Calibration Run

Allan Wylie IDWR

Reach Gain and Spring Discharge Targets

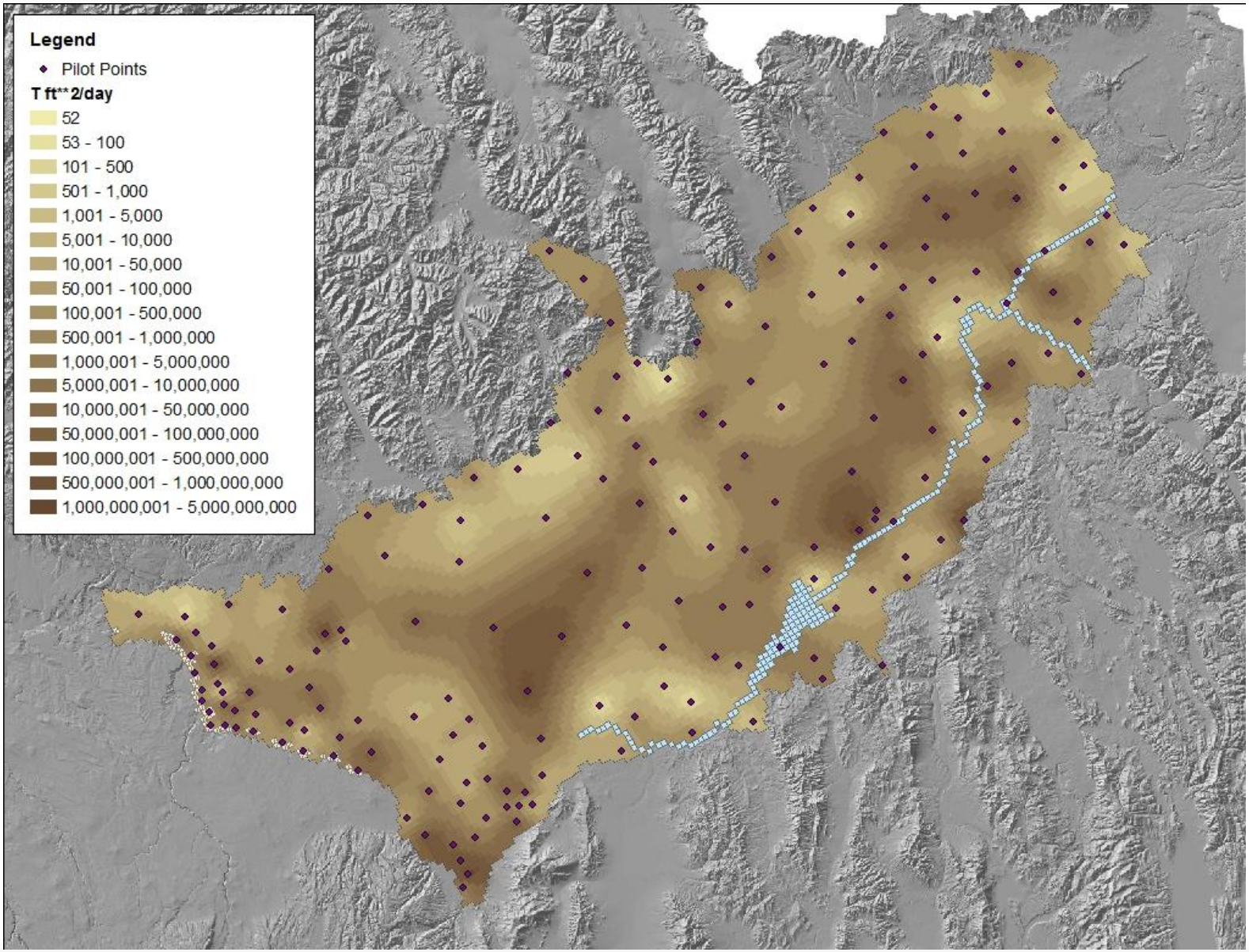
- Monthly Stress Periods
  - Using
    - MKMOD81.exe
      - Using On-Farm algorithm
    - MFUSG
    - WoodTest
      - AFRD2/Big Wood,Ritchfield and Dietrich separate entities
    - No steady state targets
    - Aquifer head
      - New set of wells to incorporate sentinel wells
    - Snake reach gain and loss targets
      - Include Heise-Menan and Menan-Shelley
      - Filtered and unfiltered
    - Spring discharge
      - Two drains in every spring cell
      - Adjusted elevation of Briggs
    - 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
      - 2 drains 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


Legend
Pilot Points
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
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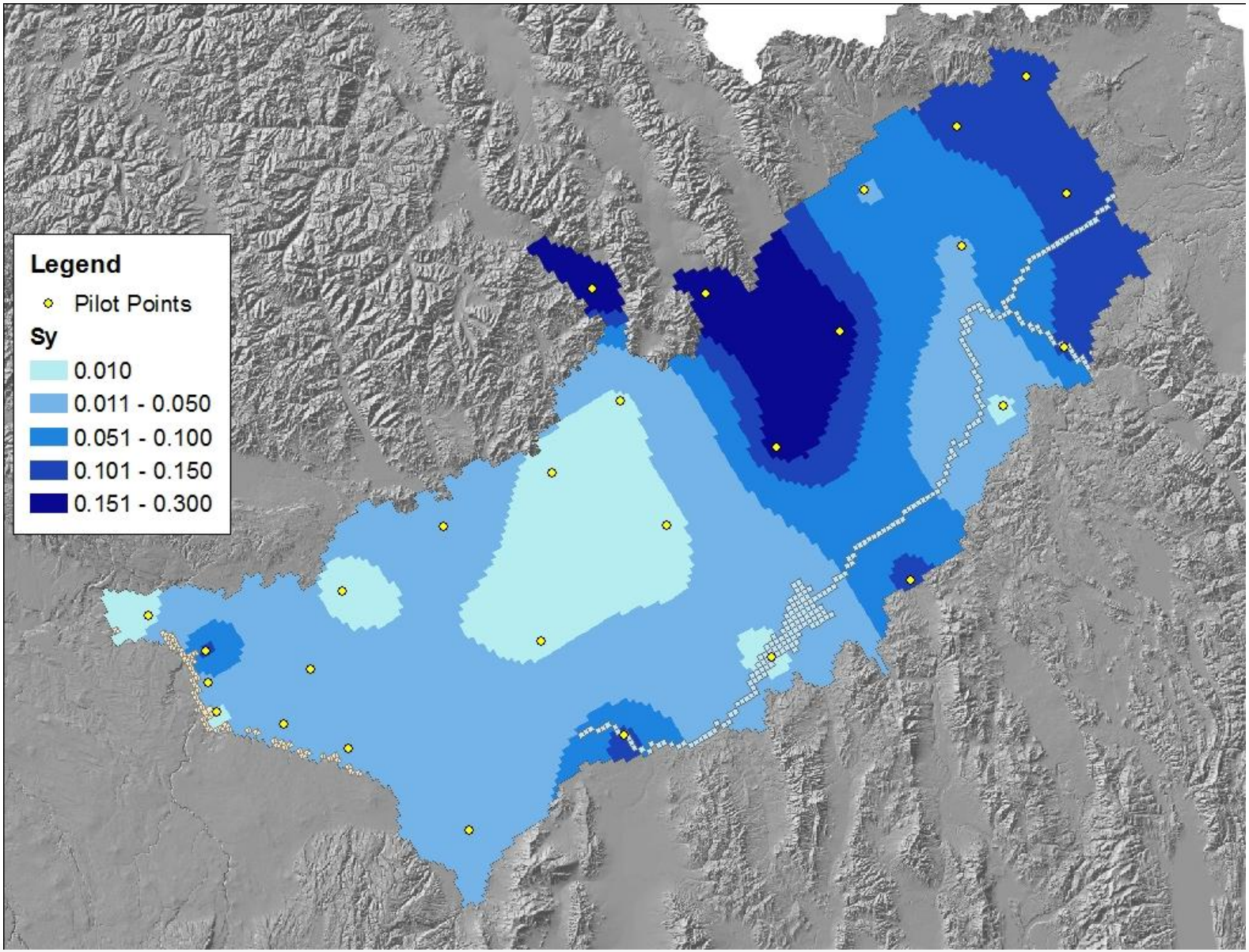
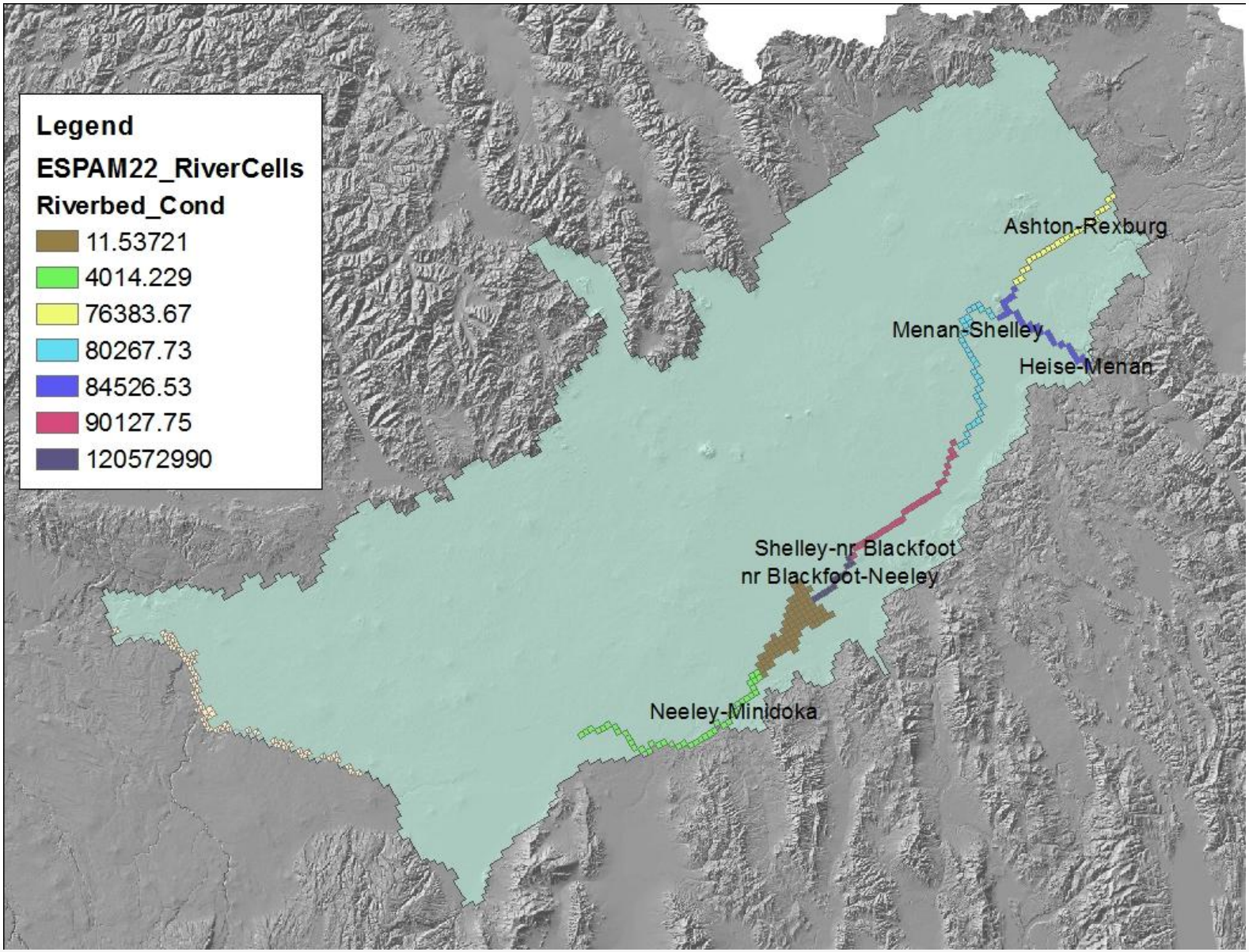
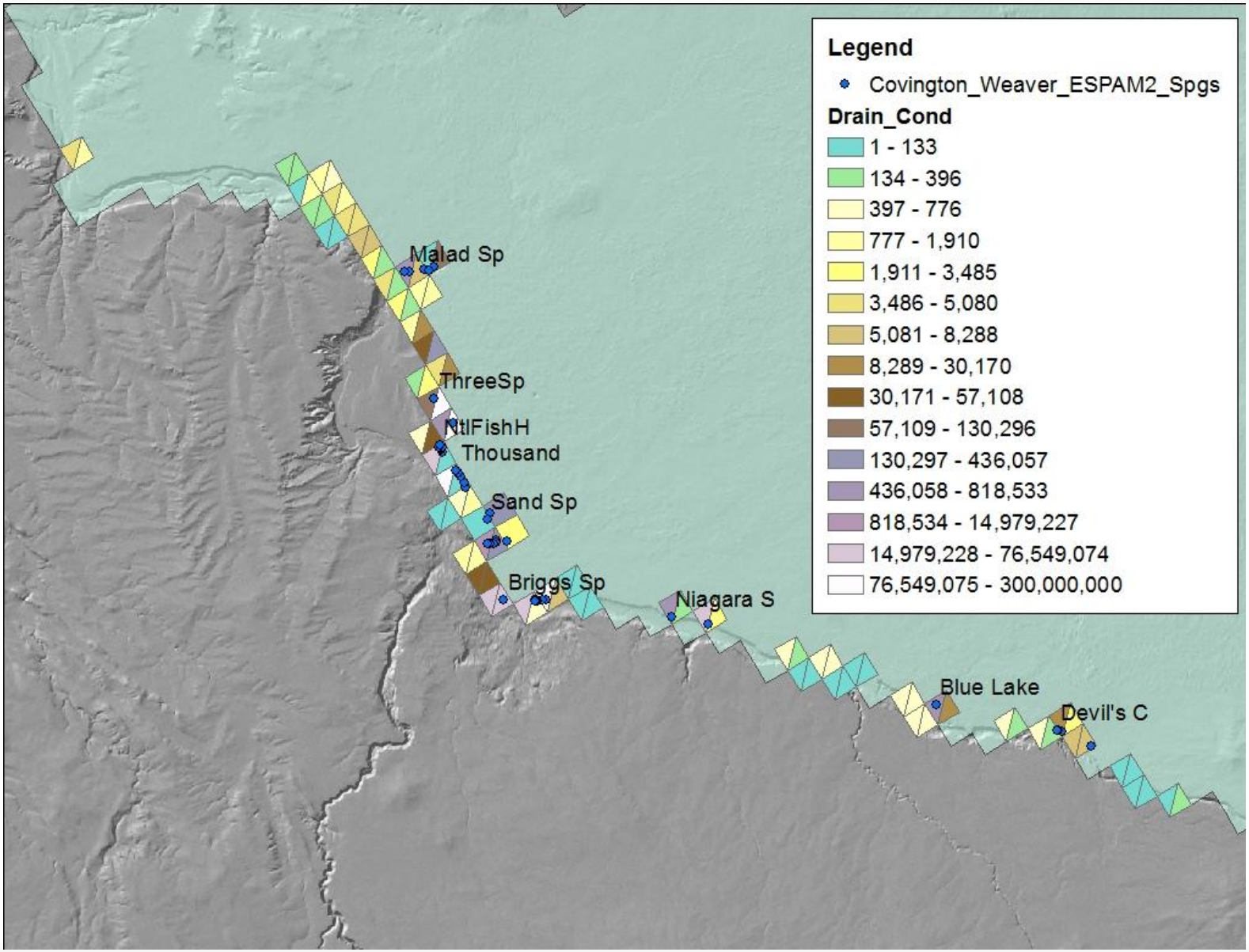
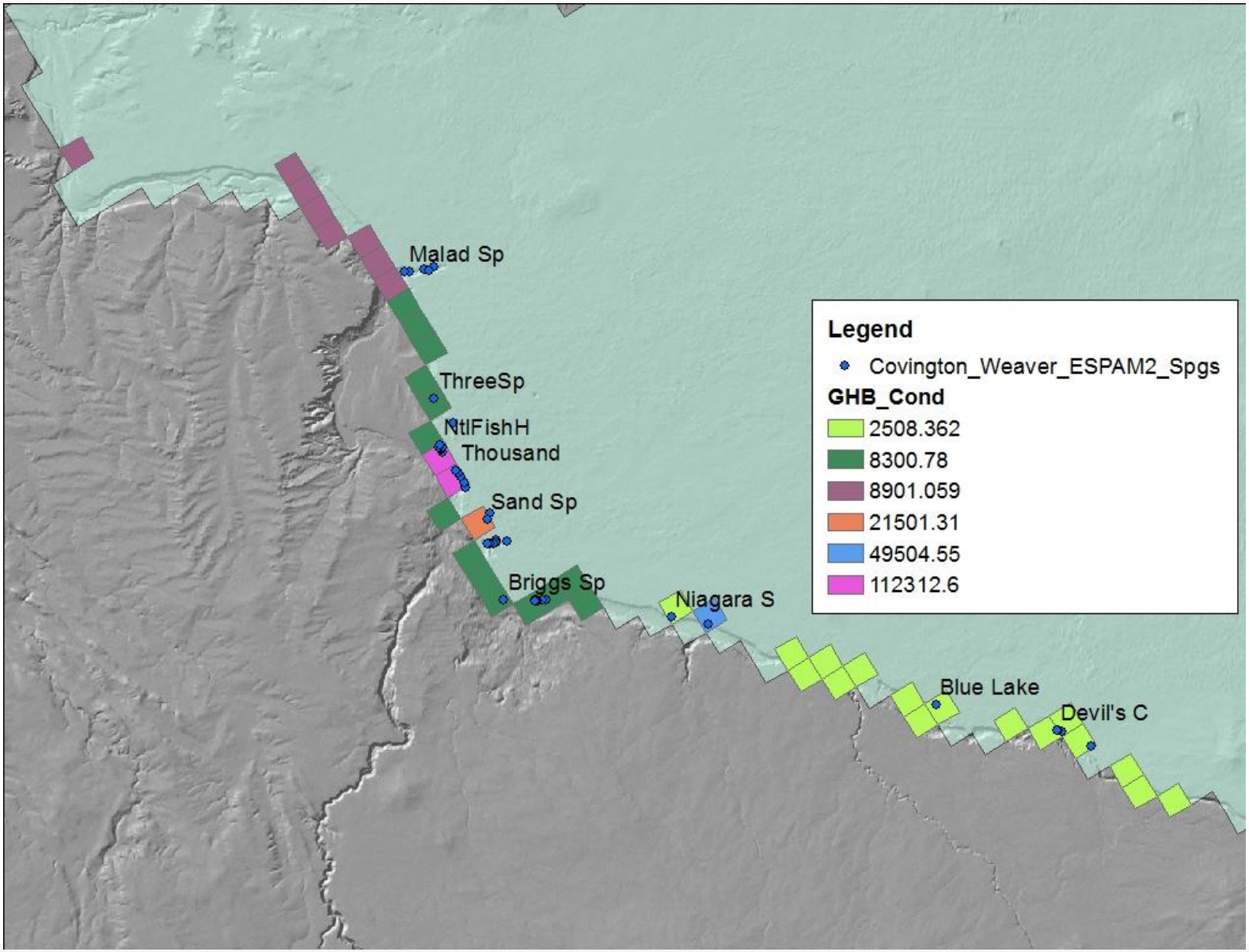
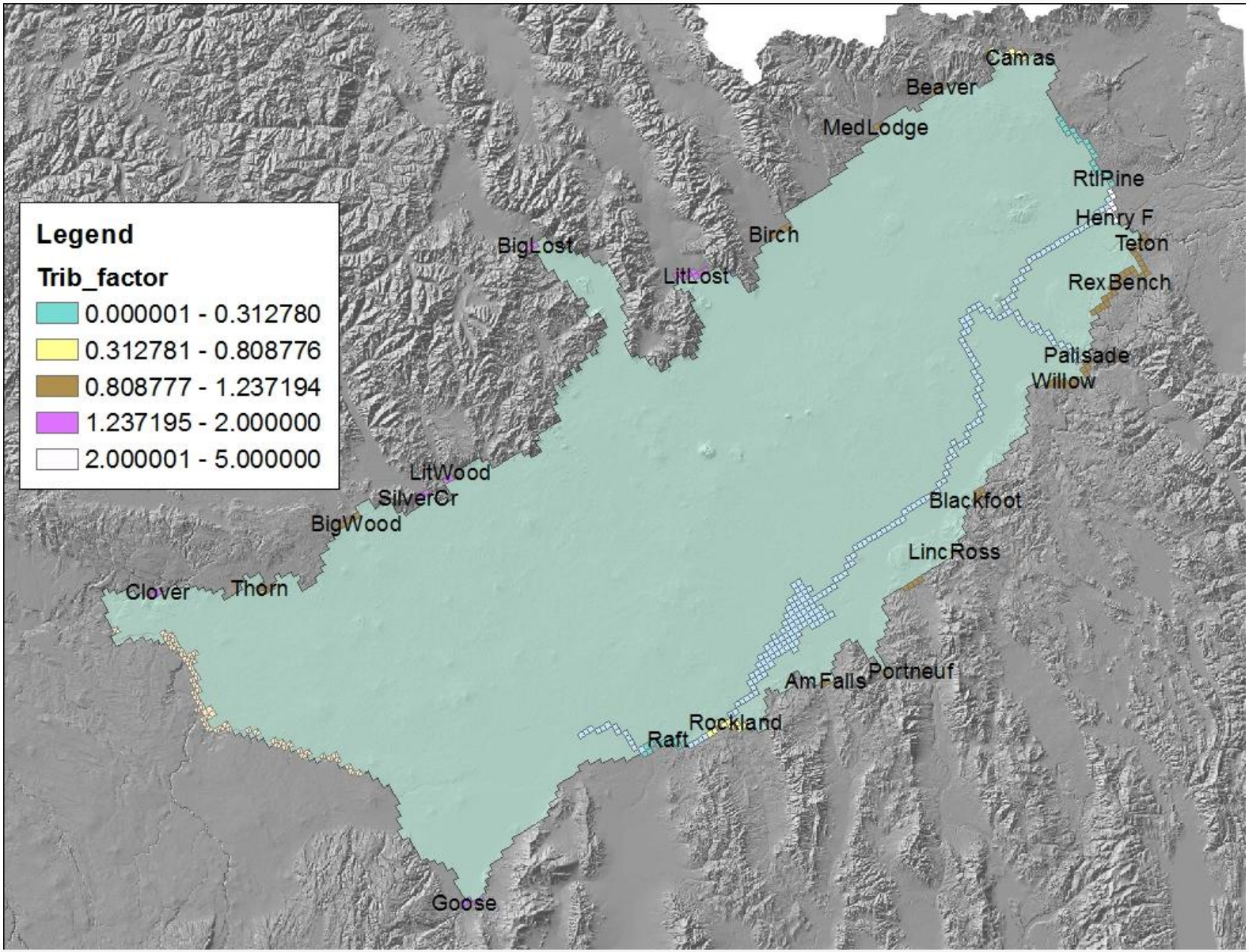
1,000,000,001 - 5,000,000,000

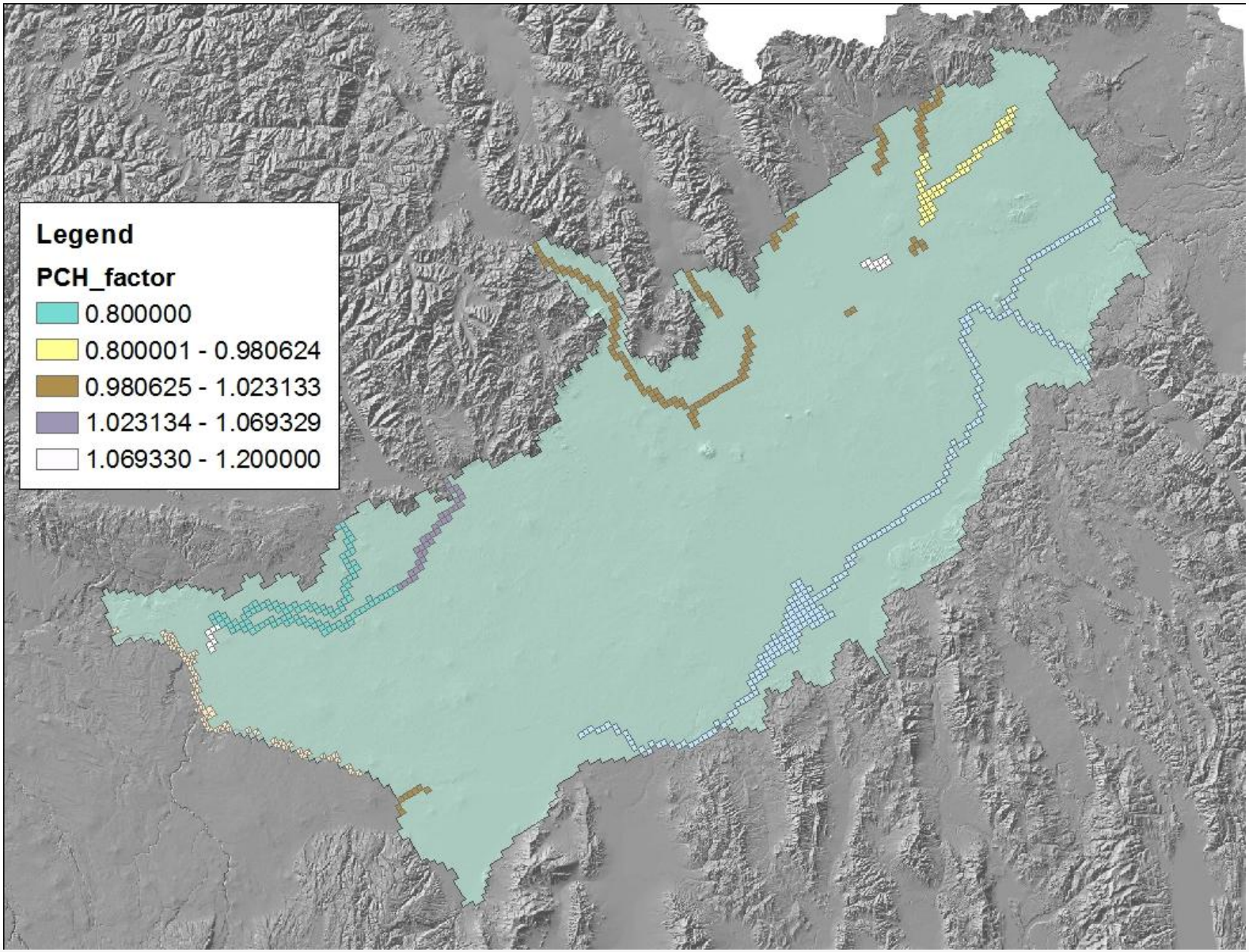

Legend
Pilot Points
Sy
0.010
0.011 - 0.050
0.051 - 0.100
0.101 - 0.150
0.151 - 0.300

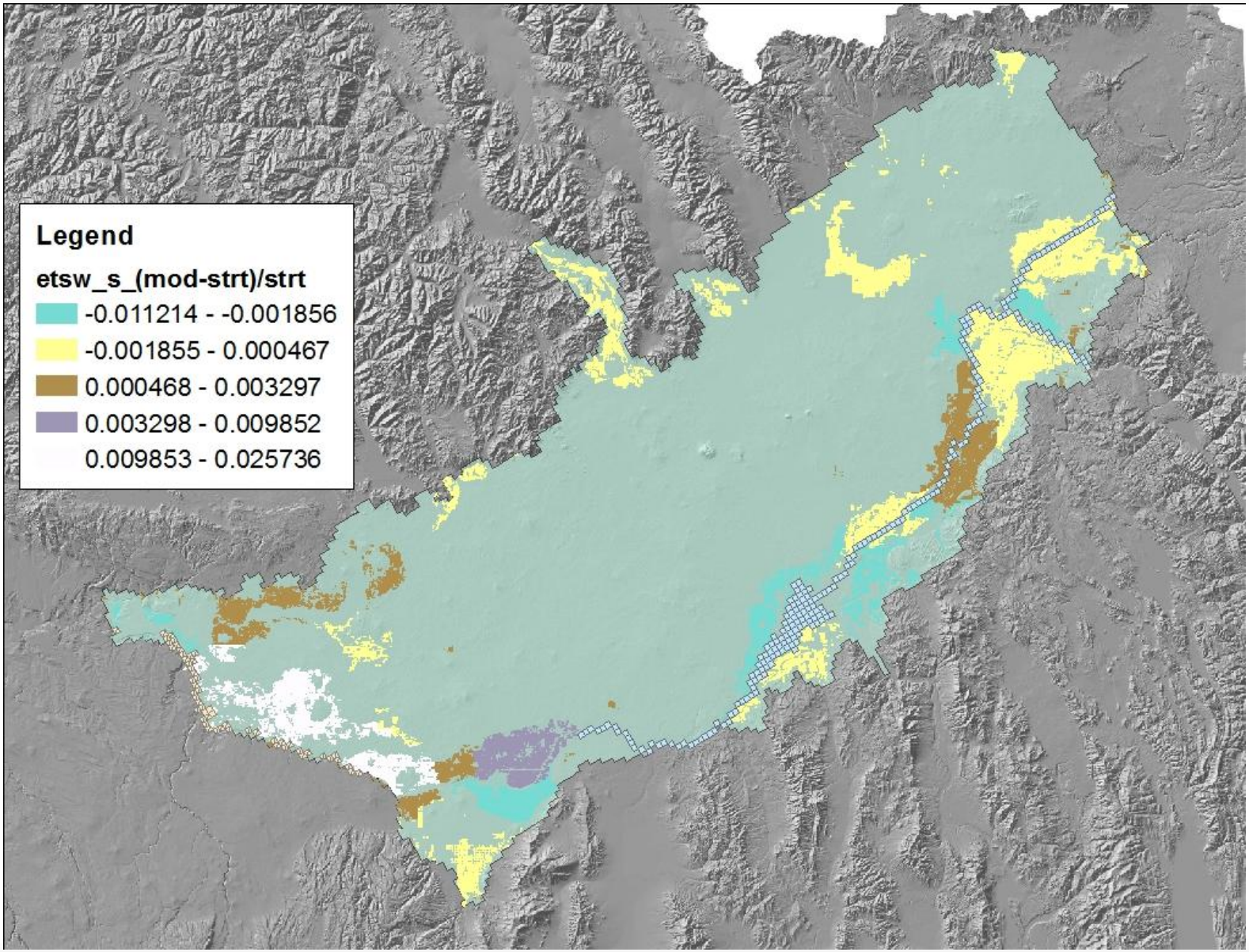

Legend
ESPAM22_RiverCells
Riverbed_Cond
11.53721
4014.229
76383.67
80267.73
84526.53
90127.75
120572990
Ashton-Rexburg
Menan-Shelley
Heise-Menan
Shelley-nr Blackfoot
nr Blackfoot-Neeley
Neeley-Minidoka

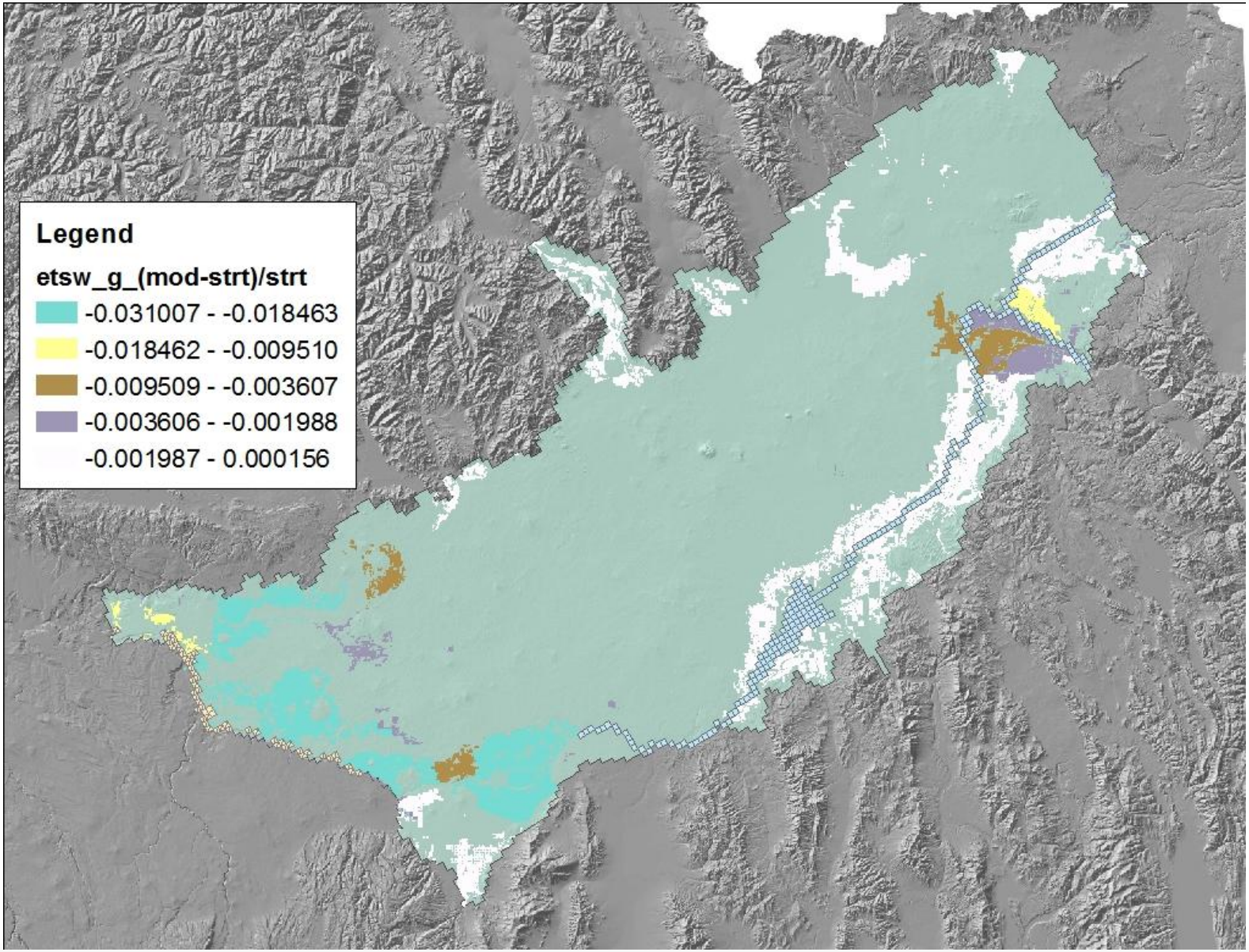

Legend
Covington_Weaver_ESPAM2_Spgs
Drain_Cond
1 - 133
134 - 396
397 - 776
777 - 1,910
1,911 - 3,485
3,486 - 5,080
5,081 - 8,288
8,289 - 30,170
30,171 - 57,108
57,109 - 130,296
130,297 - 436,057
436,058 - 818,533
818,534 - 14,979,227
14,979,228 - 76,549,074
76,549,075 - 300,000,000
Malad Sp
ThreeSp
NtlFishH
Thousand
Sand Sp
Briggs Sp
Niagara S
Blue Lake
Devil's C

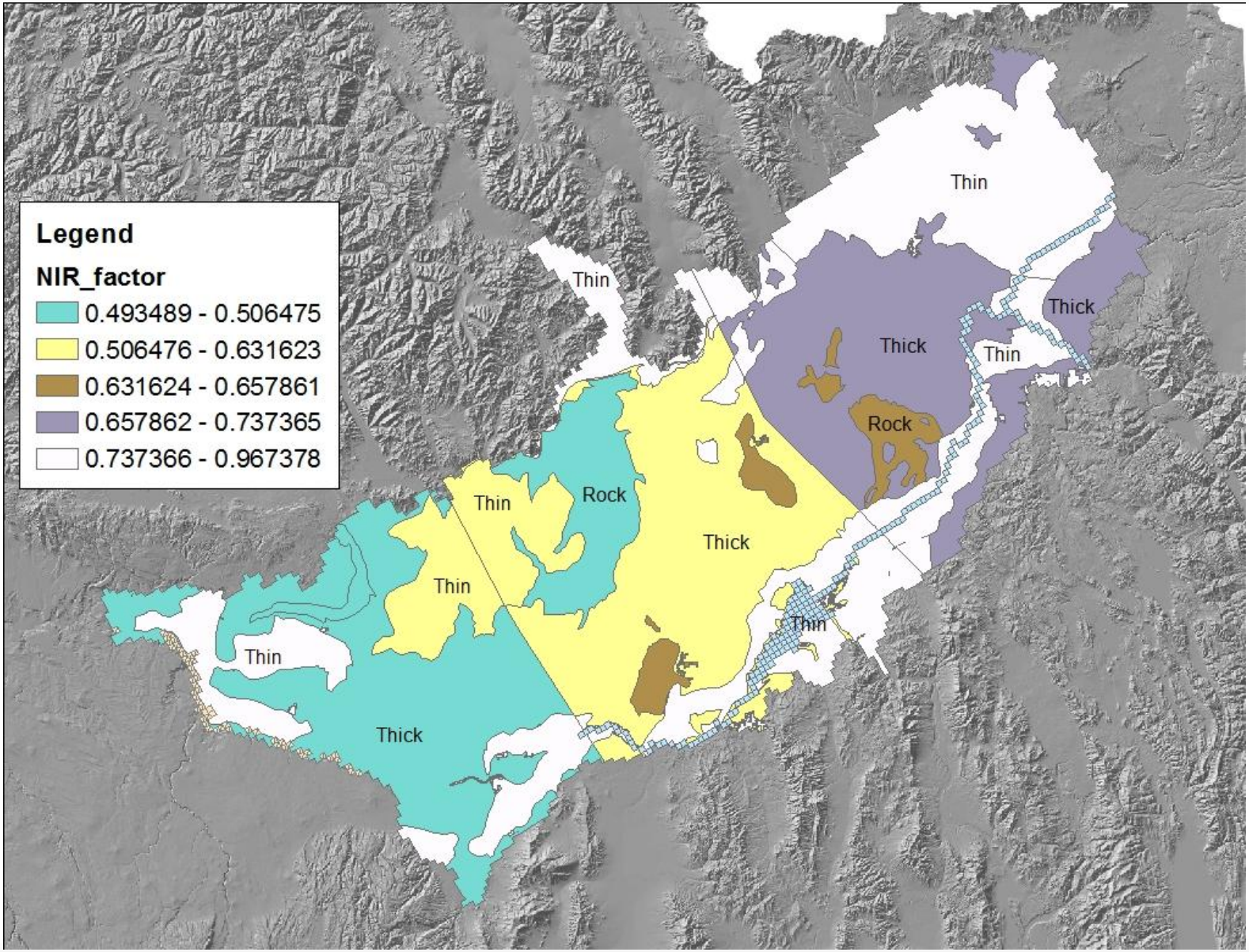

Malad Sp
ThreeSp
NtlFishH
Thousand
Sand Sp
Briggs Sp
Niagara S
Blue Lake
Devil's C
Legend
Covington_Weaver_ESPAM2_Spgs
GHB_Cond
2508.362
8300.78
8901.059
21501.31
49504.55
112312.6

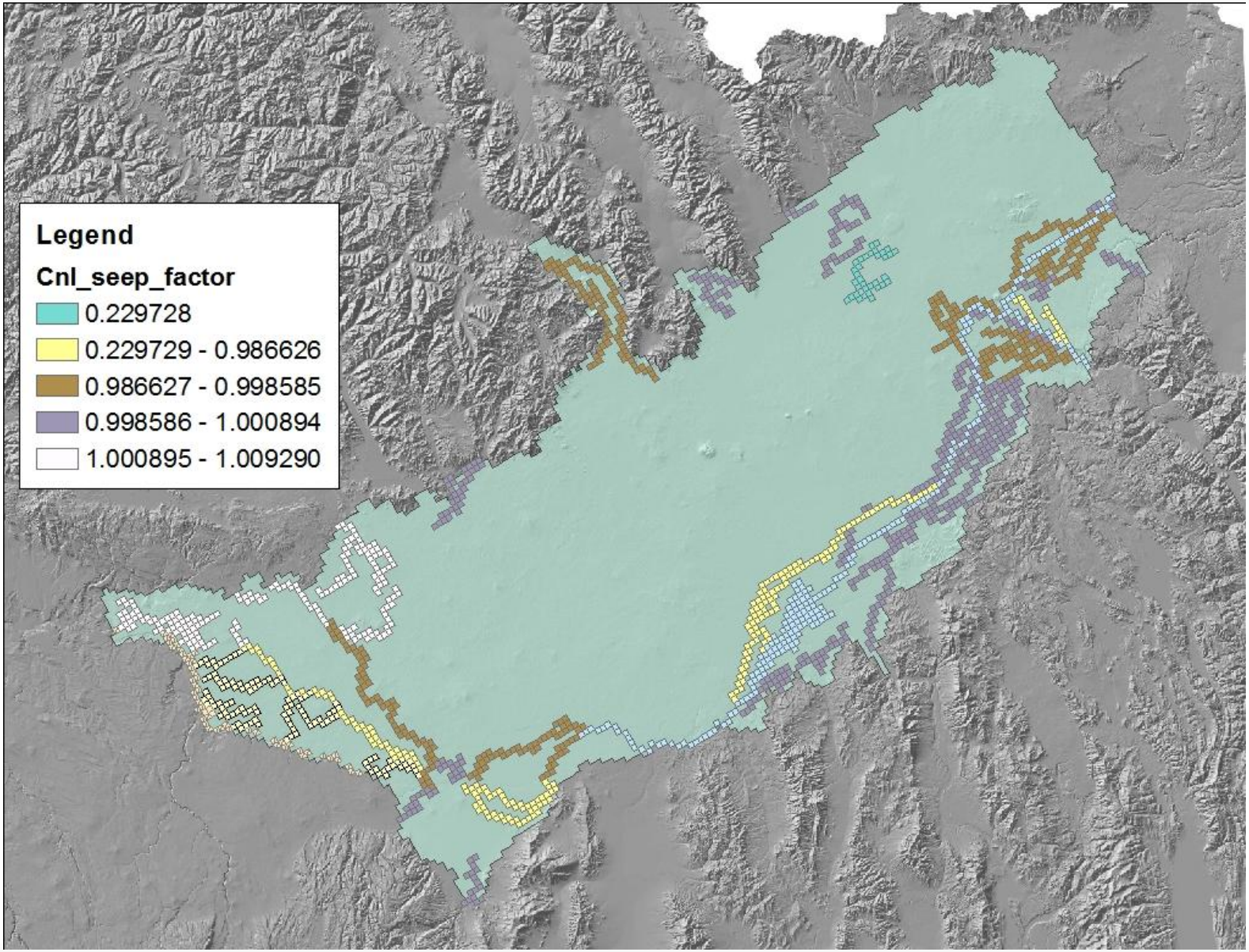

Legend
Trib_factor
0.000001 - 0.312780
0.312781 - 0.808776
0.808777 - 1.237194
1.237195 - 2.000000
2.000001 - 5.000000
Camas
Beaver
MedLodge
RtlPine
Henry F
Teton
Birch
BigLost
LitLost
RexBench
Palisade
Willow
LitWood
SilverCr
BigWood
Blackfoot
LincRoss
Clover
Thorn
AmFalls
Portneuf
Rockland
Raft
Goose

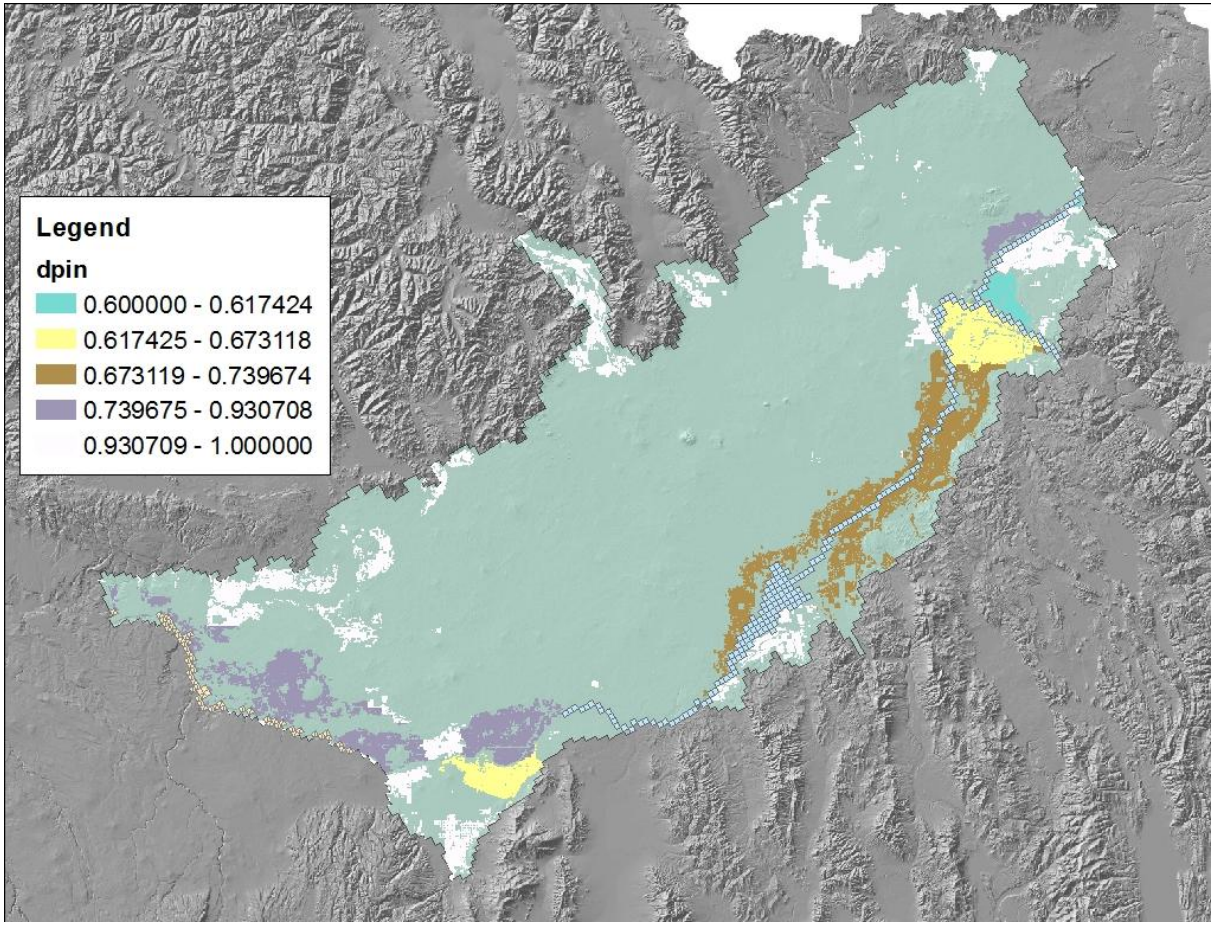

Legend
PCH_factor
0.800000
0.800001 - 0.980624
0.980625 - 1.023133
1.023134 - 1.069329
1.069330 - 1.200000


Legend
etsw_s_(mod-strt)/strt
-0.011214 - -0.001856
-0.001855 - 0.000467
0.000468 - 0.003297
0.003298 - 0.009852
0.009853 - 0.025736

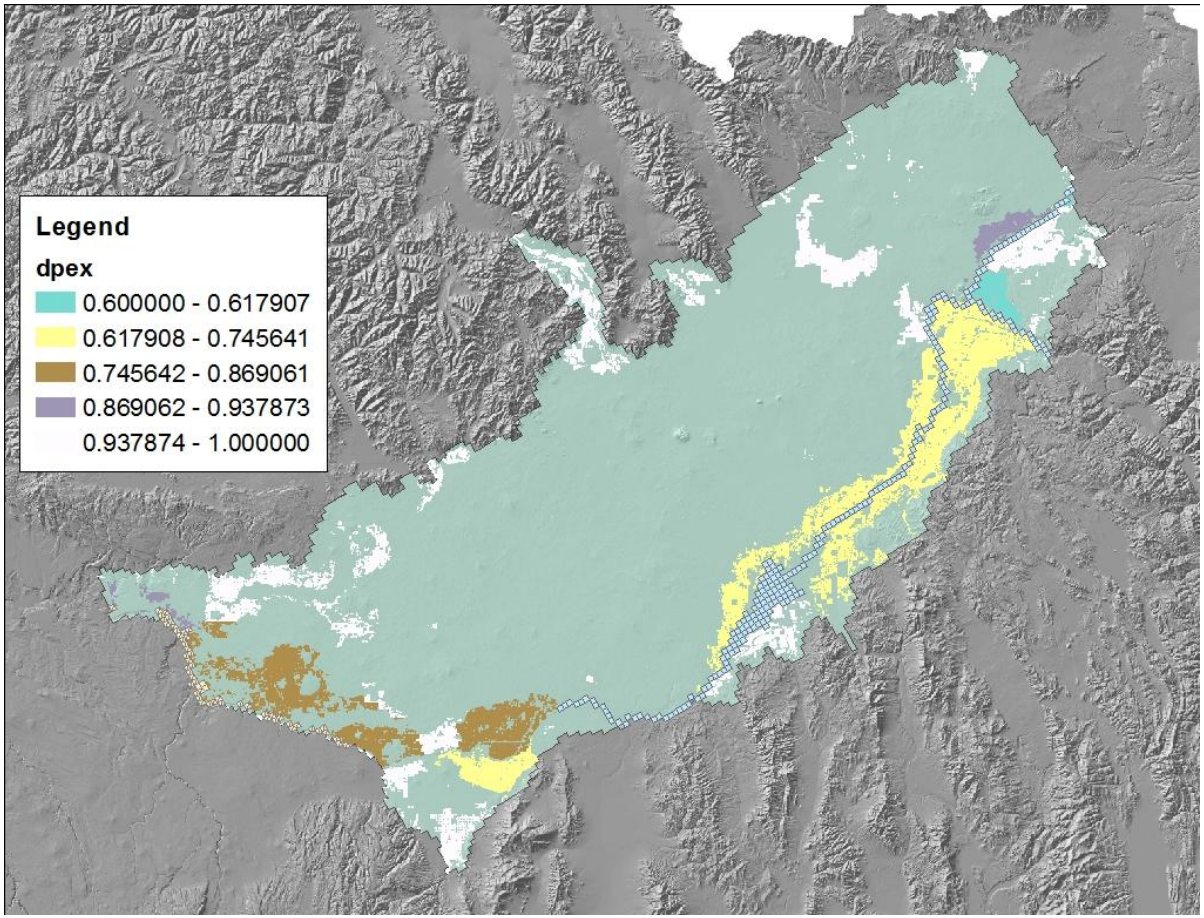

Legend
etsw_g_(mod-strt)/strt
-0.031007 - -0.018463
-0.018462 - -0.009510
-0.009509 - -0.003607
-0.003606 - -0.001988
-0.001987 - 0.000156


Legend
NIR_factor
0.493489 - 0.506475
0.506476 - 0.631623
0.631624 - 0.657861
0.657862 - 0.737365
0.737366 - 0.967378
Thin
Thin
Thick
Thick
Thin
Rock
Rock
Thin
Thick
Thin
Thin
Thin
Thick


Legend
Cnl_seep_factor
0.229728
0.229729 - 0.986626
0.986627 - 0.998585
0.998586 - 1.000894
1.000895 - 1.009290

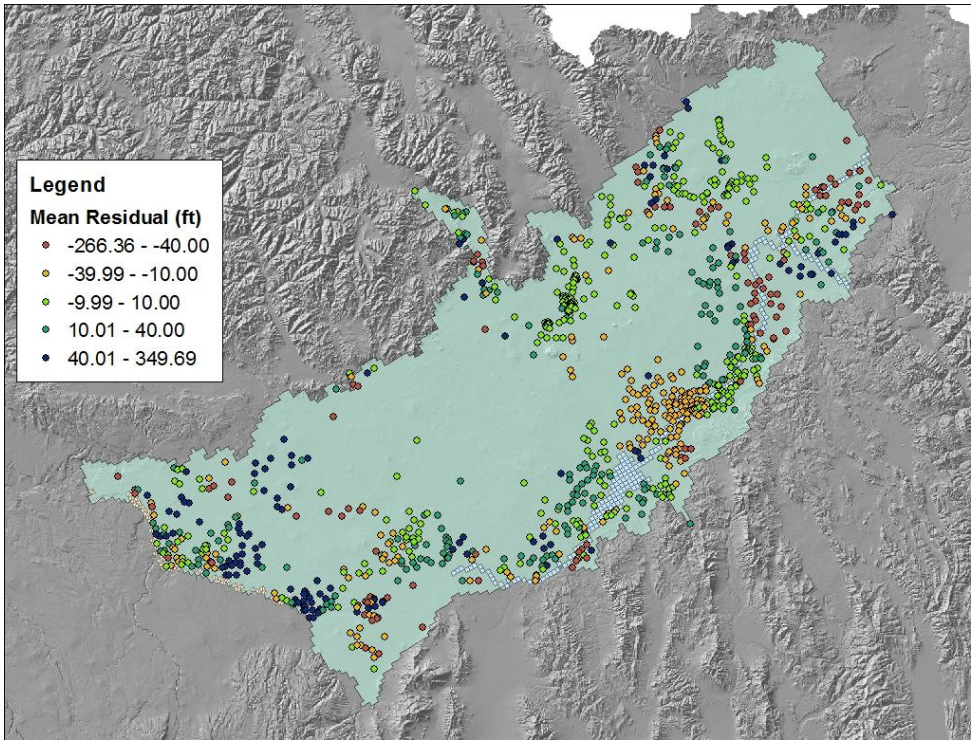


- DPin
  - fraction of the initial irrigation loss (1-eff) that percolates below the root zone
  - Fixed at 1.0 for non-Snake entities and some others
  - PEST allowed to adjust between 0.6-0.98

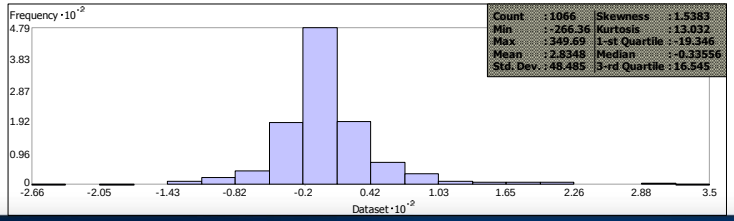


- DPex
  - fraction of delivery exceeding CIR that percolates below the root zone
  - Fixed at 1.0 for non-Snake entities and some others
  - PEST allowed to adjust between 0.6-0.98

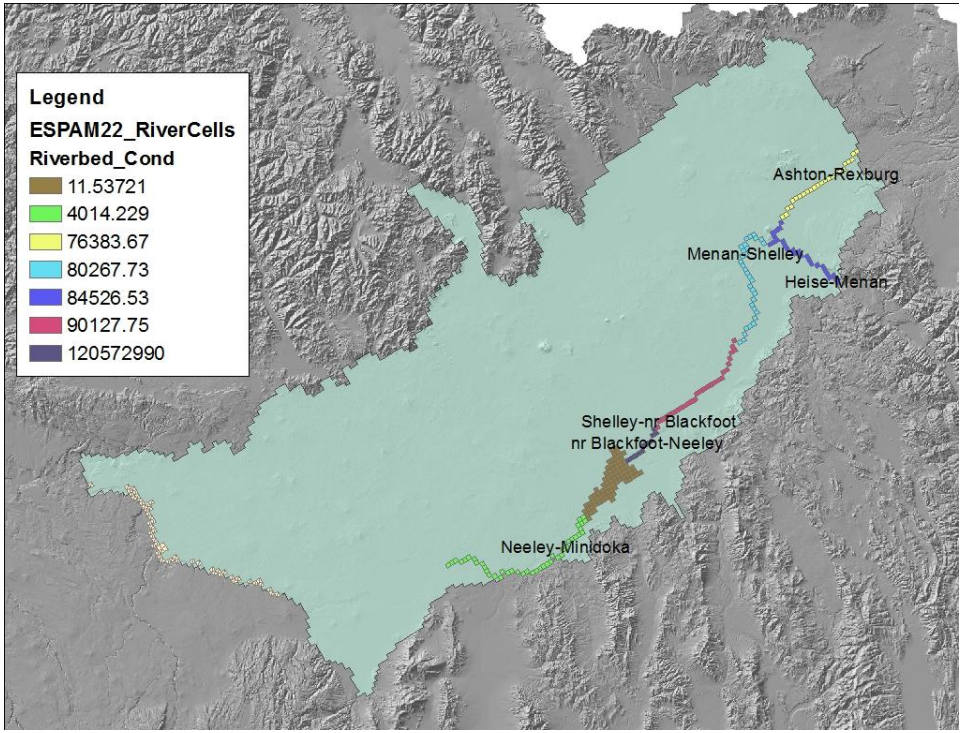
Transient Heads



Histogram
Transformation: None

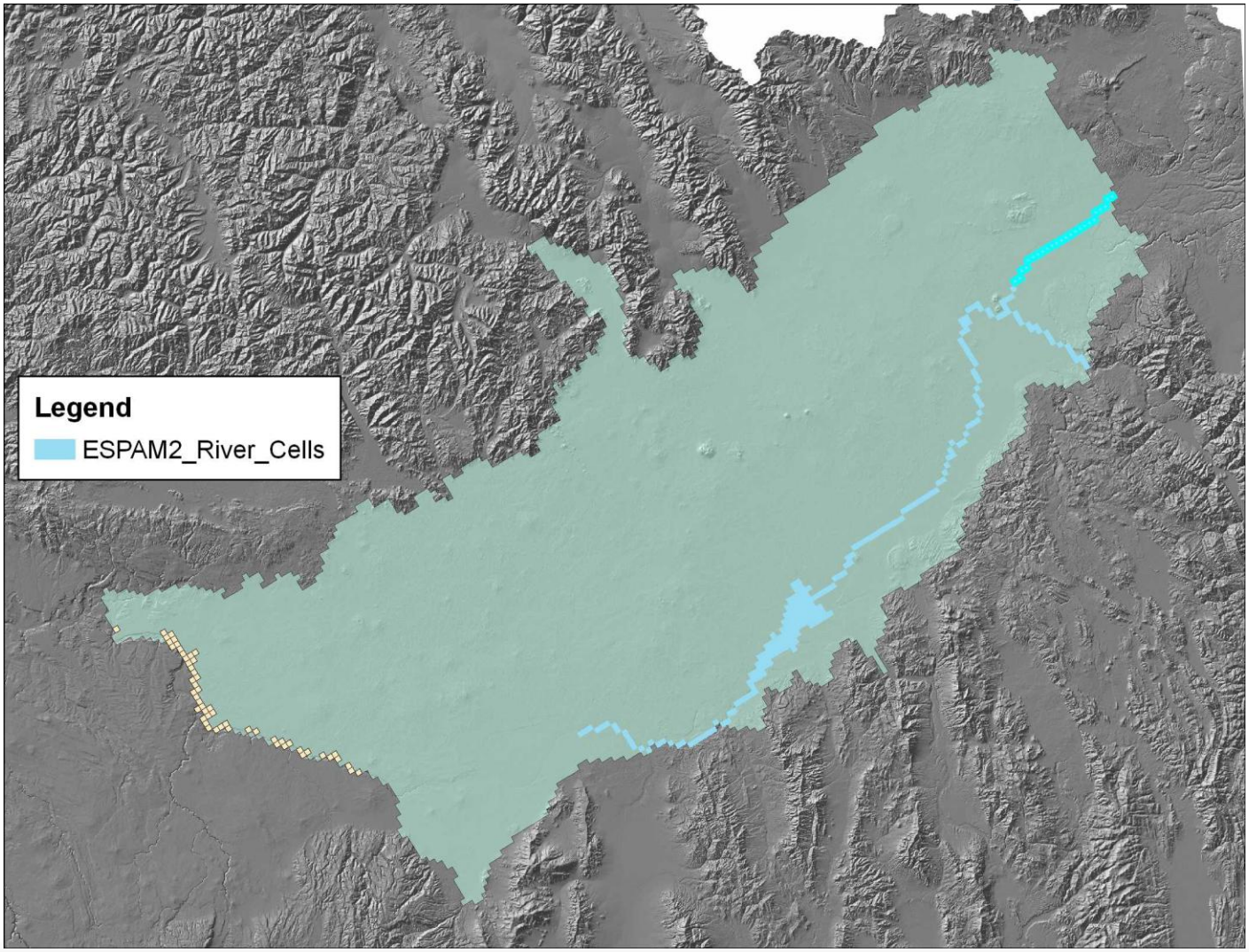


Dataset : Wells Attribute: Mean

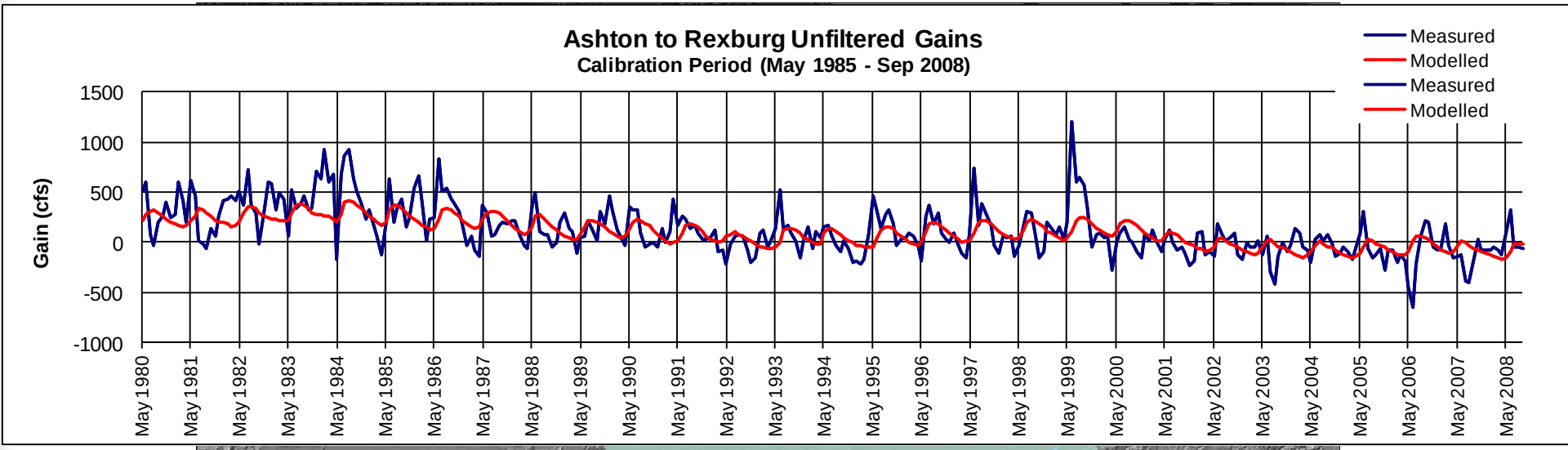


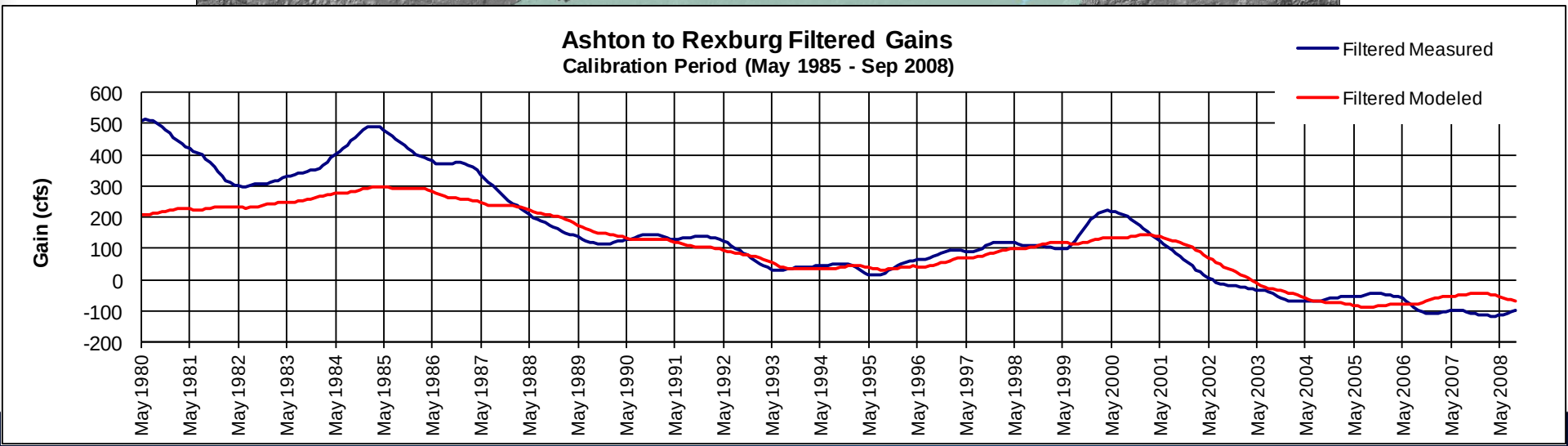
- Snake River reaches

Ashton - Rexburg

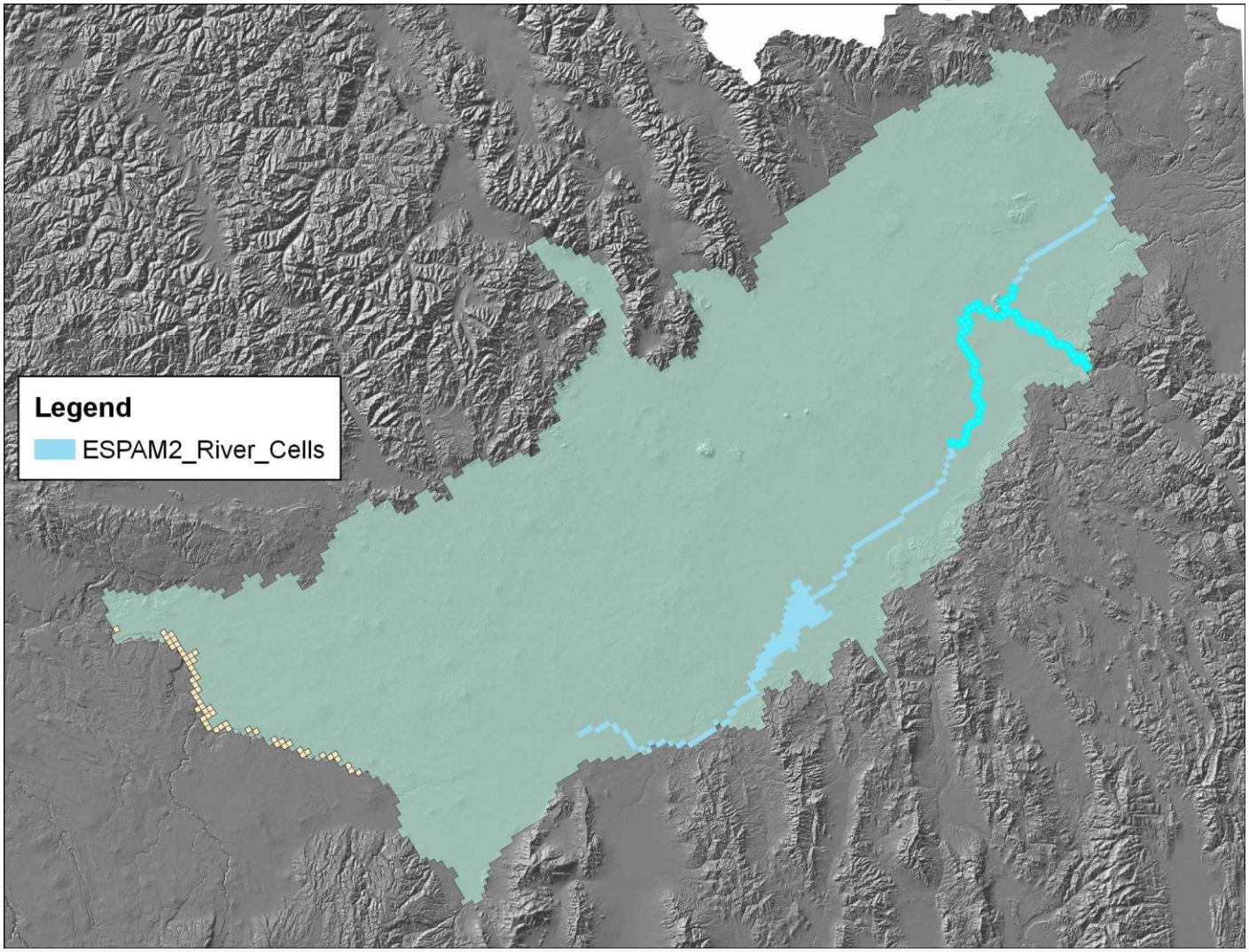


Ashton - Rexburg

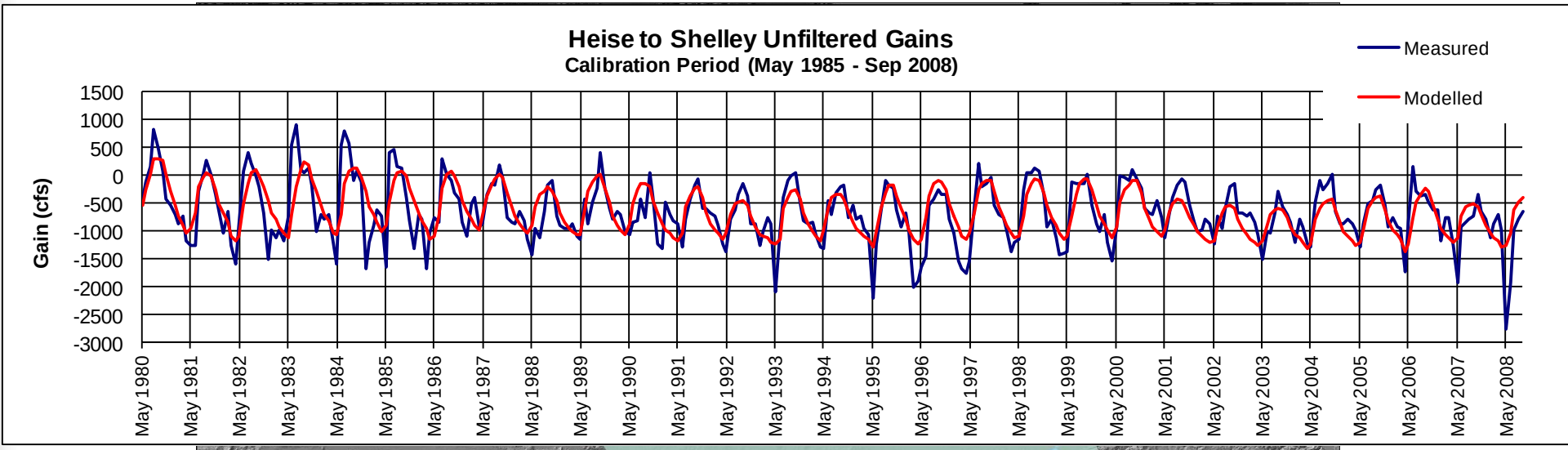


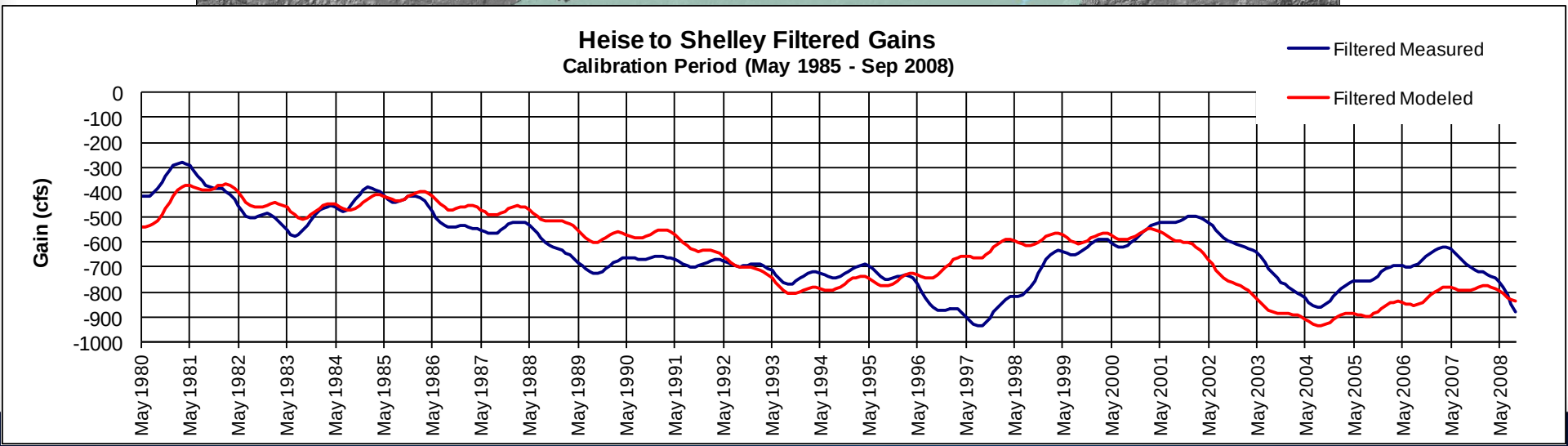


Heise - Shelley

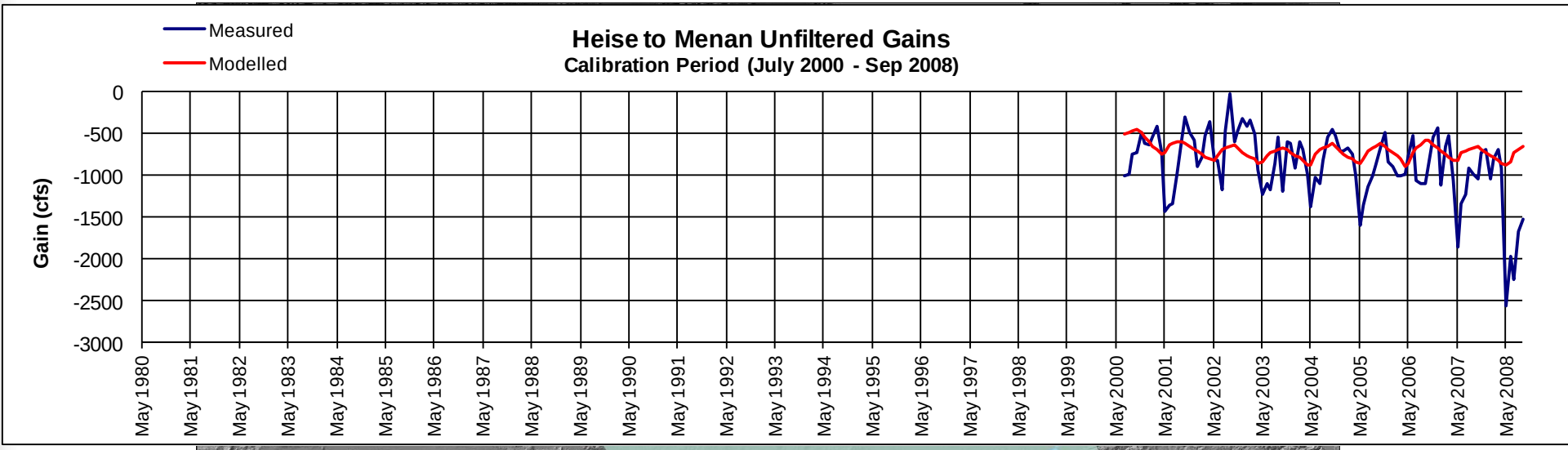


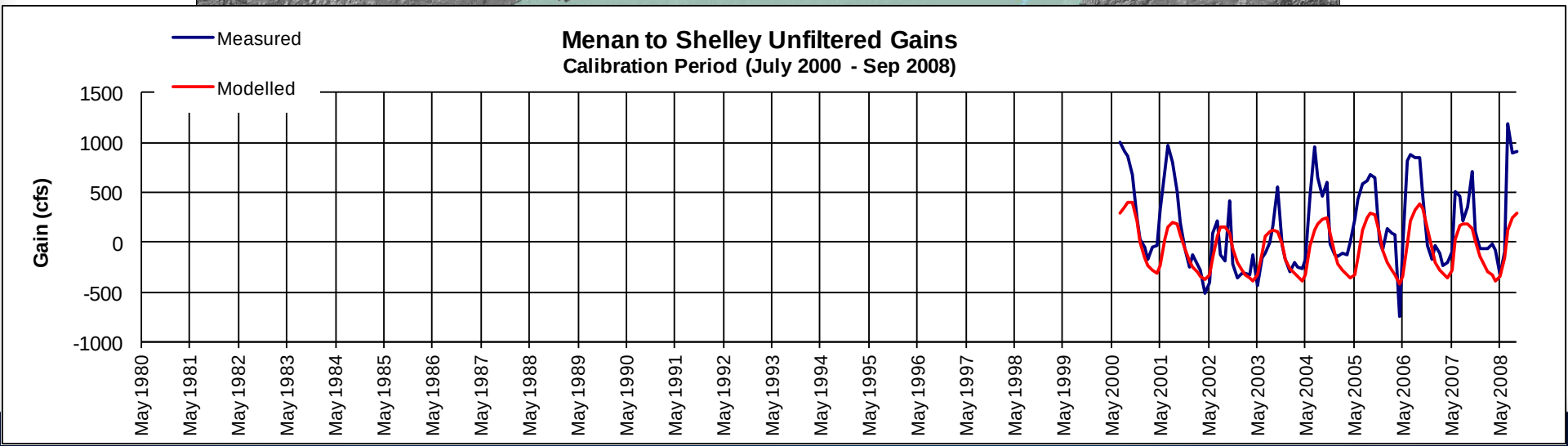
Heise - Shelley



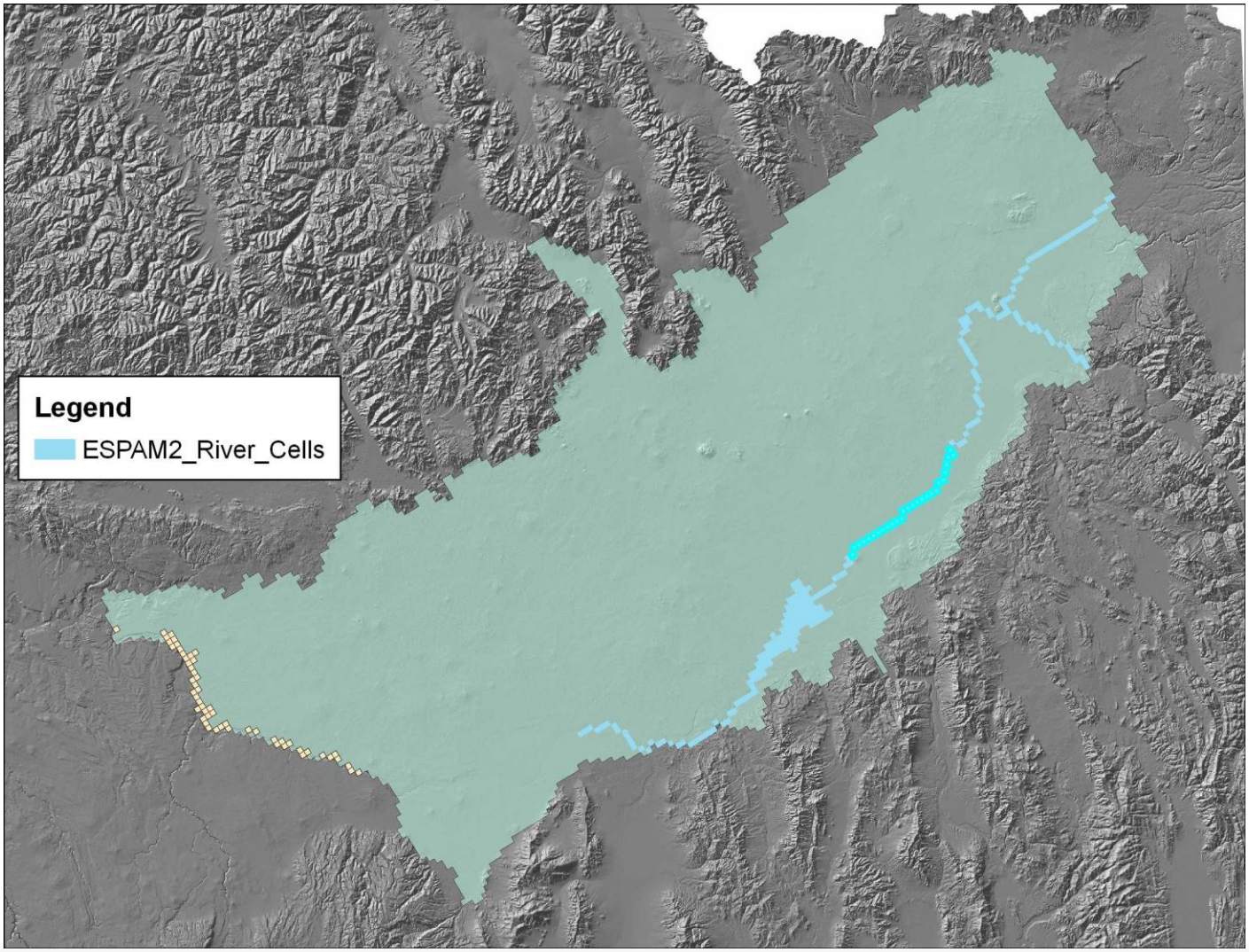


Heise - Shelley

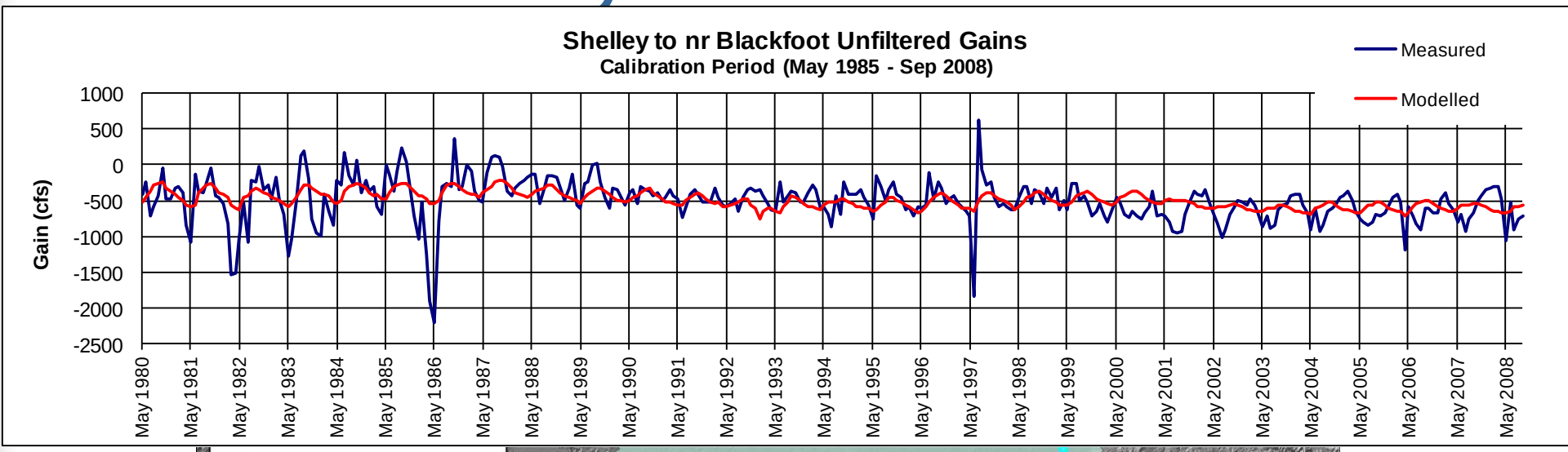


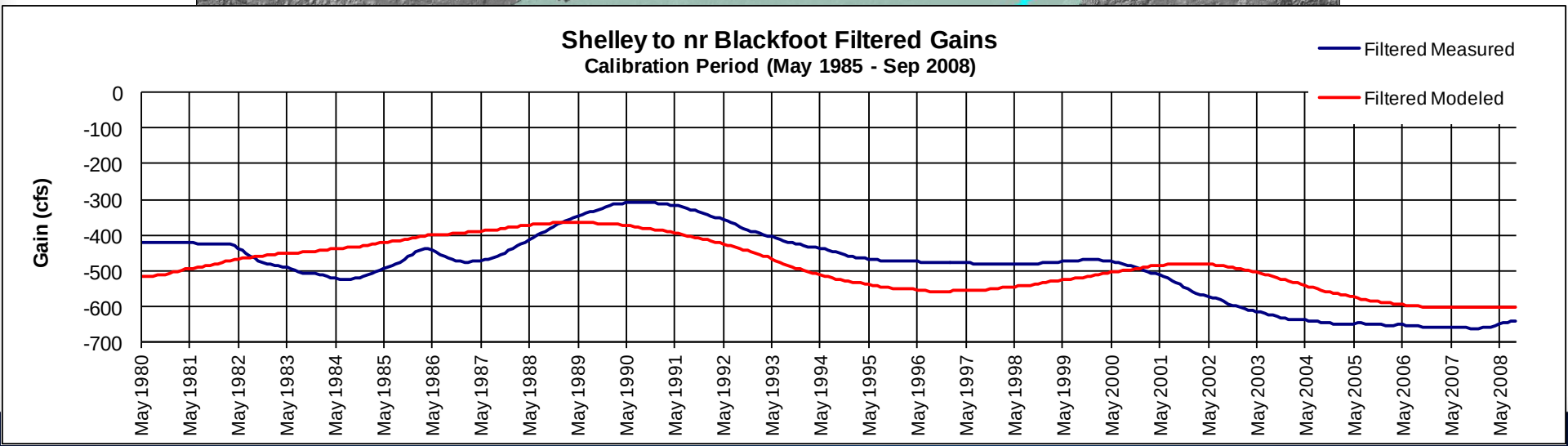


Shelley – nr Blackfoot

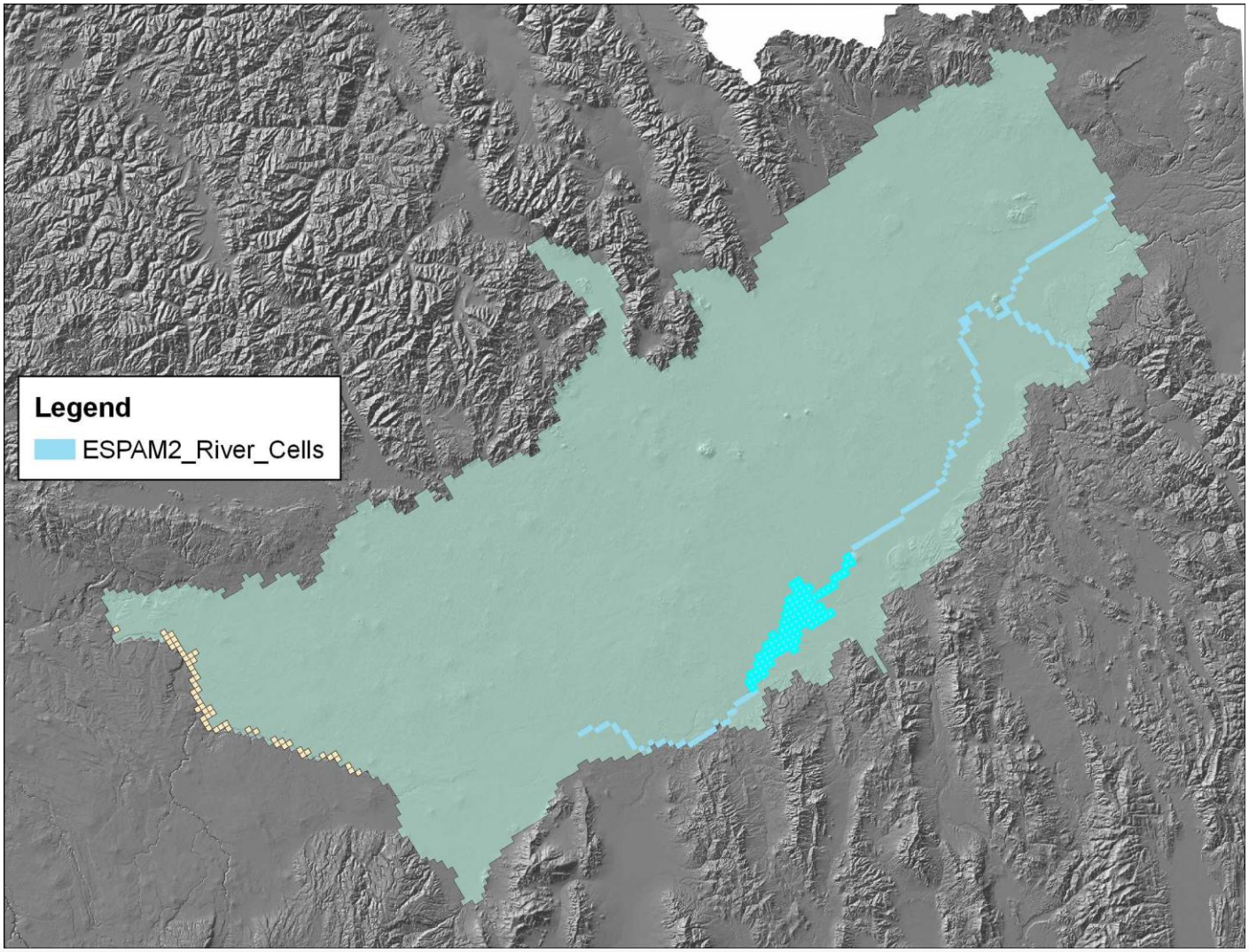


Shelley – nr Blackfoot

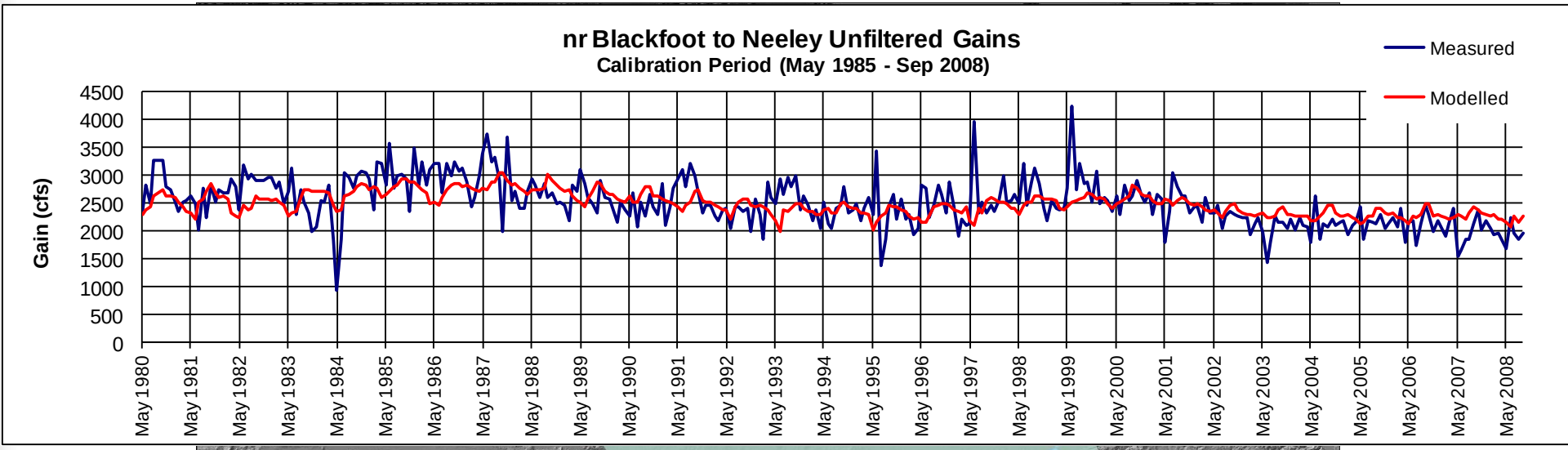


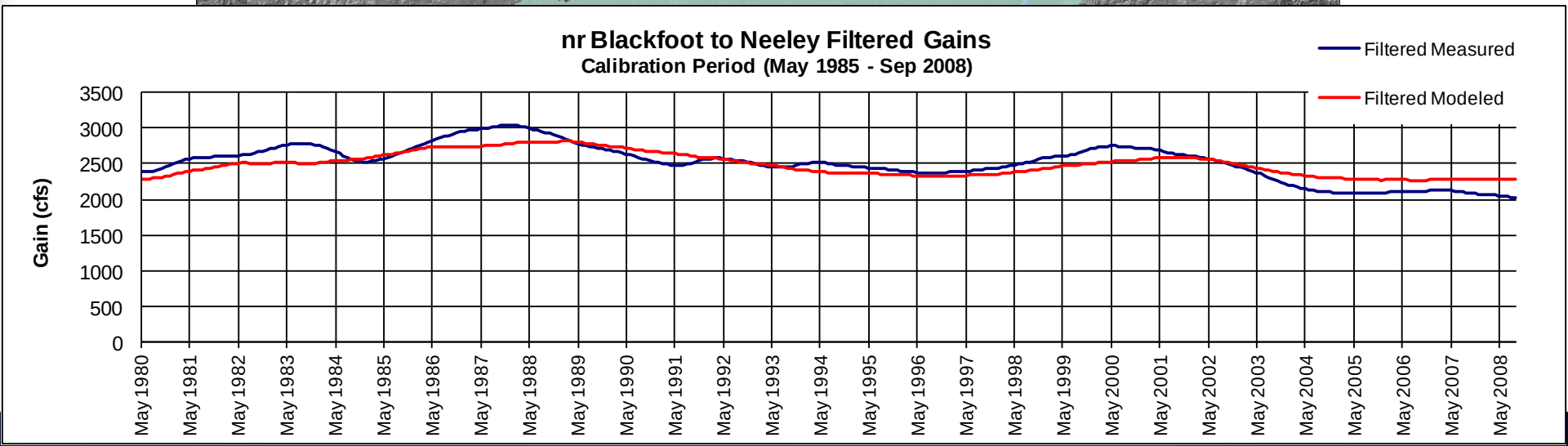


Nr Blackfoot - Neeley

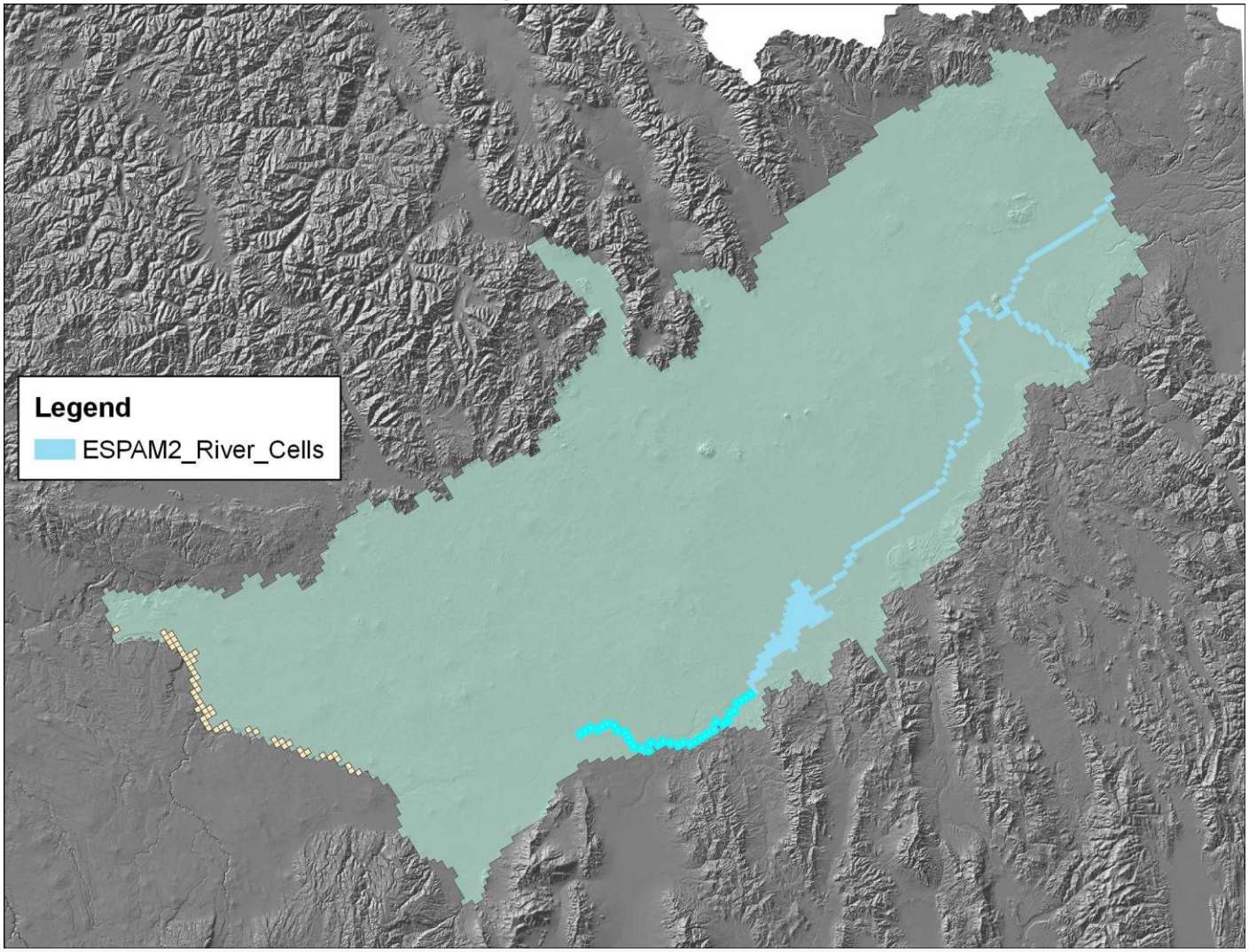


Nr Blackfoot - Neeley

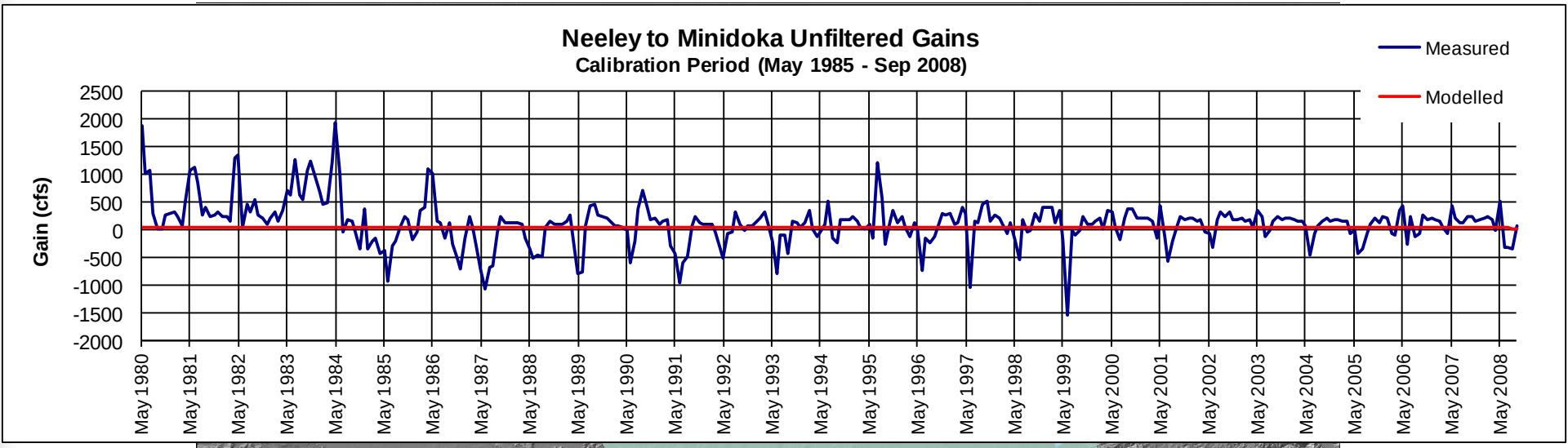


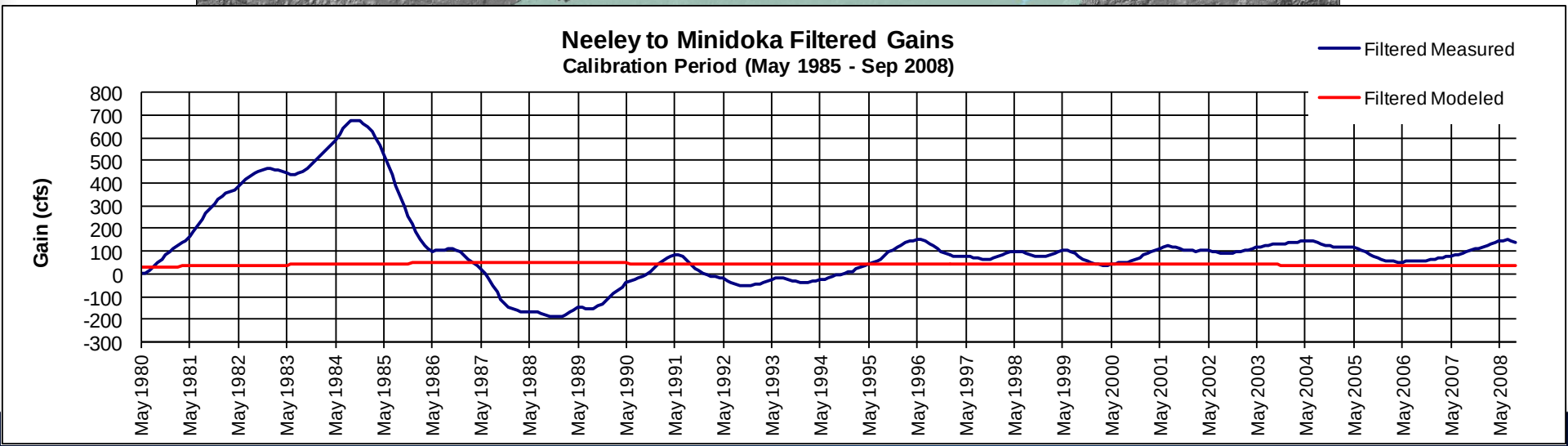


Neeley - Minidoka

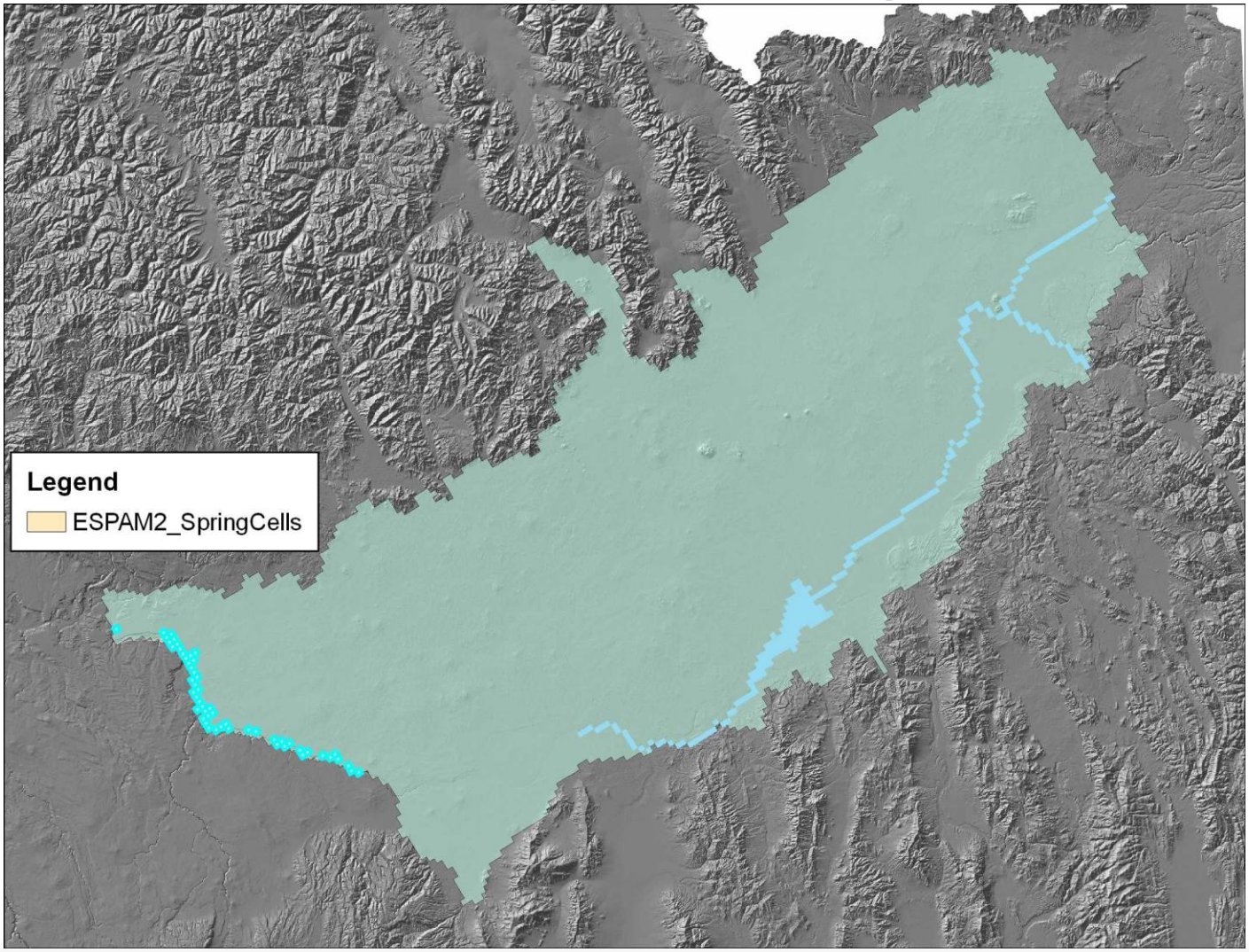


Neeley - Minidoka

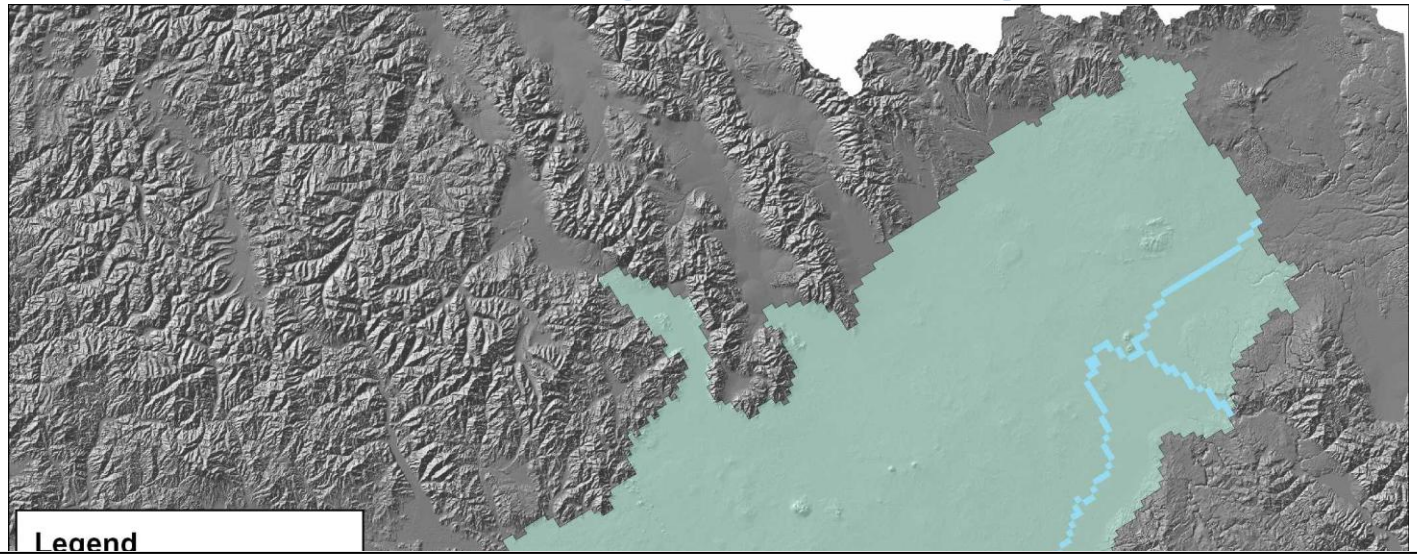


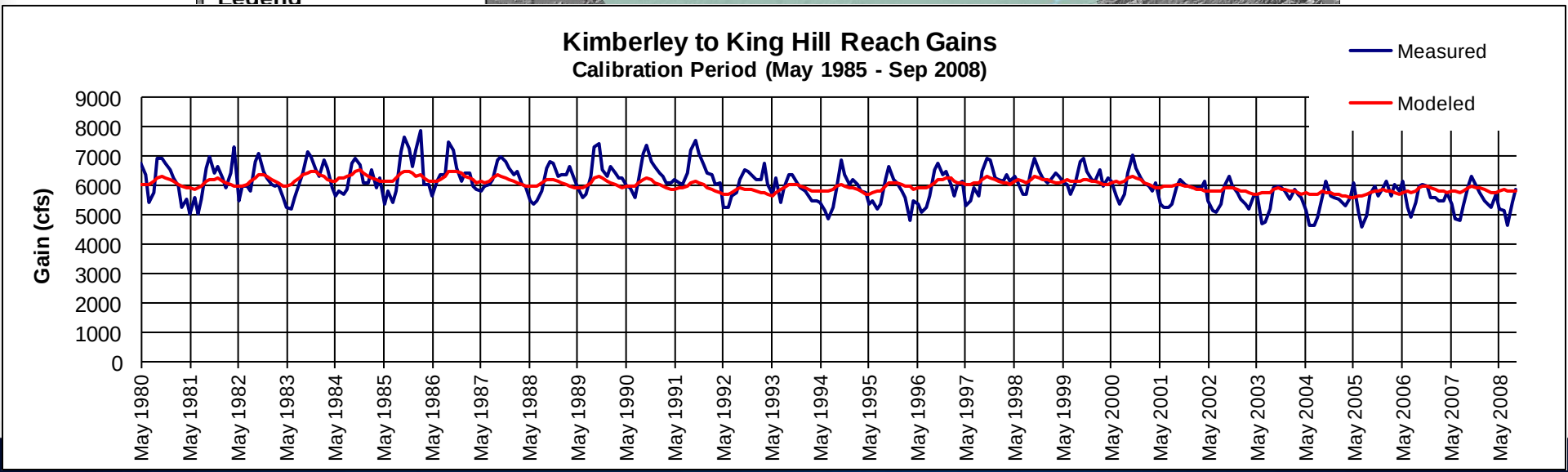


Kimberly – King Hill

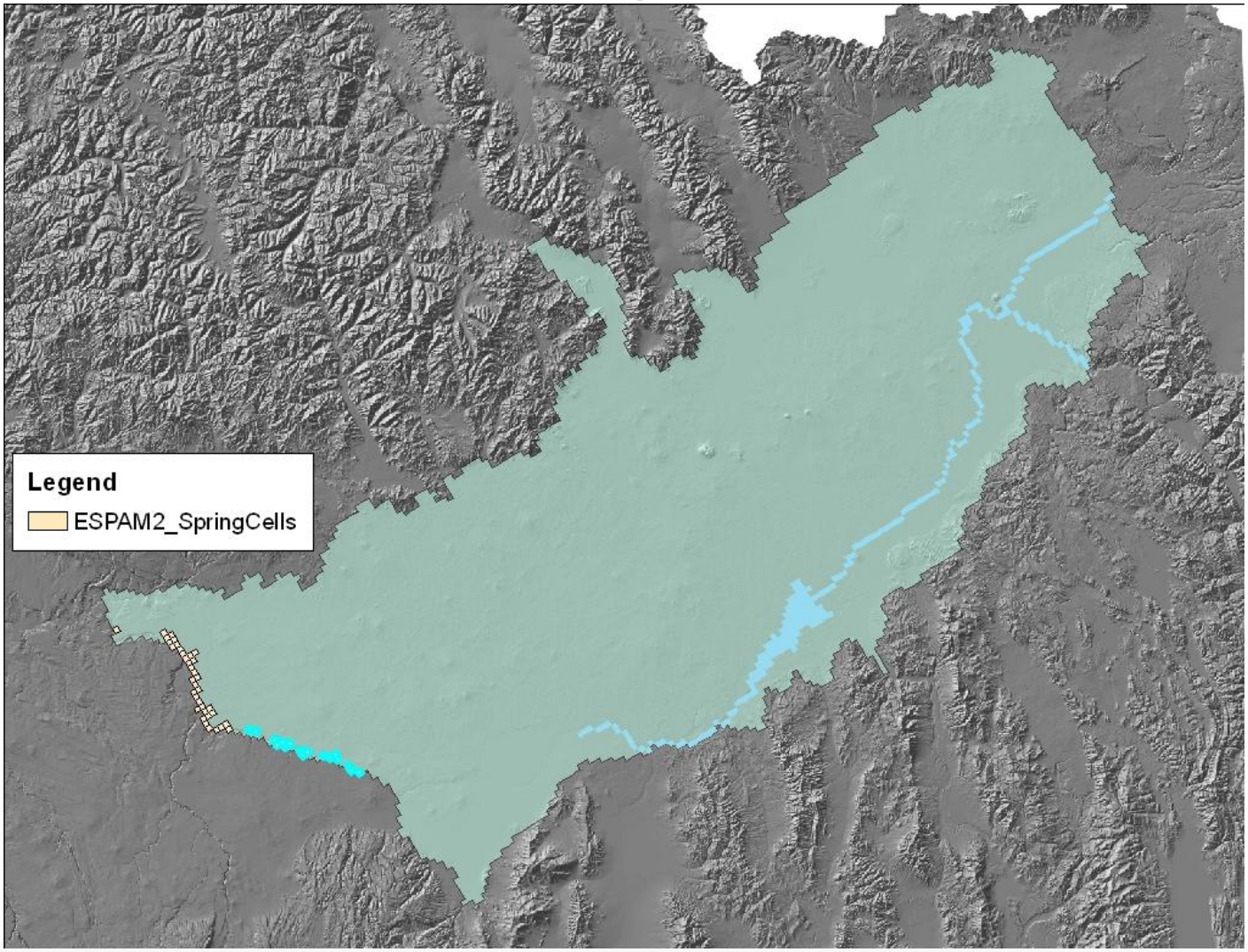


Kimberly – King Hill

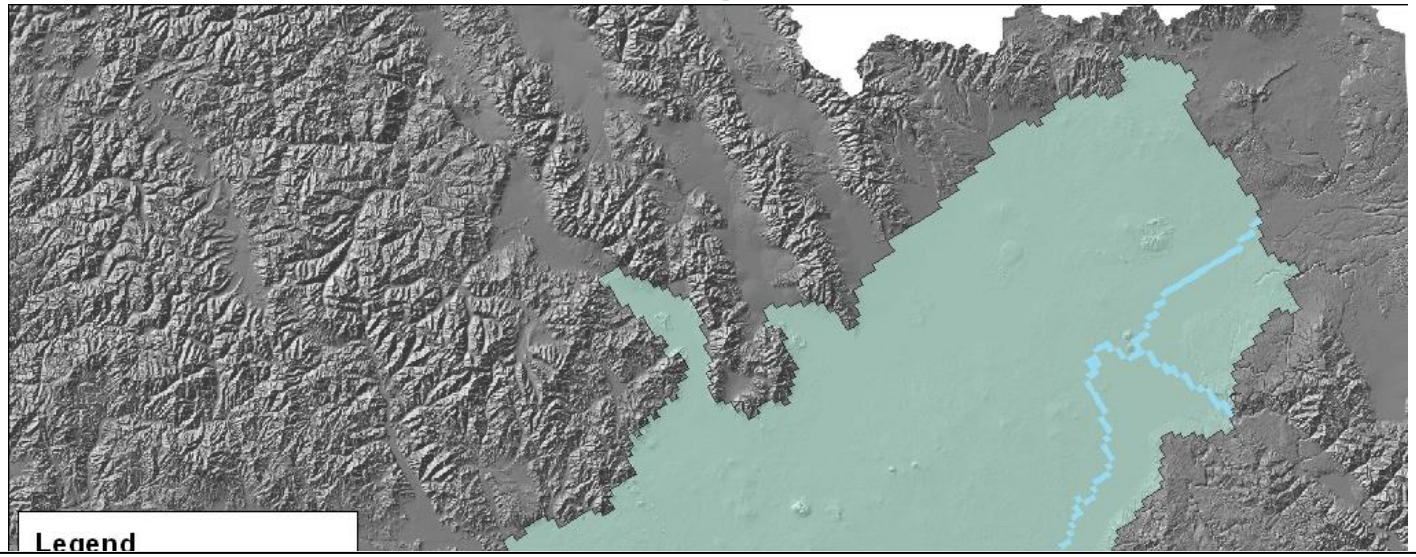


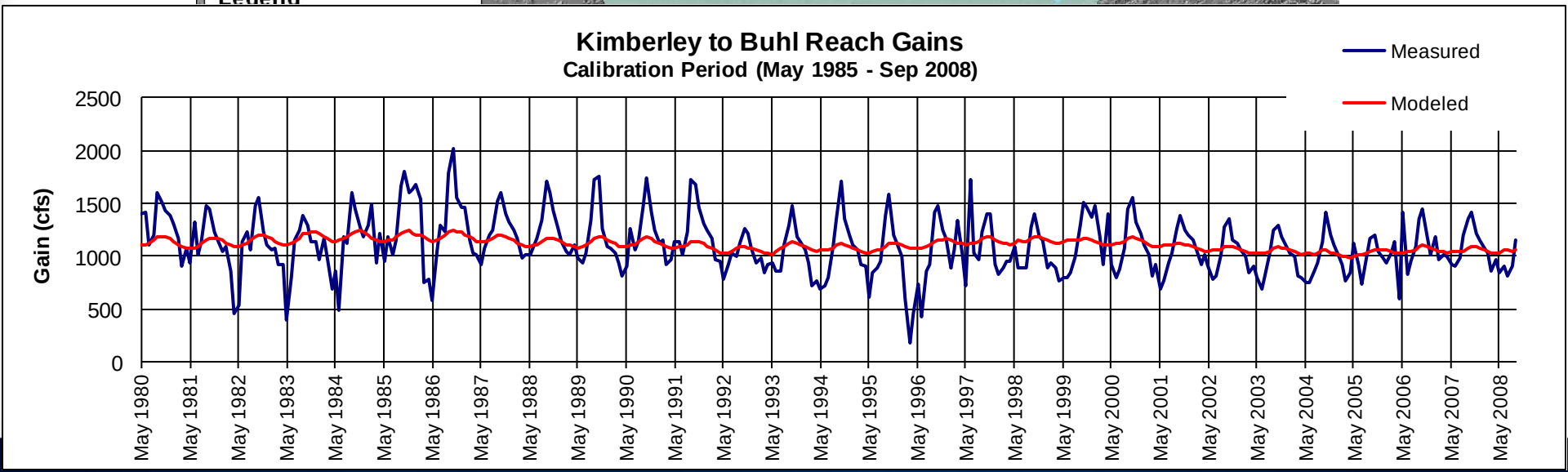


Kimberly – Buhl

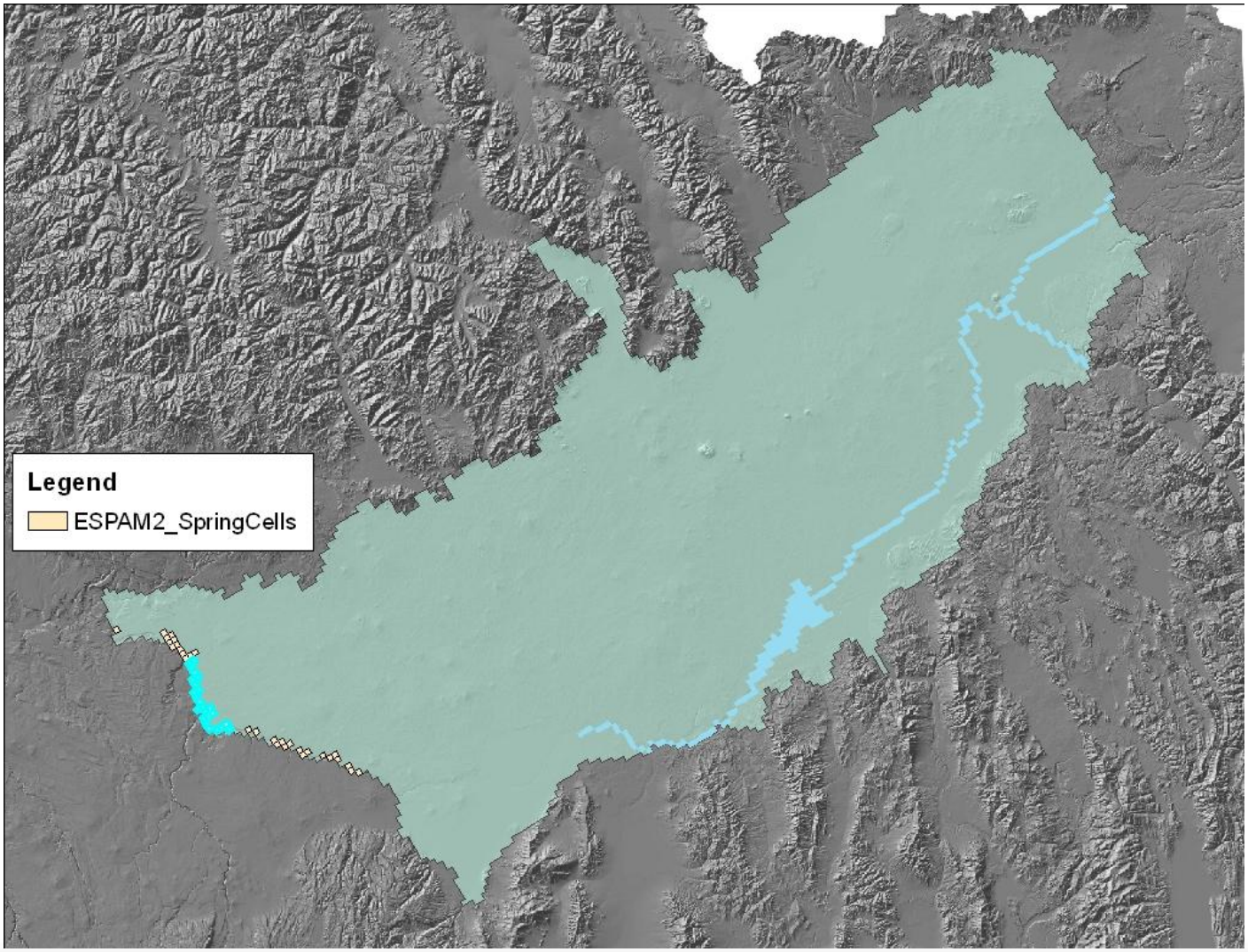


Kimberly – Buhl

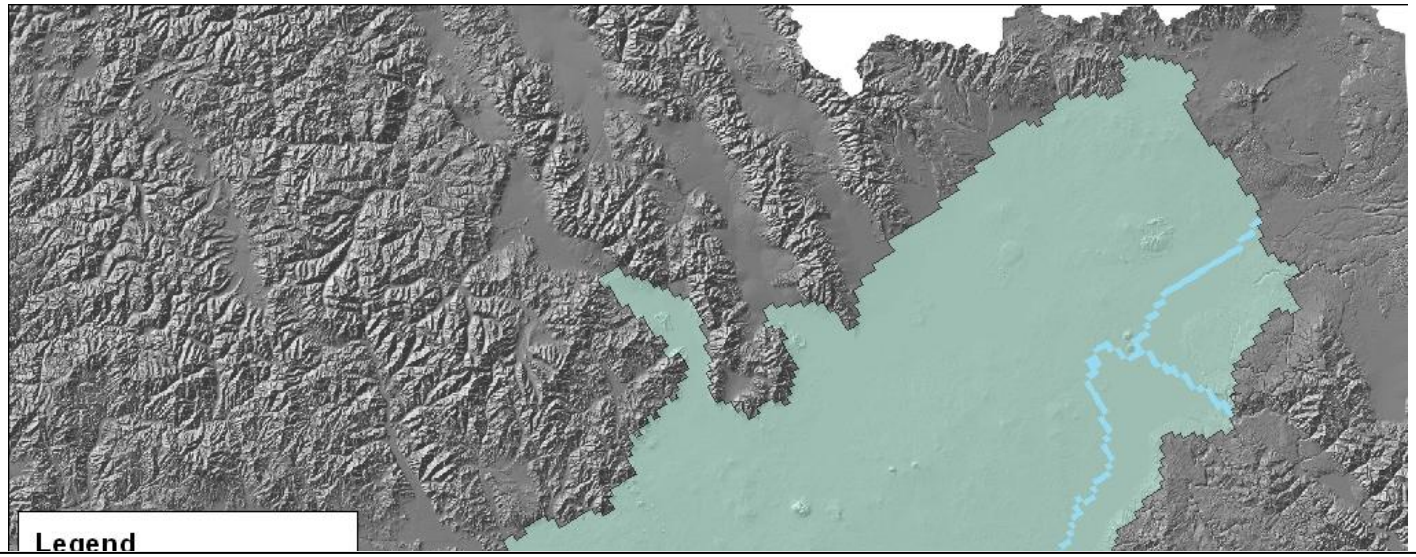


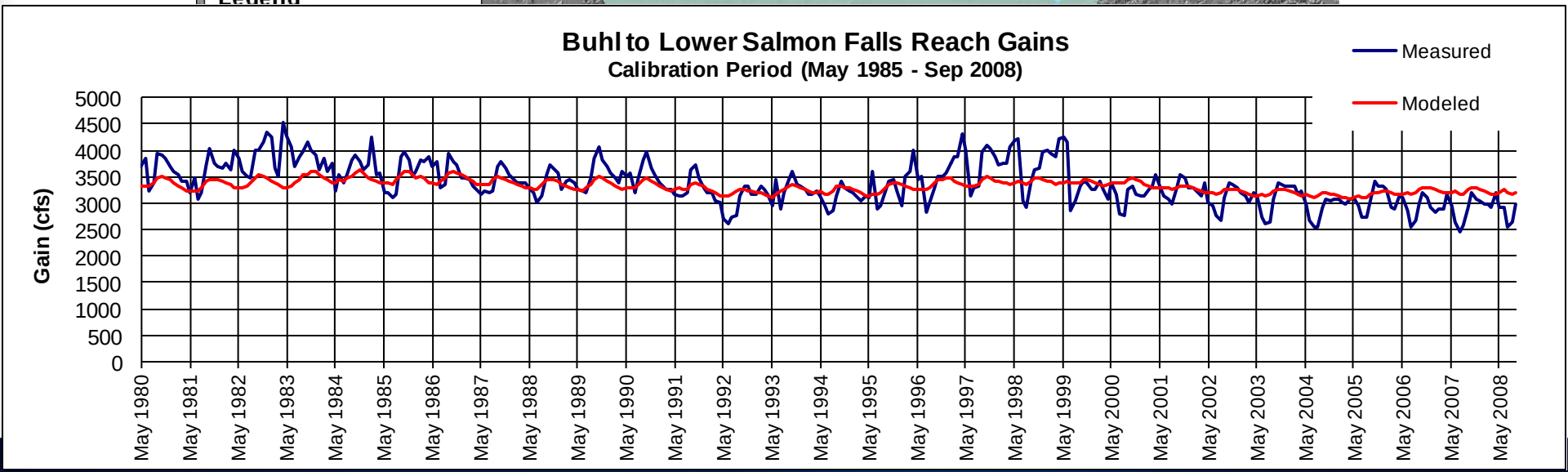


Buhl-Lower Salmon Falls

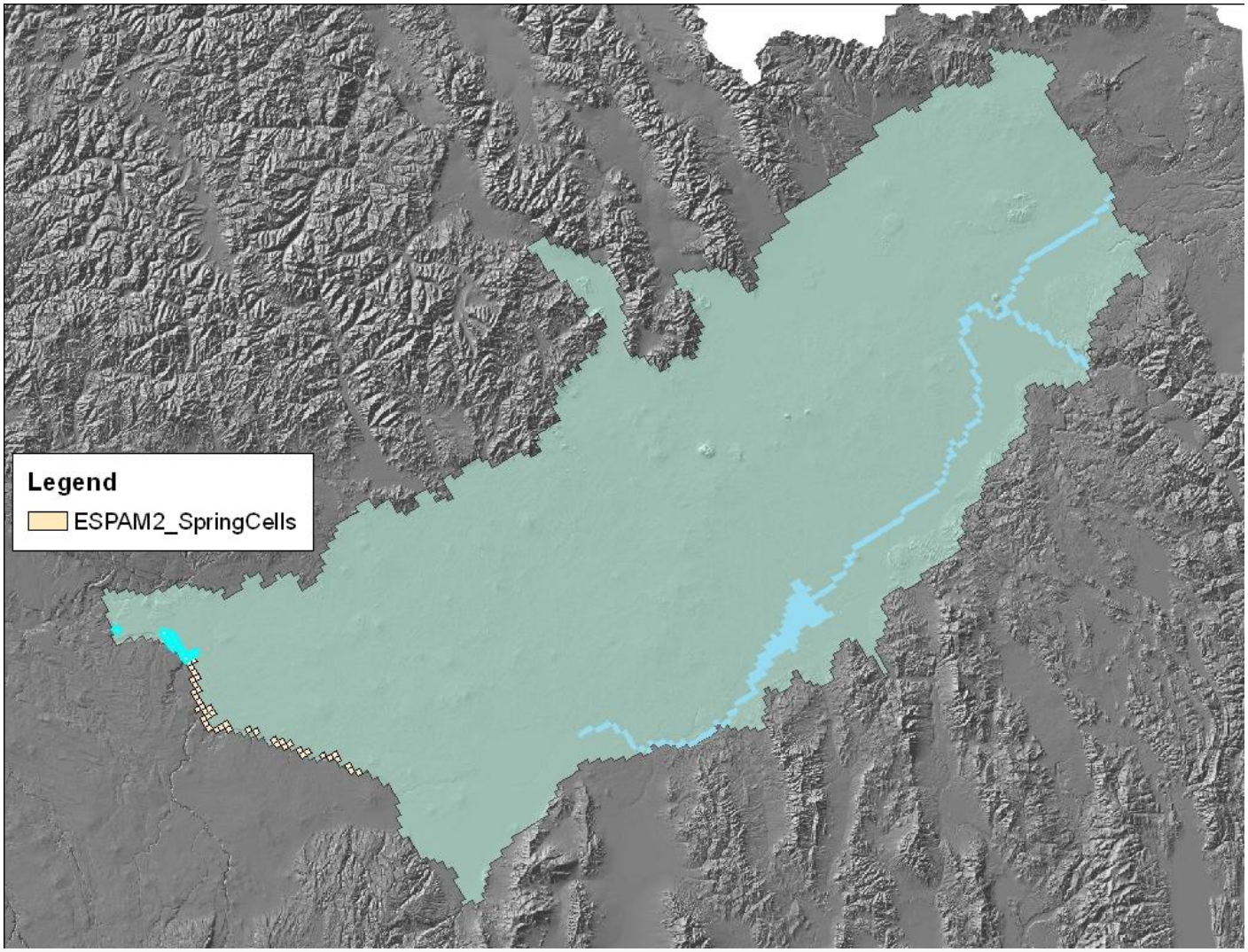


Buhl-Lower Salmon Falls

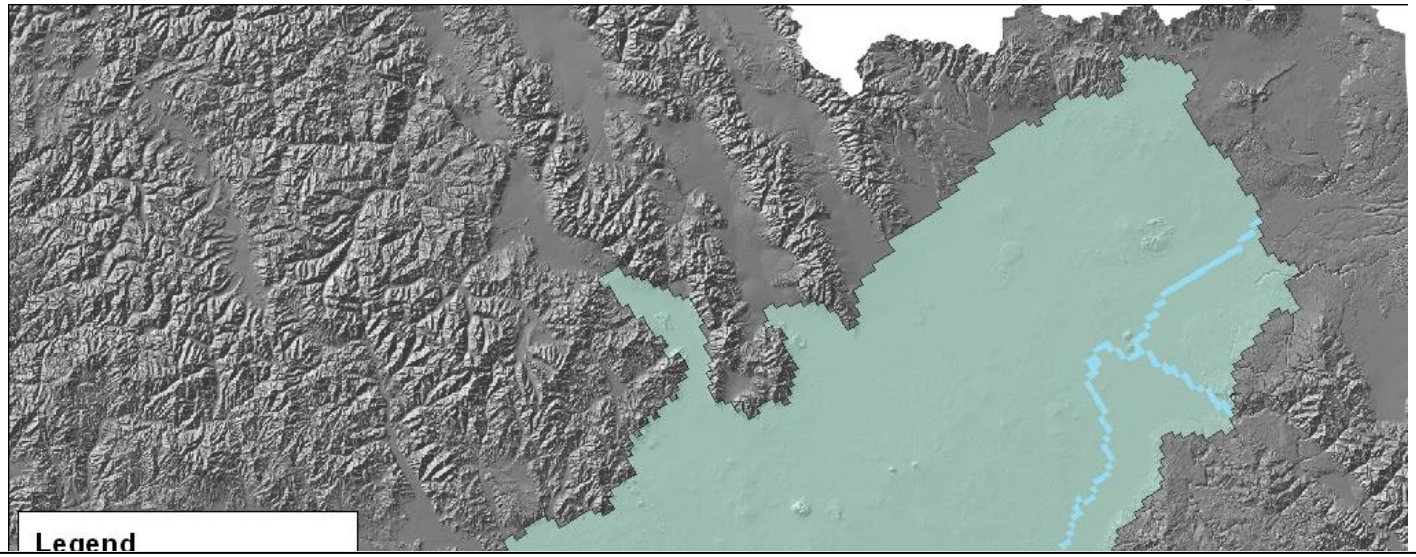


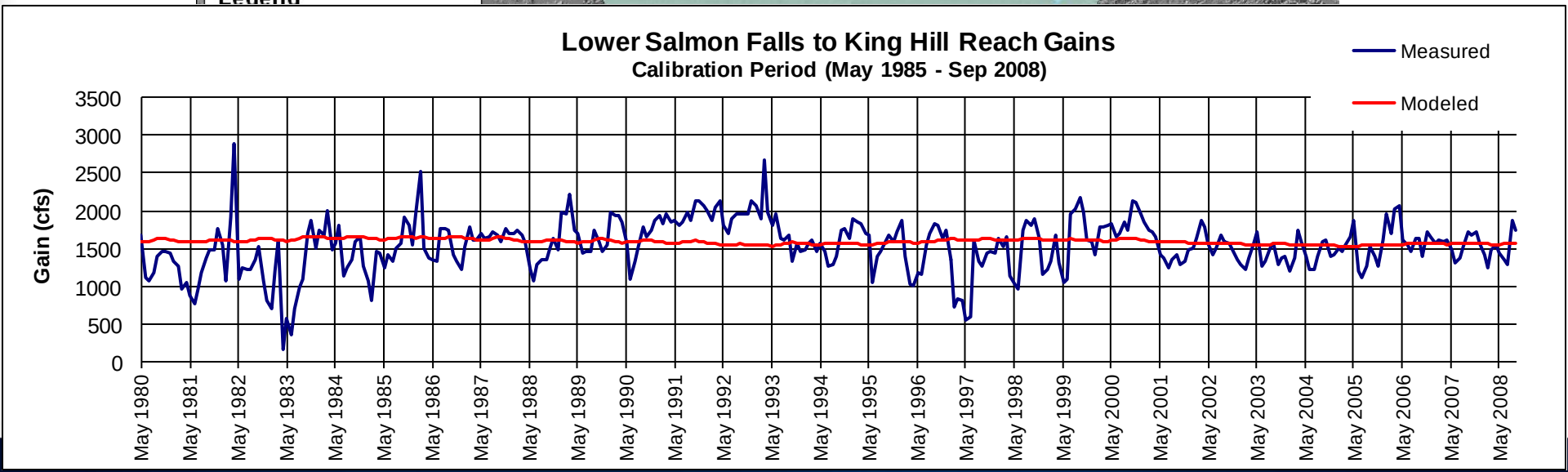


Lower Salmon Falls-King Hill

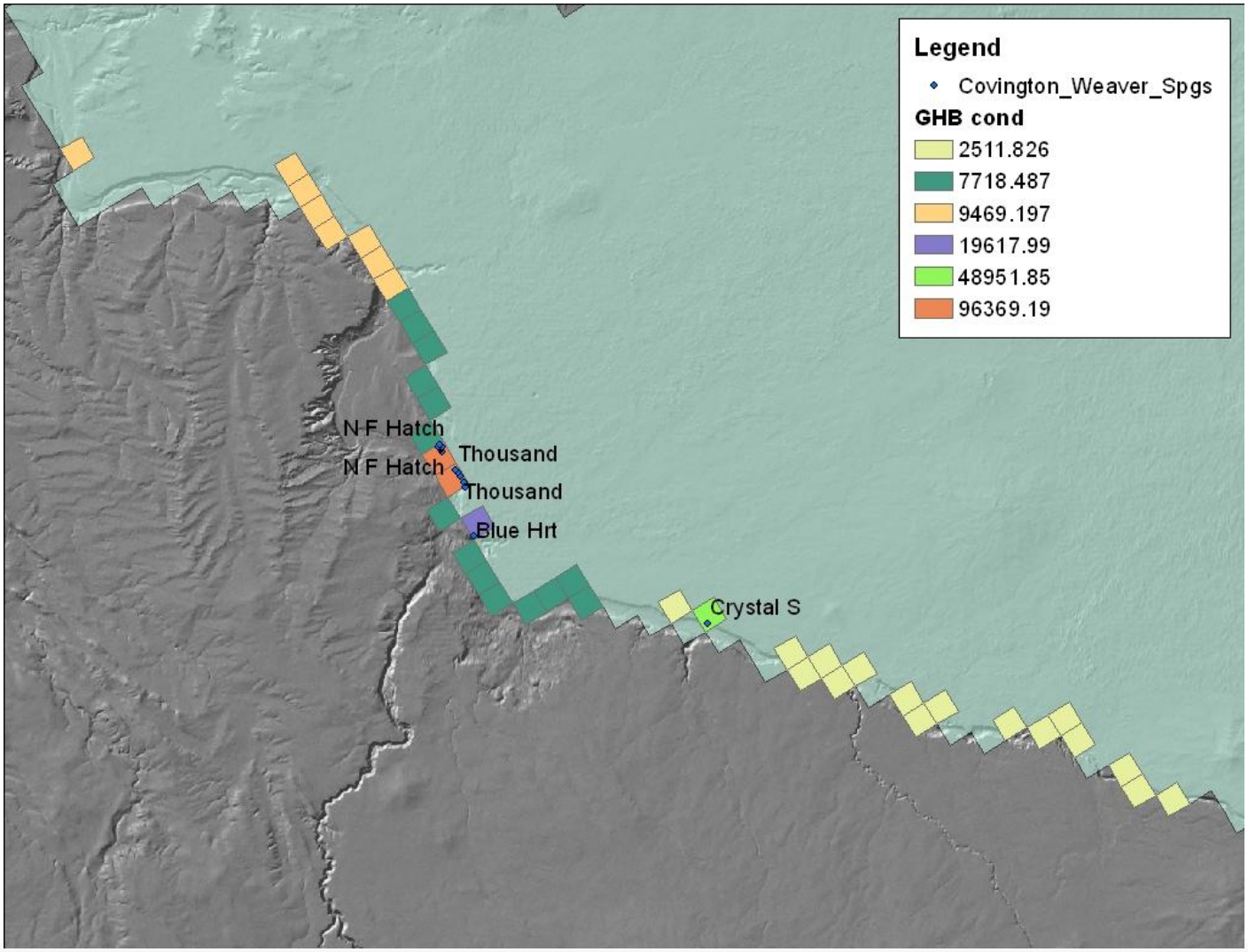


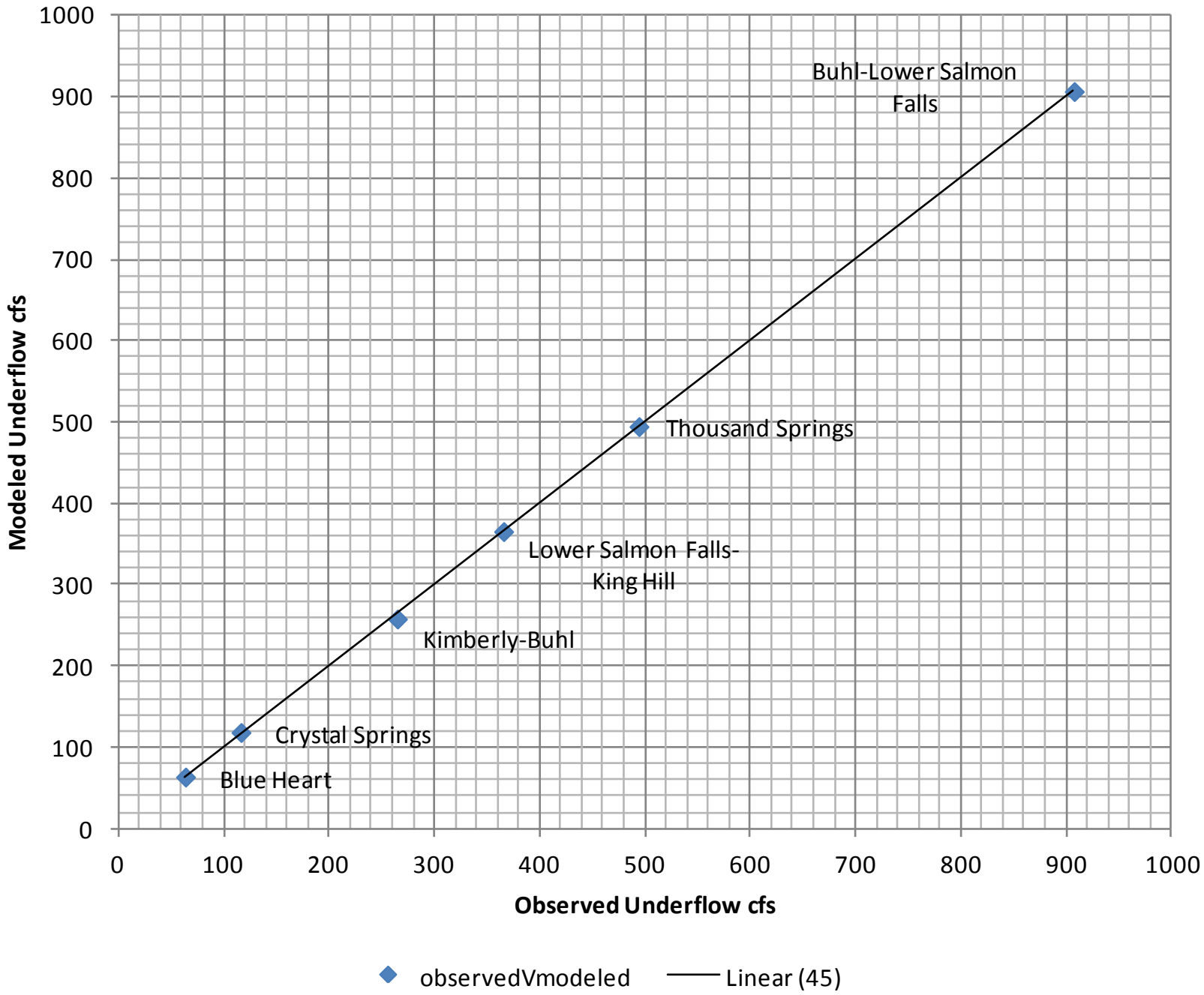
Lower Salmon Falls-King Hill

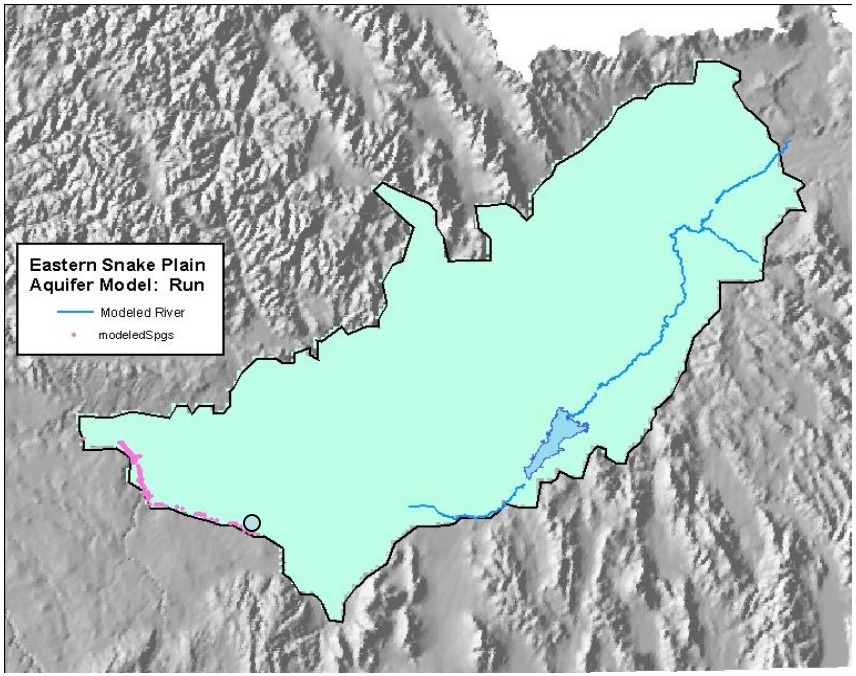




Underflow

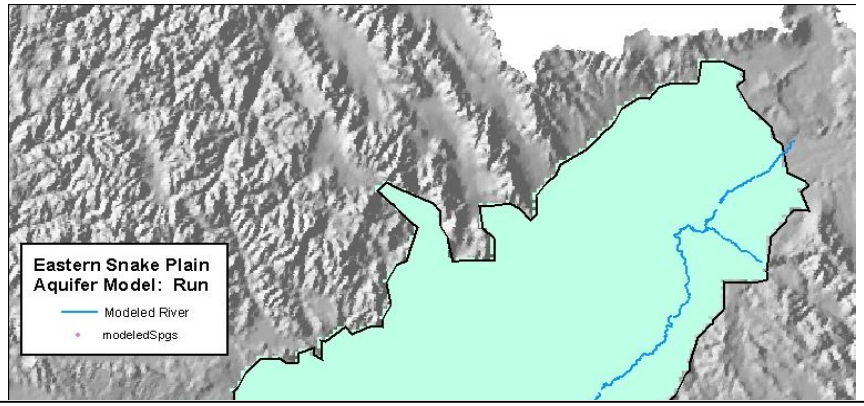

Legend
Covington_Weaver_Spgs
GHB cond
2511.826
7718.487
9469.197
19617.99
48951.85
96369.19
N F Hatch
Thousand
N F Hatch
Thousand
Blue Hrt
Crystal S

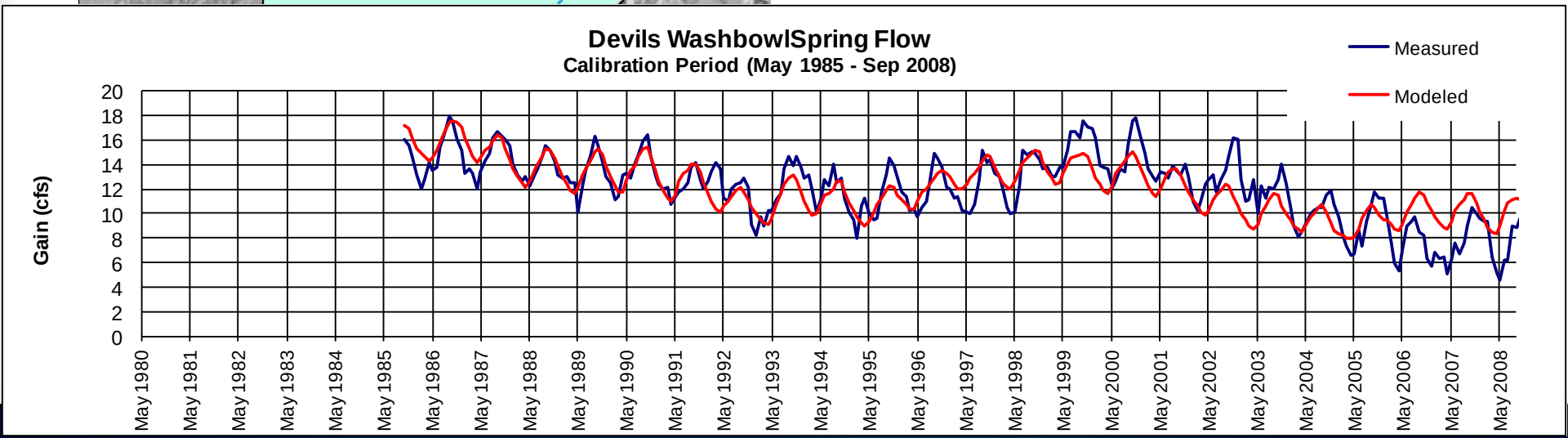

Modeled Underflow cfs
Observed Underflow cfs
0
100
200
300
400
500
600
700
800
900
1000
Buhl-Lower Salmon Falls
Thousand Springs
Lower Salmon Falls-King Hill
Kimberly-Buhl
Crystal Springs
Blue Heart
observedVmodeled
Linear (45)

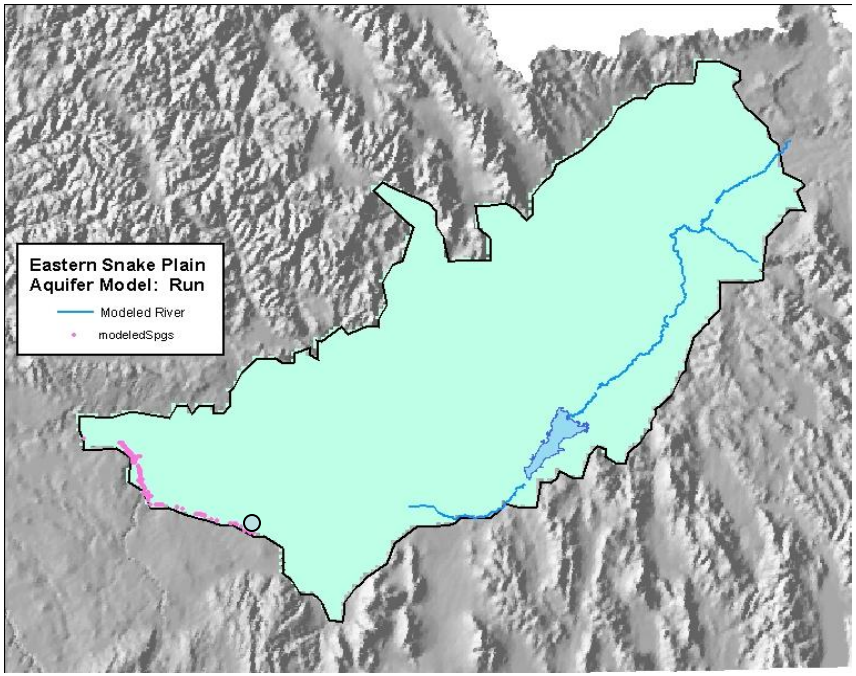


- Devils Washbowl

- Devils Washbowl

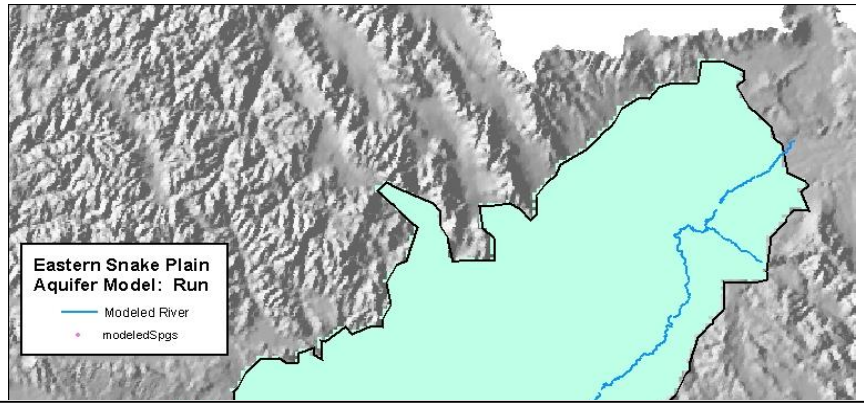


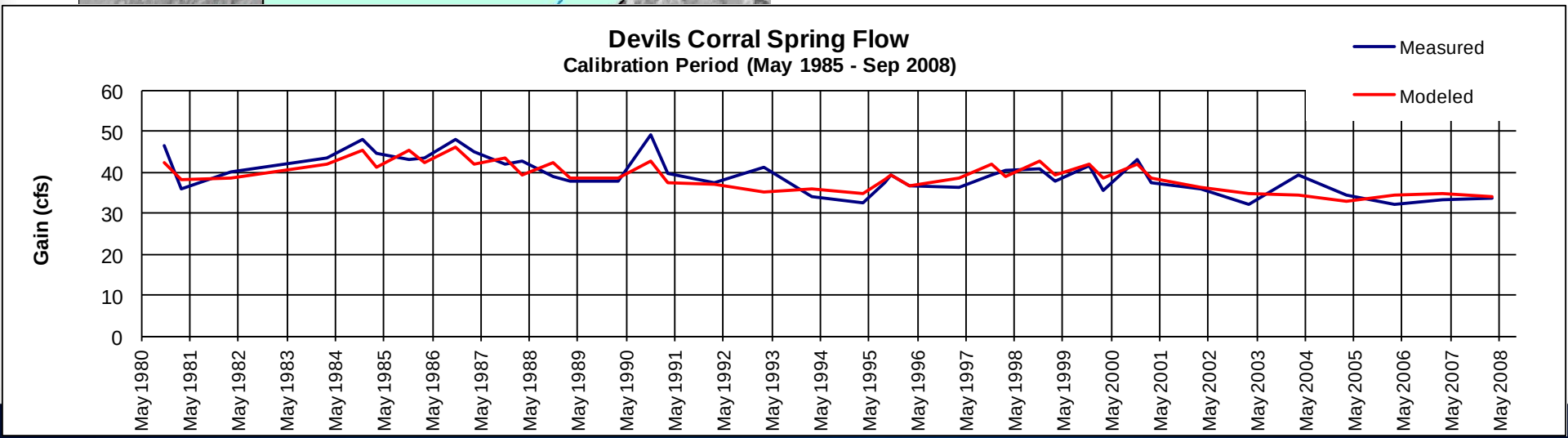


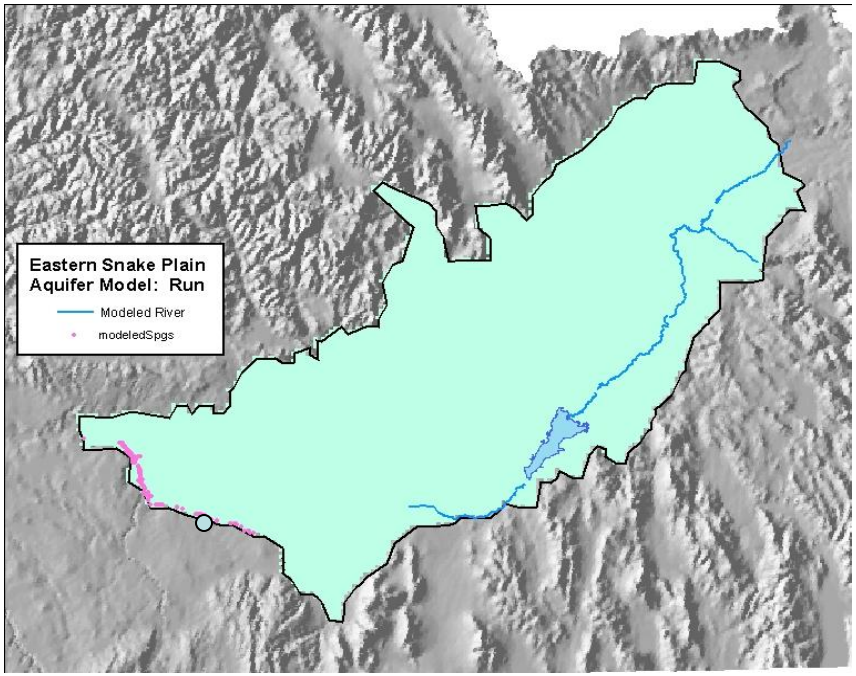


- Devils Corral

- Devils Corral

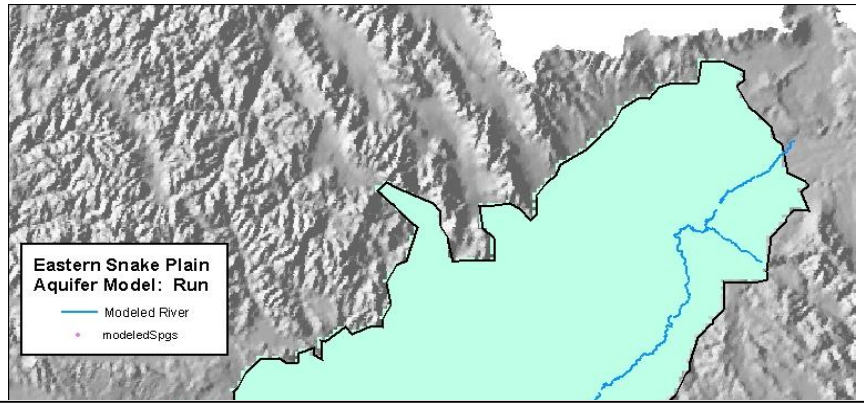


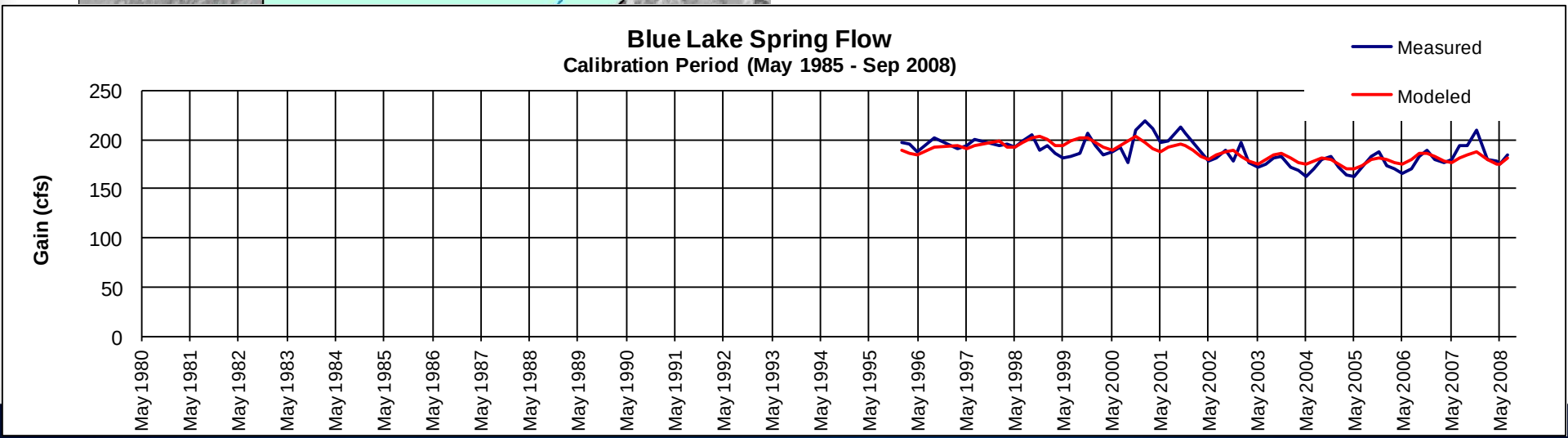


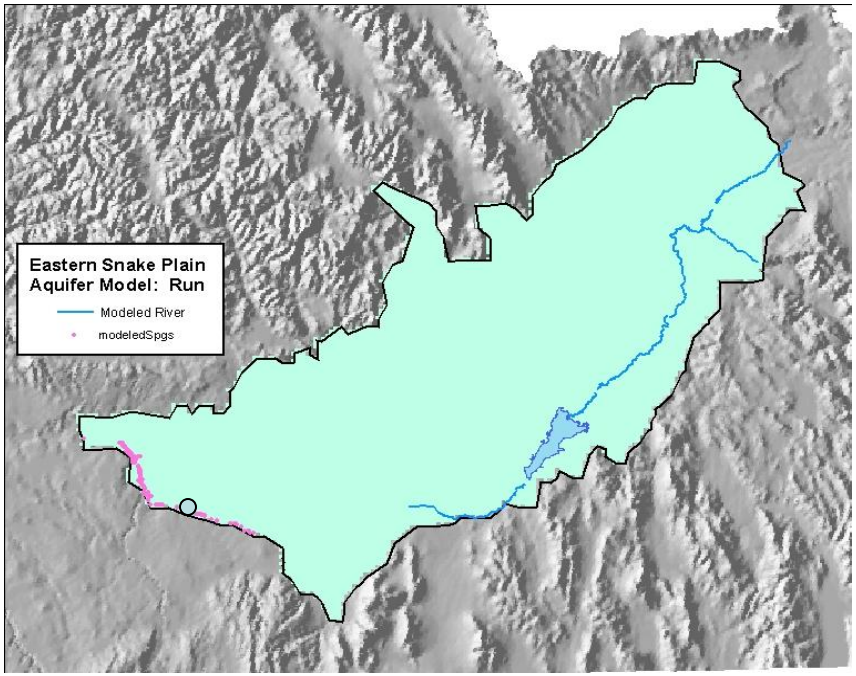

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Blue Lakes

- Blue Lakes

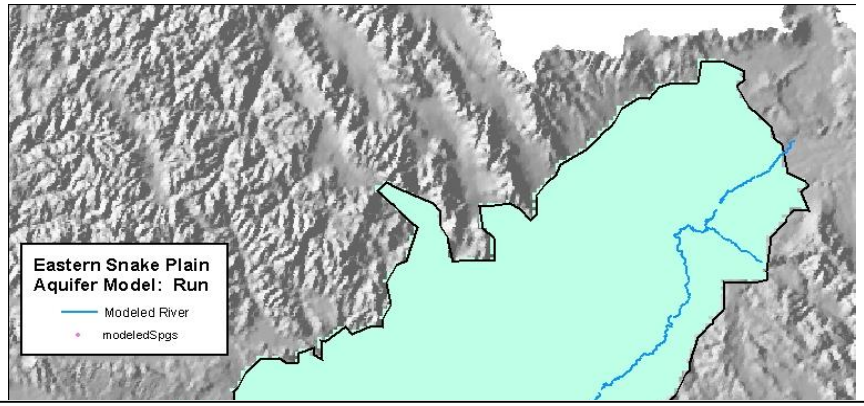

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

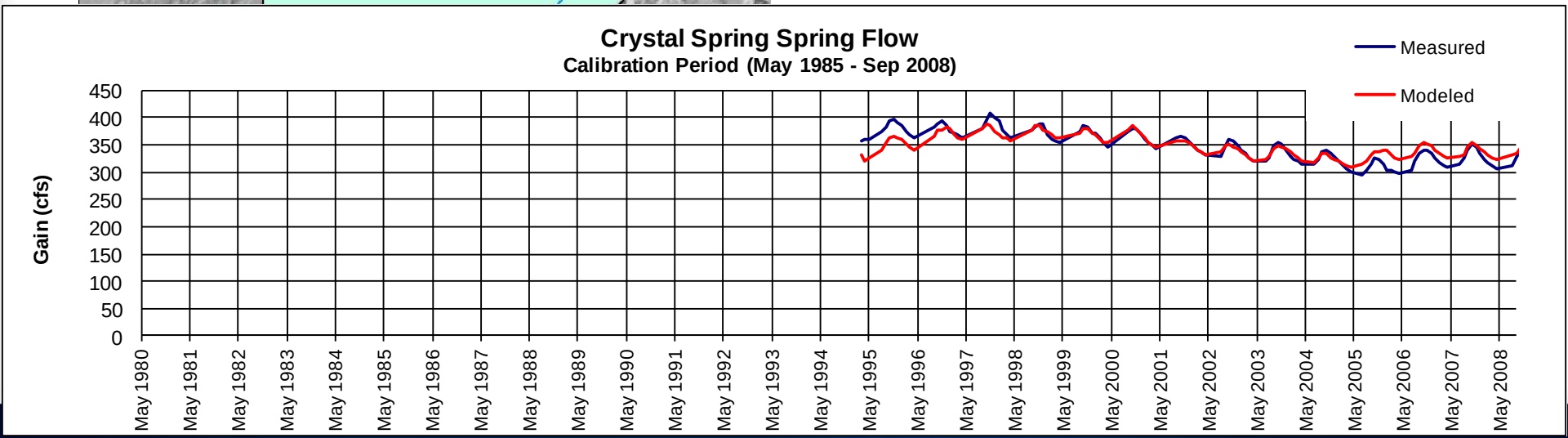

Blue Lake Spring Flow
Calibration Period (May 1985 - Sep 2008)
Measured
Modeled
Gain (cfs)
250
200
150
100
50
0
May 1980
May 1981
May 1982
May 1983
May 1984
May 1985
May 1986
May 1987
May 1988
May 1989
May 1990
May 1991
May 1992
May 1993
May 1994
May 1995
May 1996
May 1997
May 1998
May 1999
May 2000
May 2001
May 2002
May 2003
May 2004
May 2005
May 2006
May 2007
May 2008

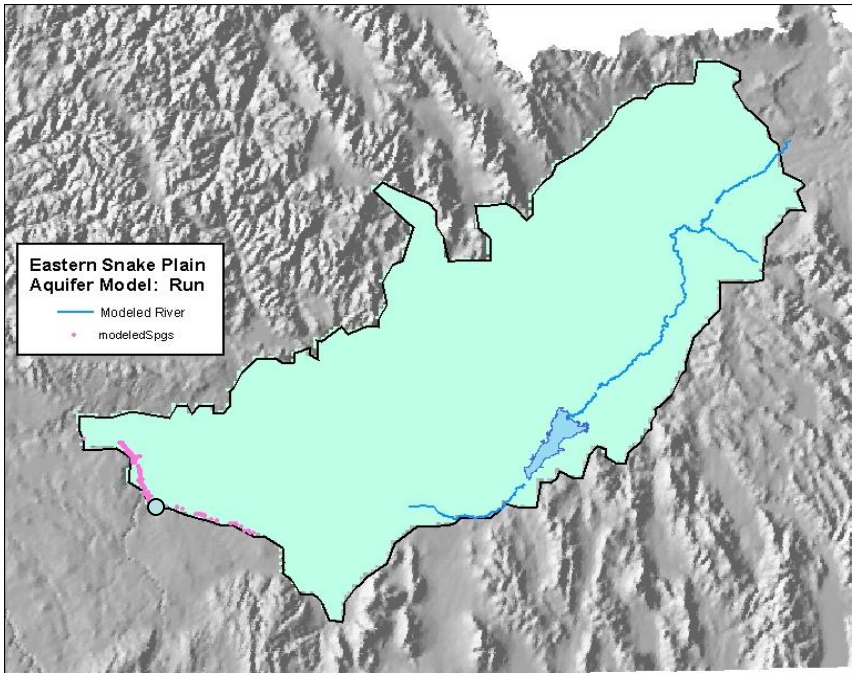


- Crystal Springs

- Crystal Springs

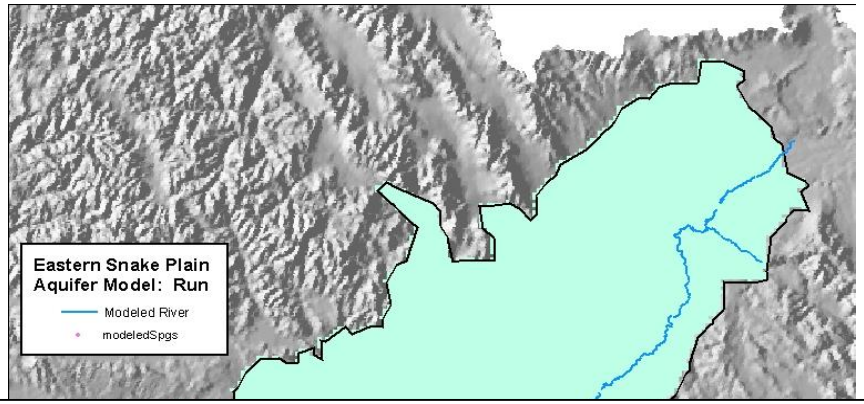


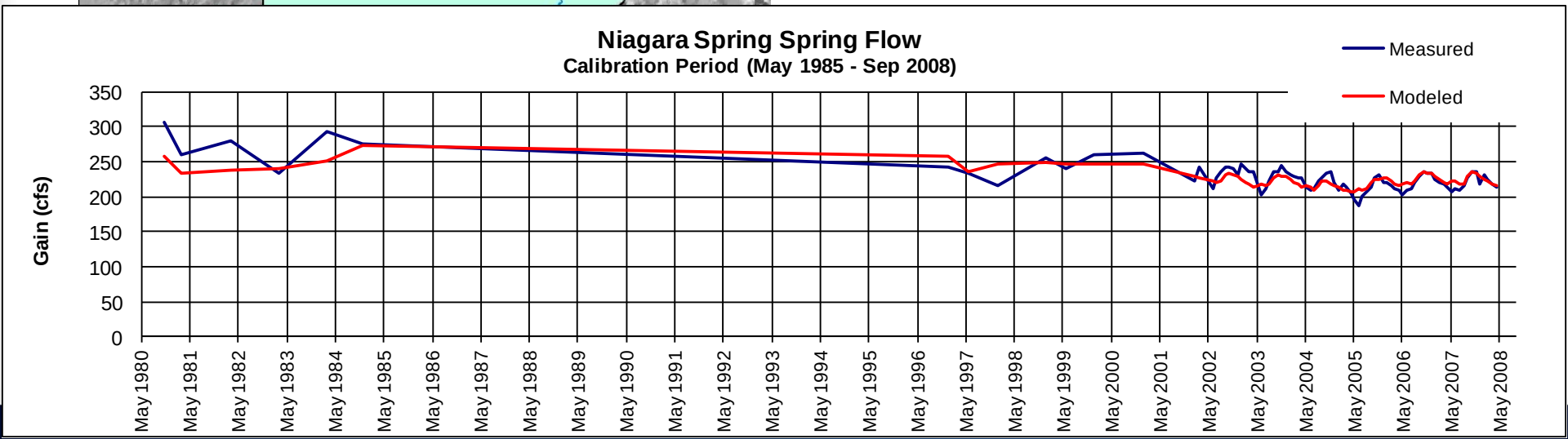



Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Niagara

- Niagara


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs


Niagara Spring Spring Flow
Calibration Period (May 1985 - Sep 2008)
Measured
Modeled
Gain (cfs)
350
300
250
200
150
100
50
0
May 1980
May 1981
May 1982
May 1983
May 1984
May 1985
May 1986
May 1987
May 1988
May 1989
May 1990
May 1991
May 1992
May 1993
May 1994
May 1995
May 1996
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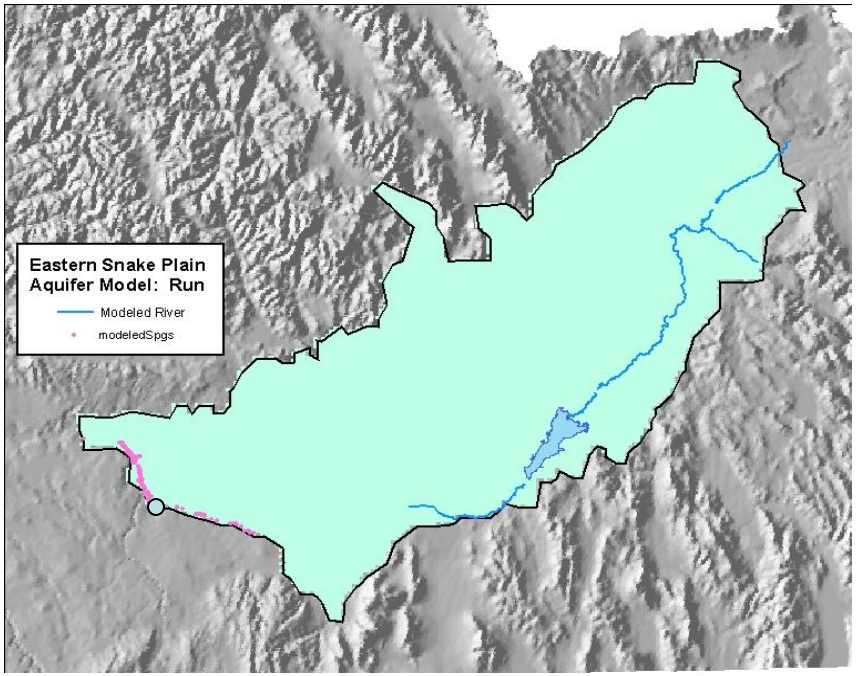
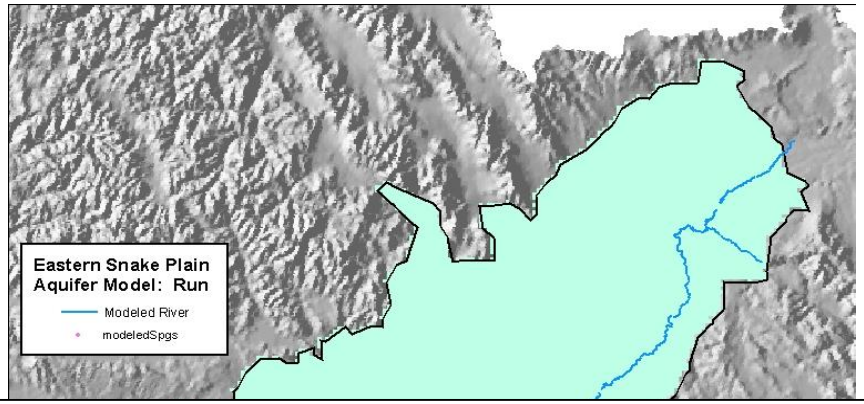
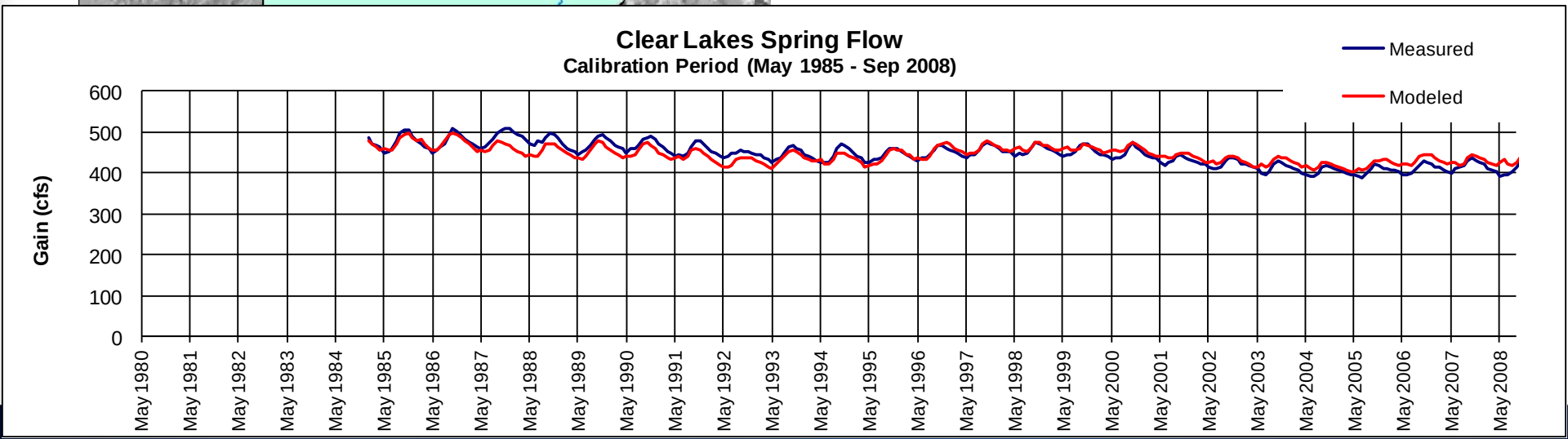
May 1998
May 1999
May 2000
May 2001
May 2002
May 2003
May 2004
May 2005
May 2006
May 2007
May 2008


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Clear Lakes

- Clear Lakes


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs


Clear Lakes Spring Flow
Calibration Period (May 1985 - Sep 2008)
Measured
Modeled
Gain (cfs)
600
500
400
300
200
100
0
May 1980
May 1981
May 1982
May 1983
May 1984
May 1985
May 1986
May 1987
May 1988
May 1989
May 1990
May 1991
May 1992
May 1993
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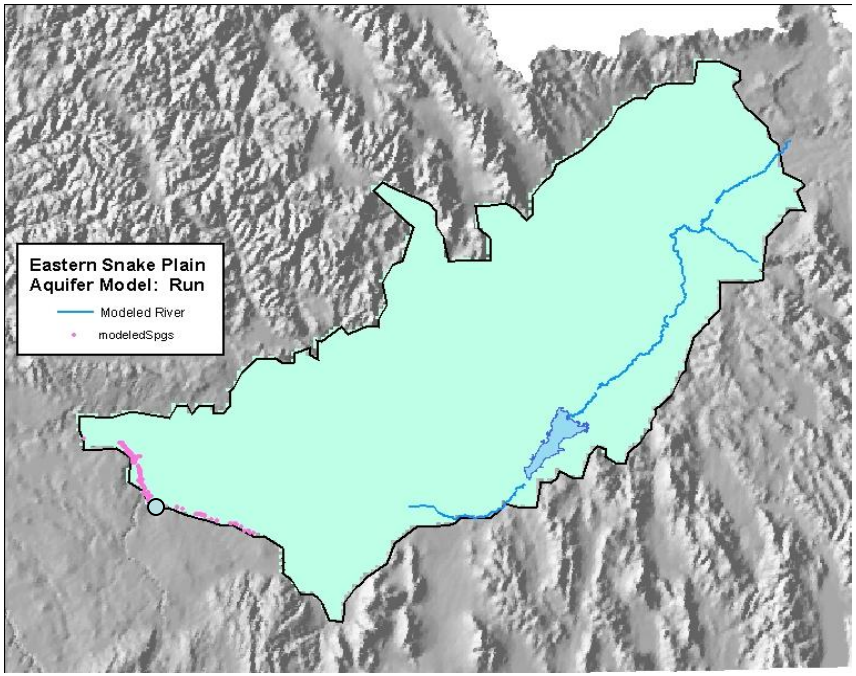
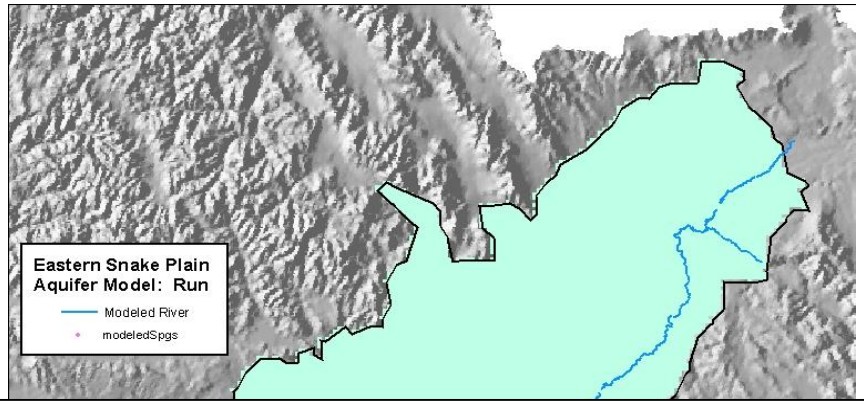
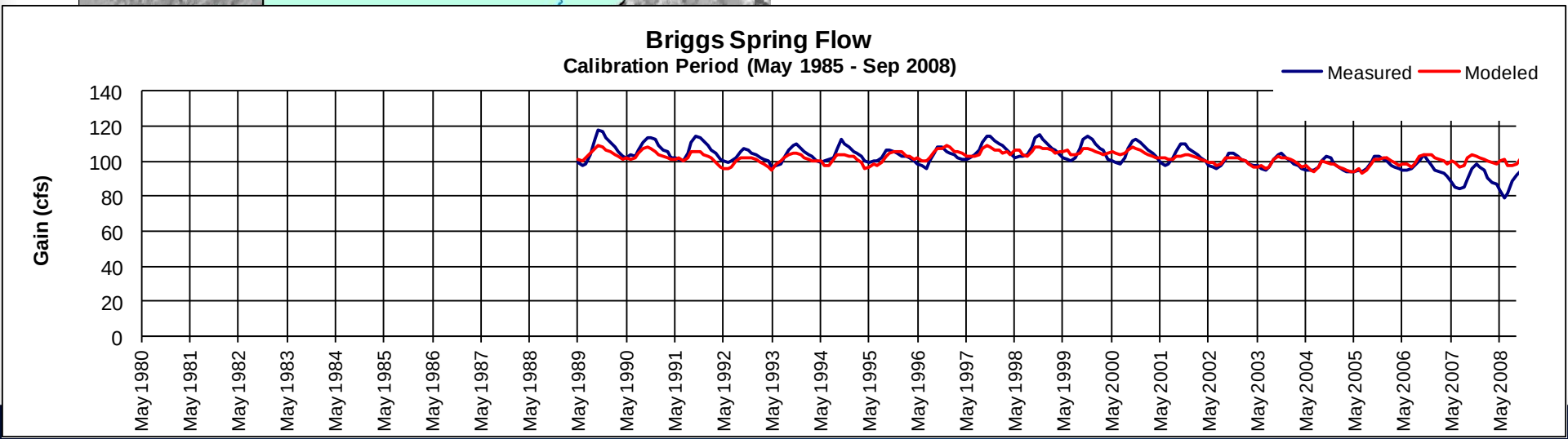
May 1995
May 1996
May 1997
May 1998
May 1999
May 2000
May 2001
May 2002
May 2003
May 2004
May 2005
May 2006
May 2007
May 2008

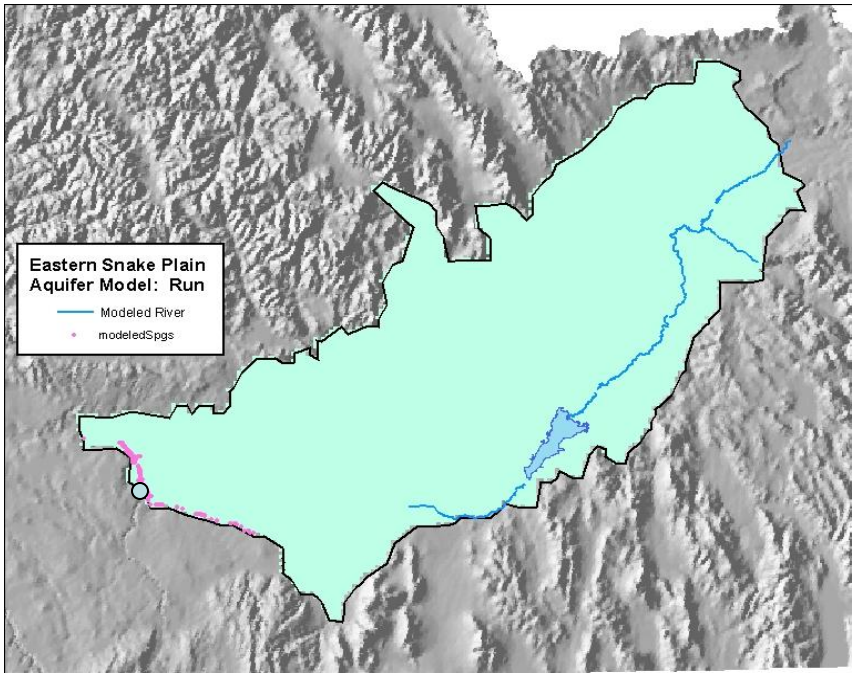


- Briggs Spring

- Briggs Spring

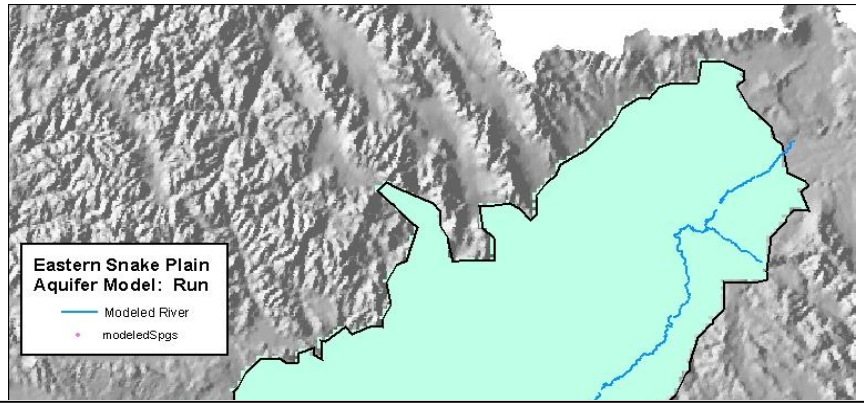


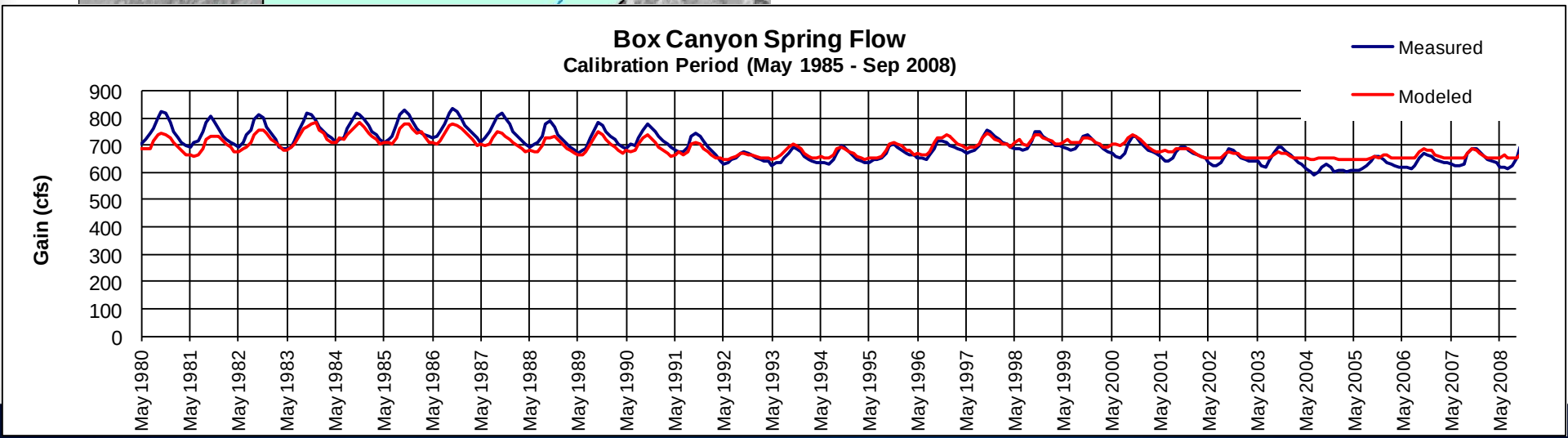


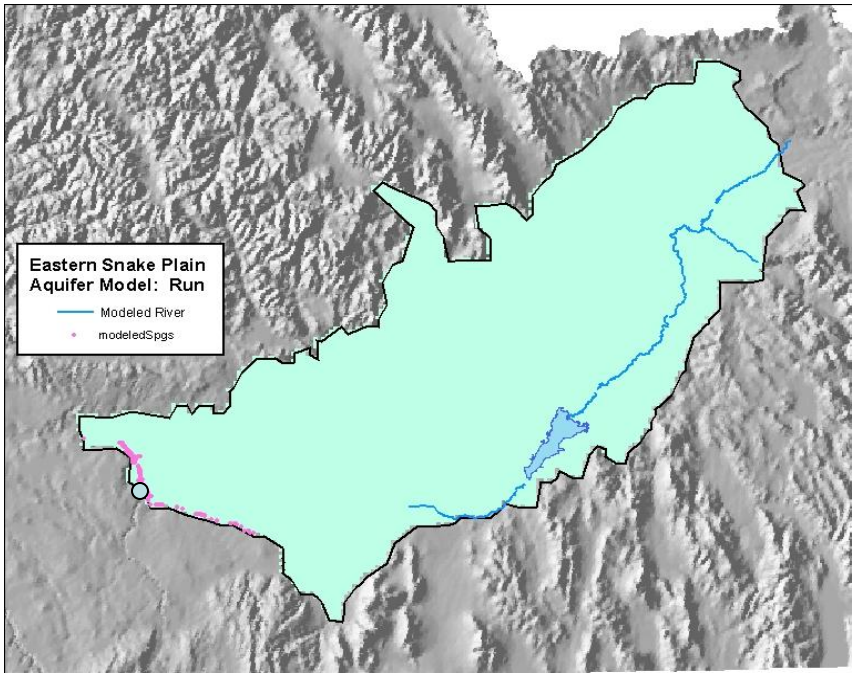


- Box Canyon Spring

- Box Canyon Spring

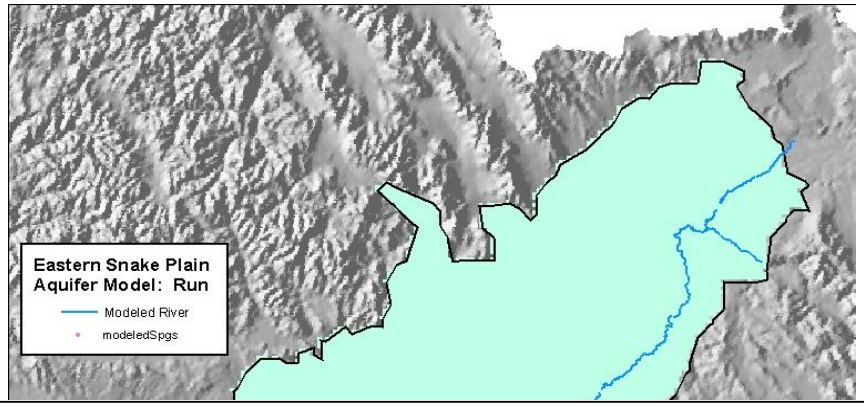


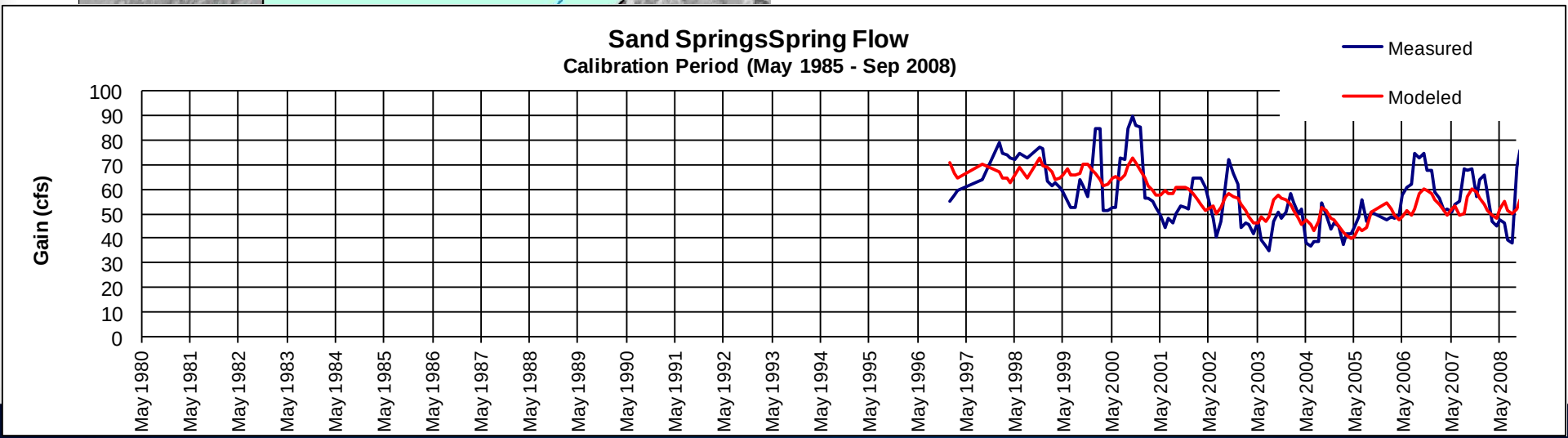


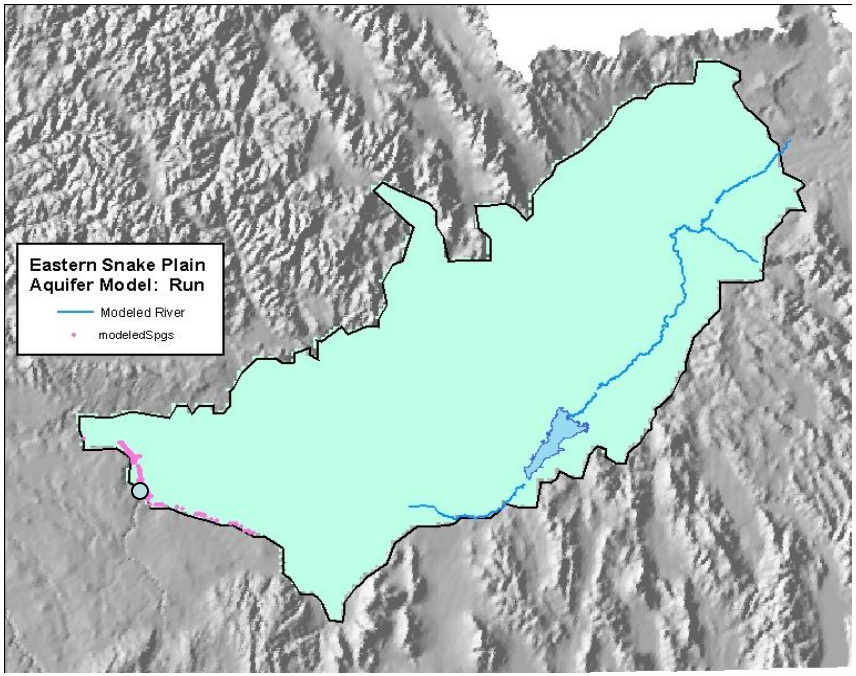


- Sand Springs

- Sand Springs

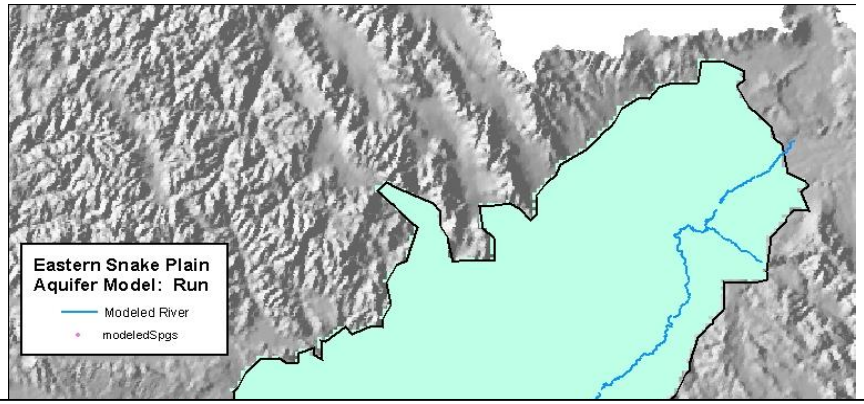


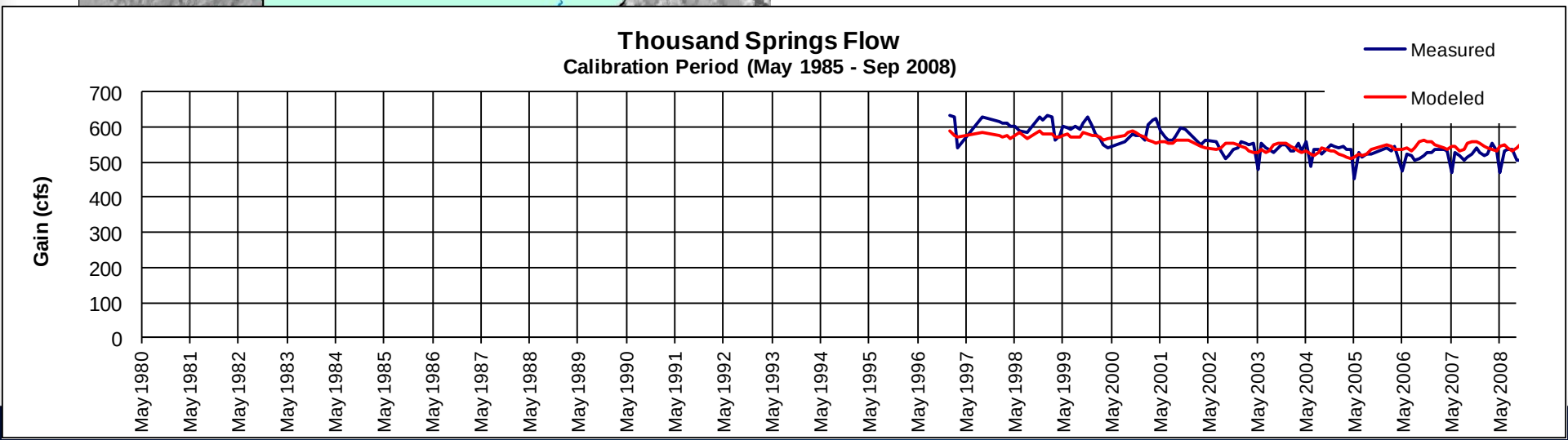


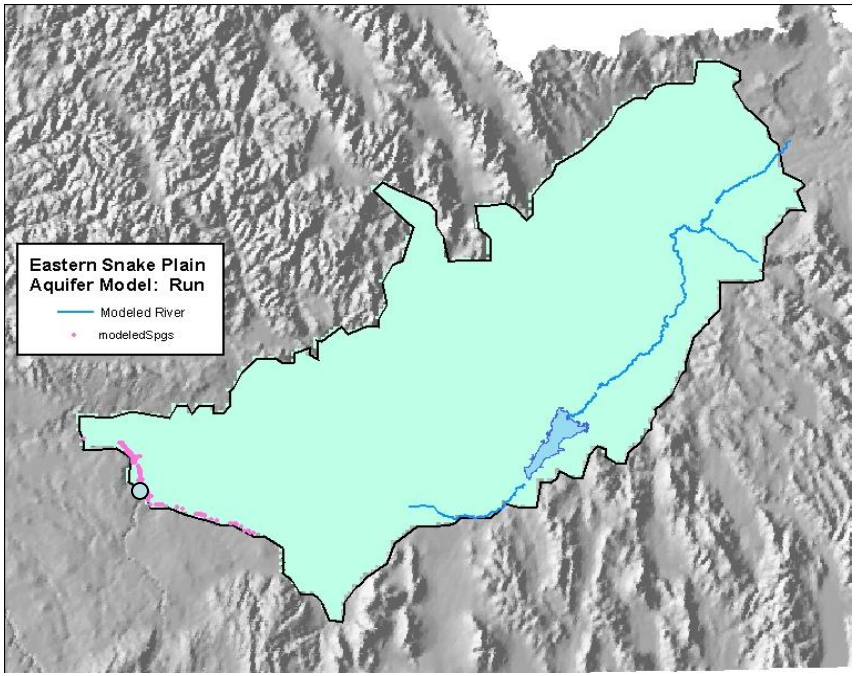


- Thousand Springs

- Thousand Springs

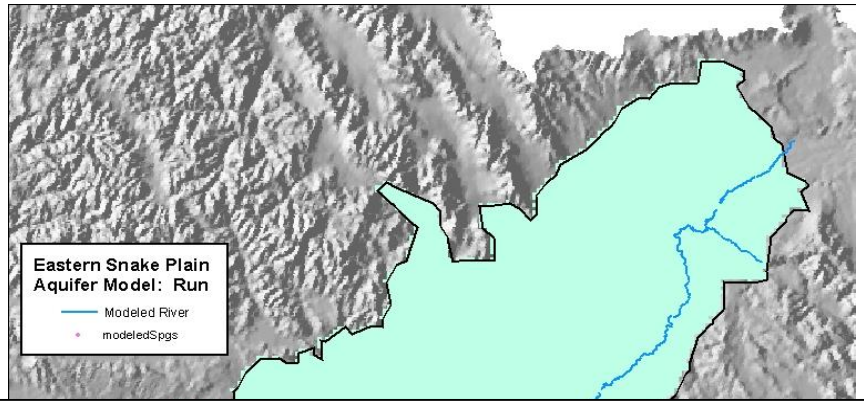


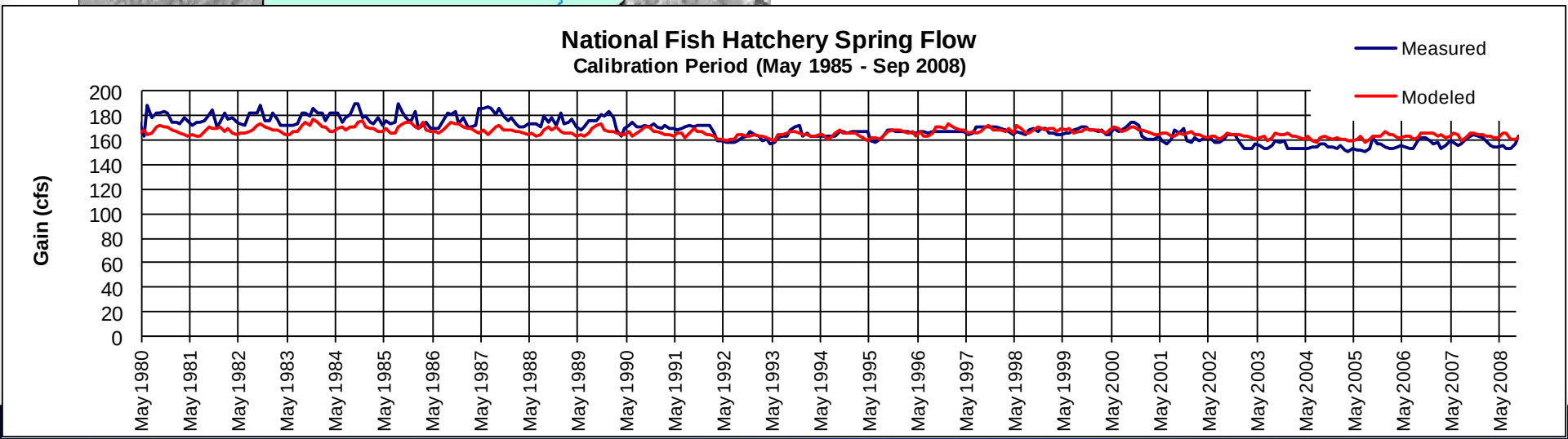


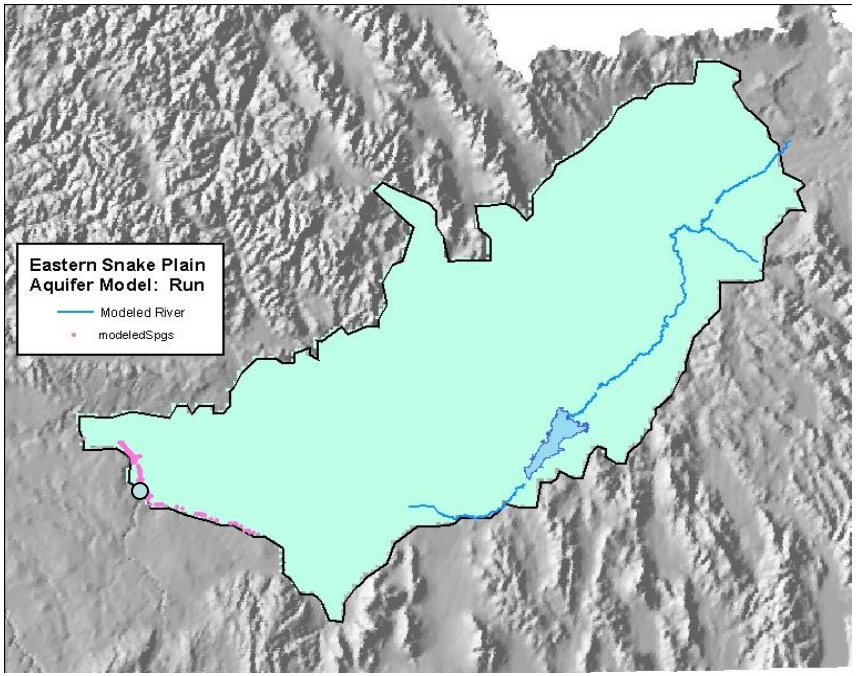


- Ntl Fish Hatchery

- Ntl Fish Hatchery

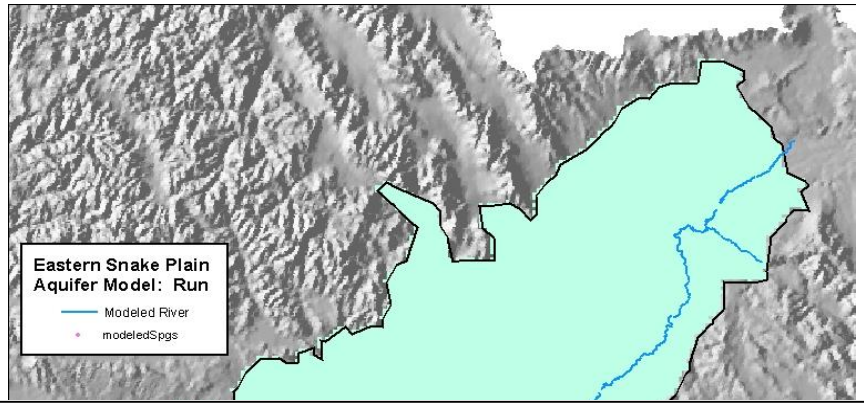


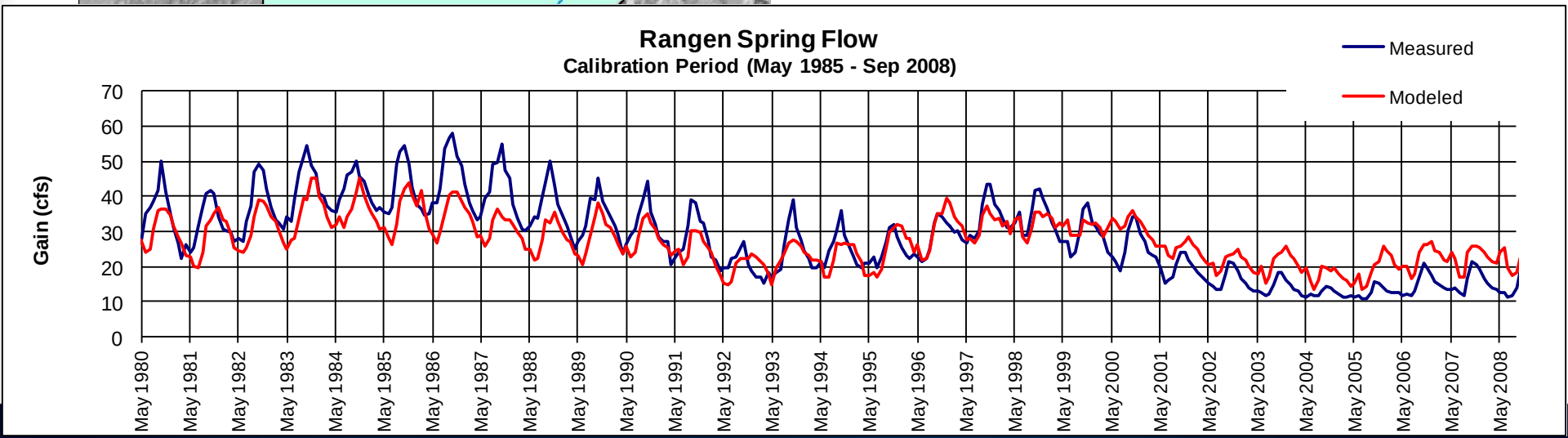


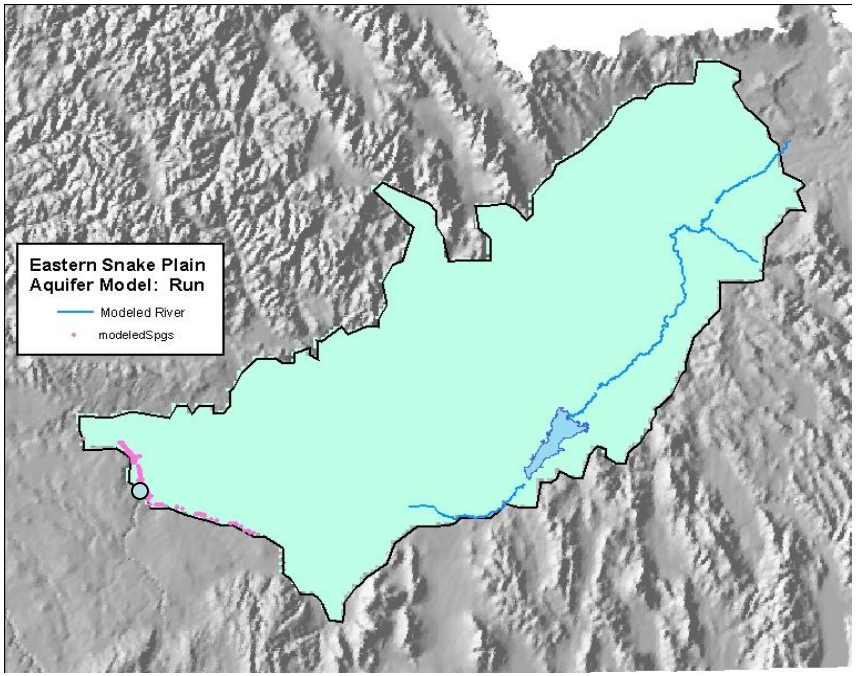


- Rangen Spring

- Rangen Spring

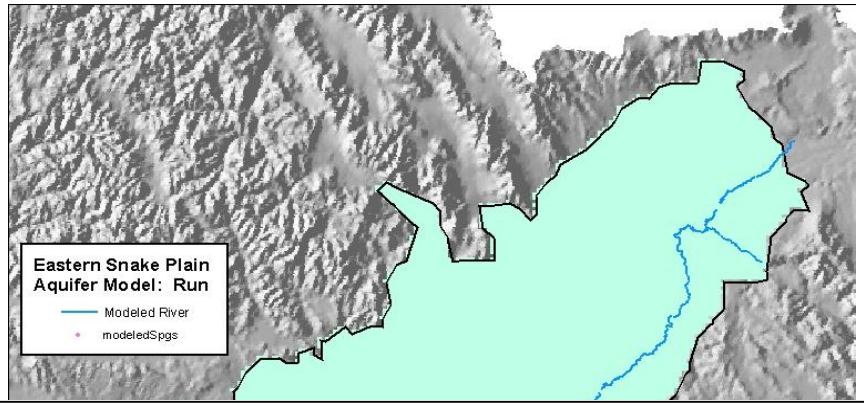


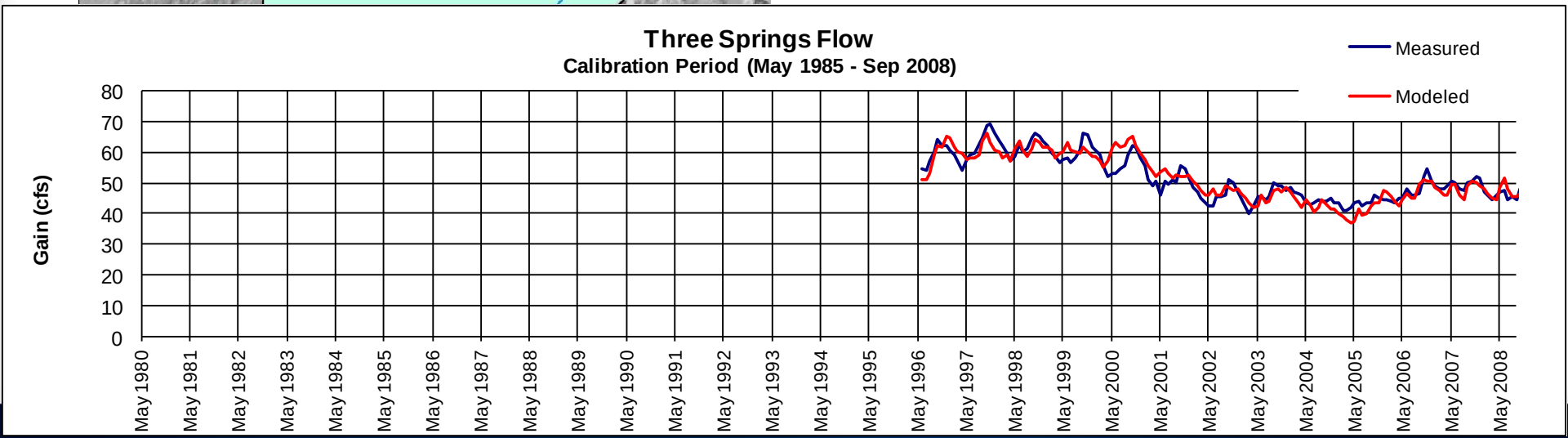


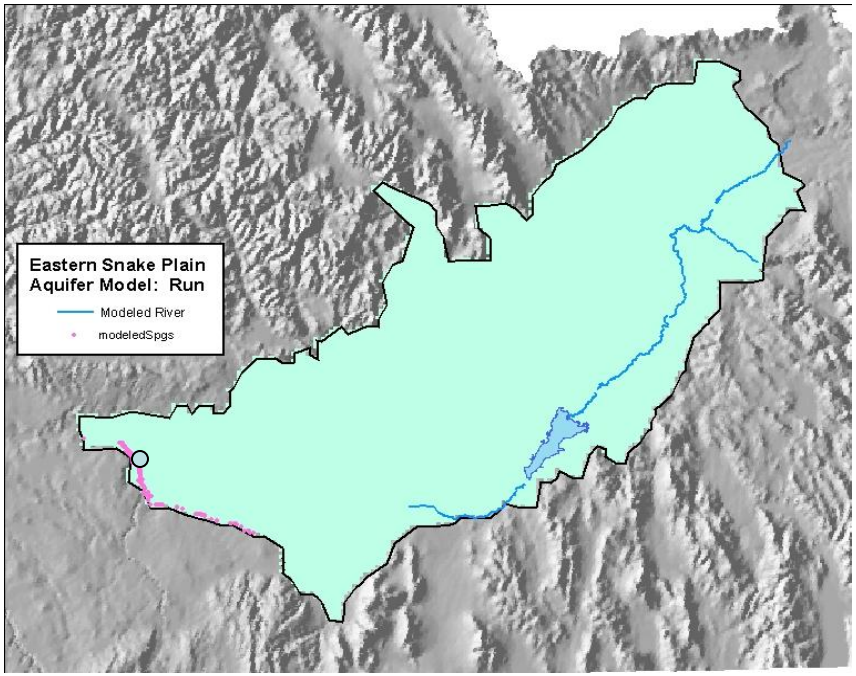


- Three Springs

- Three Springs

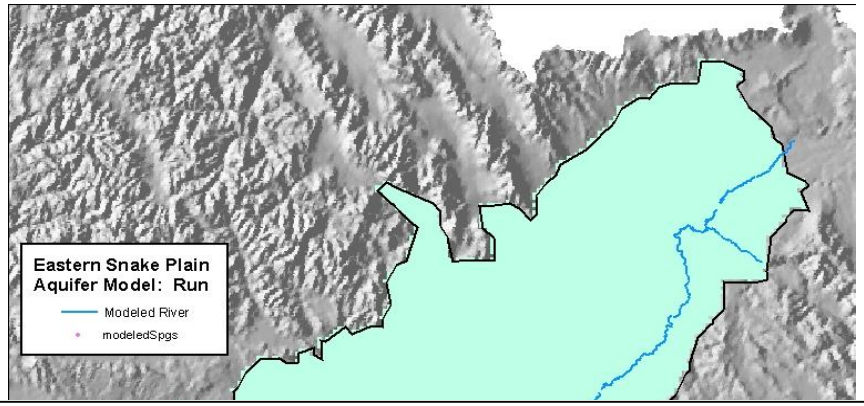


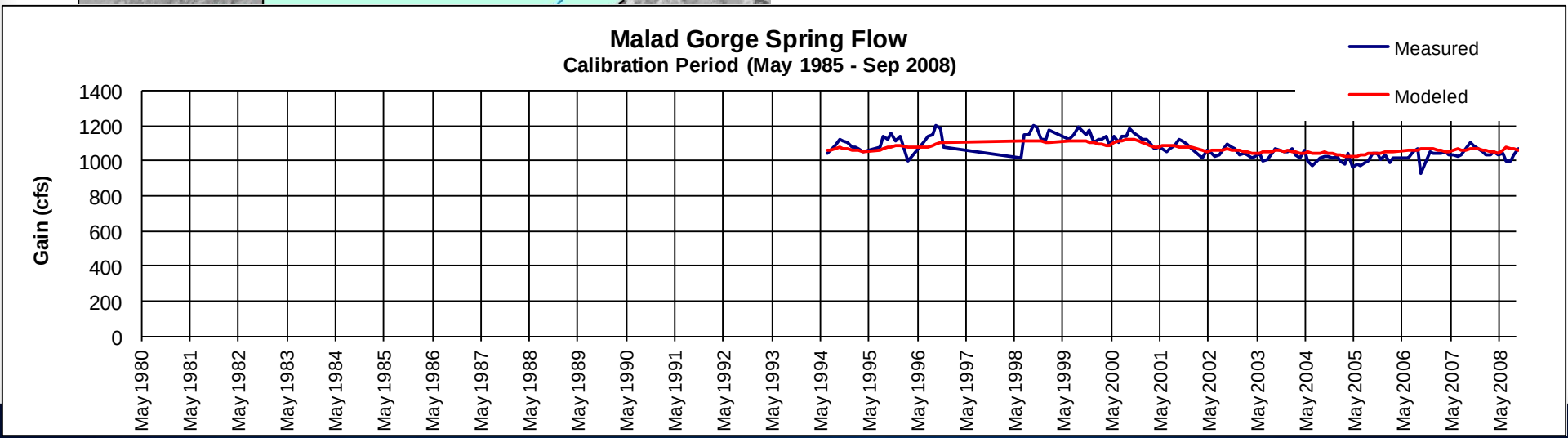



Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Malad

- Malad


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs


Malad Gorge Spring Flow
Calibration Period (May 1985 - Sep 2008)
Measured
Modeled
Gain (cfs)
1400
1200
1000
800
600
400
200
0
May 1980
May 1981
May 1982
May 1983
May 1984
May 1985
May 1986
May 1987
May 1988
May 1989
May 1990
May 1991
May 1992
May 1993
May 1994
May 1995
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May 1997
May 1998
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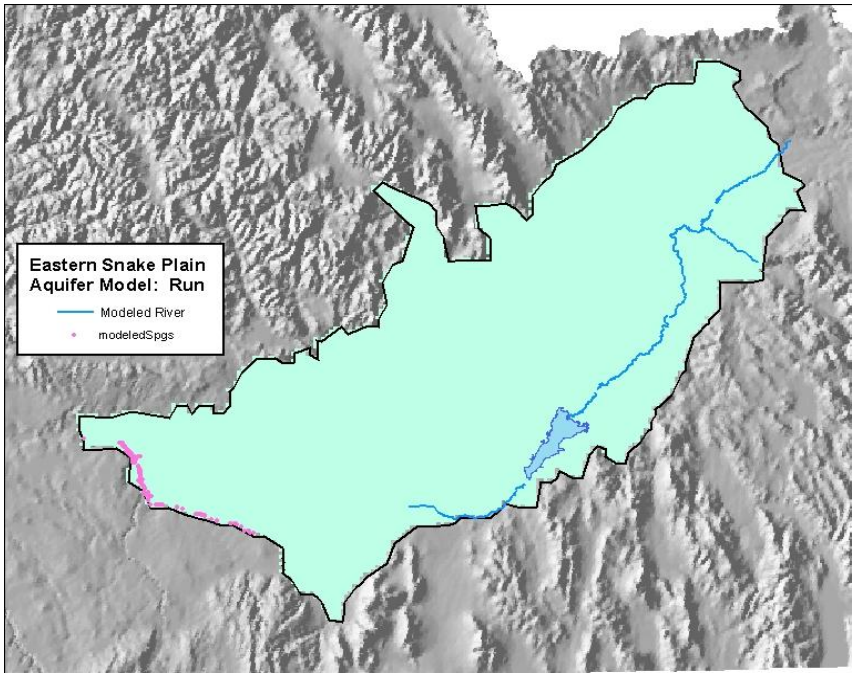
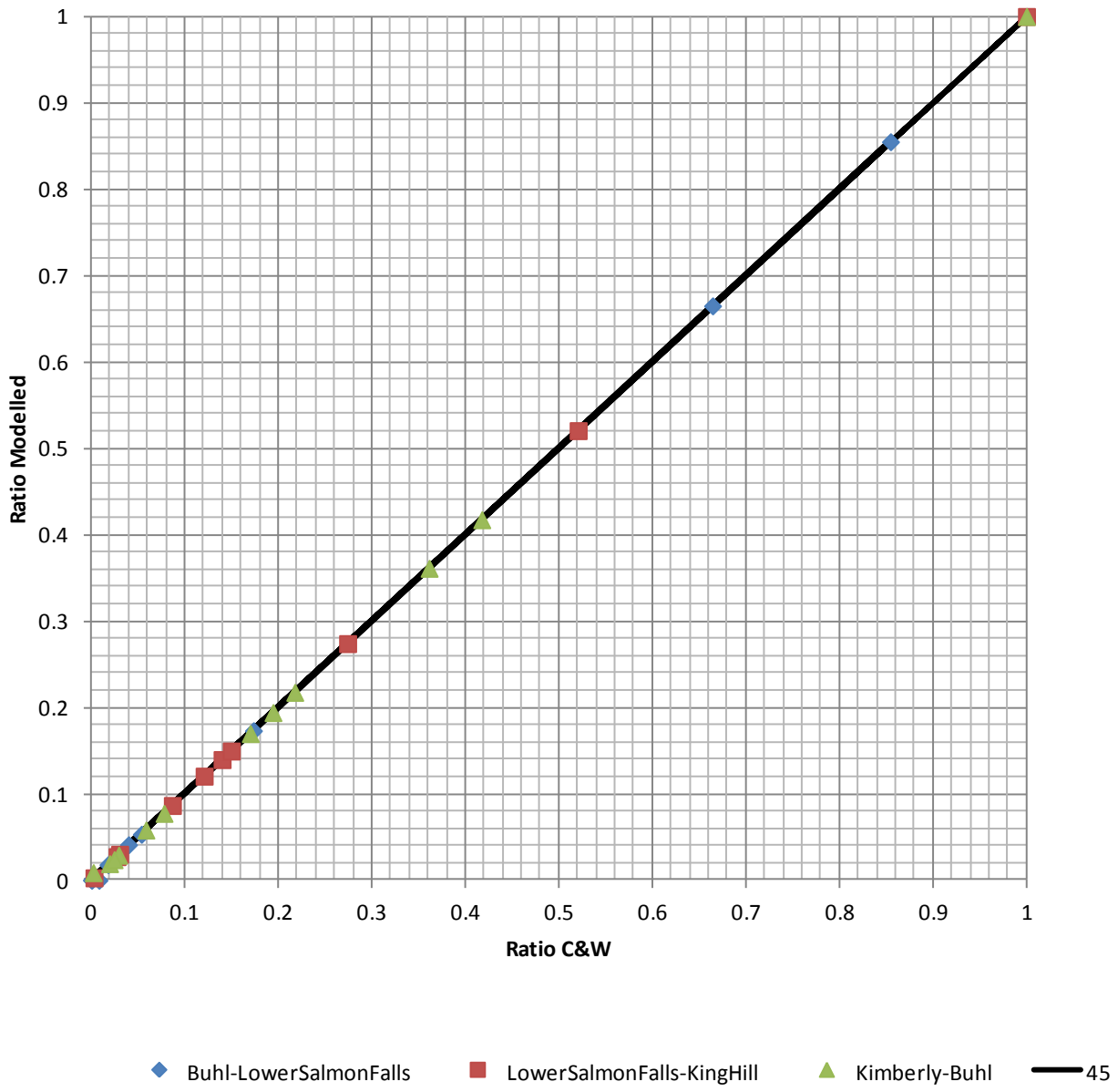
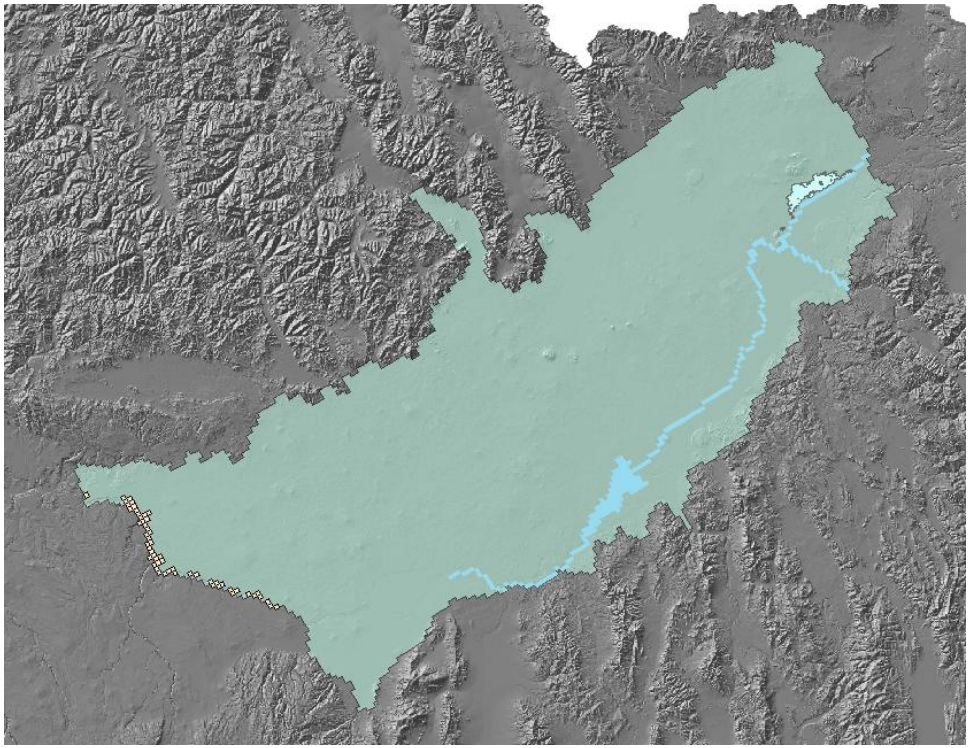
May 2000
May 2001
May 2002
May 2003
May 2004
May 2005
May 2006
May 2007
May 2008

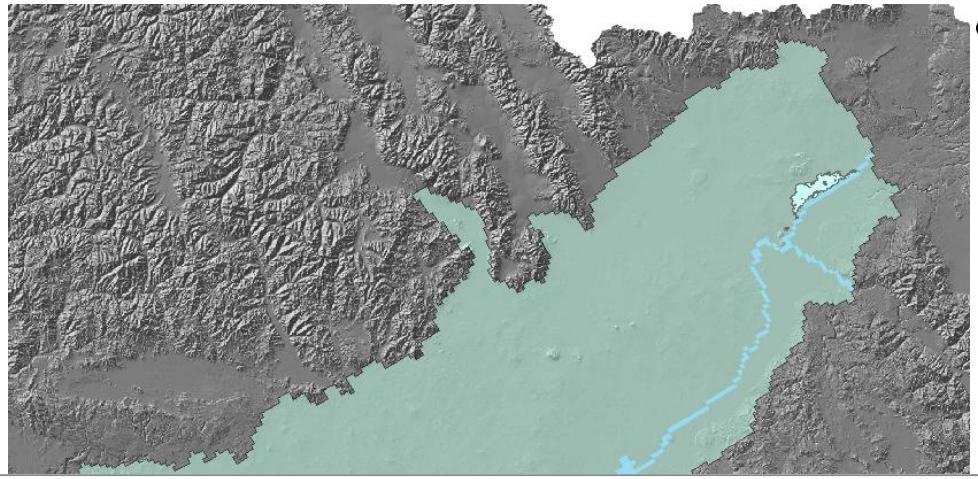


- Group C Springs

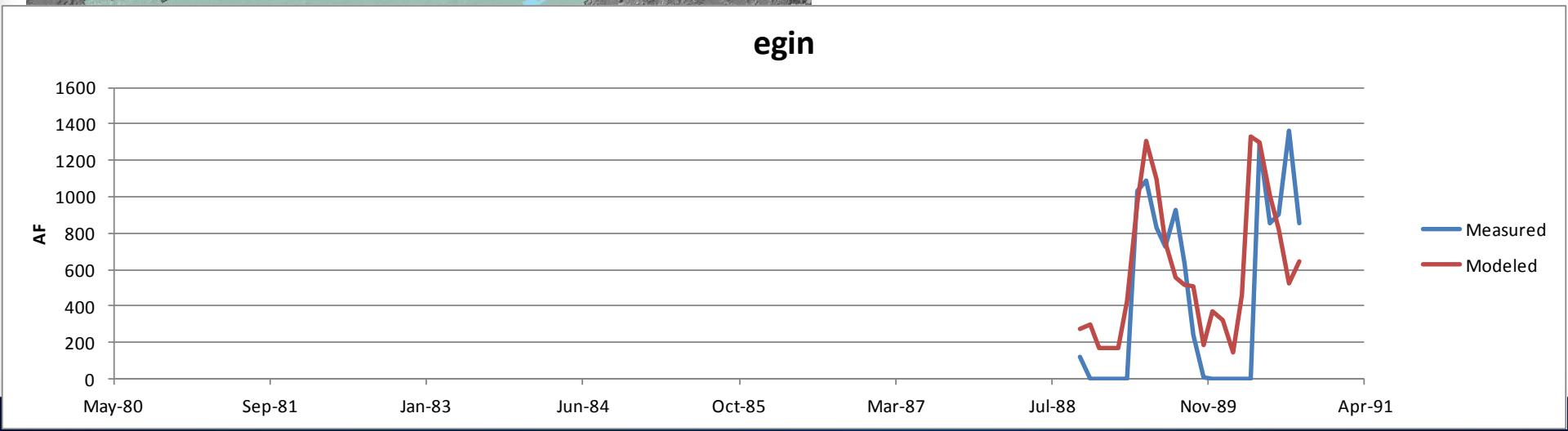

Ratio Modelled
Ratio C&W
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Buhl-LowerSalmonFalls
LowerSalmonFalls-KingHill
Kimberly-Buhl
45

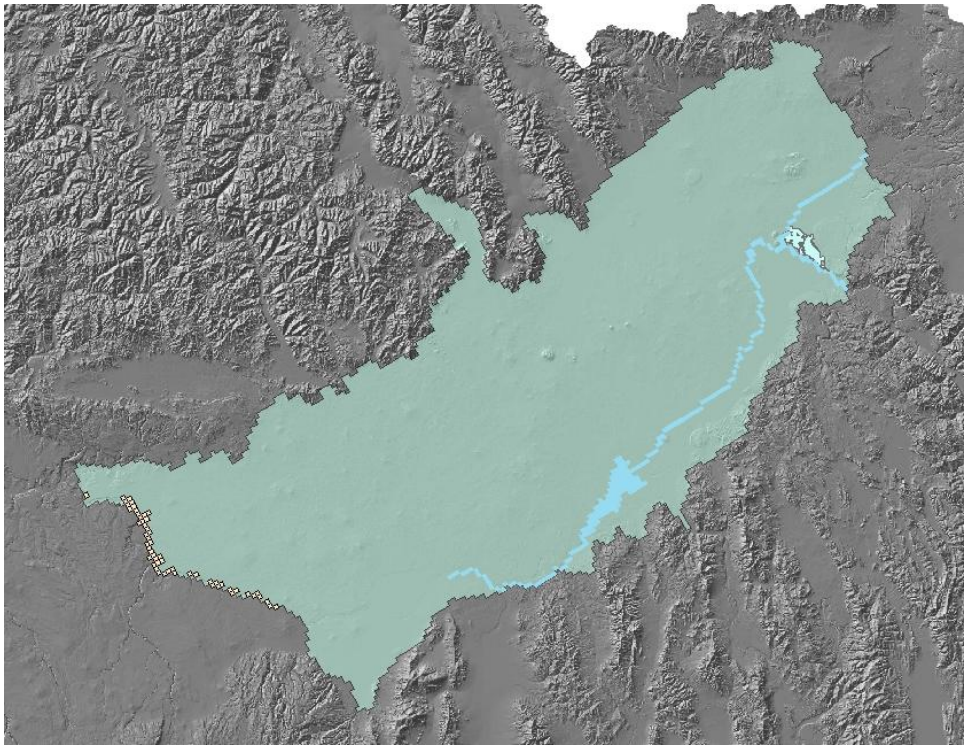


- Egin returns

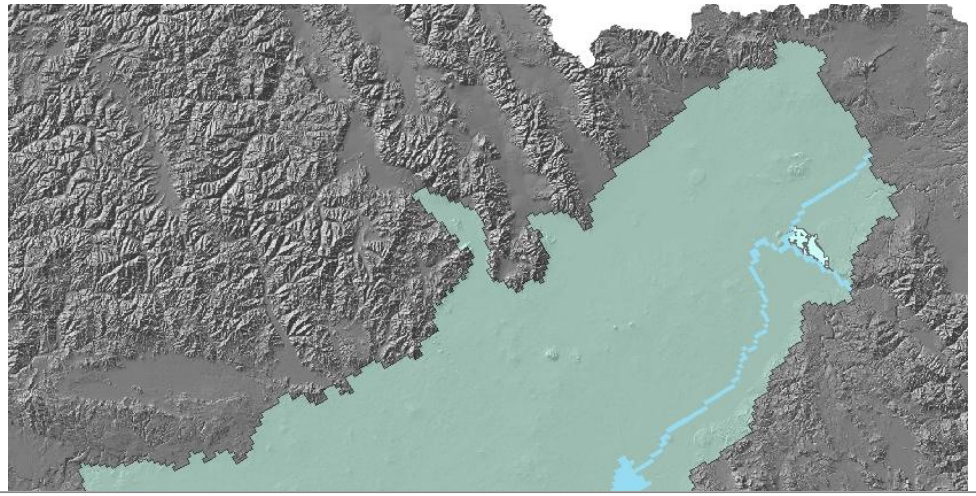


- Egin returns

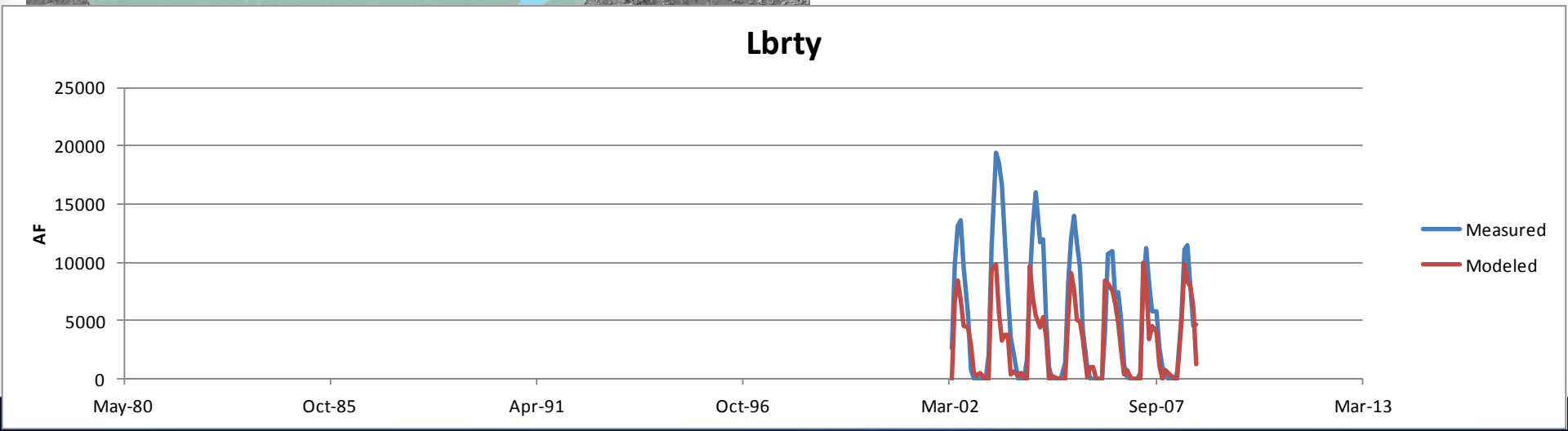


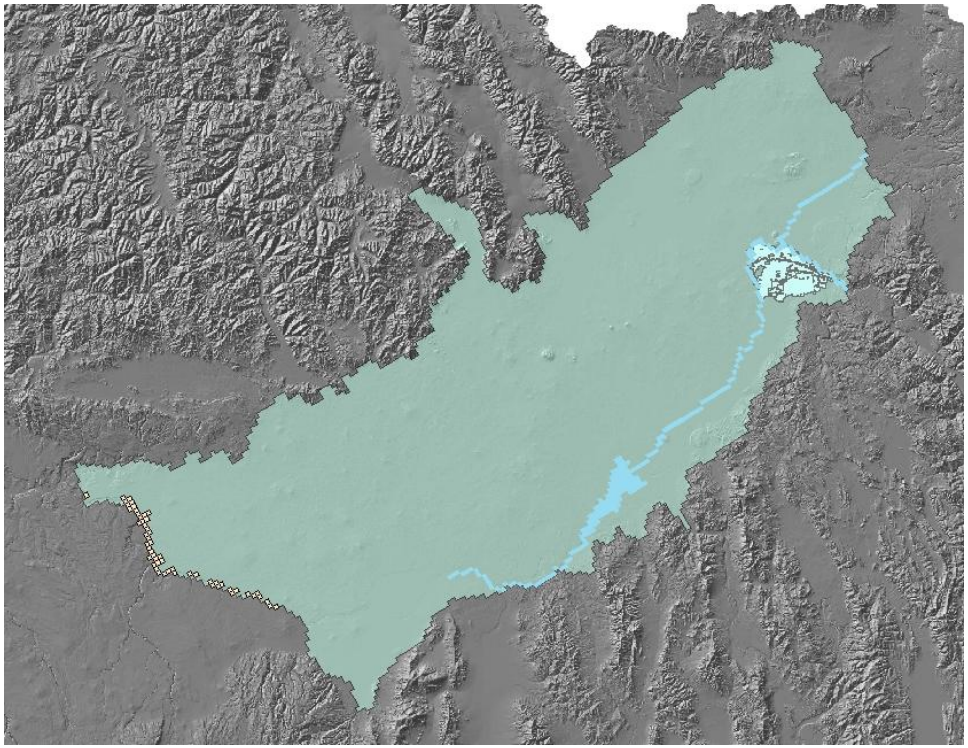


- Liberty returns

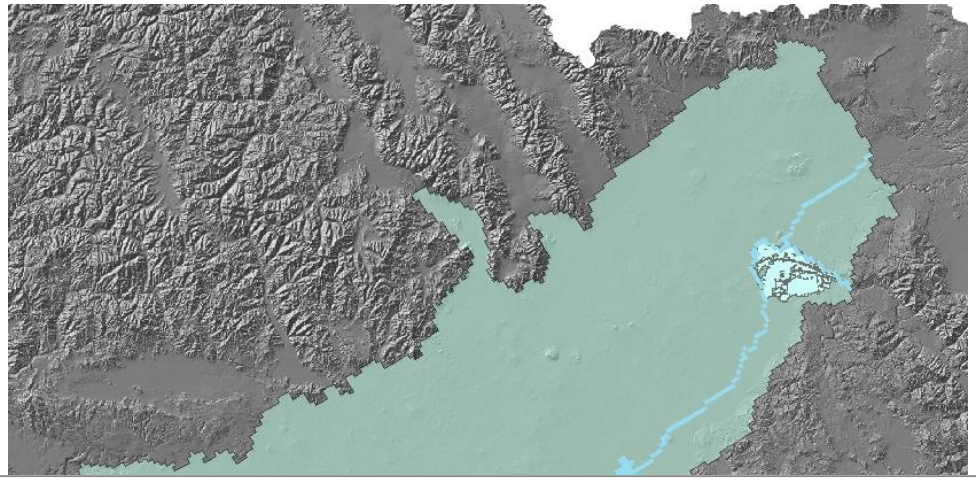


- Liberty returns

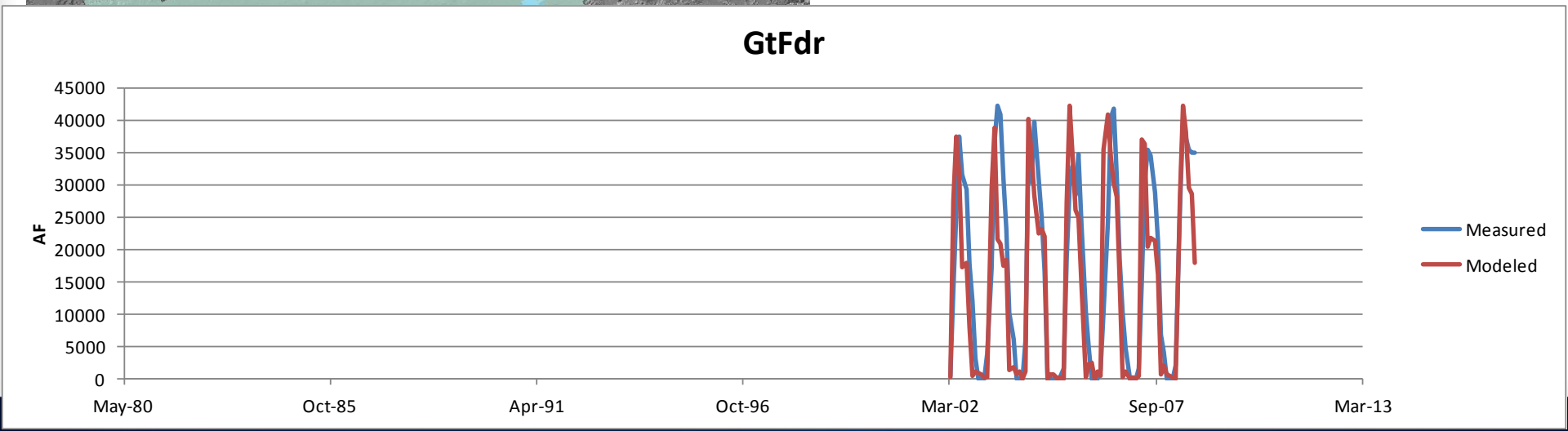


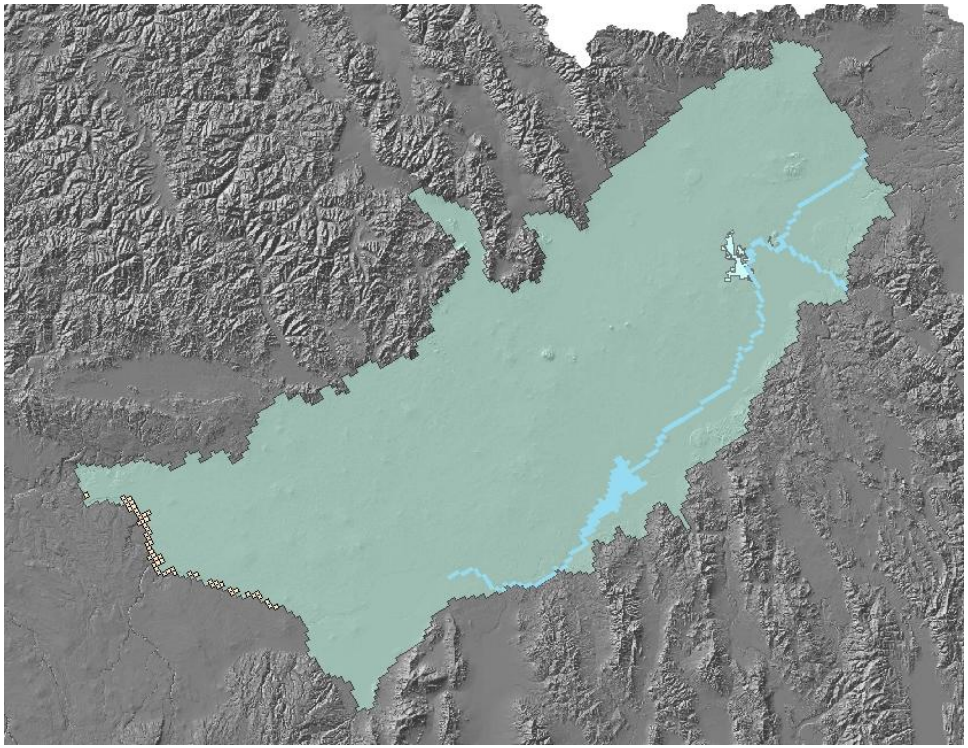


- Great Feeder Group returns

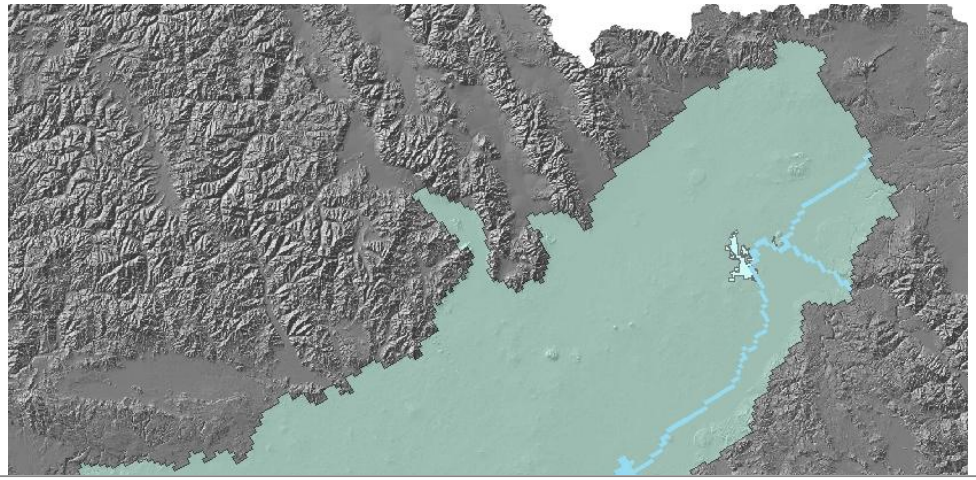


- Great Feeder Group returns

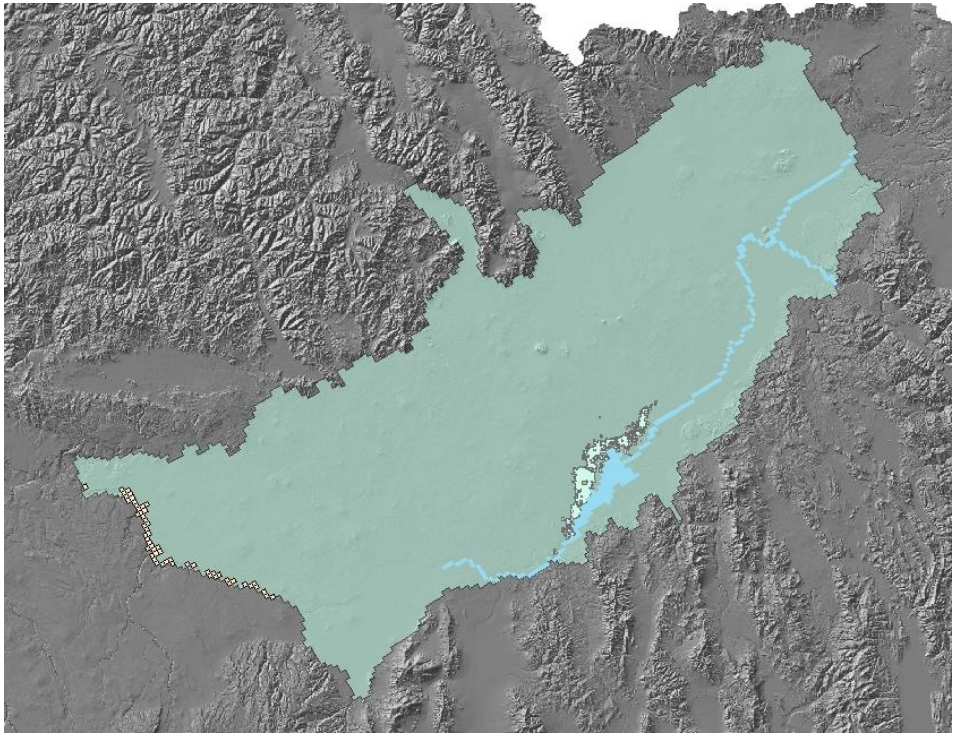




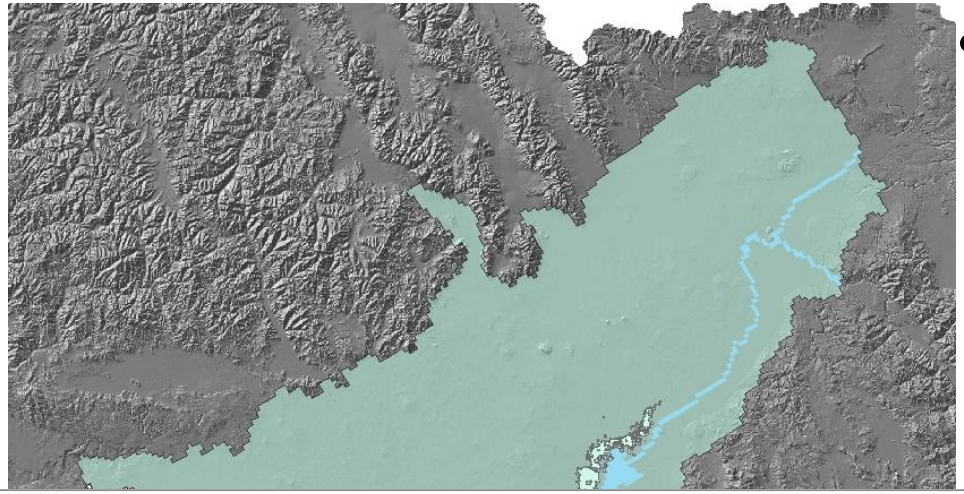
- Butte-Market Lake returns



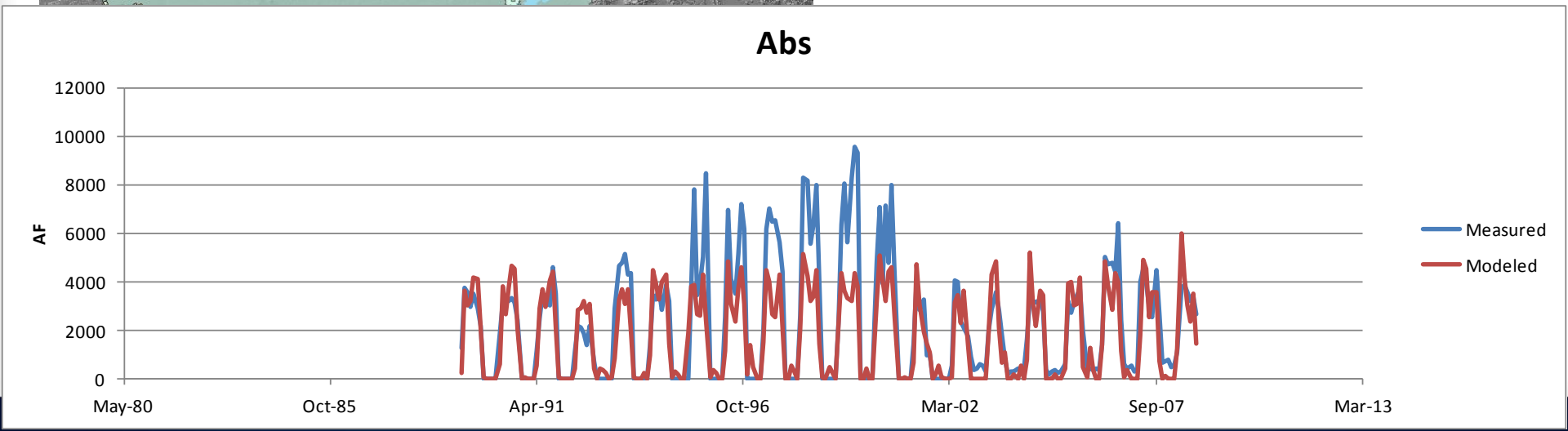
- Butte-Market Lake returns

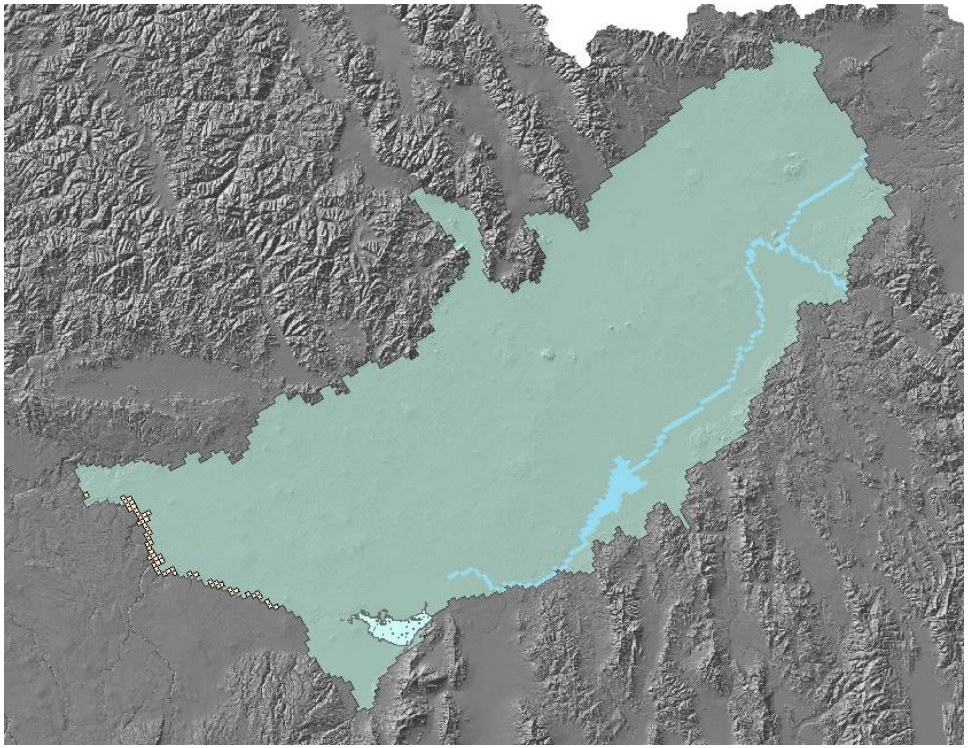


- Aberdeen-Springfield returns

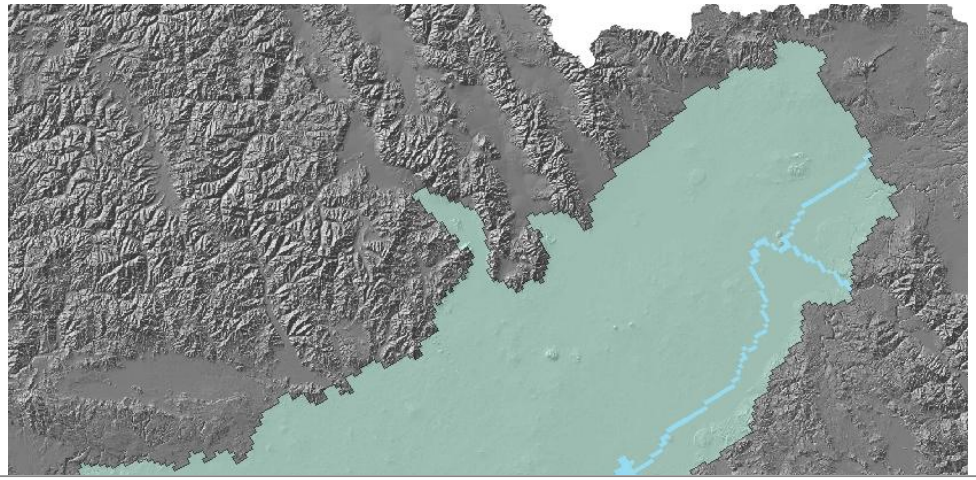


- Aberdeen-Springfield returns

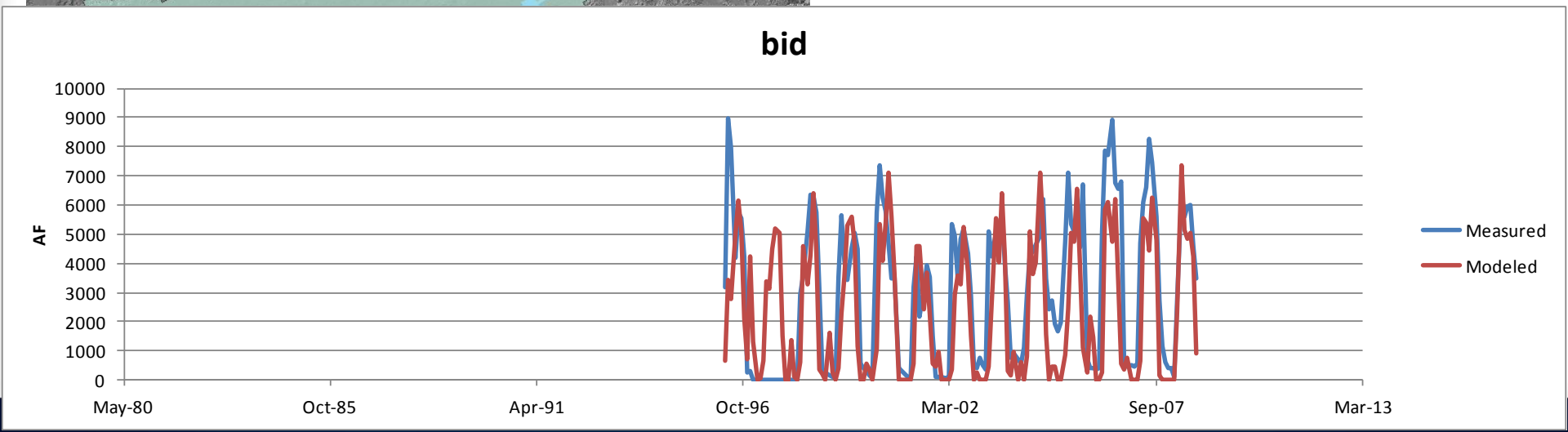


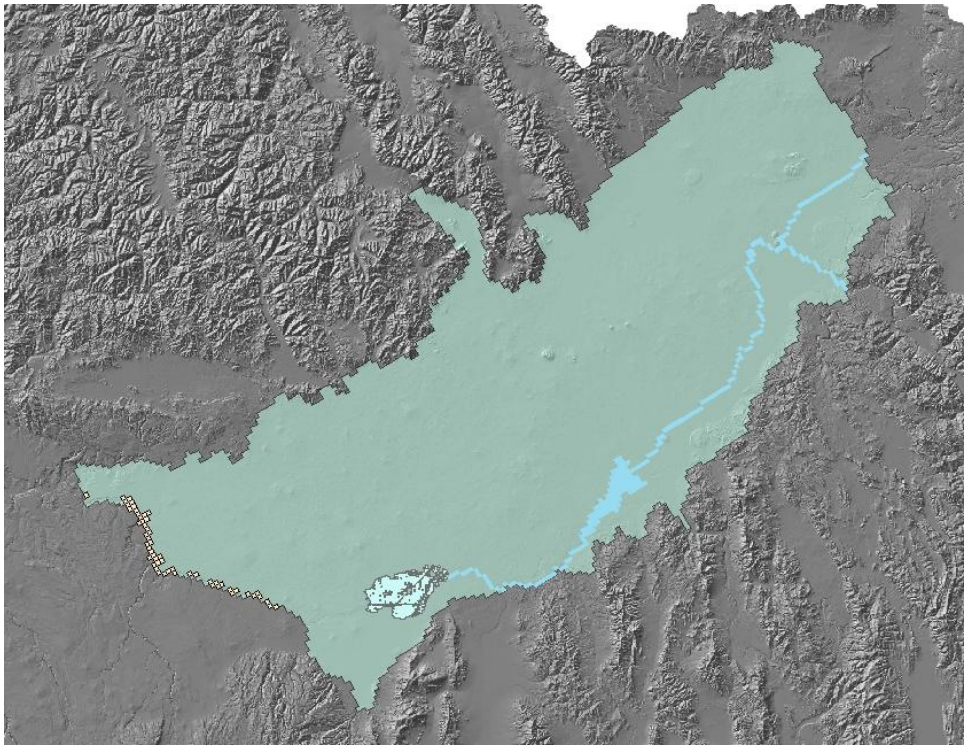


- Burley Irrigation District returns

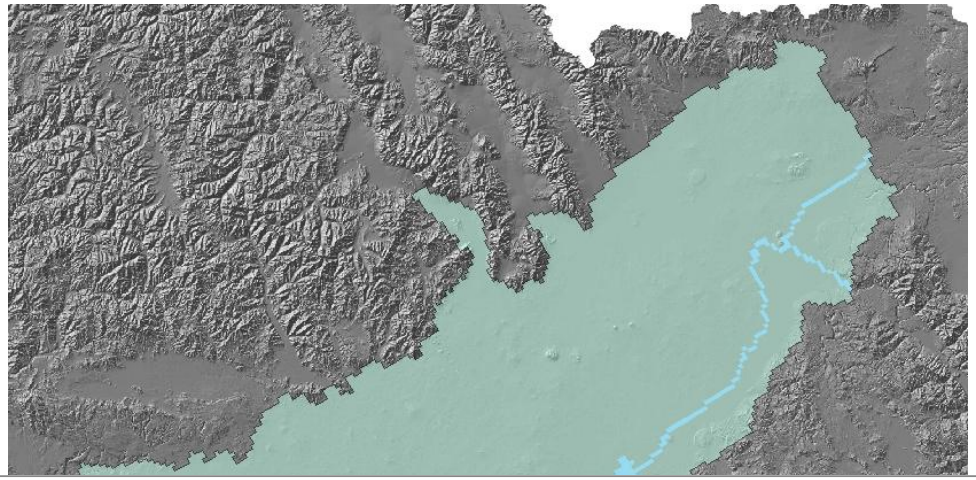


- Burley Irrigation District returns

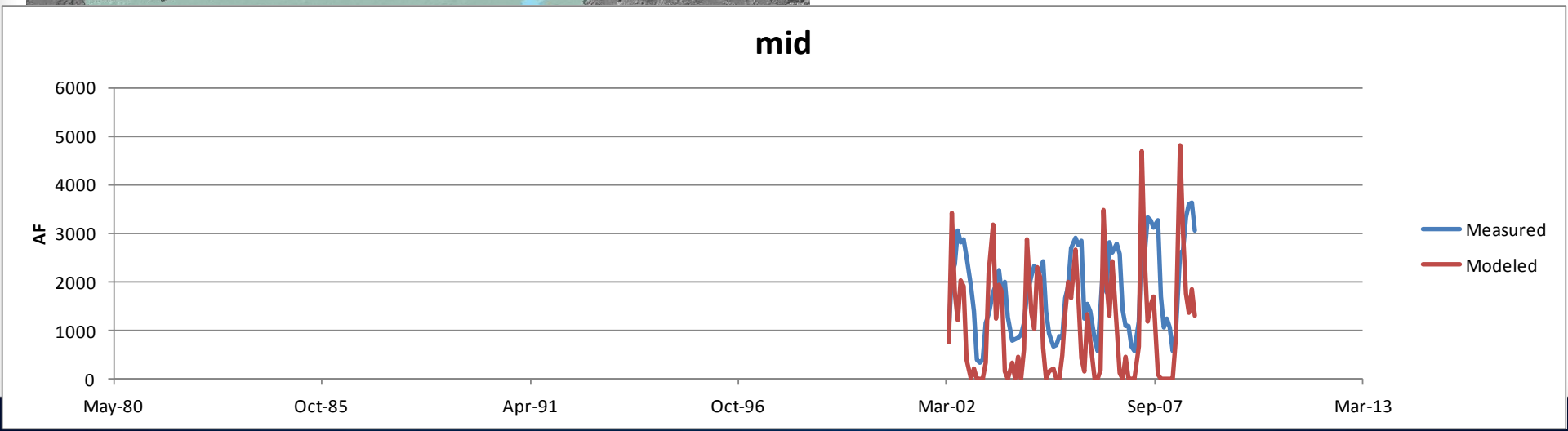


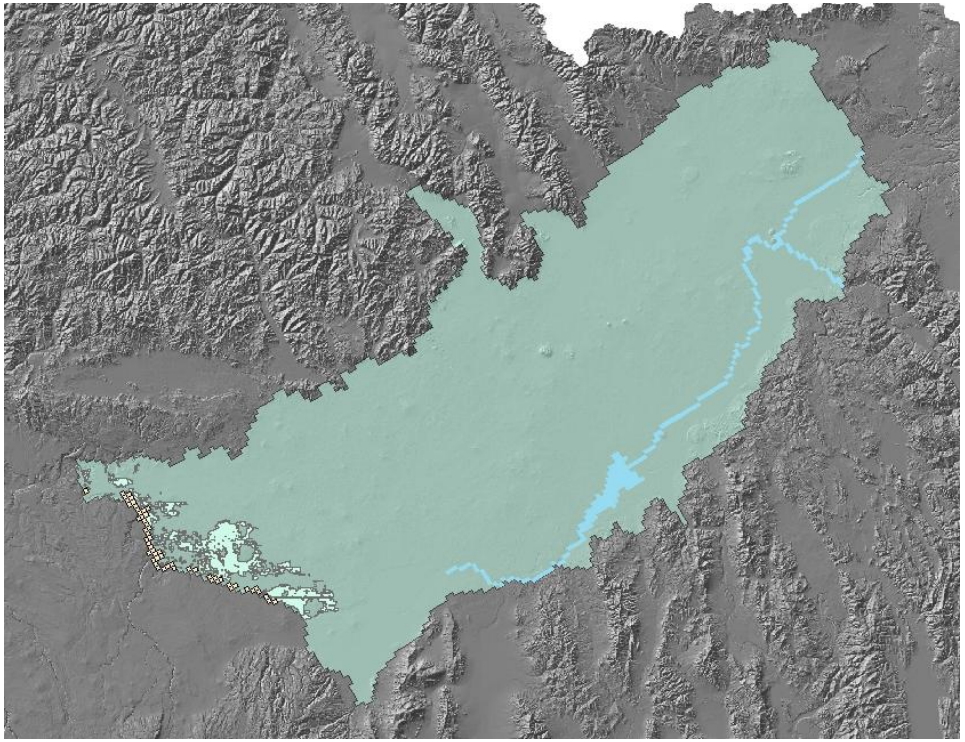


- Minidoka Irrigation District returns



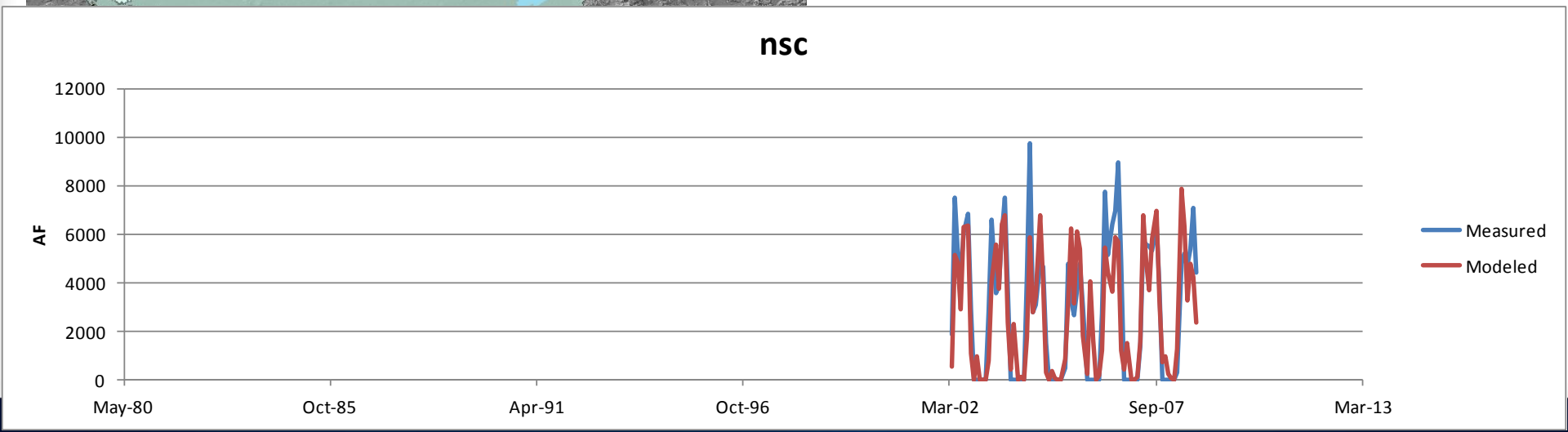
- Minidoka Irrigation District returns

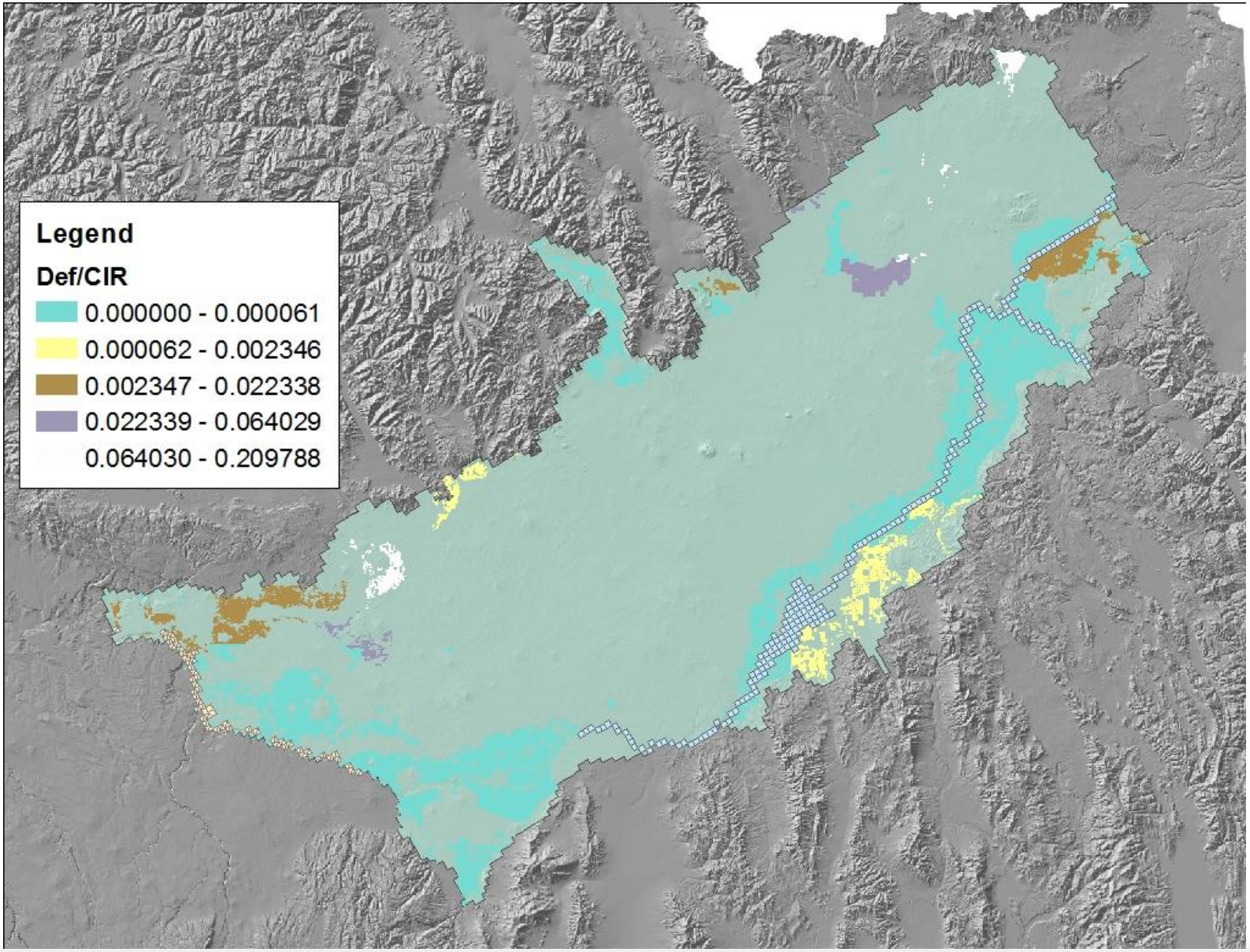




- North Side Canal Co returns

- North Side Canal Co returns

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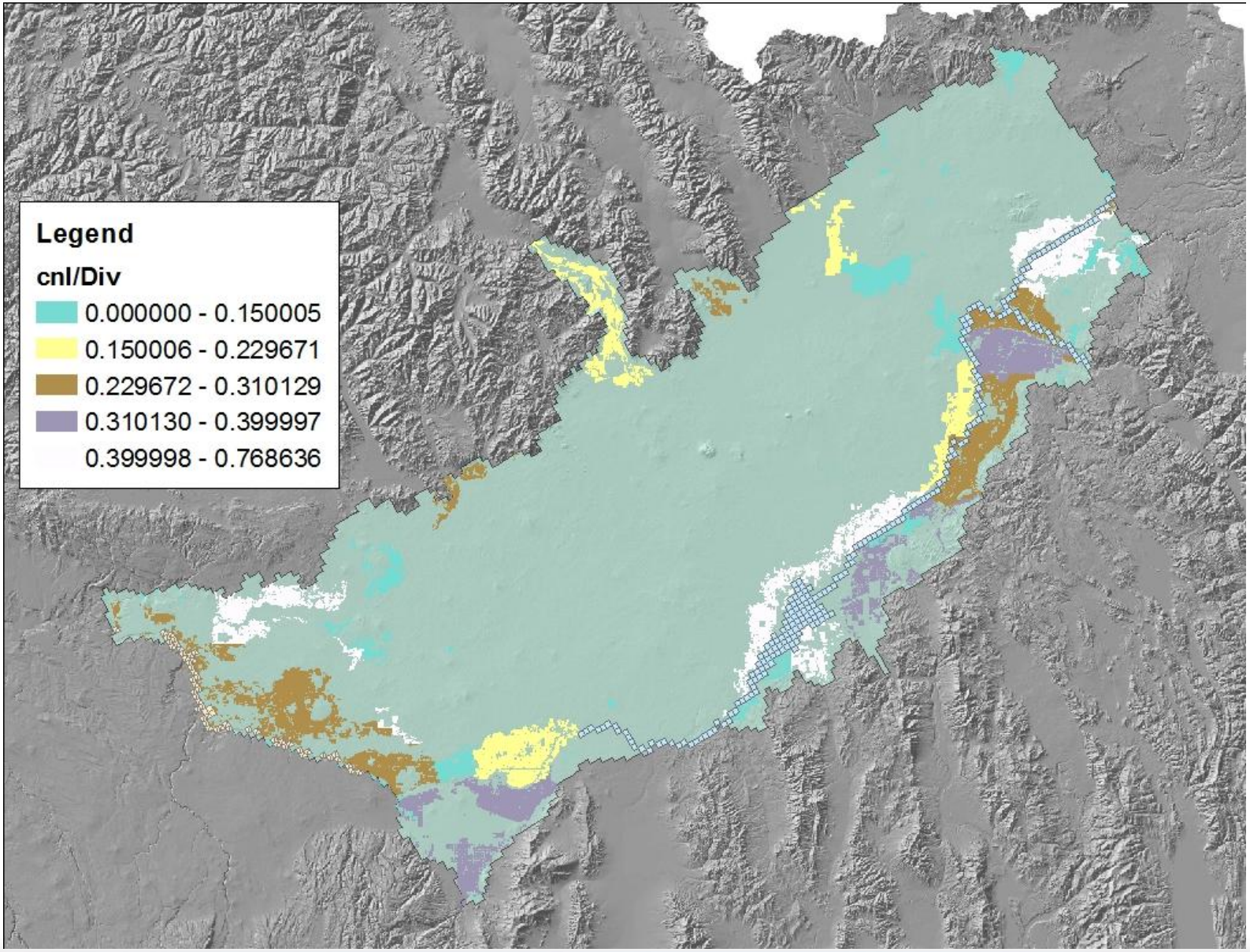
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