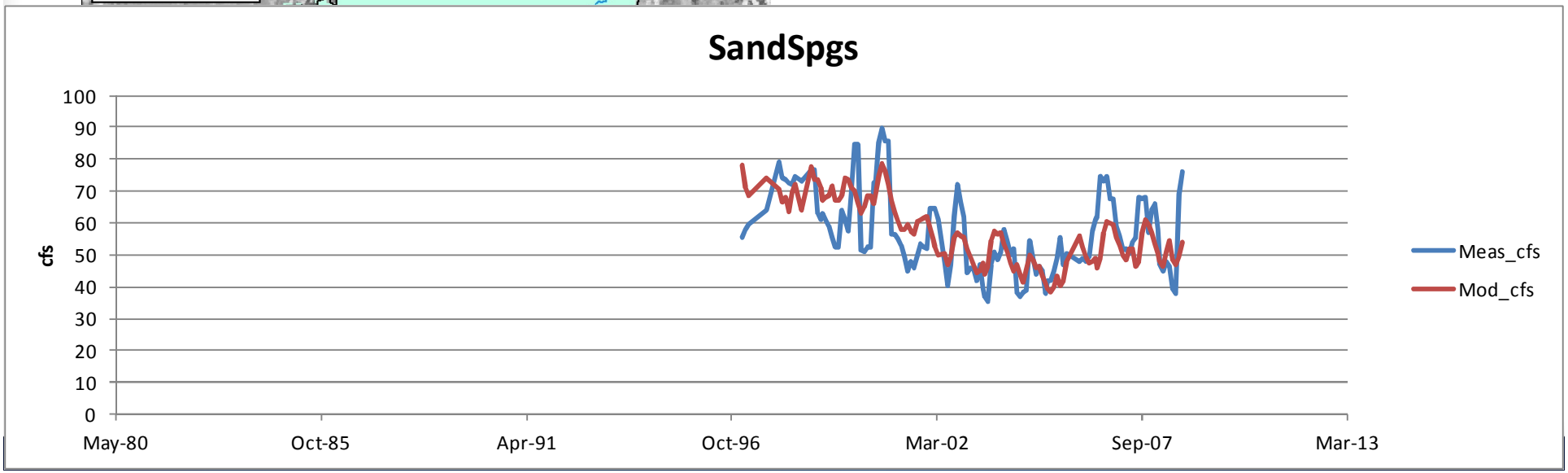


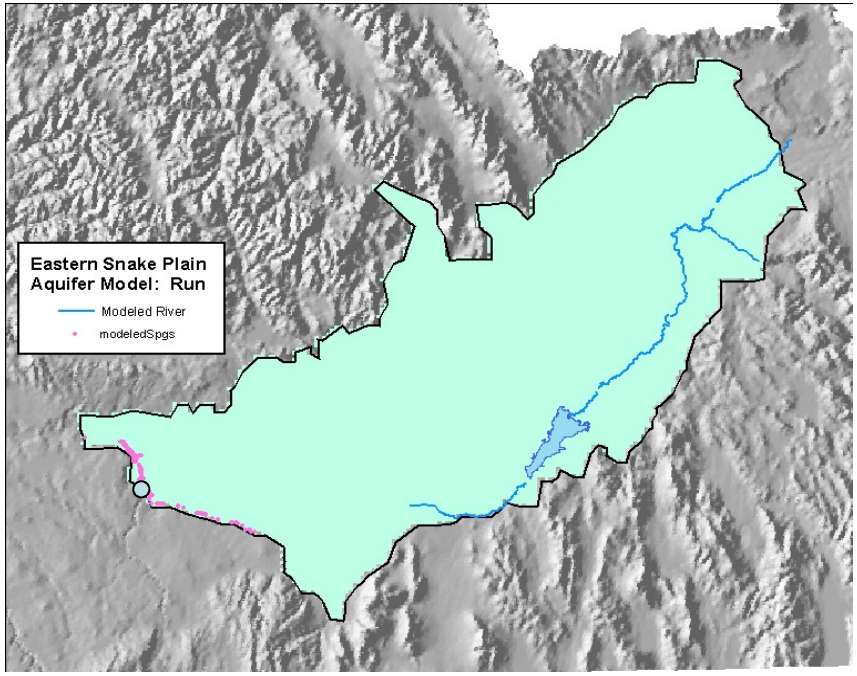


- Sand Springs

- Sand Springs

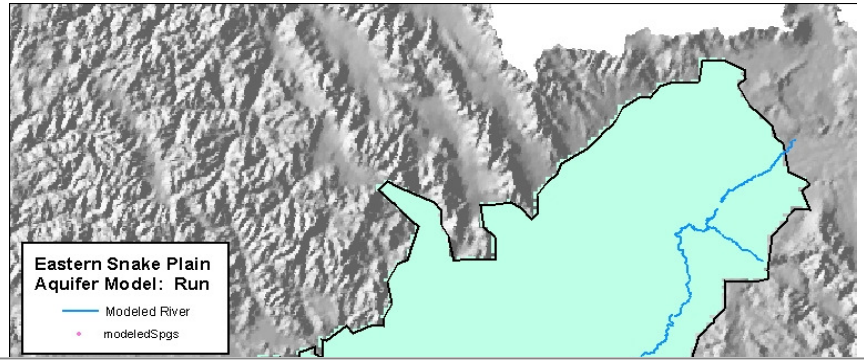


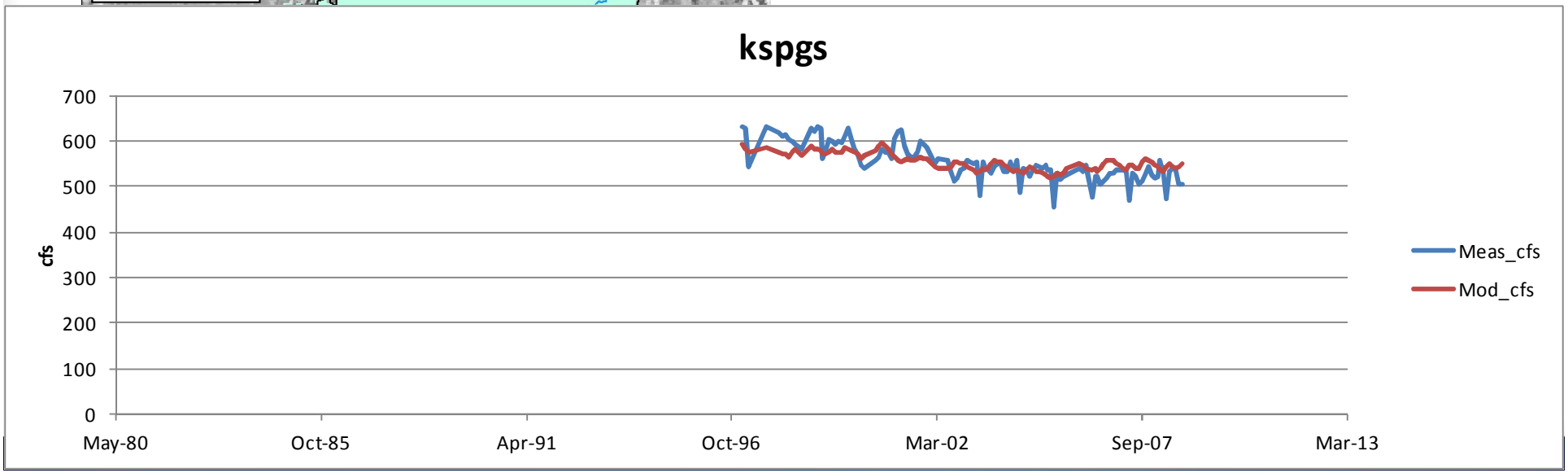


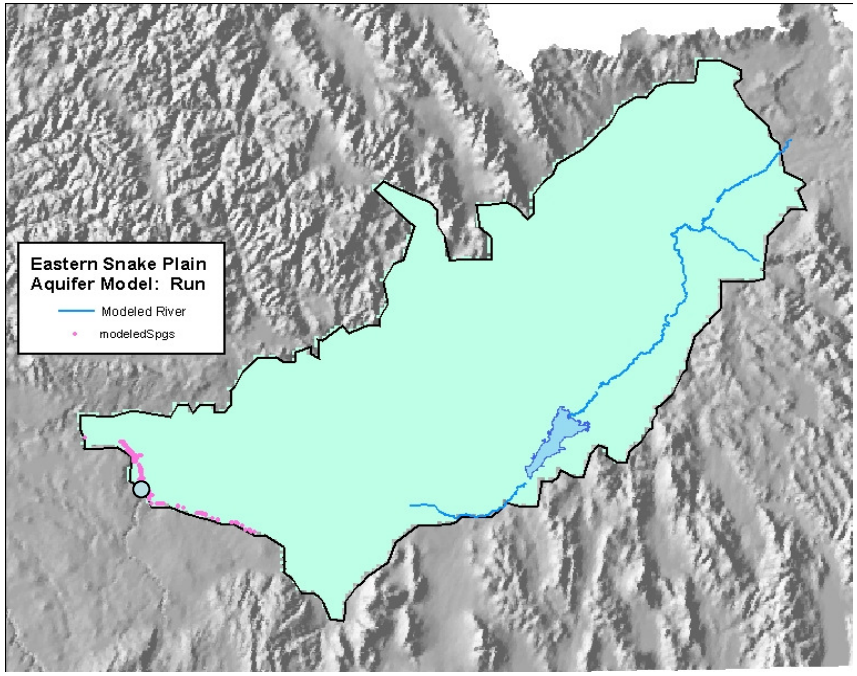


- Thousand Springs

- Thousand Springs

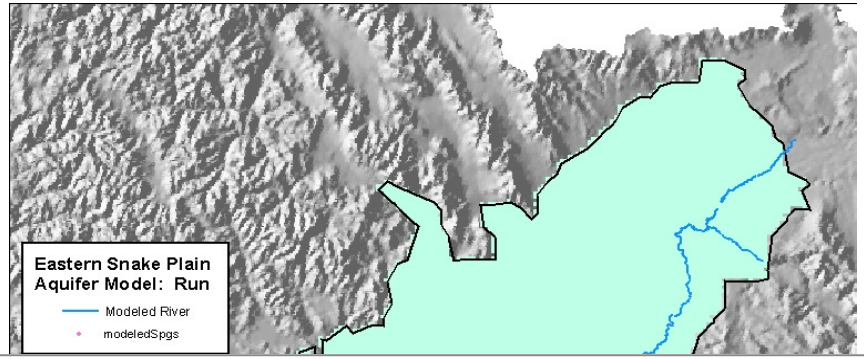


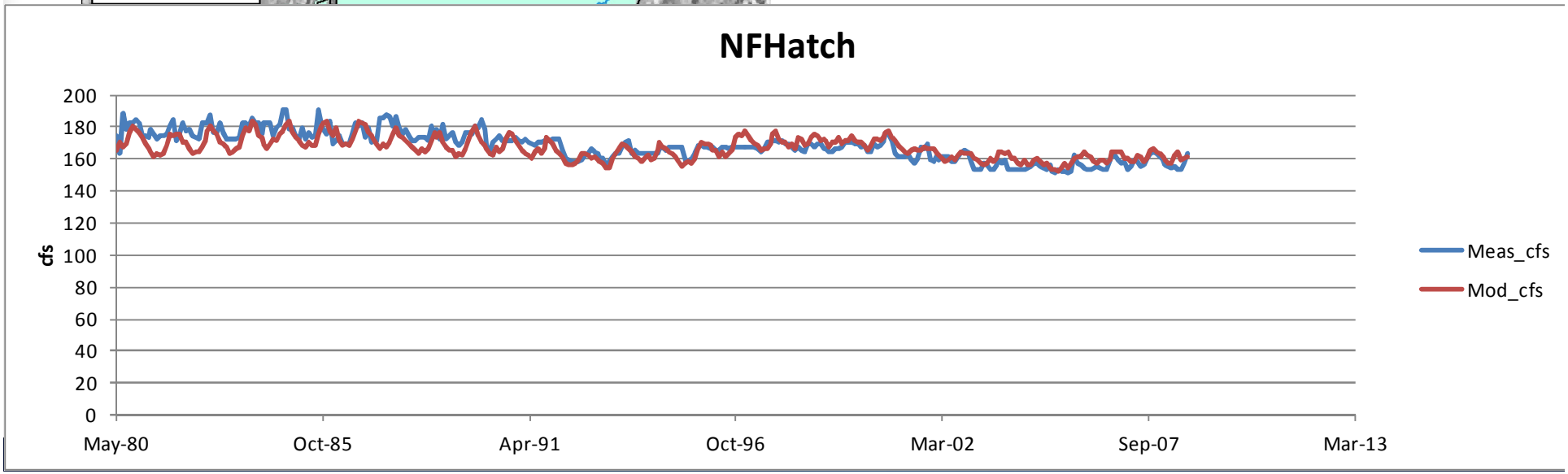


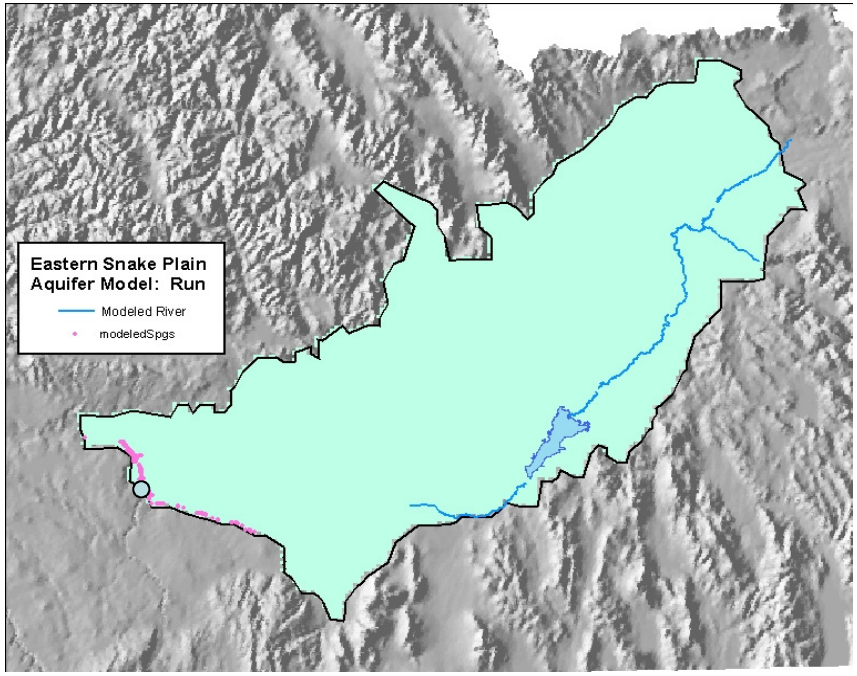


- Ntl Fish Hatchery

- Ntl Fish Hatchery

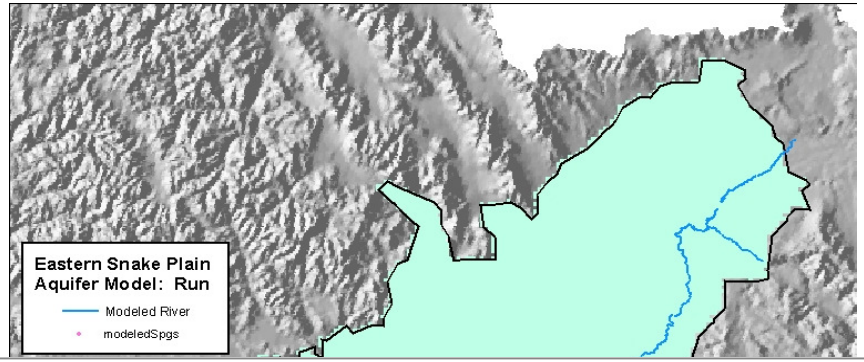


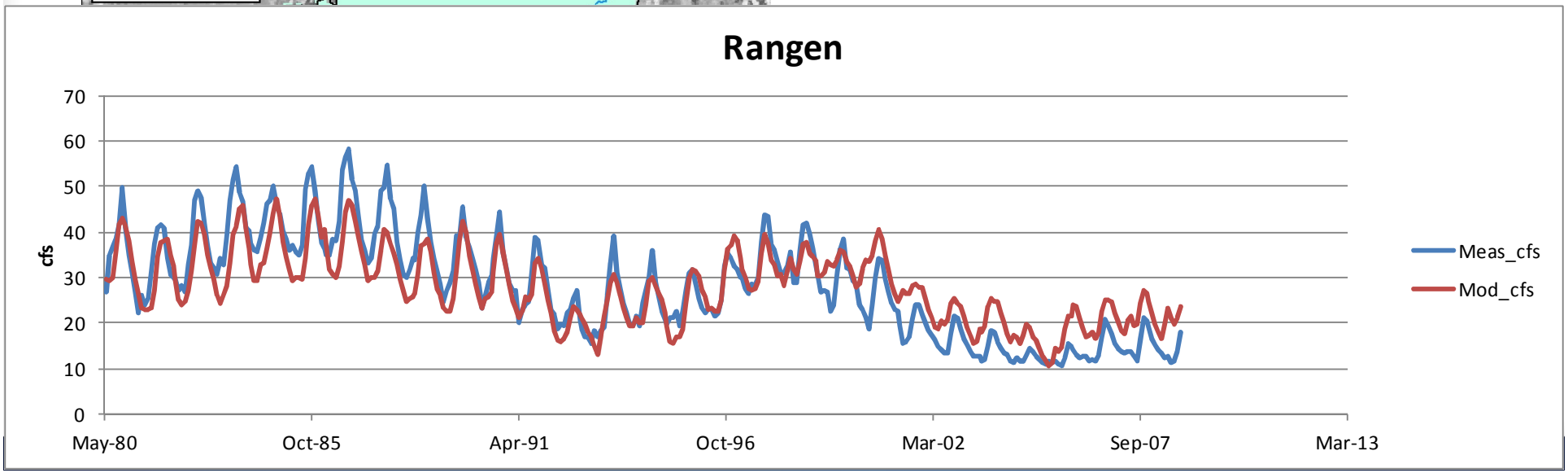


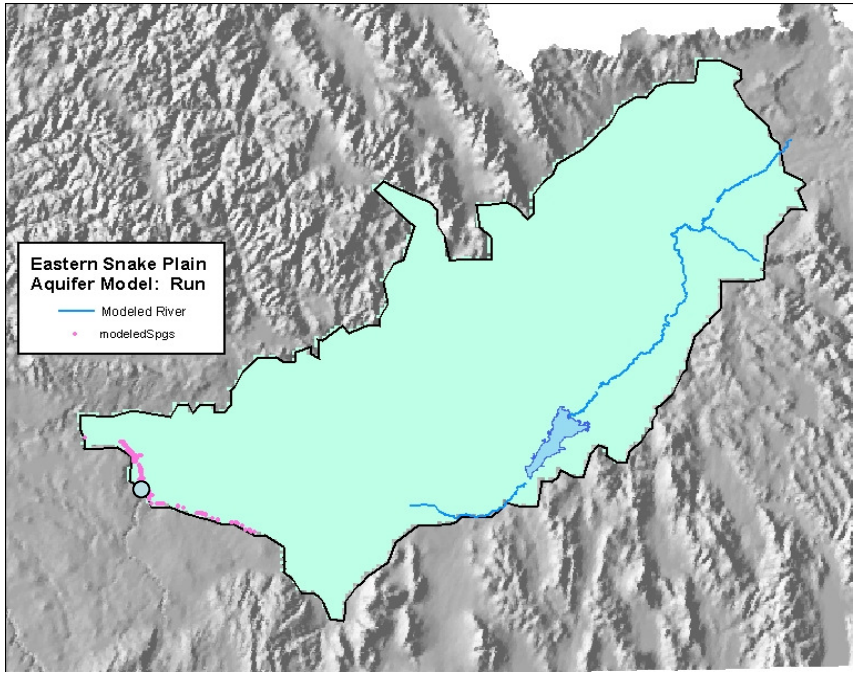


- Rangen Spring

- Rangen Spring

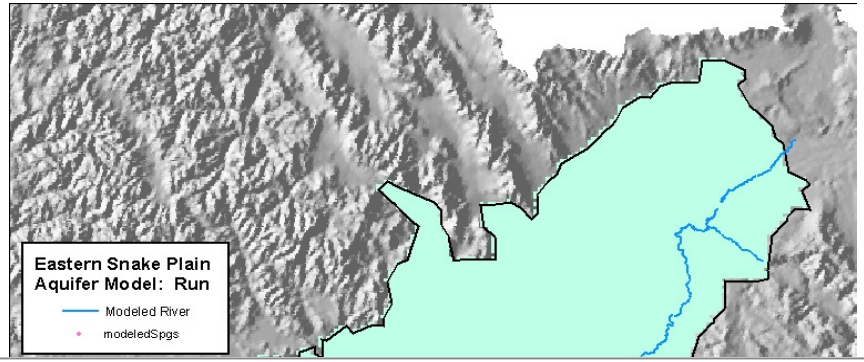


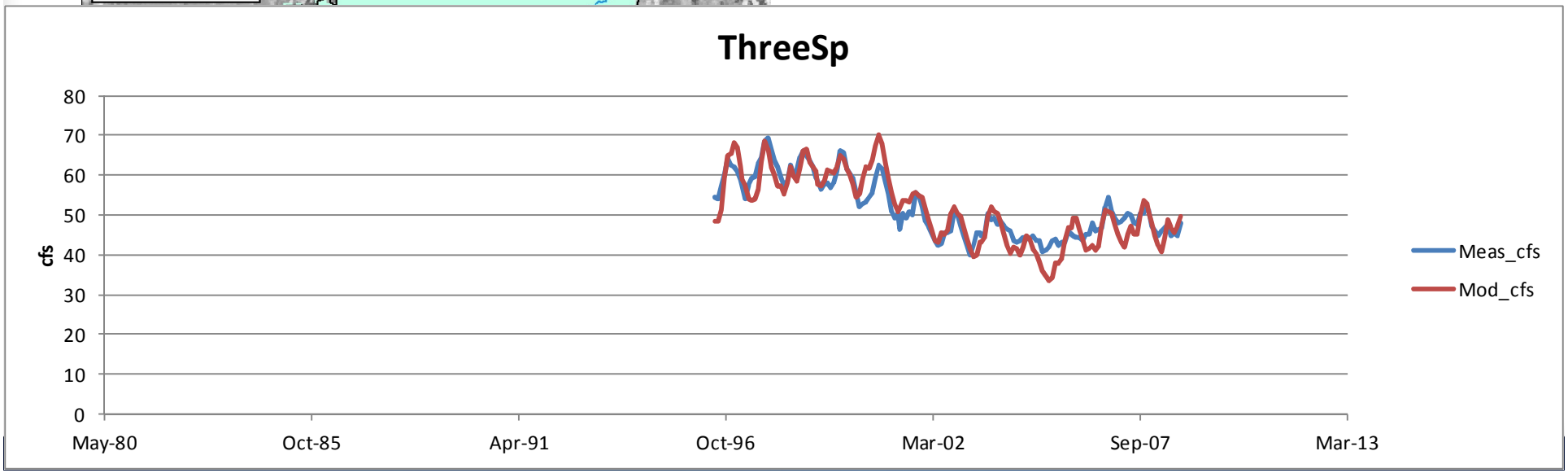


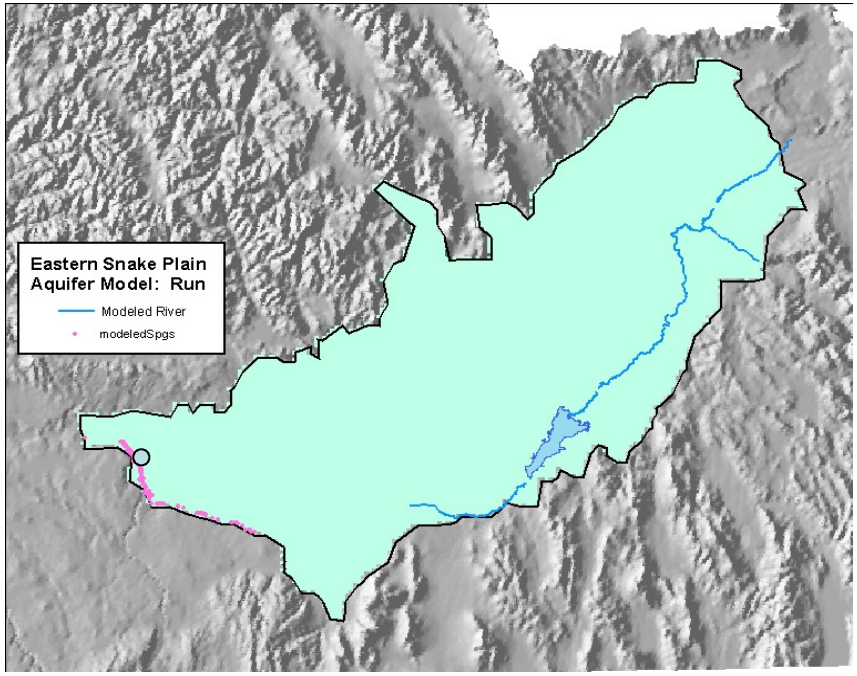


- Three Springs

- Three Springs

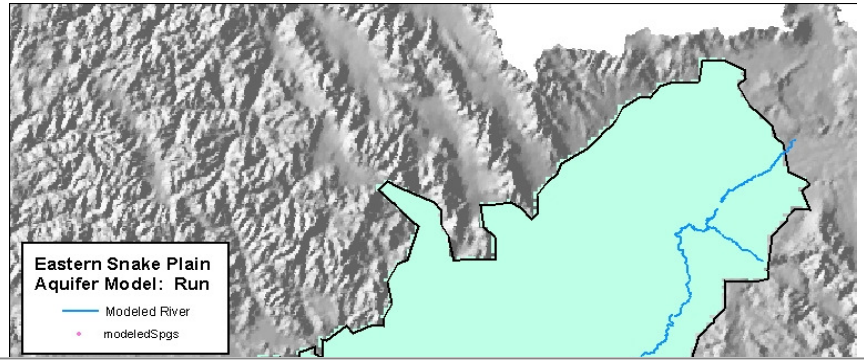


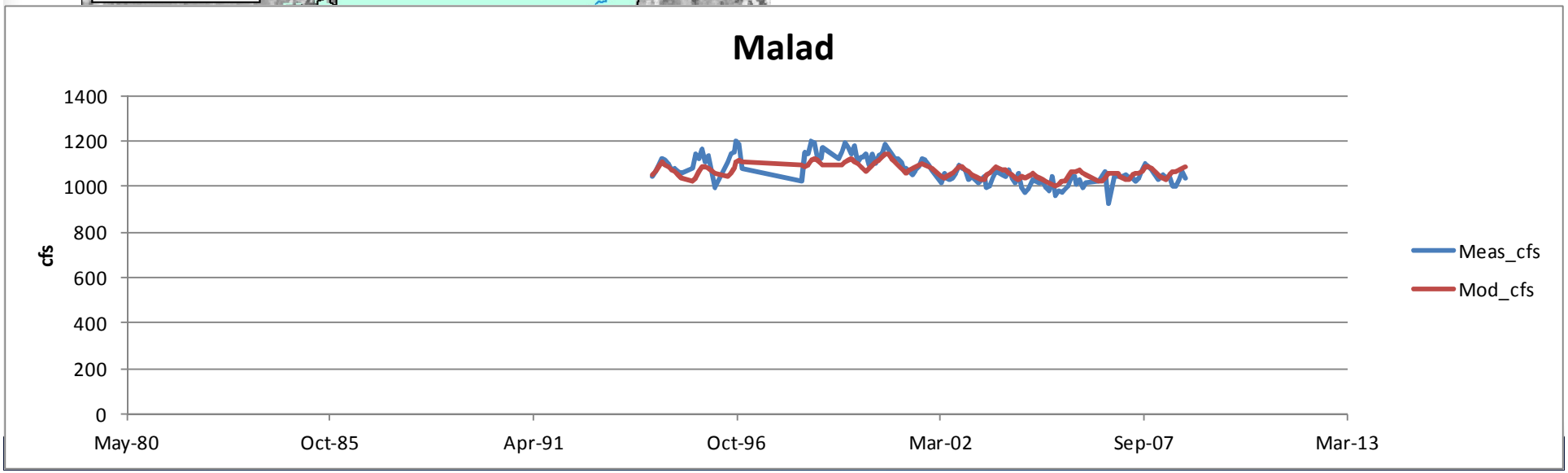



Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Malad

- Malad


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs


Malad
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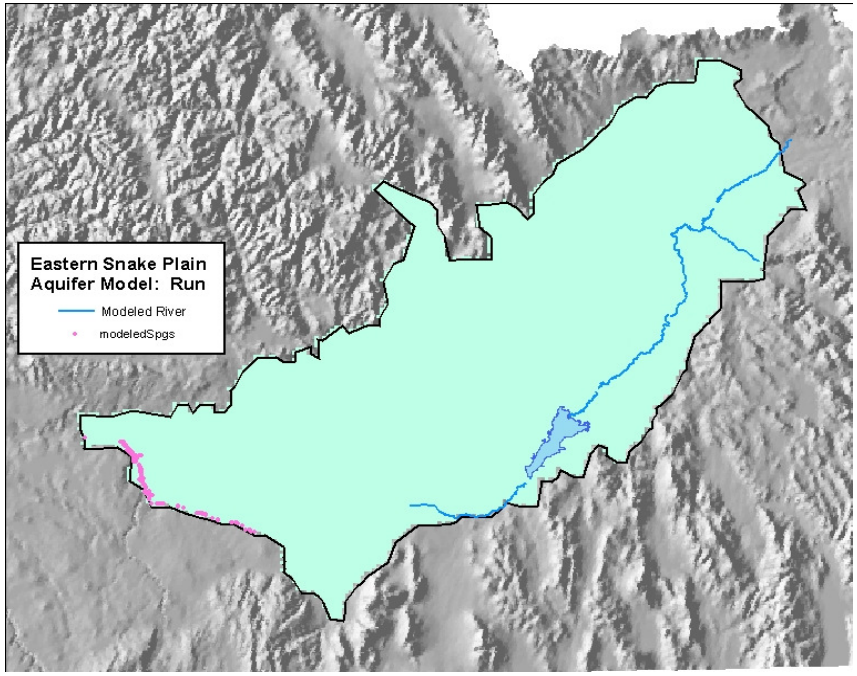
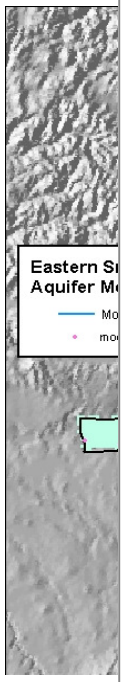


- Group C Springs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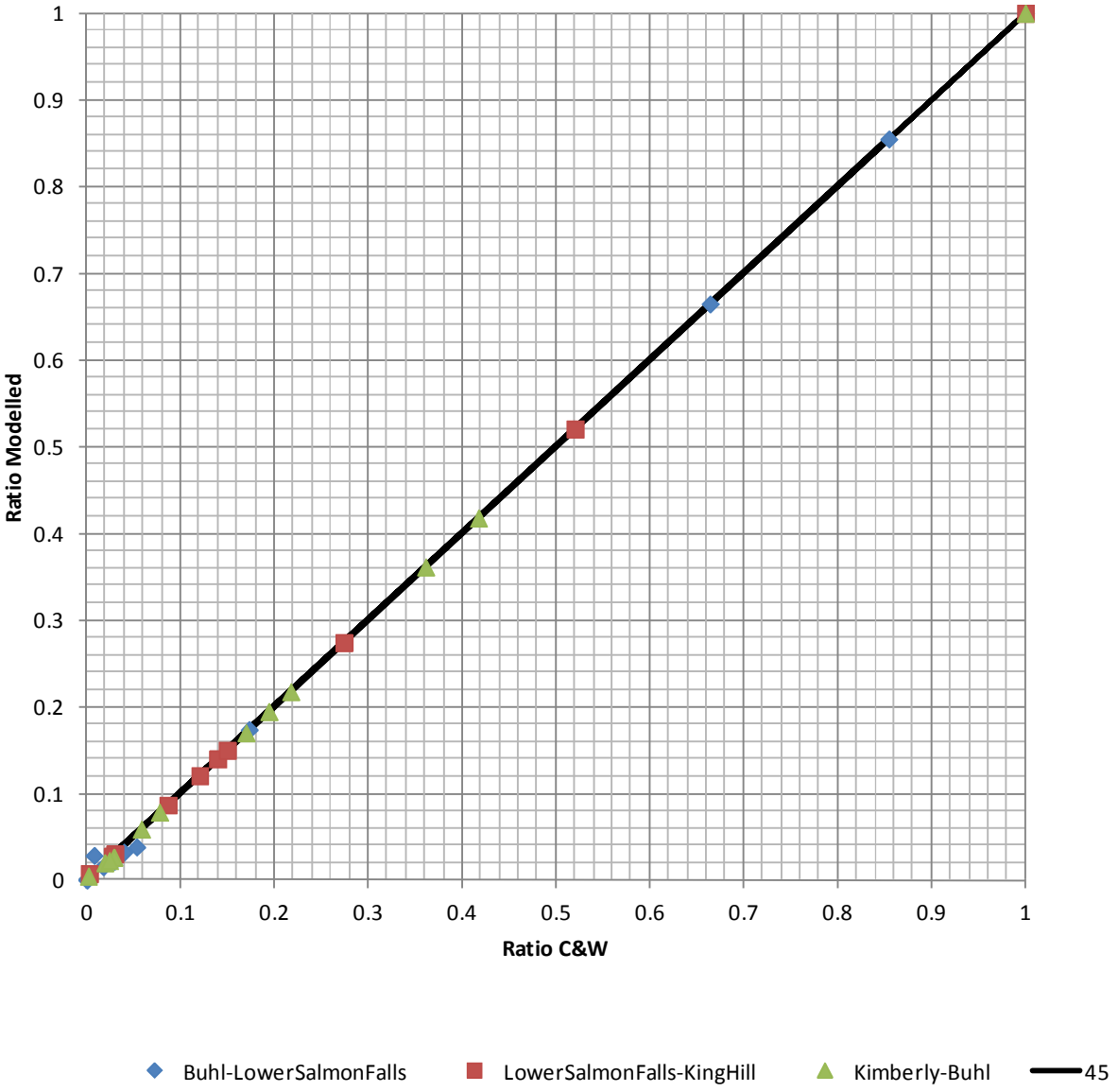
Aquifer M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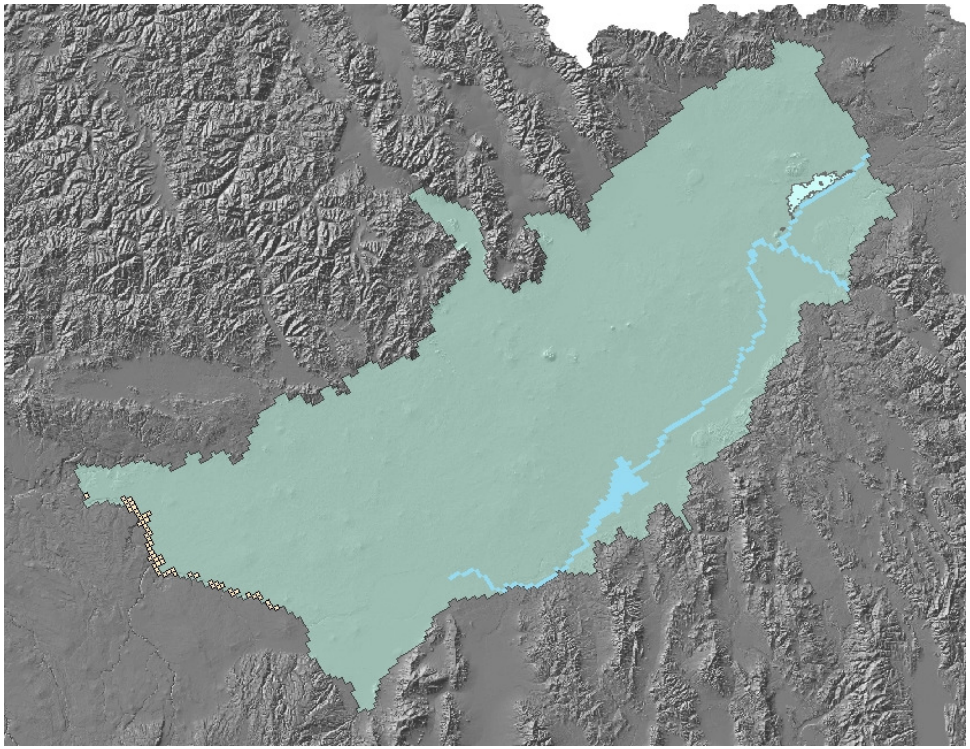
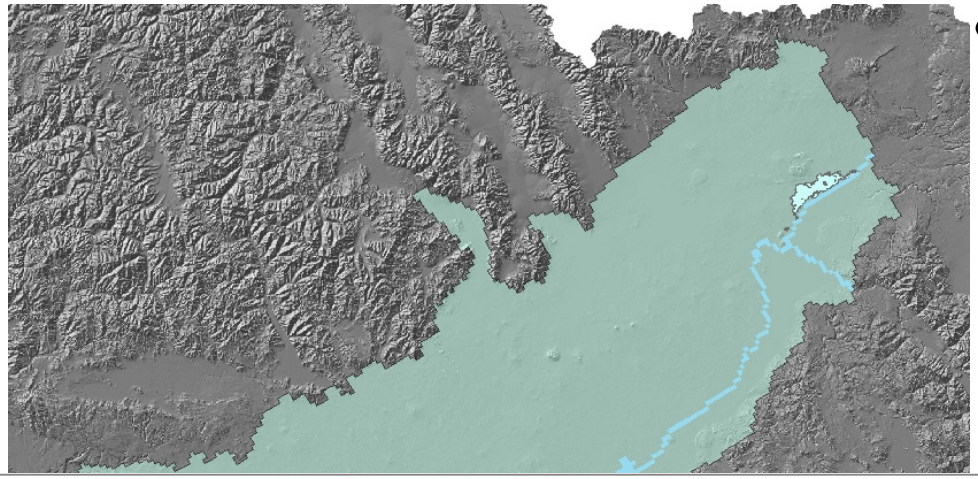
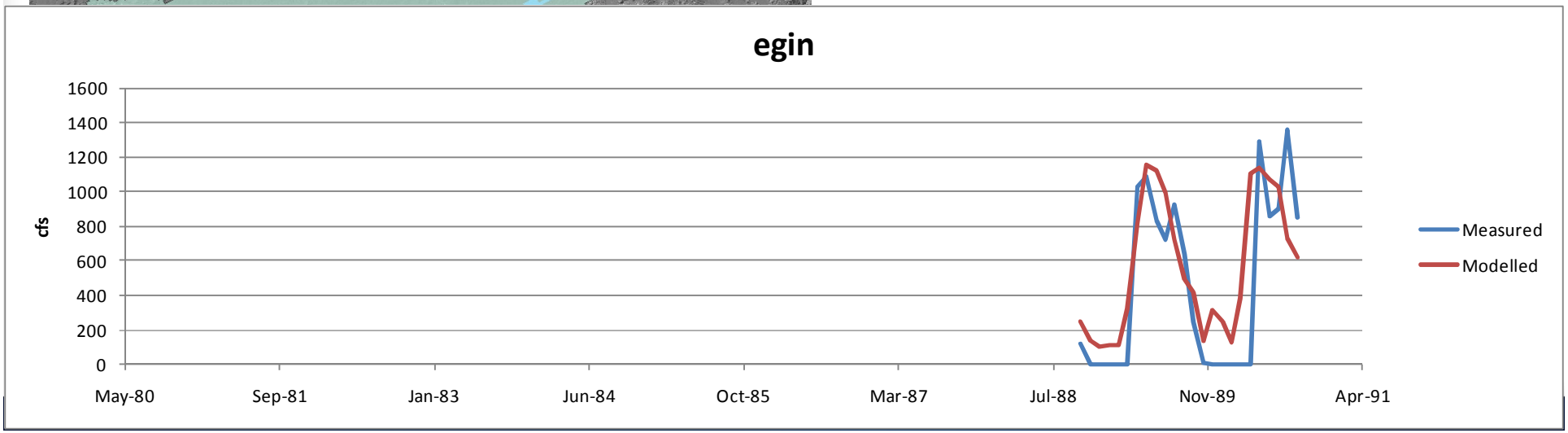
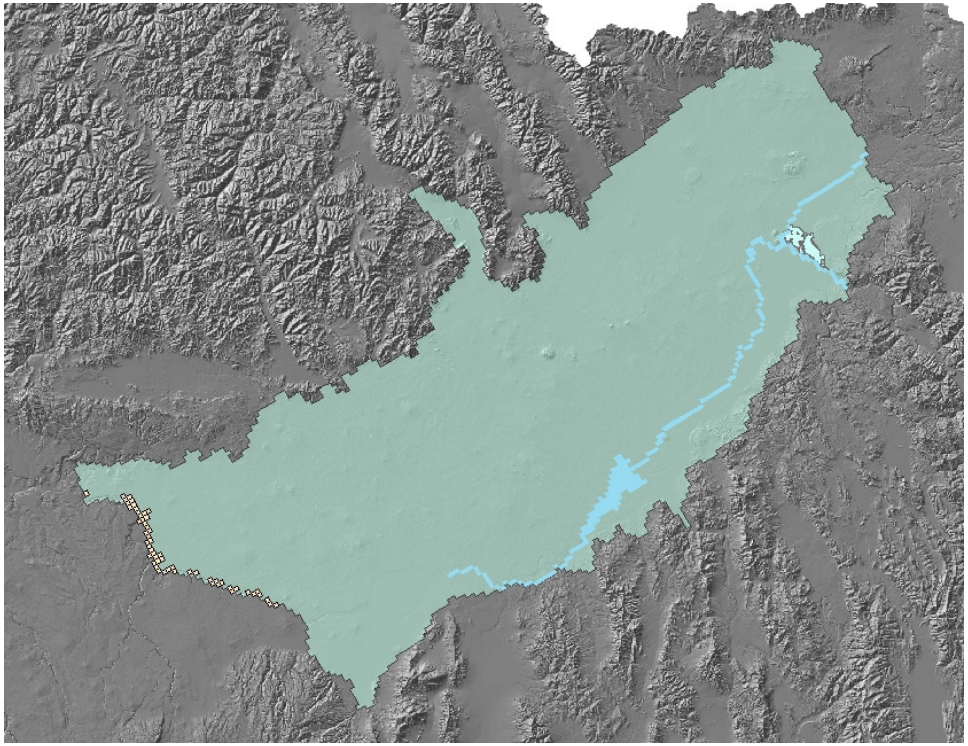


- Egin returns

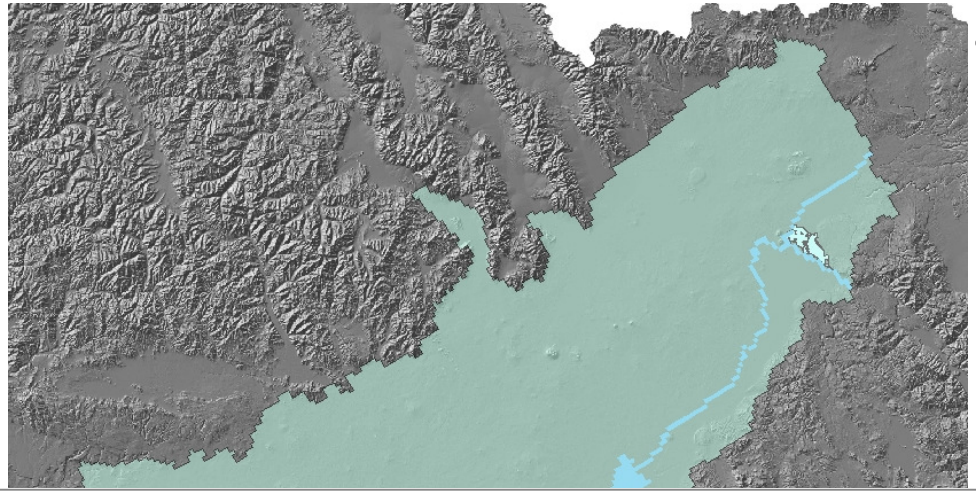


- Egin returns

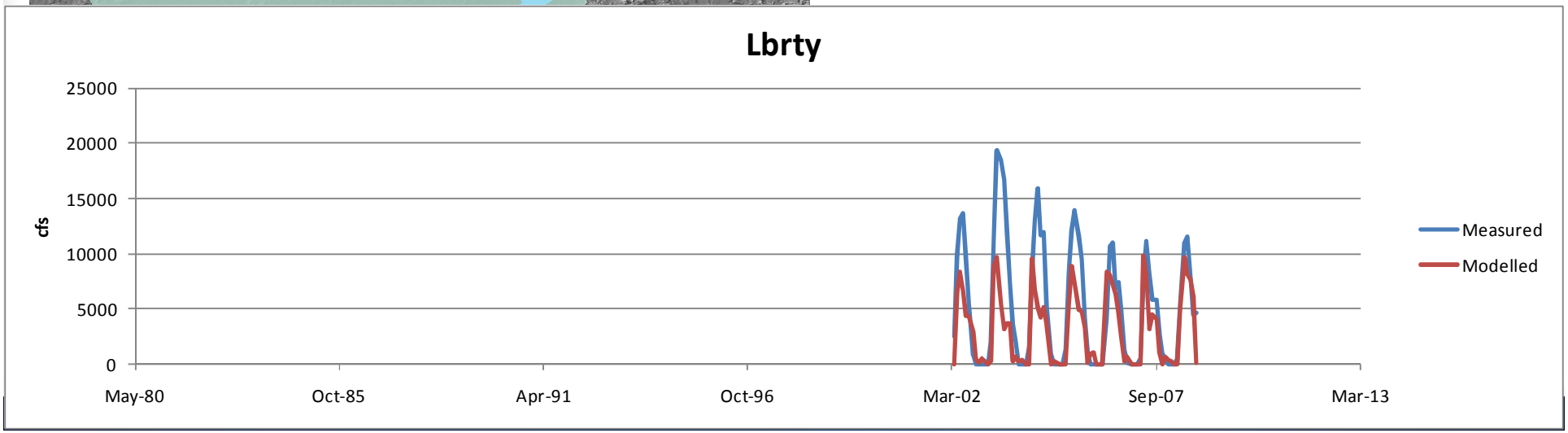


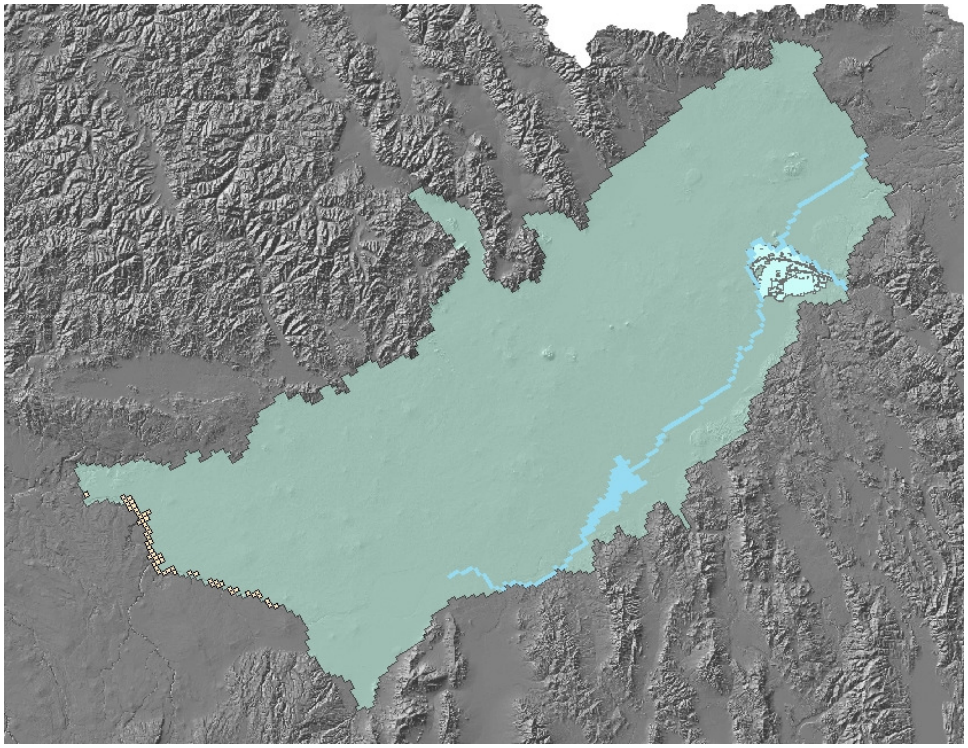


- Liberty returns

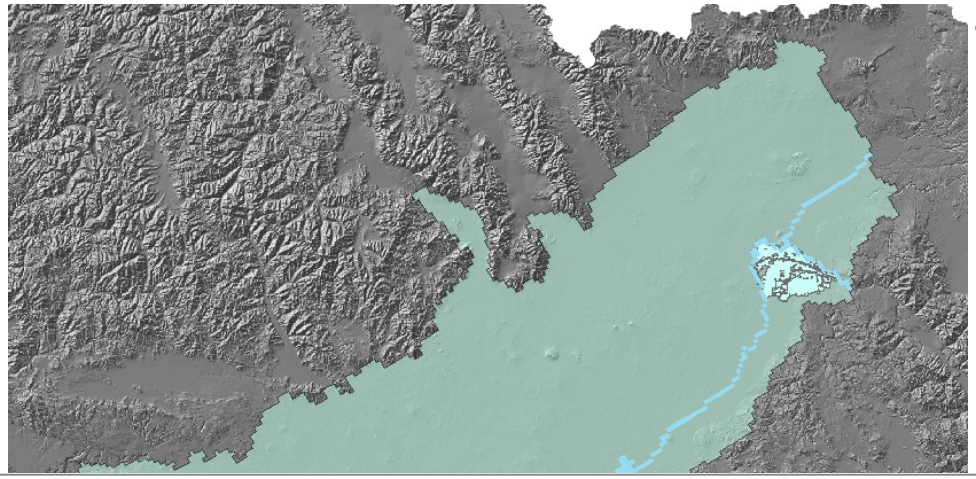


- Liberty returns

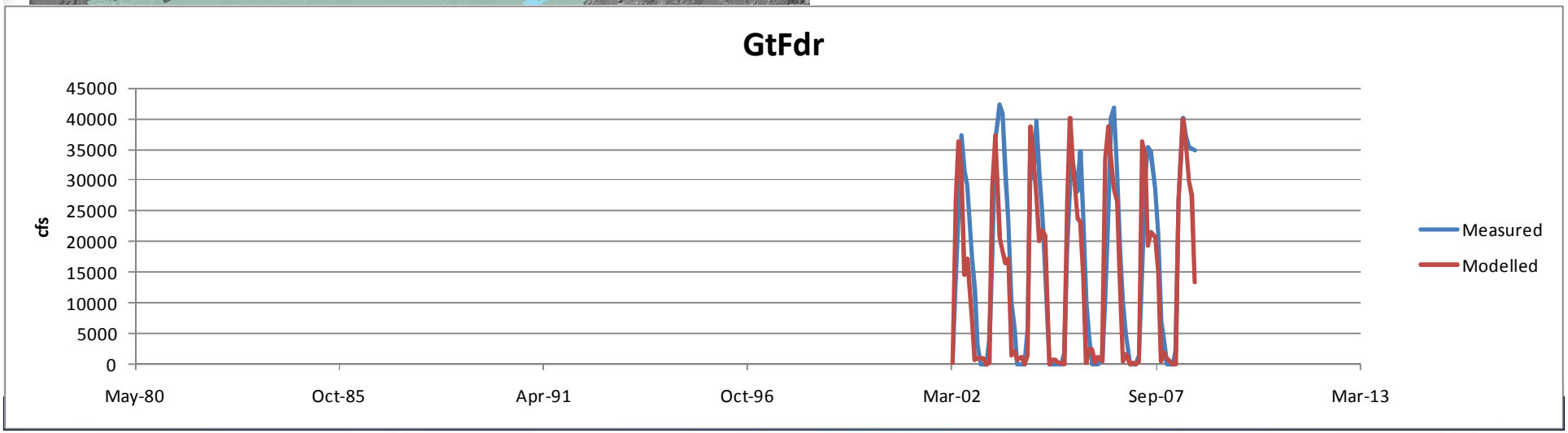


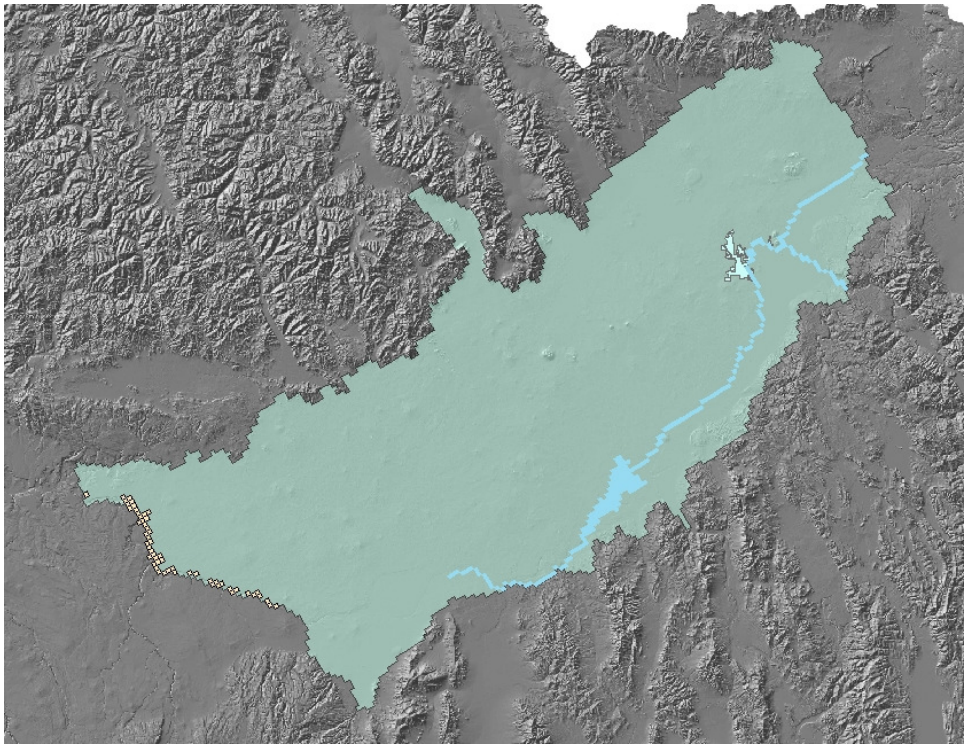


- Great Feeder Group returns

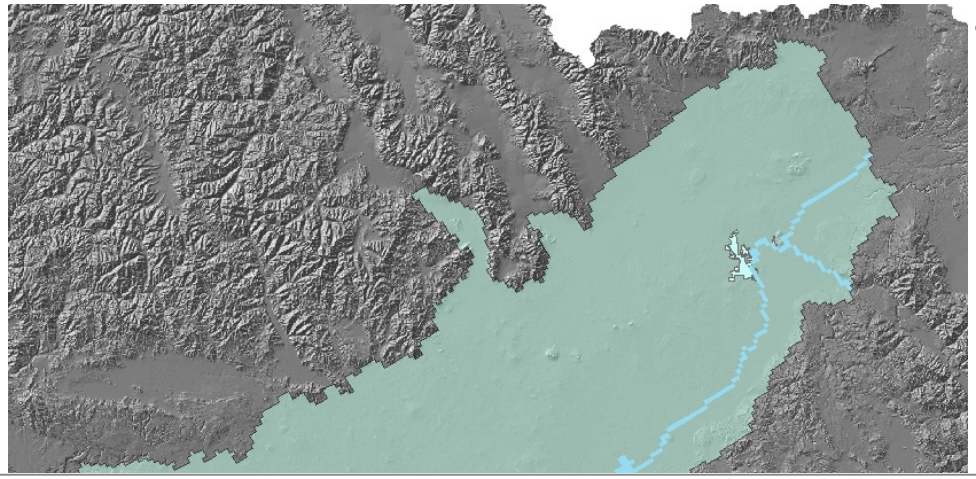


- Great Feeder Group returns

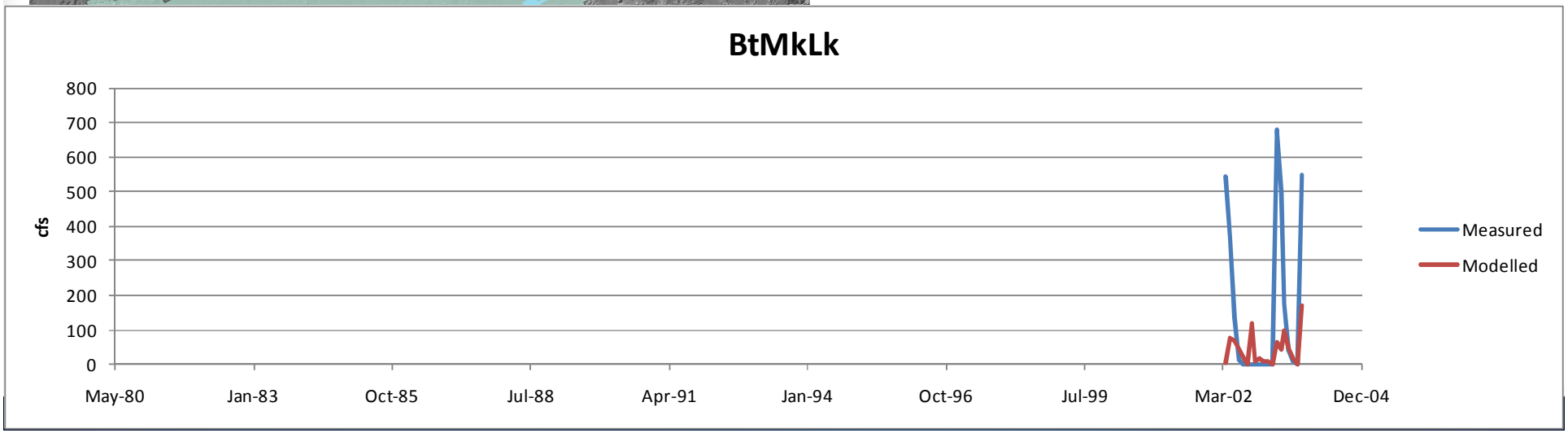


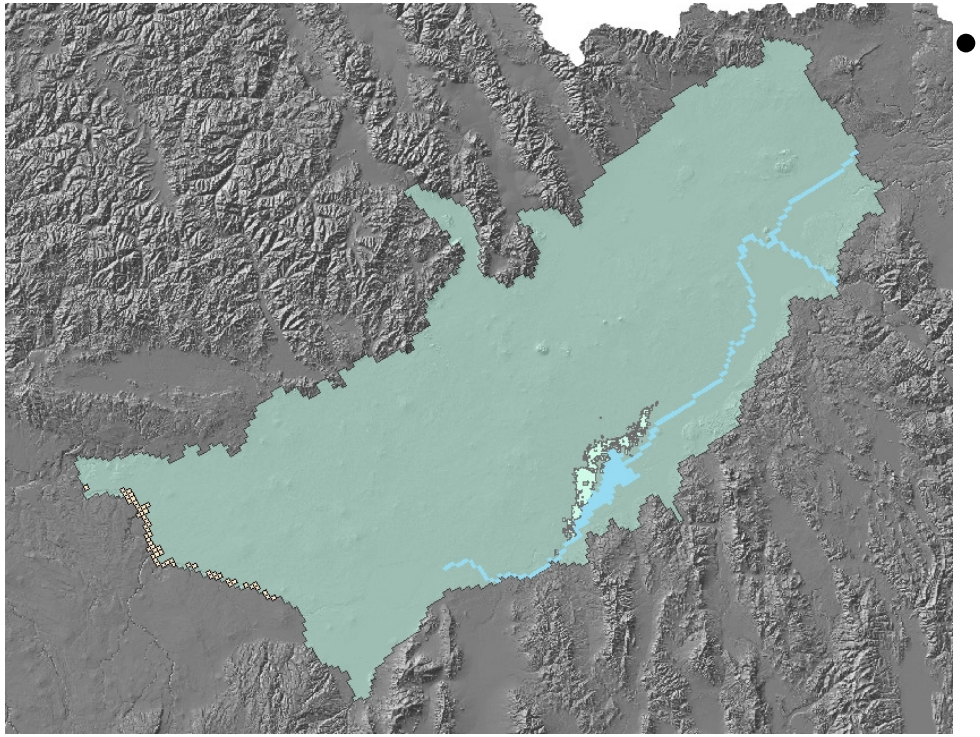


- Butte-Market Lake returns

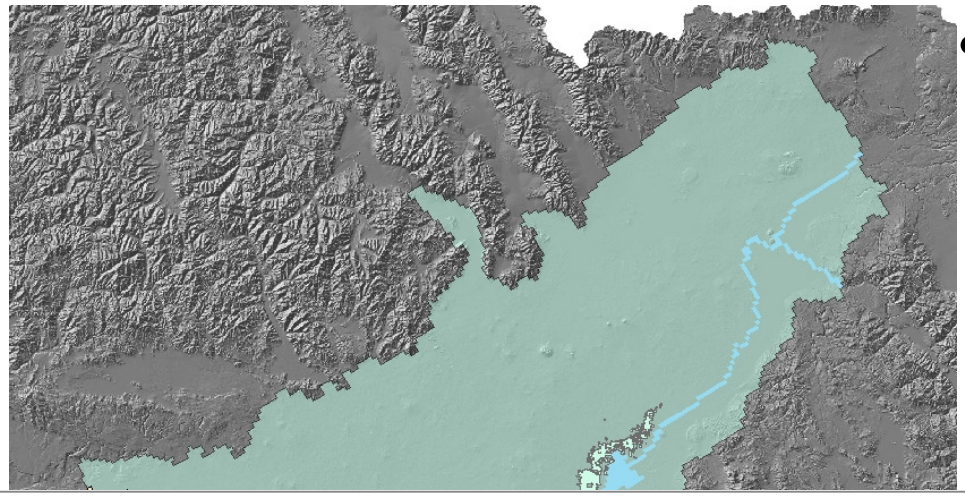


- Butte-Market Lake returns

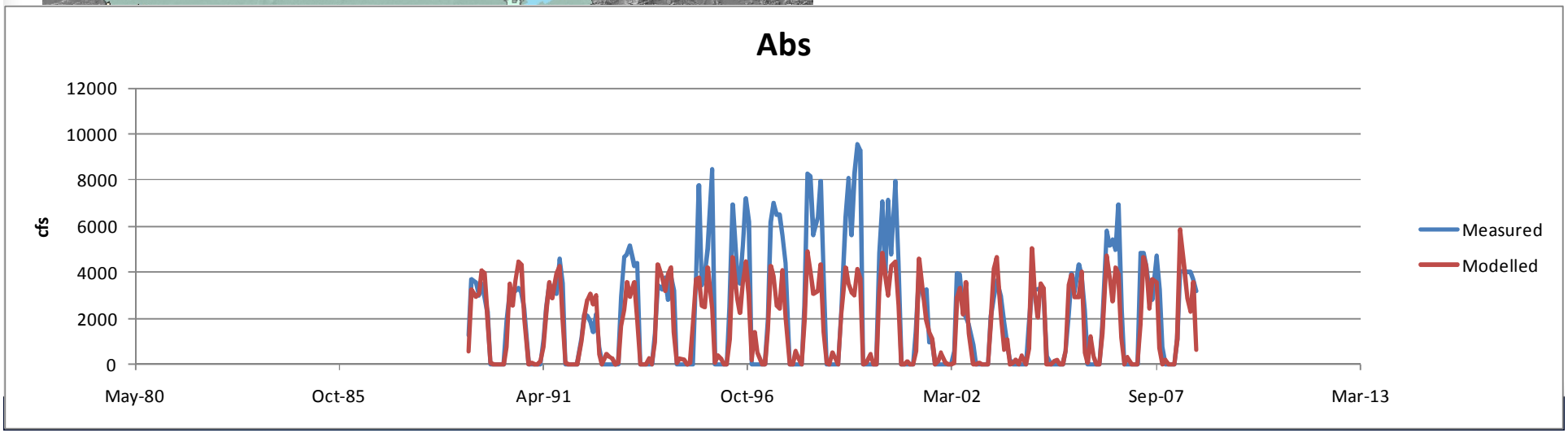


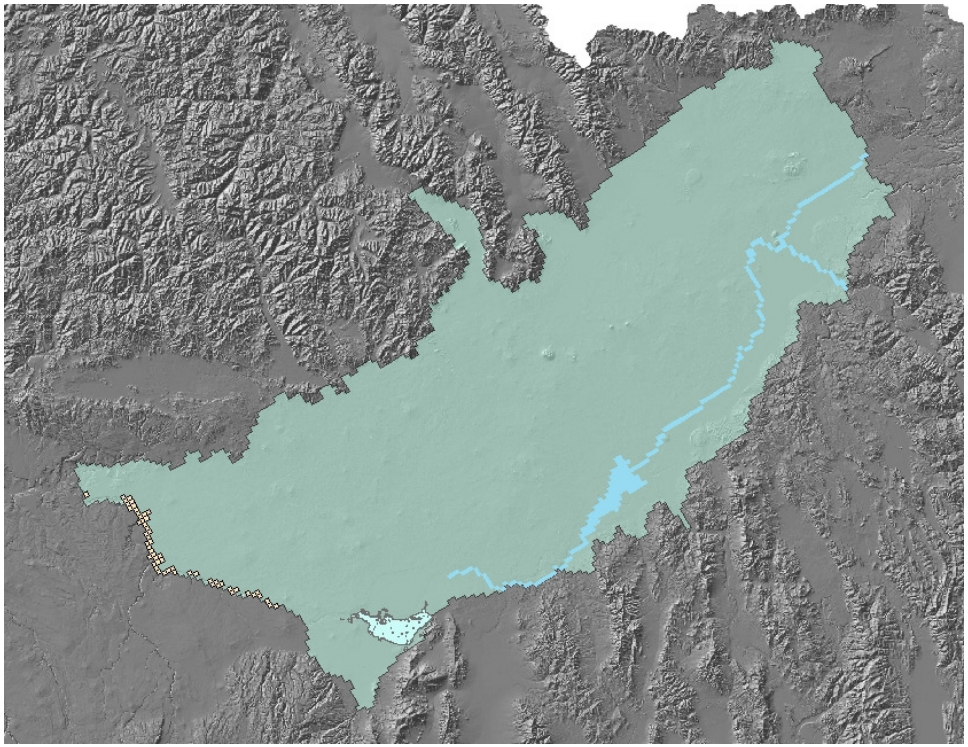


- Aberdeen-Springfield returns

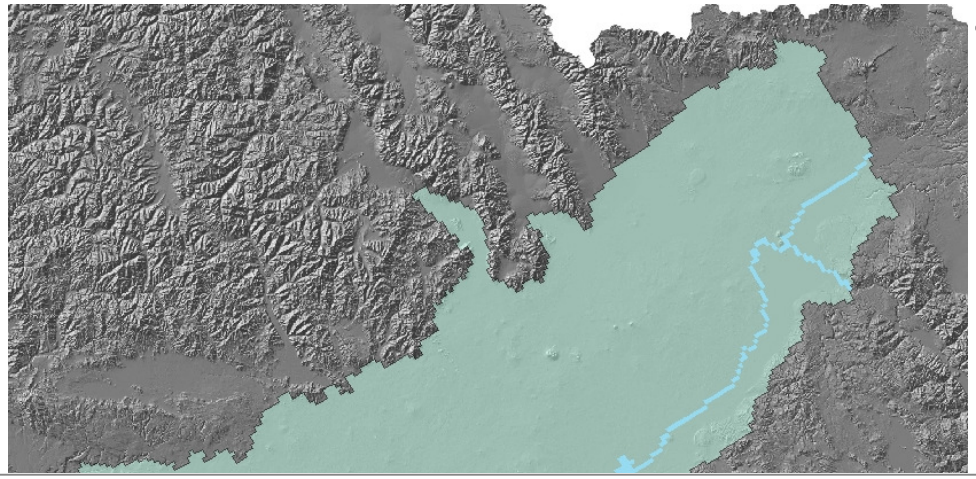


- Aberdeen-Springfield returns

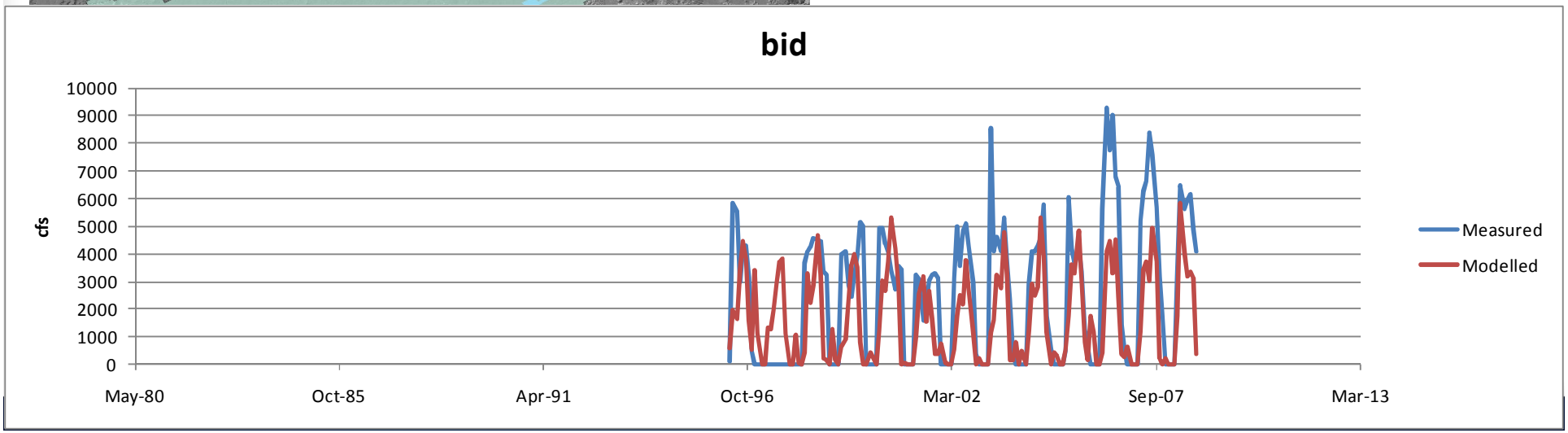


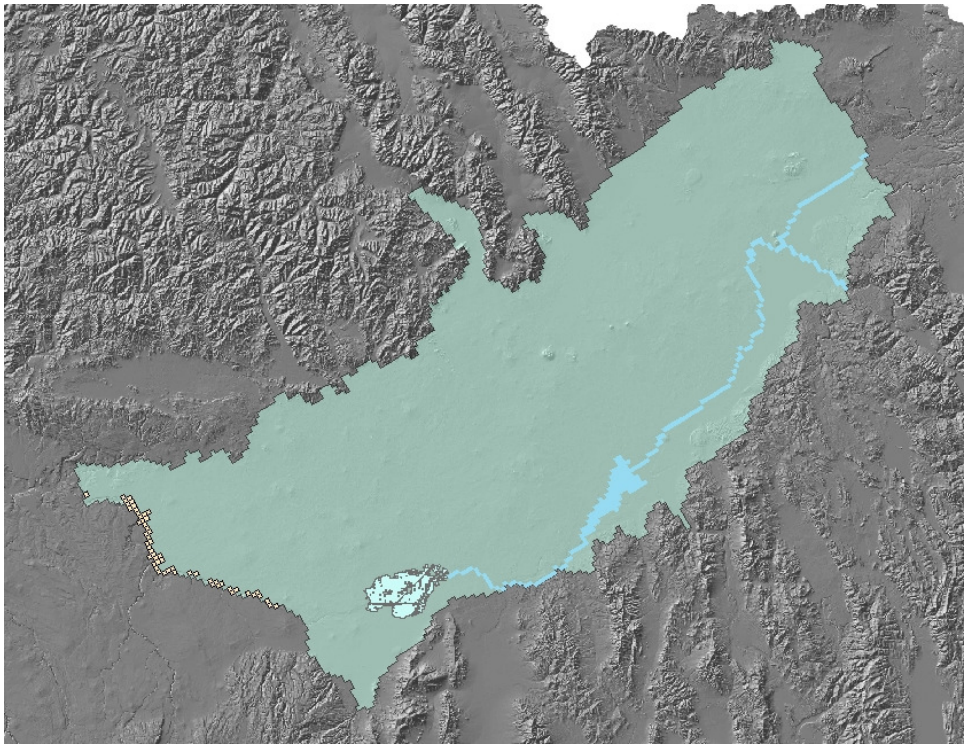


- Burley Irrigation District returns

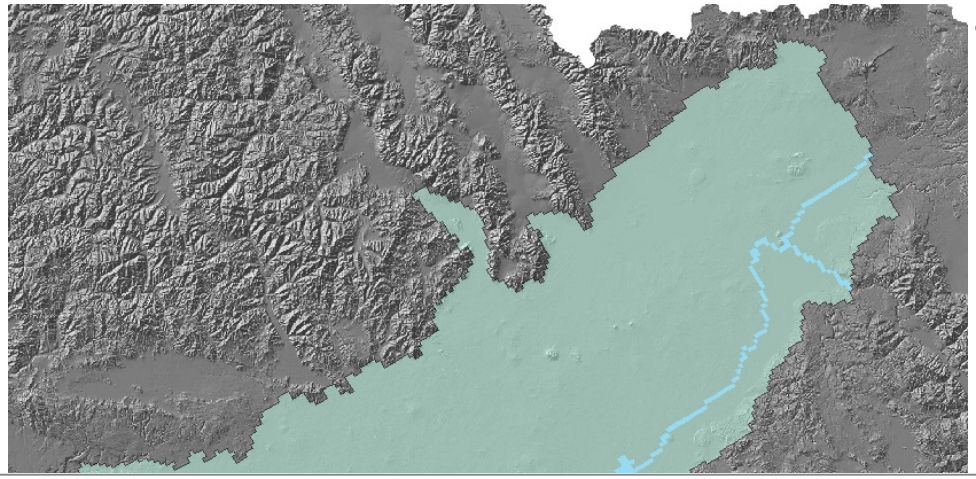


- Burley Irrigation District returns

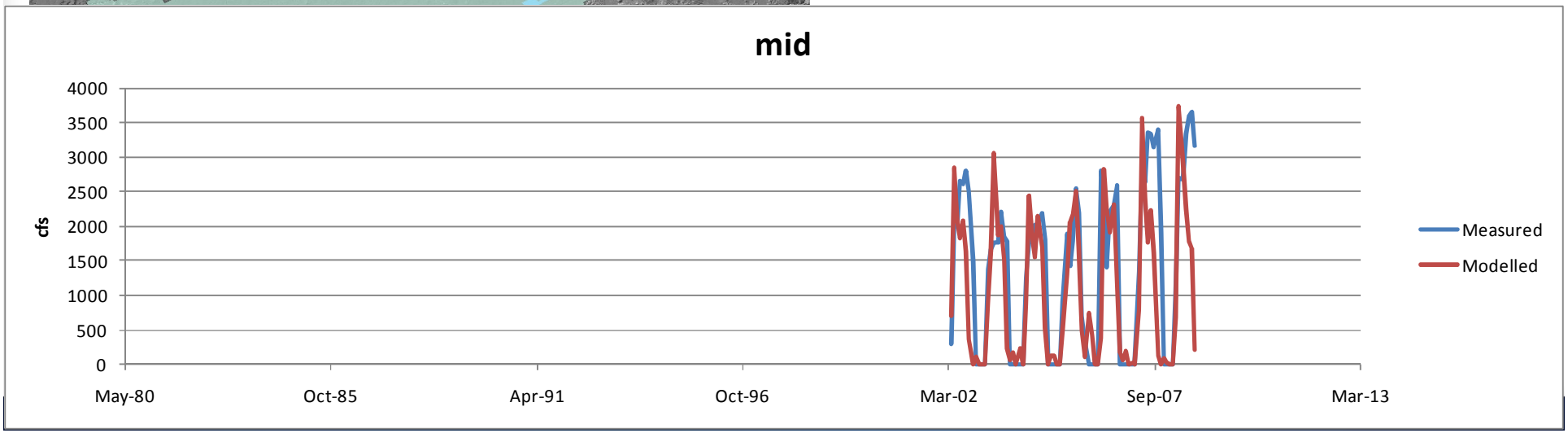


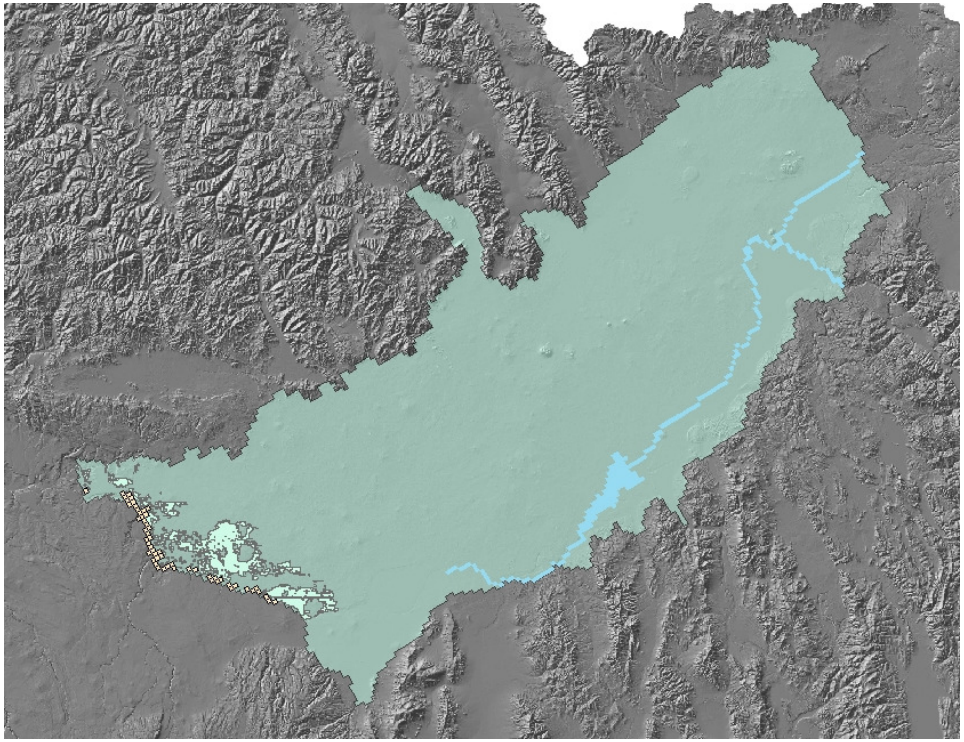


- Minidoka Irrigation District returns

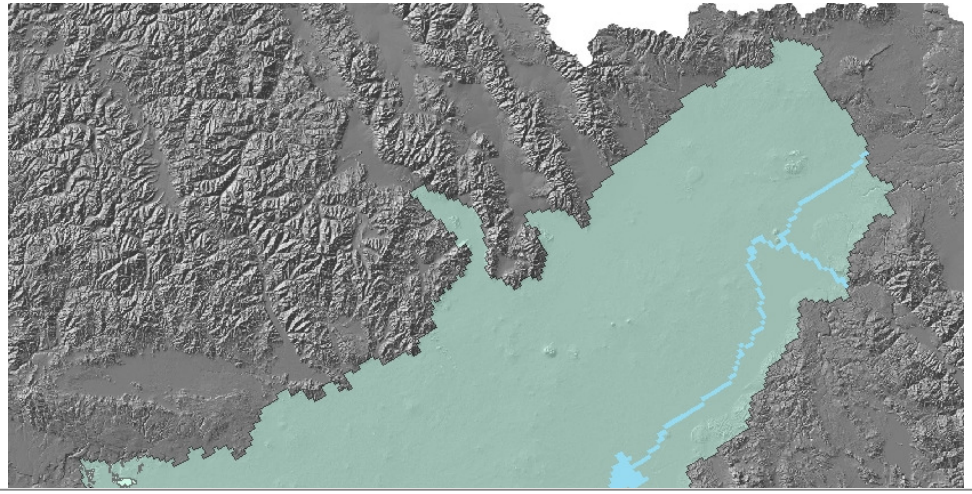


- Minidoka Irrigation District returns

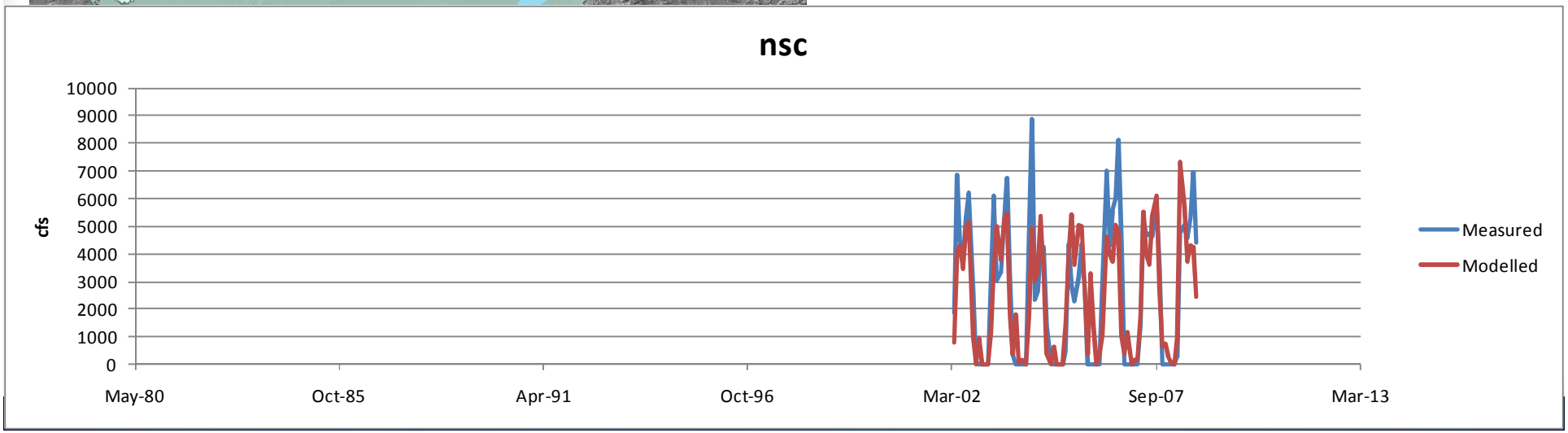




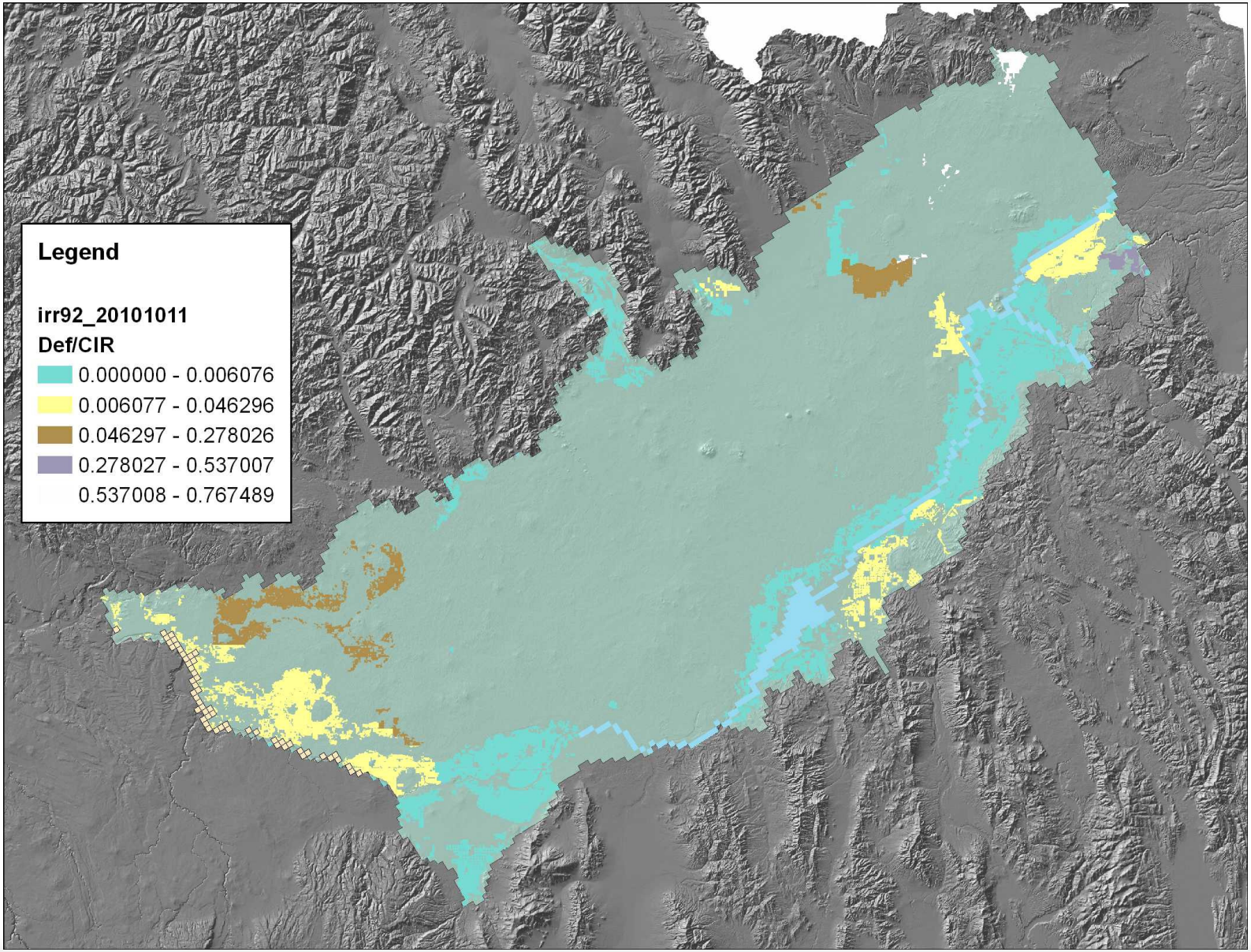
- North Side Canal Co returns



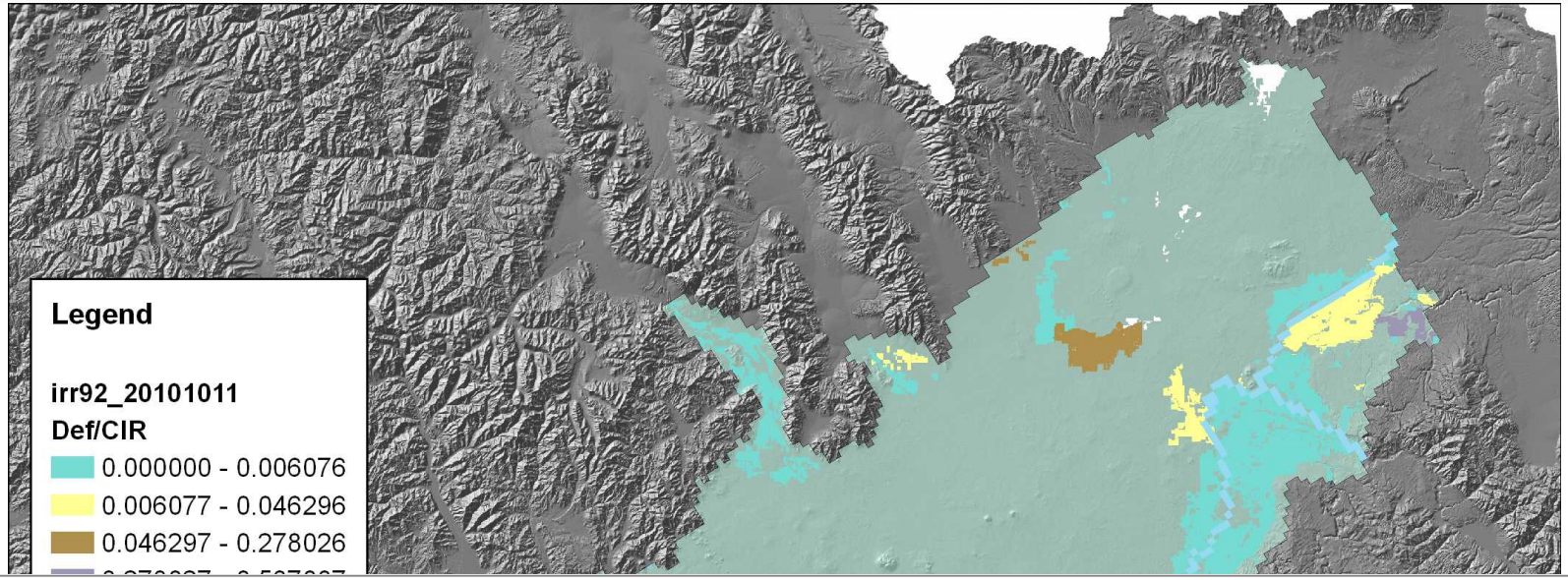
- North Side Canal Co returns

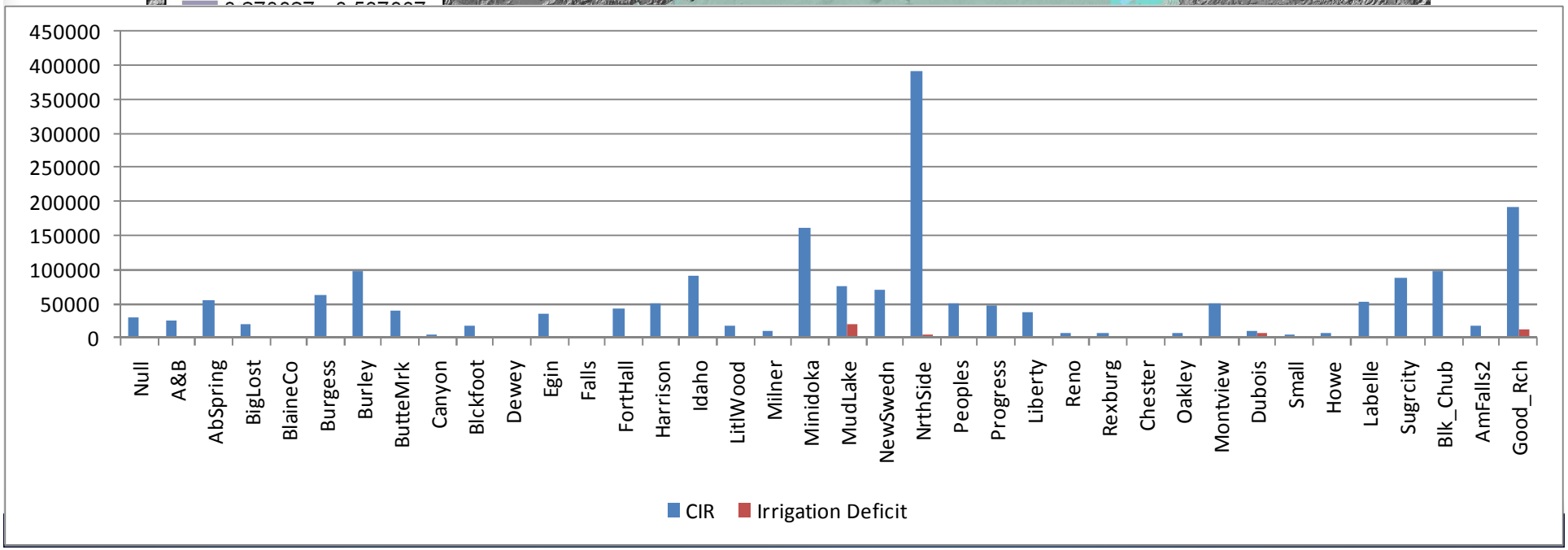


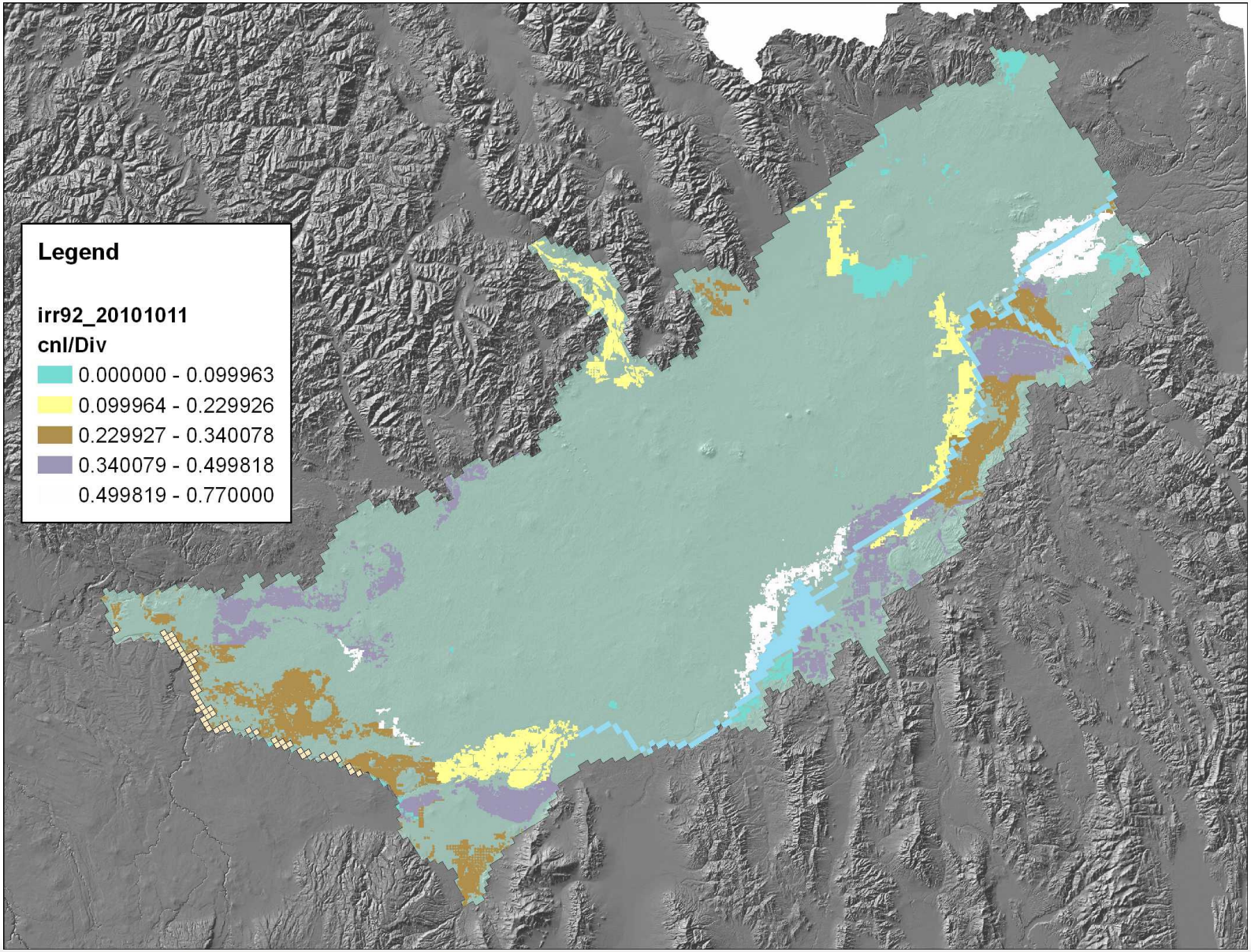
IDAHO Department of Water Resources



IDAHO Department of Water Resources



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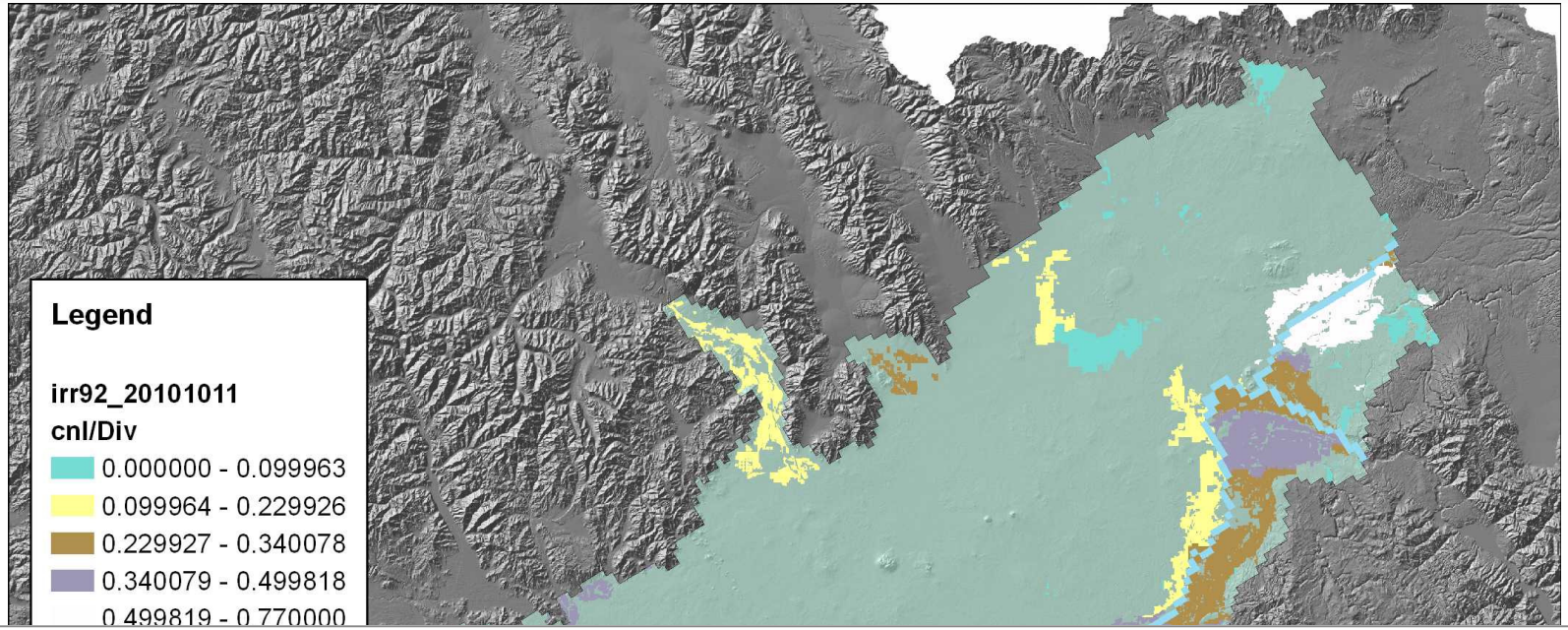
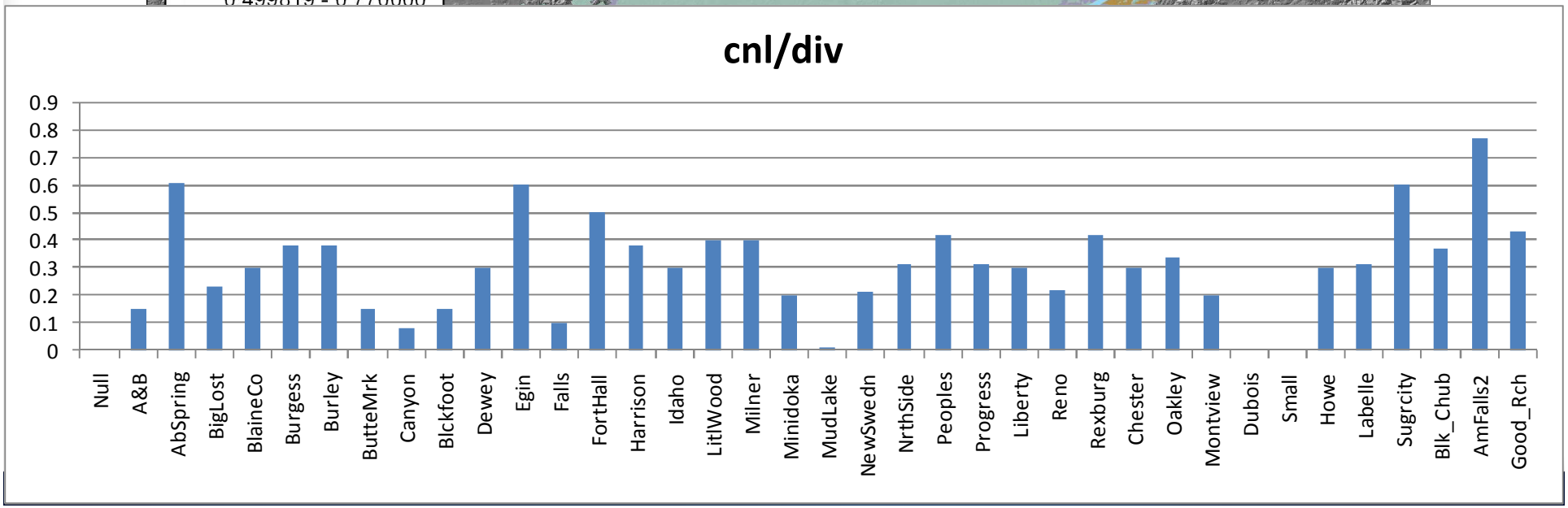
IDAHO Department of Water Resources





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