Calibration Run E110406A_007

Allan Wylie IDWR

Reach Gain and Spring Discharge Targets

- Monthly Stress Periods
  - Using
    - MKMOD6.exe
      - Using On-Farm algorithm
    - E110406A
      - Minidoka and Montview fixed, Mud Lake adjustments
    - 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

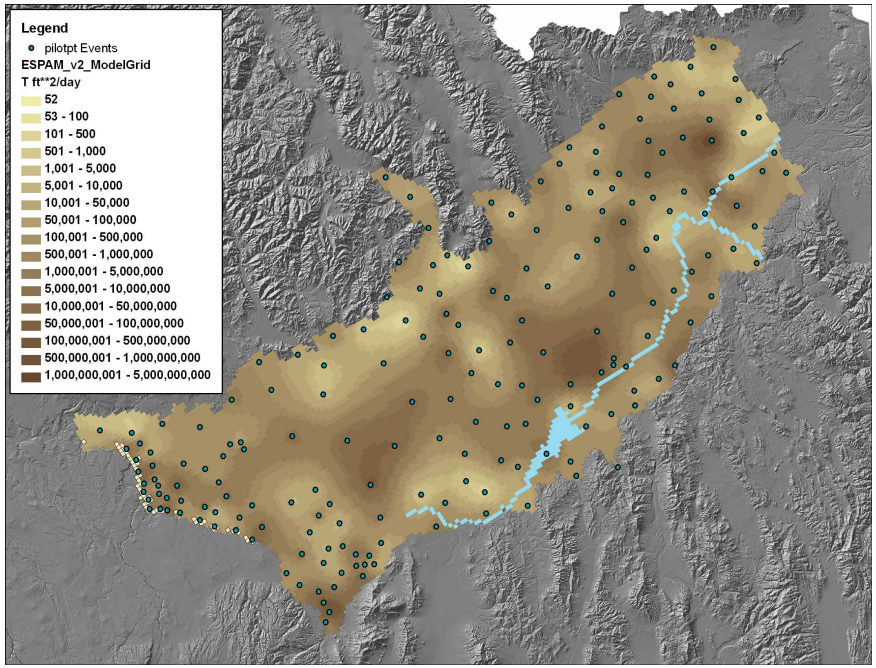
Reach Gain and Spring Discharge Targets

- Adjustable Parameters
  - Transmissivity
    - Pilot Points
      - 1e-10 – 1e+10
  - Specific Yield
    - Pilot Points
      - 0.01 – 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

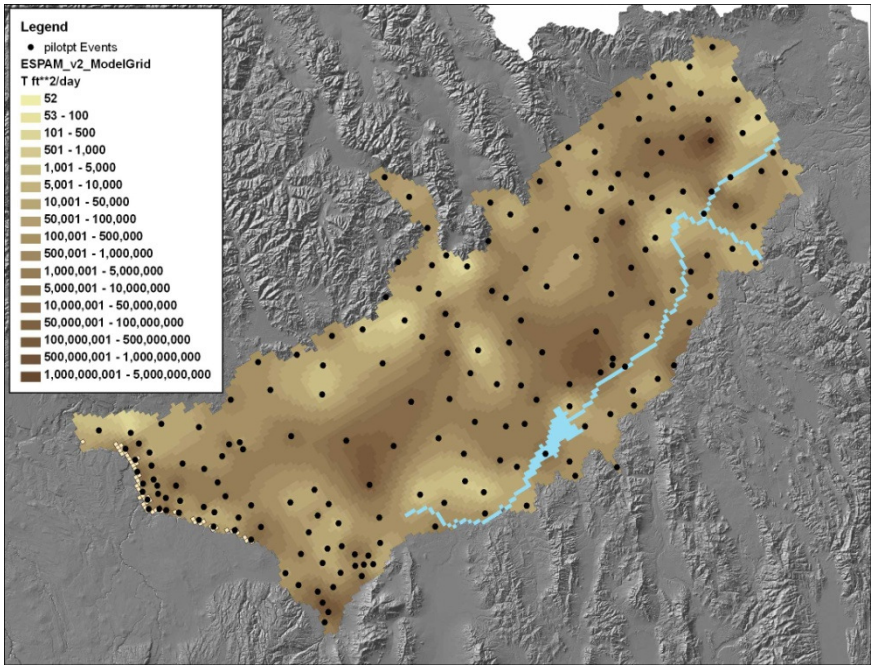
2008 Reach Gain and Spring Discharge Targets

- 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

006


Legend
pilotpt Events
ESPAM_v2_ModelGrid
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

007


Legend
pilotpt Events
ESPAM_v2_ModelGrid
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
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500,000,001 - 1,000,000,000
1,000,000,001 - 5,000,000,000

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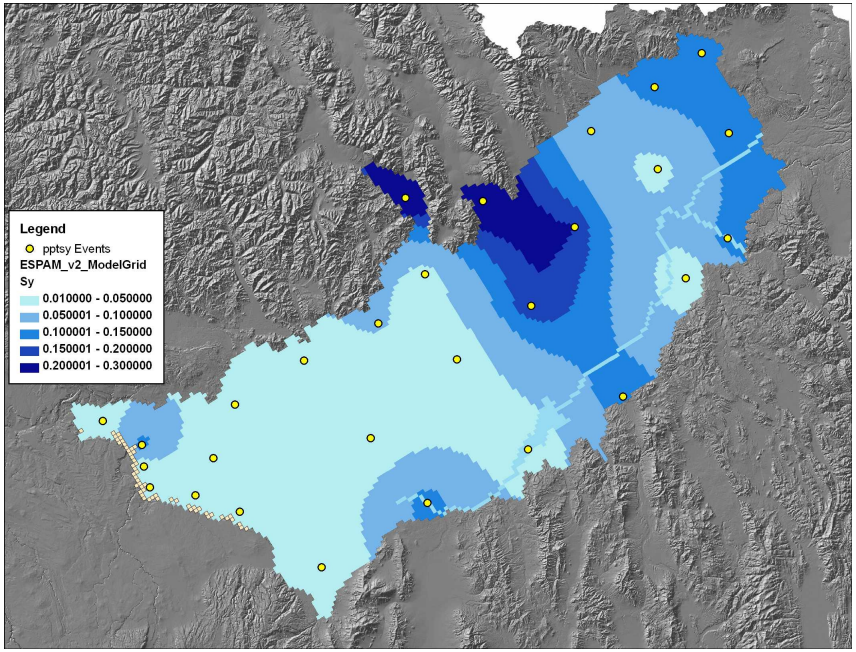
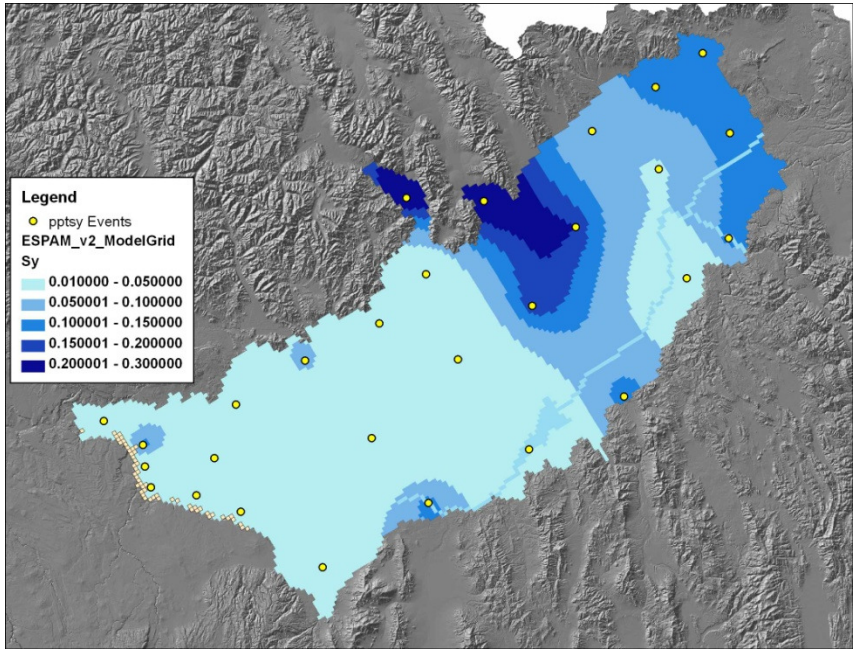
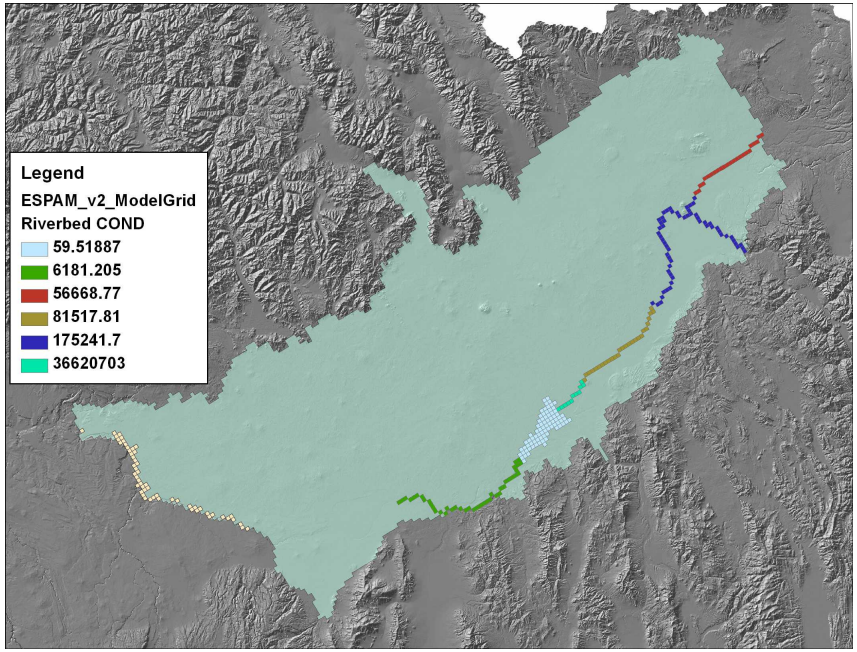

Legend
pptsy Events
ESPAM_v2_ModelGrid
Sy
0.010000 - 0.050000
0.050001 - 0.100000
0.100001 - 0.150000
0.150001 - 0.200000
0.200001 - 0.300000

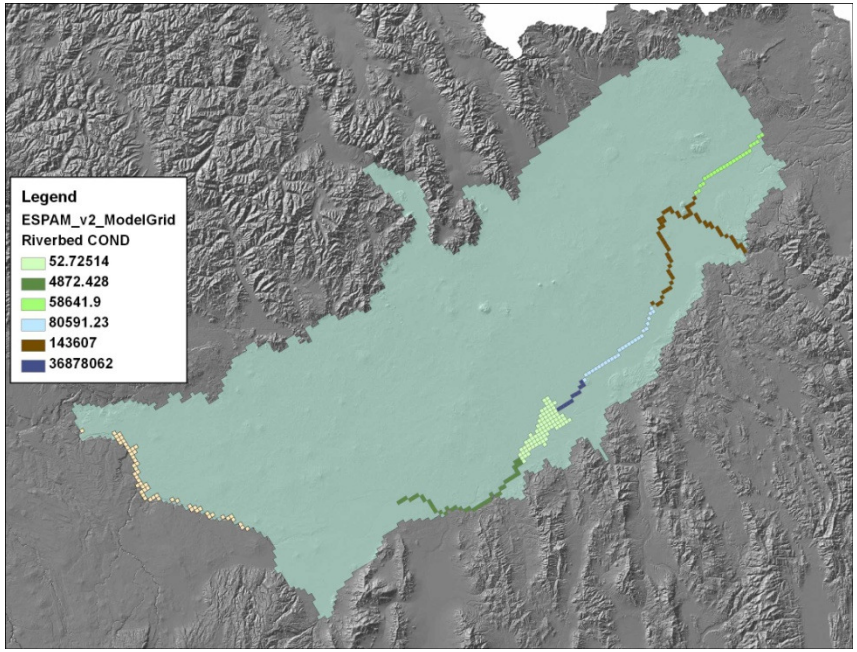
007


Legend
pptsy Events
ESPAM_v2_ModelGrid
Sy
0.010000 - 0.050000
0.050001 - 0.100000
0.100001 - 0.150000
0.150001 - 0.200000
0.200001 - 0.300000

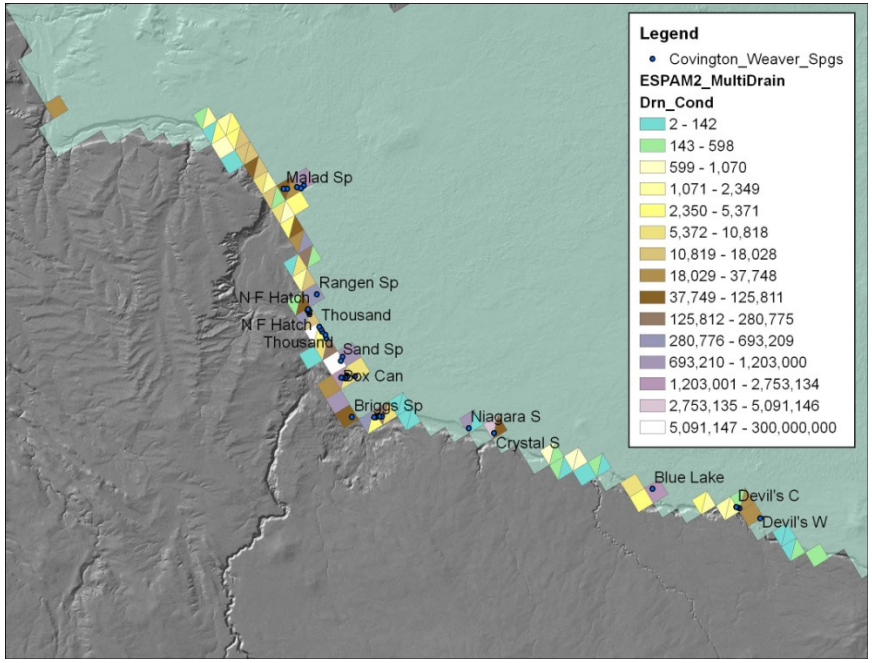
006


Legend
ESPAM_v2_ModelGrid
Riverbed COND
59.51887
6181.205
56668.77
81517.81
175241.7
36620703

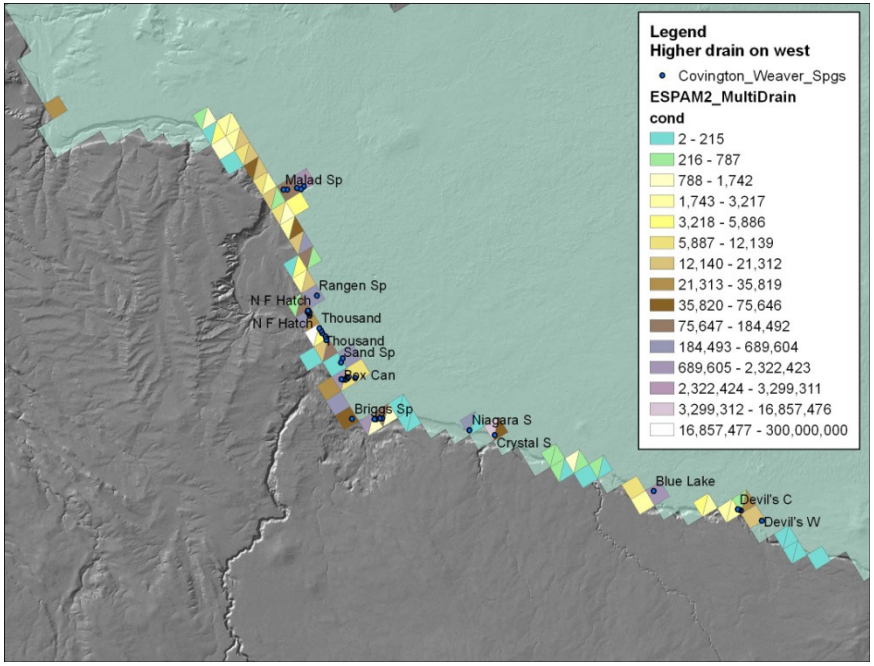
007


Legend
ESPAM_v2_ModelGrid
Riverbed COND
52.72514
4872.428
58641.9
80591.23
143607
36878062

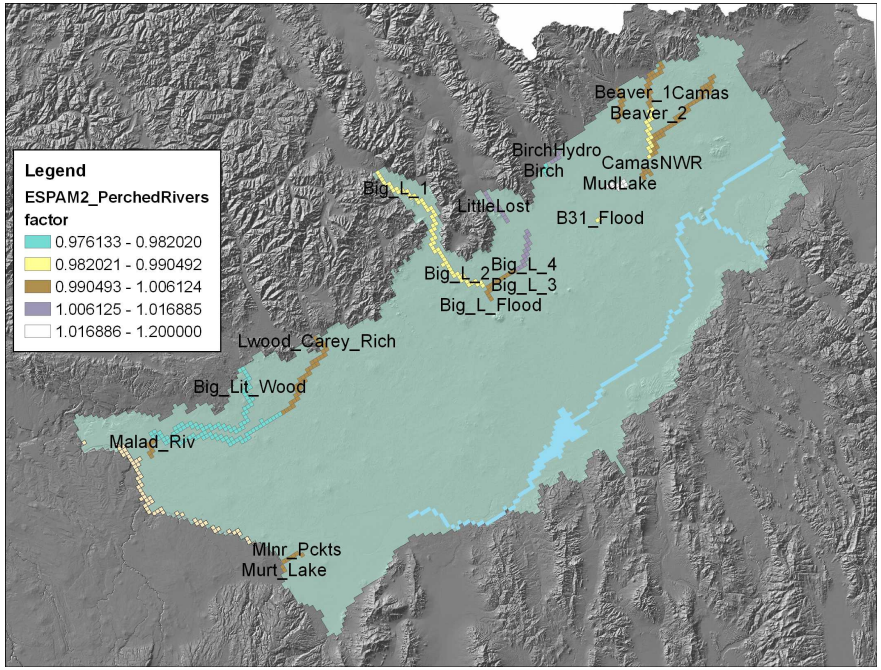
006


Legend
Covington_Weaver_Spgs
ESPAM2_MultiDrain
Drn_Cond
2 - 142
143 - 598
599 - 1,070
1,071 - 2,349
2,350 - 5,371
5,372 - 10,818
10,819 - 18,028
18,029 - 37,748
37,749 - 125,811
125,812 - 280,775
280,776 - 693,209
693,210 - 1,203,000
1,203,001 - 2,753,134
2,753,135 - 5,091,146
5,091,147 - 300,000,000
Malad Sp
Rangen Sp
N F Hatch
Thousand
N F Hatch
Thousand
Sand Sp
Box Can
Briggs Sp
Niagara S
Crystal S
Blue Lake
Devil's C
Devil's W

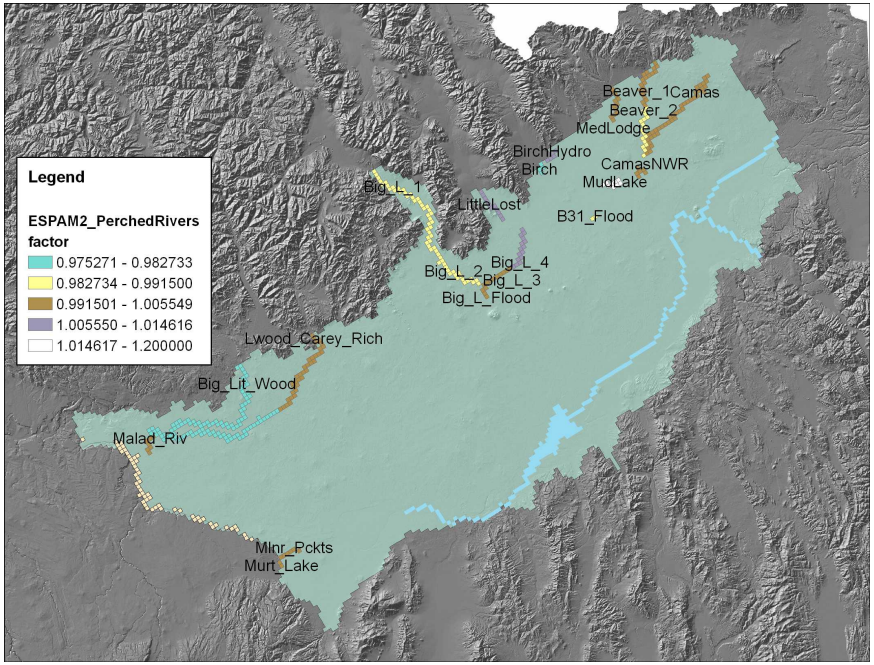
007


Legend
Higher drain on west
Covington_Weaver_Spgs
ESPAM2_MultiDrain
cond
2 - 215
216 - 787
788 - 1,742
1,743 - 3,217
3,218 - 5,886
5,887 - 12,139
12,140 - 21,312
21,313 - 35,819
35,820 - 75,646
75,647 - 184,492
184,493 - 689,604
689,605 - 2,322,423
2,322,424 - 3,299,311
3,299,312 - 16,857,476
16,857,477 - 300,000,000
Malad Sp
Rangen Sp
N F Hatch
Thousand
N F Hatch
Thousand
Sand Sp
Box Can
Briggs Sp
Niagara S
Crystal S
Blue Lake
Devil's C
Devil's W

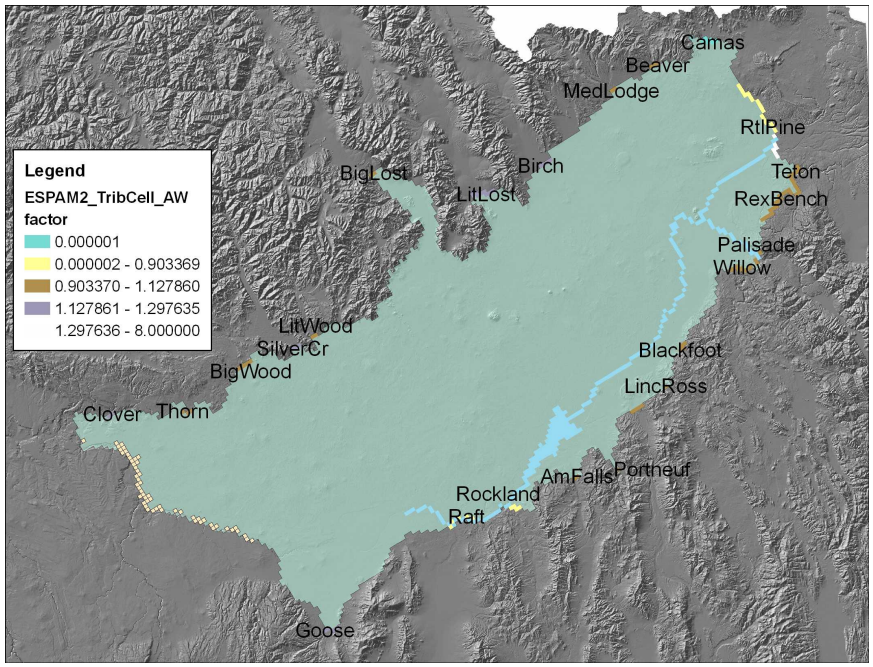
006


Legend
ESPAM2_PerchedRivers
factor
0.976133 - 0.982020
0.982021 - 0.990492
0.990493 - 1.006124
1.006125 - 1.016885
1.016886 - 1.200000
Beaver_1Camas
Beaver_2
BirchHydro
Birch
CamasNWR
MudLake
Big_L_1
LittleLost
B31_Flood
Big_L_4
Big_L_2
Big_L_3
Big_L_Flood
Lwood_Carey_Rich
Big_Lit_Wood
Malad_Riv
Mlnr_Pckts
Murt_Lake

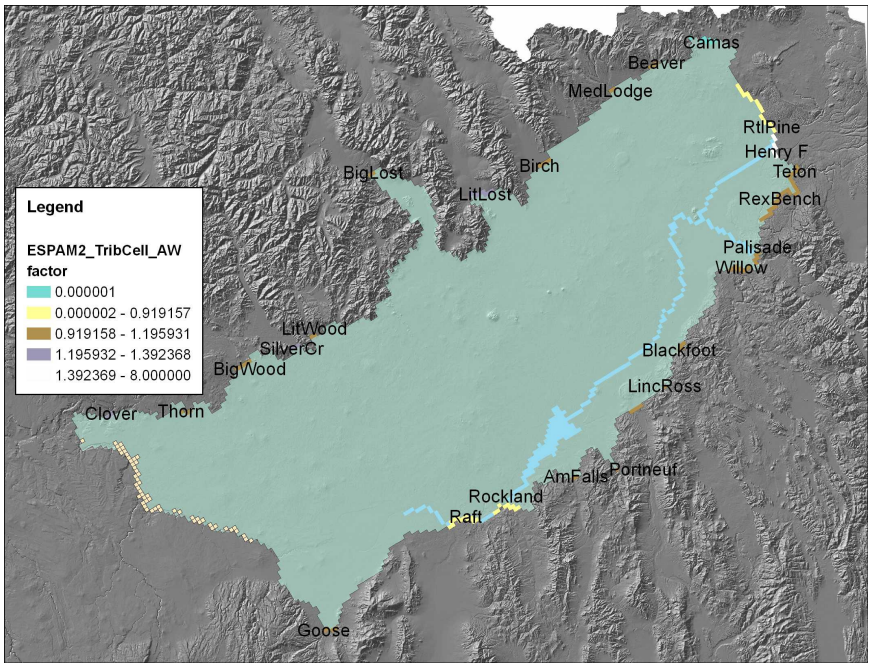
007


Legend
ESPAM2_PerchedRivers
factor
0.975271 - 0.982733
0.982734 - 0.991500
0.991501 - 1.005549
1.005550 - 1.014616
1.014617 - 1.200000
Beaver_1Camas
Beaver_2
MedLodge
BirchHydro
Birch
CamasNWR
MudLake
Big_L_1
LittleLost
B31_Flood
Big_L_4
Big_L_2
Big_L_3
Big_L_Flood
Lwood_Carey_Rich
Big_Lit_Wood
Malad_Riv
Mlnr_Pckts
Murt_Lake

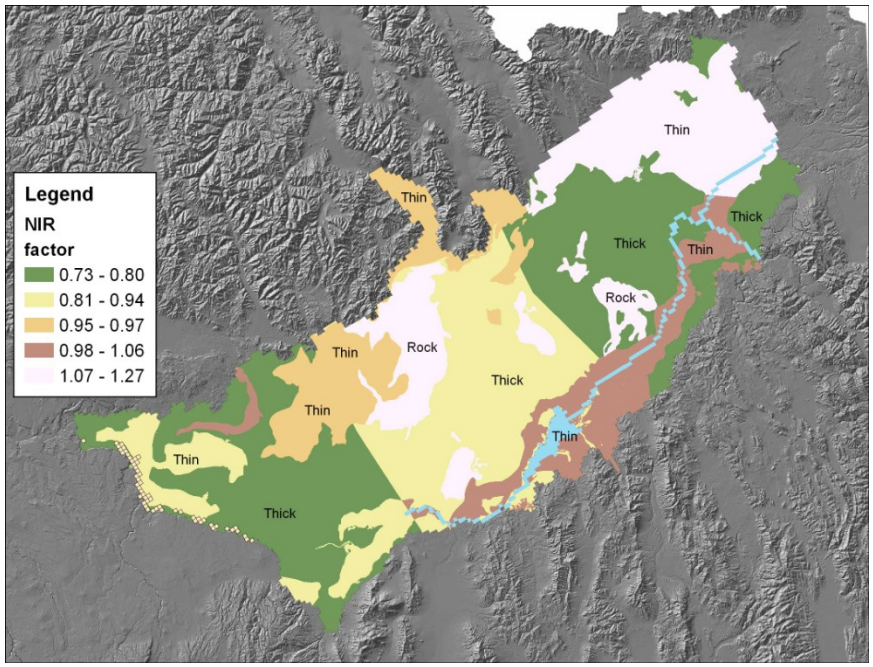
006


Legend
ESPAM2_TribCell_AW factor
0.000001
0.000002 - 0.903369
0.903370 - 1.127860
1.127861 - 1.297635
1.297636 - 8.000000
Camas
Beaver
MedLodge
RtlPine
Teton
RexBench
Palisade
Willow
BigLost
Birch
LitLost
LitWood
SilverCr
BigWood
Clover
Thorn
Blackfoot
LincRoss
AmFalls
Portneuf
Rockland
Raft
Goose

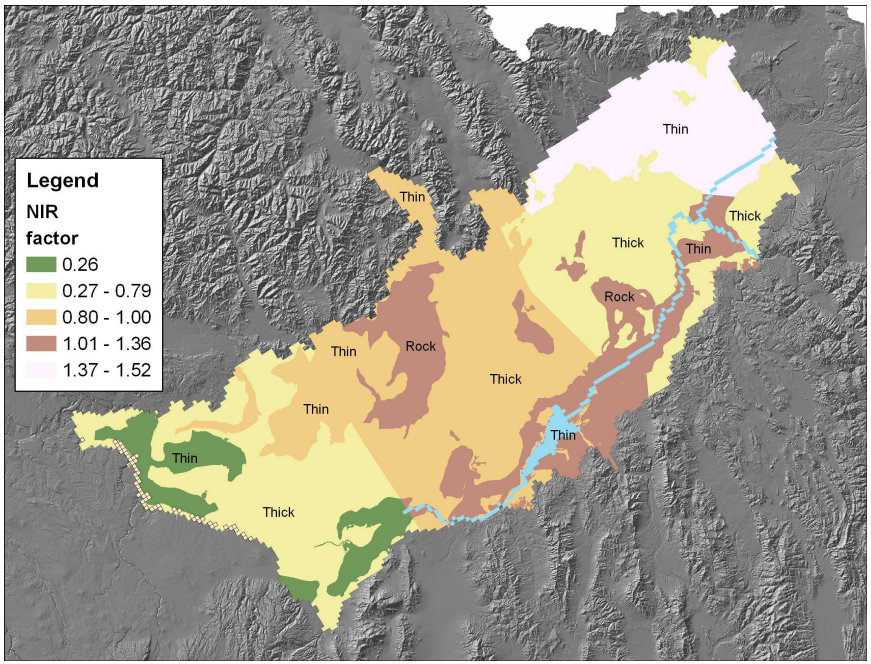
007


Legend
ESPAM2_TribCell_AW factor
0.000001
0.000002 - 0.919157
0.919158 - 1.195931
1.195932 - 1.392368
1.392369 - 8.000000
Camas
Beaver
MedLodge
RtlPine
Henry F
Teton
RexBench
Palisade
Willow
BigLost
Birch
LitLost
LitWood
SilverCr
BigWood
Clover
Thorn
Blackfoot
LincRoss
AmFalls
Portneuf
Rockland
Raft
Goose

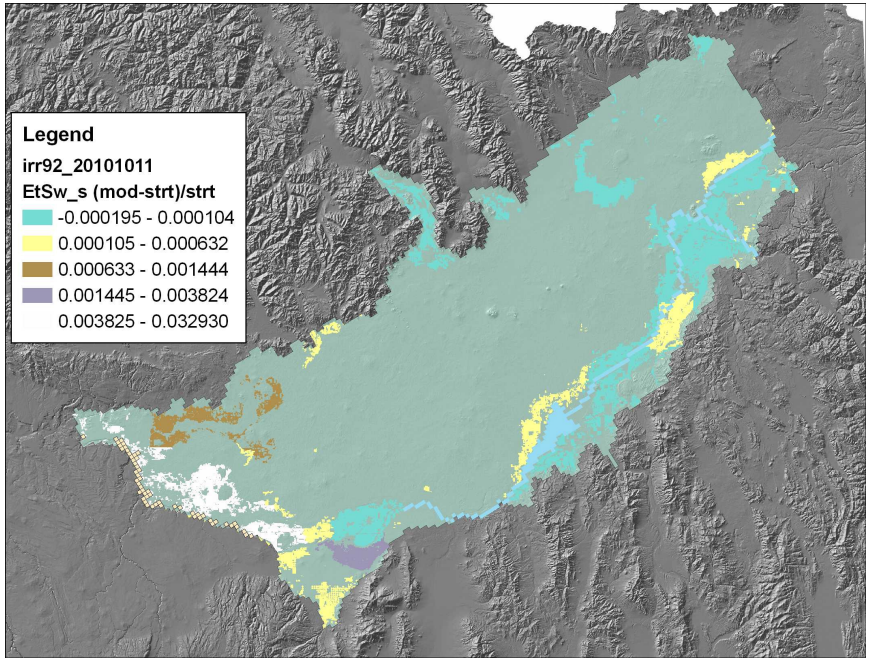
006


Legend
NIR
factor
0.73 - 0.80
0.81 - 0.94
0.95 - 0.97
0.98 - 1.06
1.07 - 1.27
Thin
Thick
Rock

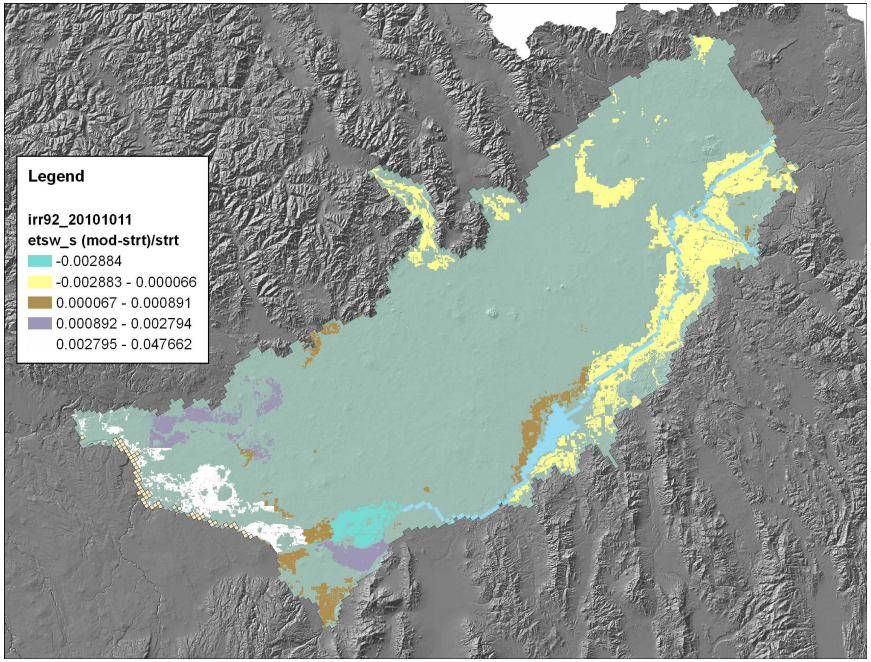
007


Legend
NIR
factor
0.26
0.27 - 0.79
0.80 - 1.00
1.01 - 1.36
1.37 - 1.52
Thin
Thick
Rock

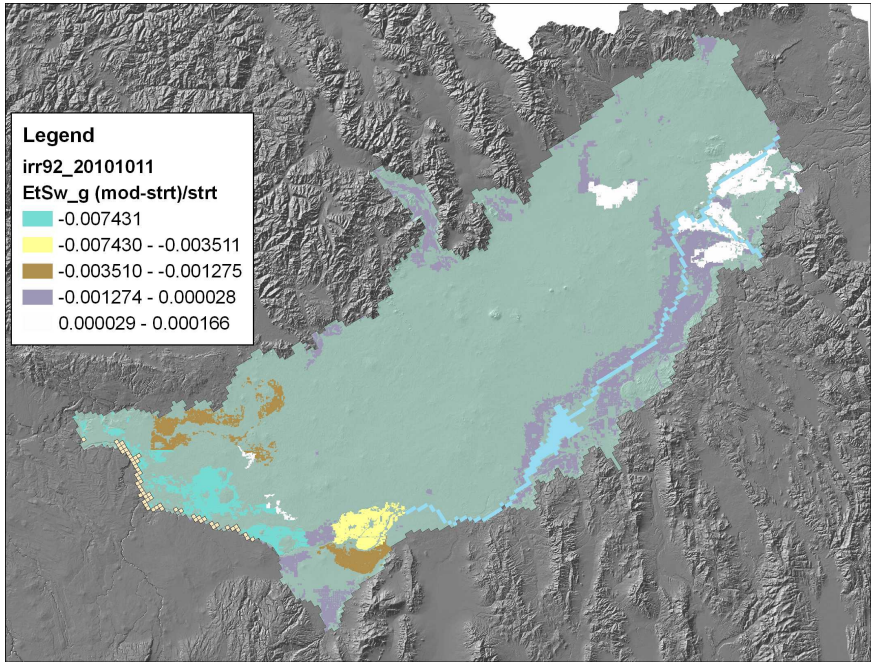
006


Legend
irr92_20101011
EtSw_s (mod-strt)/strt
-0.000195 - 0.000104
0.000105 - 0.000632
0.000633 - 0.001444
0.001445 - 0.003824
0.003825 - 0.032930

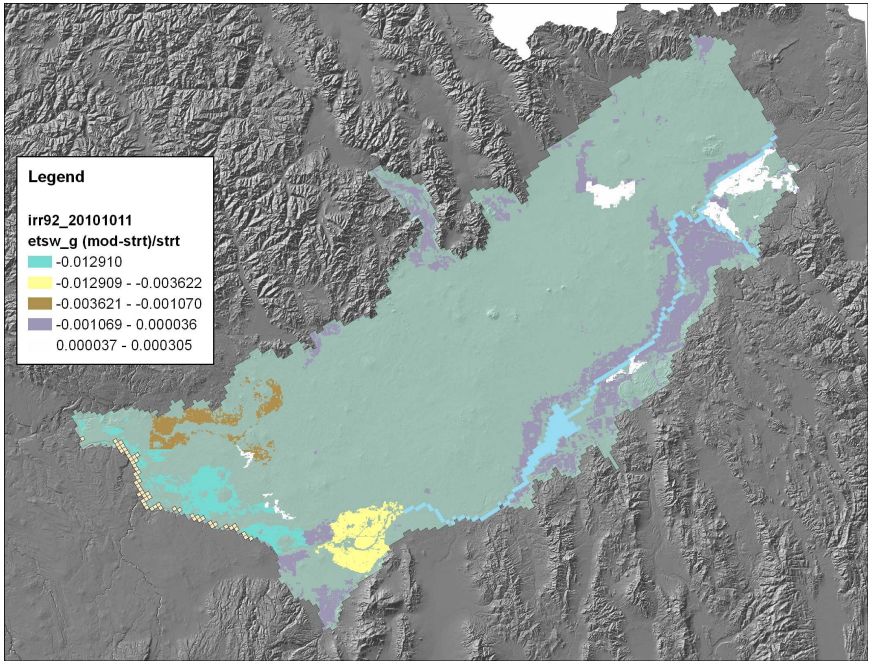
007


Legend
irr92_20101011
etsw_s (mod-strt)/strt
-0.002884
-0.002883 - 0.000066
0.000067 - 0.000891
0.000892 - 0.002794
0.002795 - 0.047662

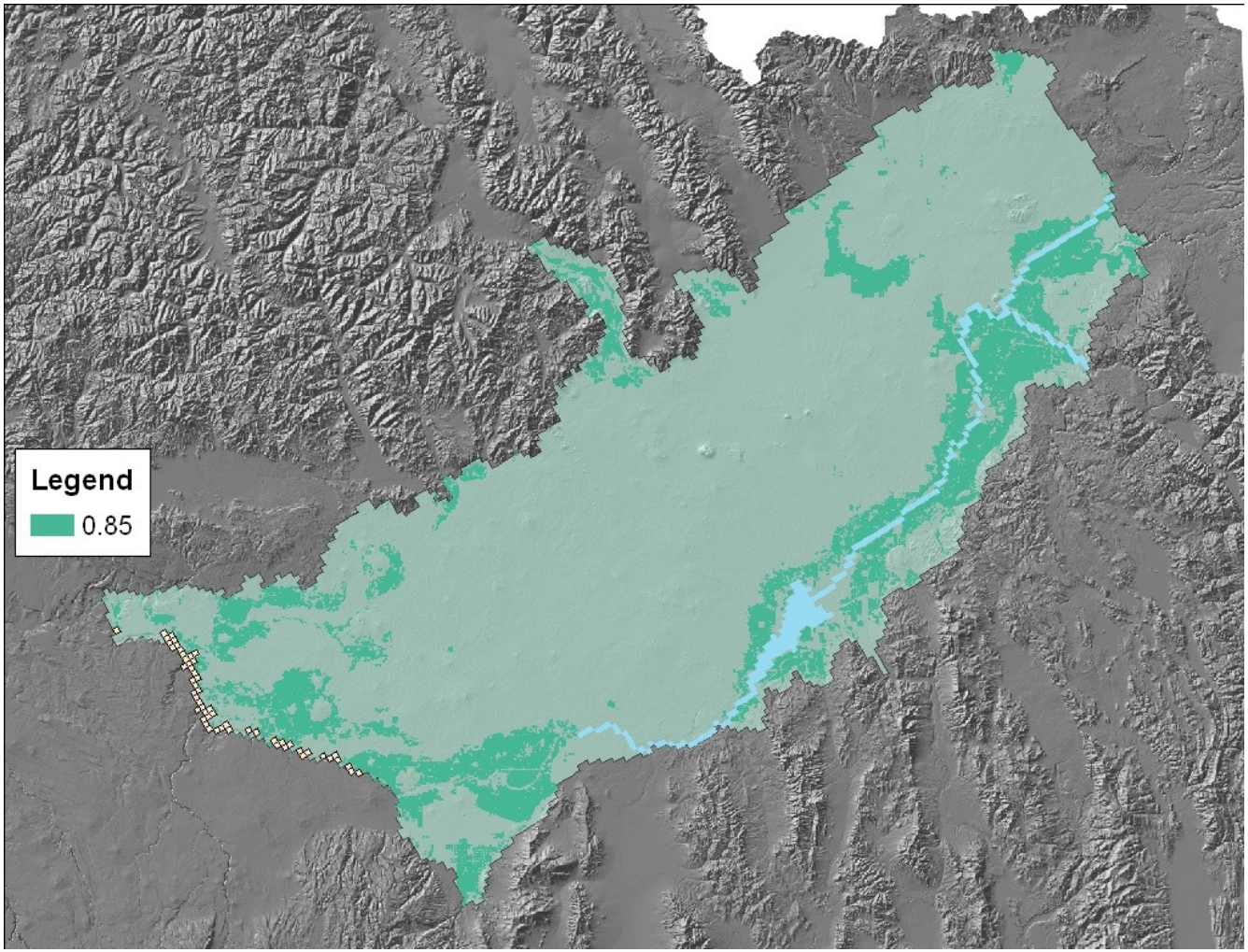
006


Legend
irr92_20101011
EtSw_g (mod-strt)/strt
-0.007431
-0.007430 - -0.003511
-0.003510 - -0.001275
-0.001274 - 0.000028
0.000029 - 0.000166

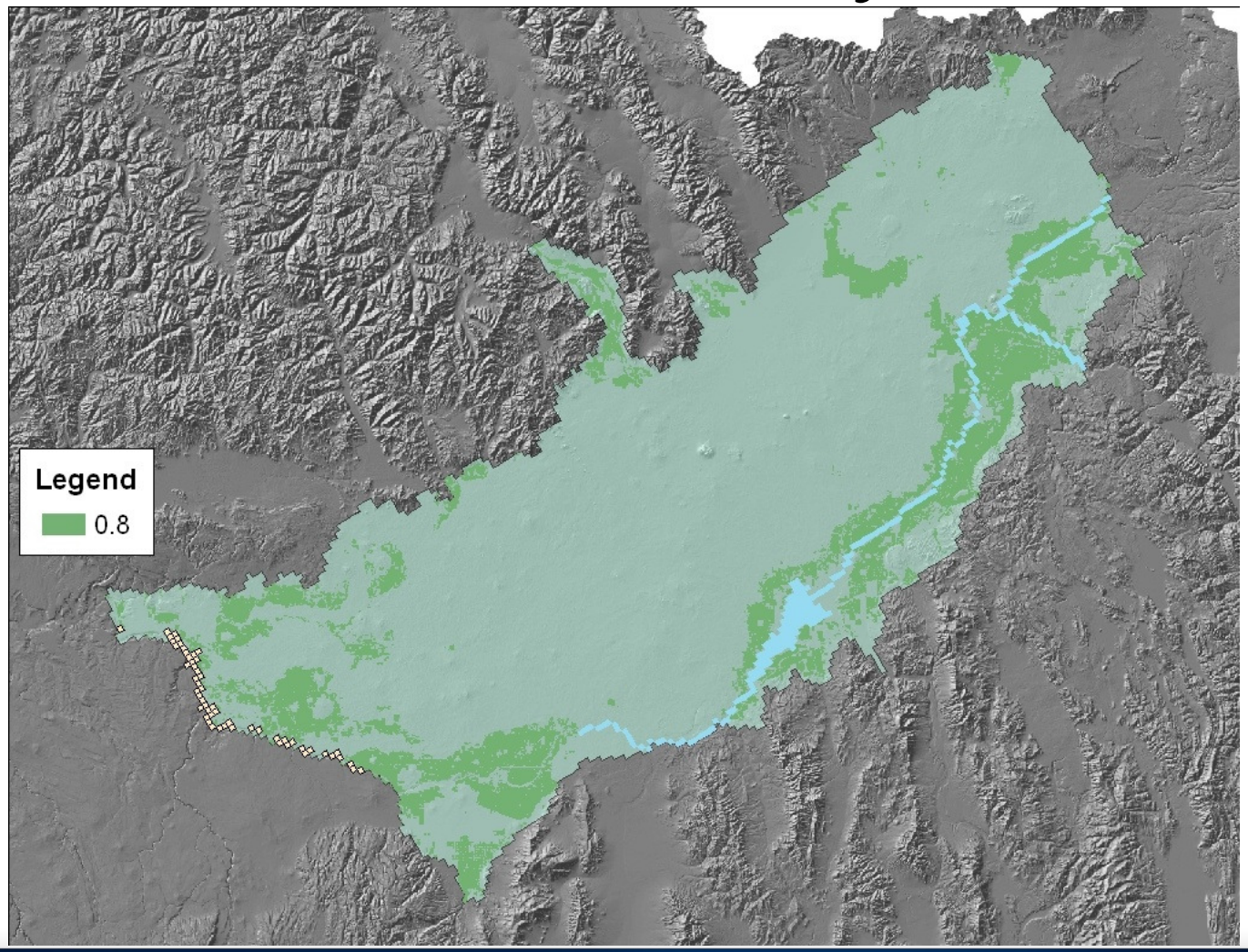
007


Legend
irr92_20101011
etsw_g (mod-strt)/strt
-0.012910
-0.012909 - -0.003622
-0.003621 - -0.001070
-0.001069 - 0.000036
0.000037 - 0.000305

Surface Water Sprinkler Efficiency



Surface Water Gravity Efficiency



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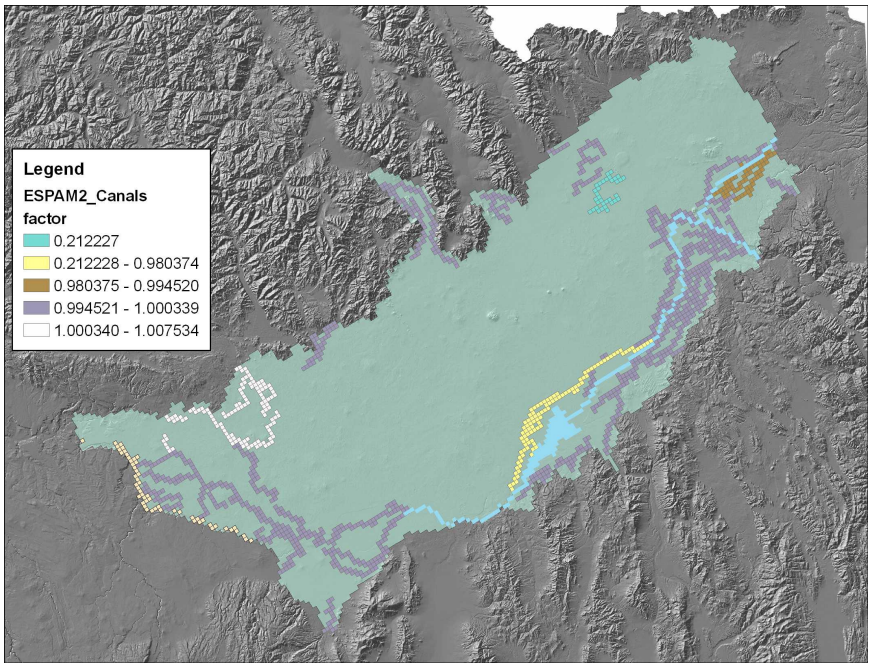
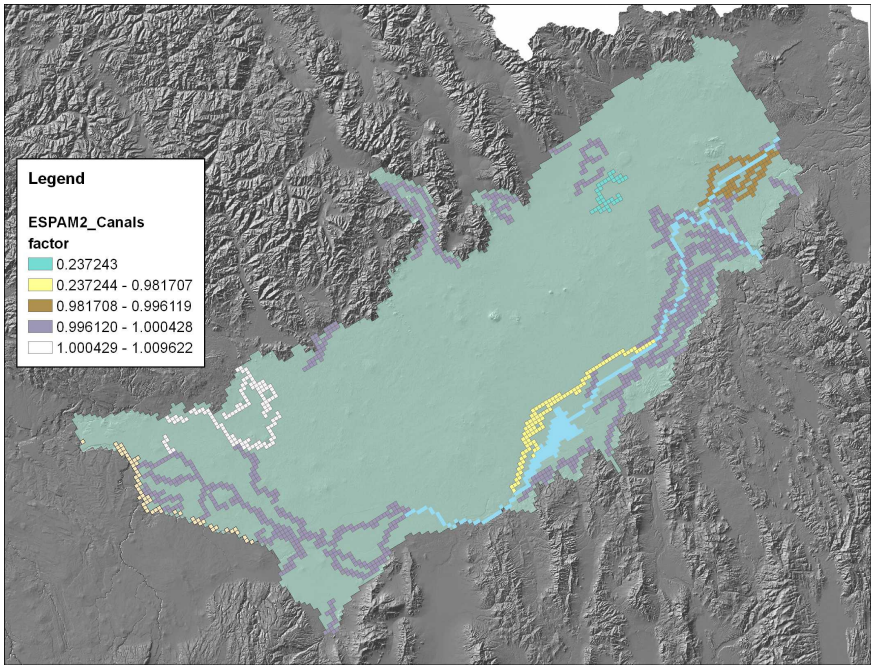
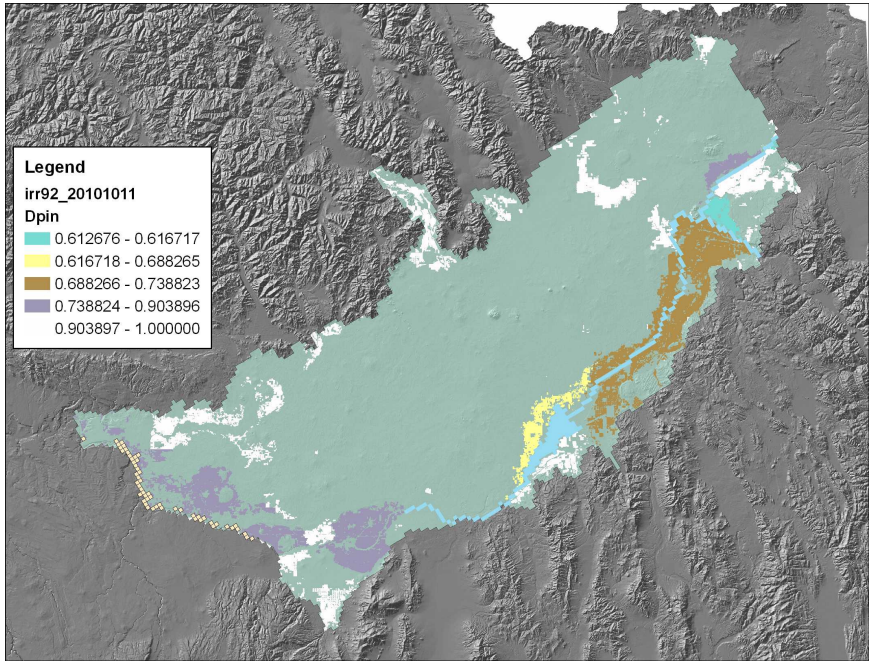

Legend
ESPAM2_Canals
factor
0.212227
0.212228 - 0.980374
0.980375 - 0.994520
0.994521 - 1.000339
1.000340 - 1.007534

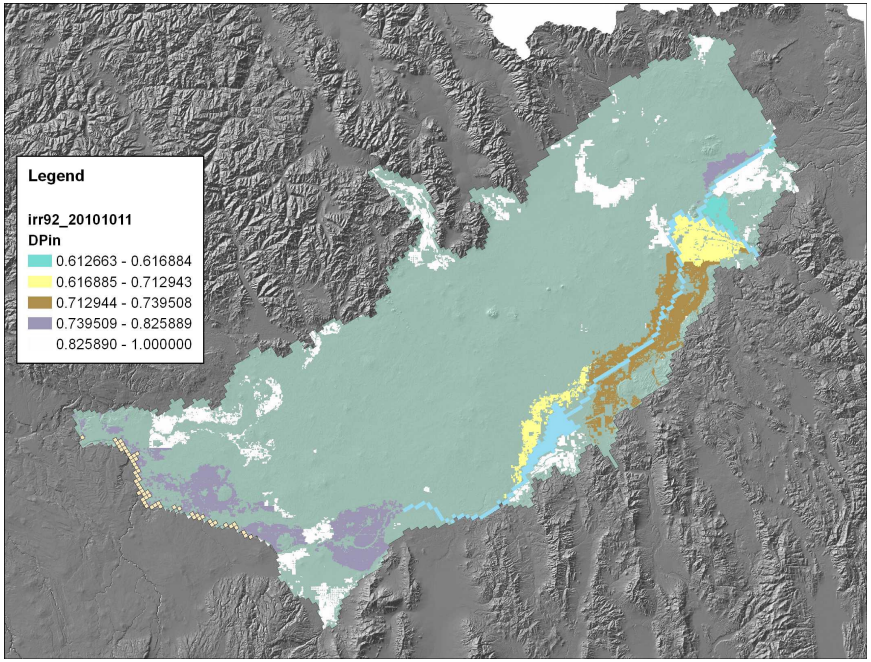
007


Legend
ESPAM2_Canals
factor
0.237243
0.237244 - 0.981707
0.981708 - 0.996119
0.996120 - 1.000428
1.000429 - 1.009622

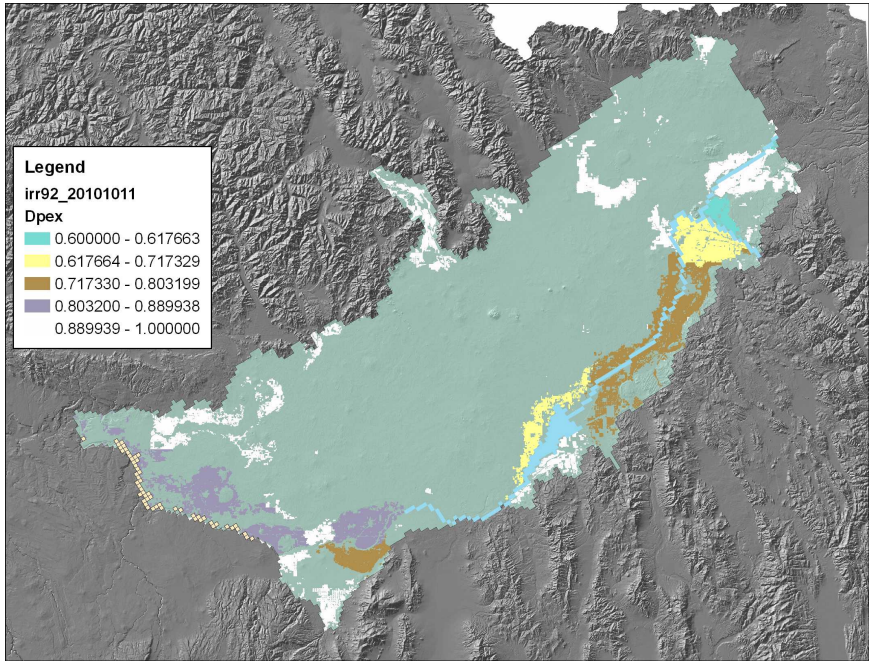
006


Legend
irr92_20101011
Dpin
0.612676 - 0.616717
0.616718 - 0.688265
0.688266 - 0.738823
0.738824 - 0.903896
0.903897 - 1.000000

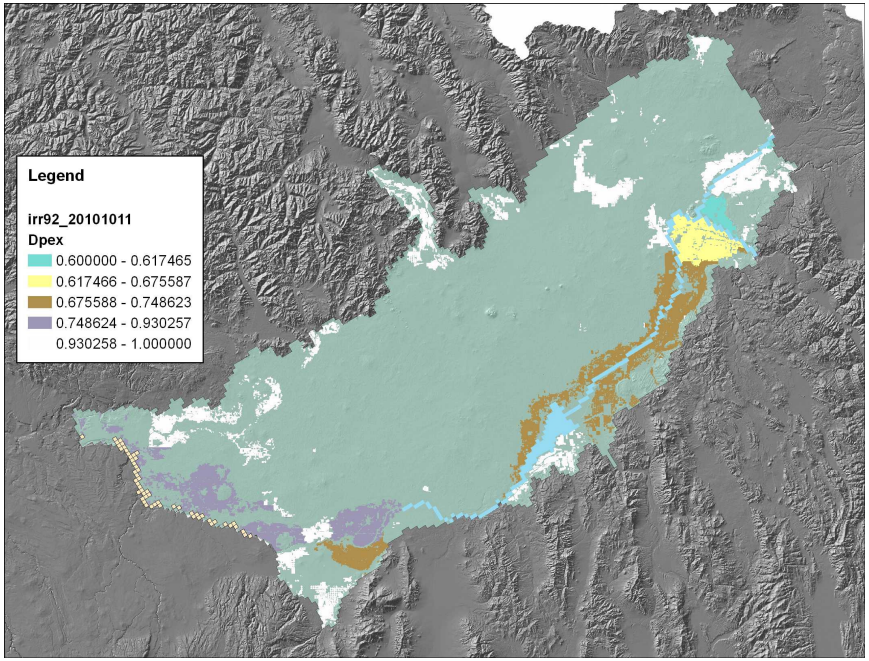
007


Legend
irr92_20101011
DPin
0.612663 - 0.616884
0.616885 - 0.712943
0.712944 - 0.739508
0.739509 - 0.825889
0.825890 - 1.000000

006


Legend
irr92_20101011
Dpex
0.600000 - 0.617663
0.617664 - 0.717329
0.717330 - 0.803199
0.803200 - 0.889938
0.889939 - 1.000000

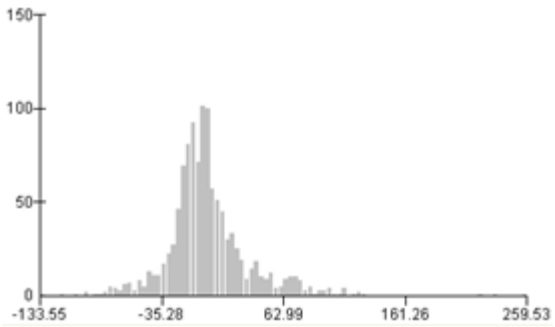
007


Legend
irr92_20101011
Dpex
0.600000 - 0.617465
0.617466 - 0.675587
0.675588 - 0.748623
0.748624 - 0.930257
0.930258 - 1.000000

006

Transient Heads

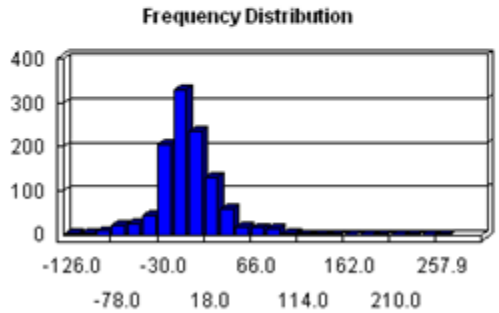
Mean = -1.16
Standard Deviation = 23.59



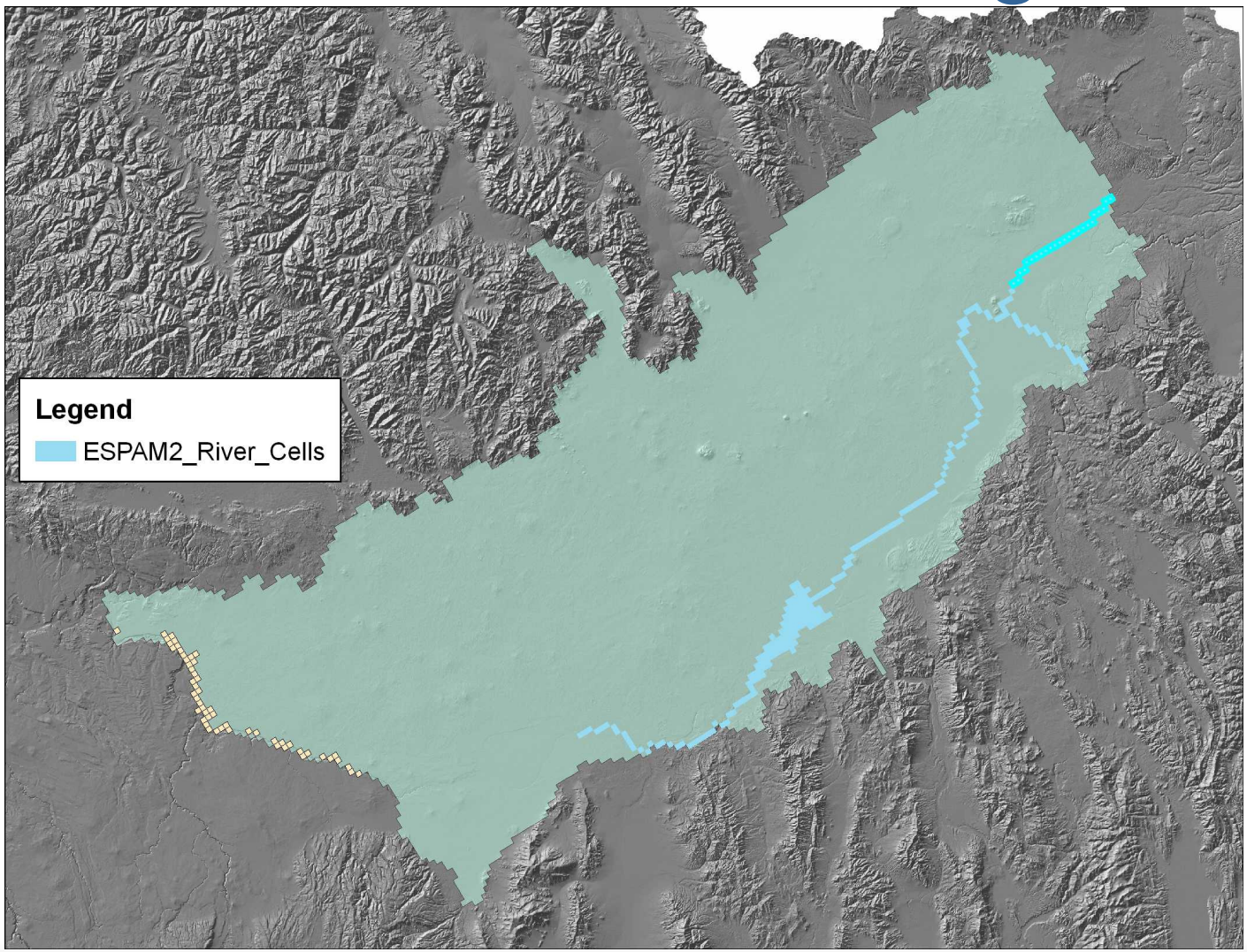
007

Transient Heads

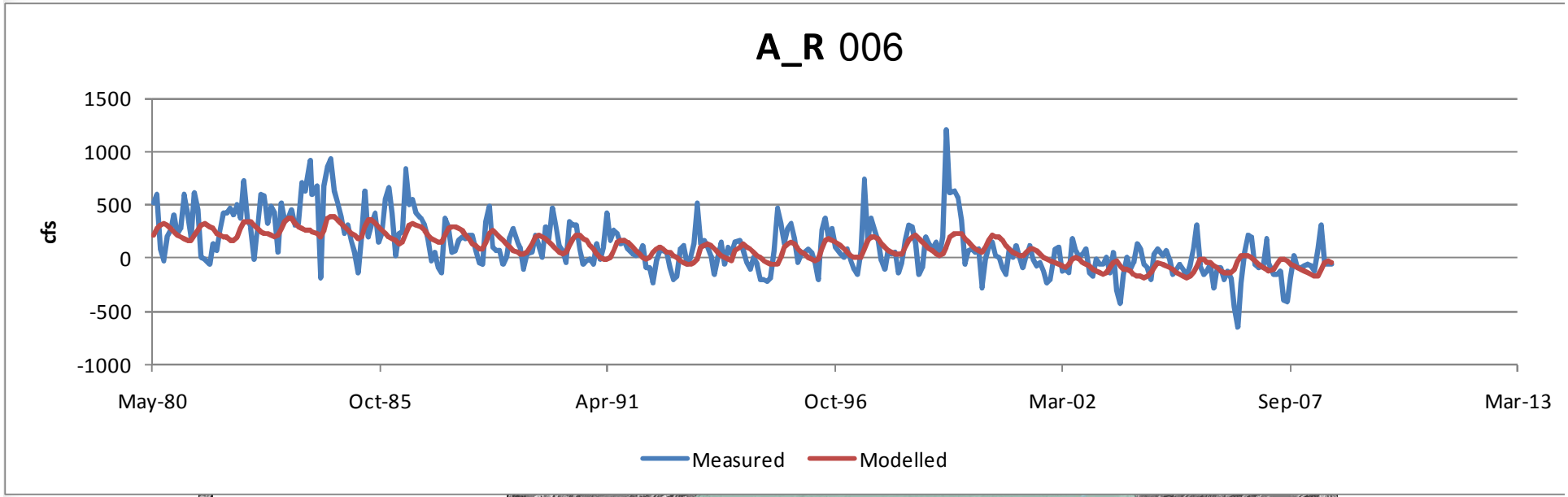
Mean = -2.10
Standard Deviation = 21.87

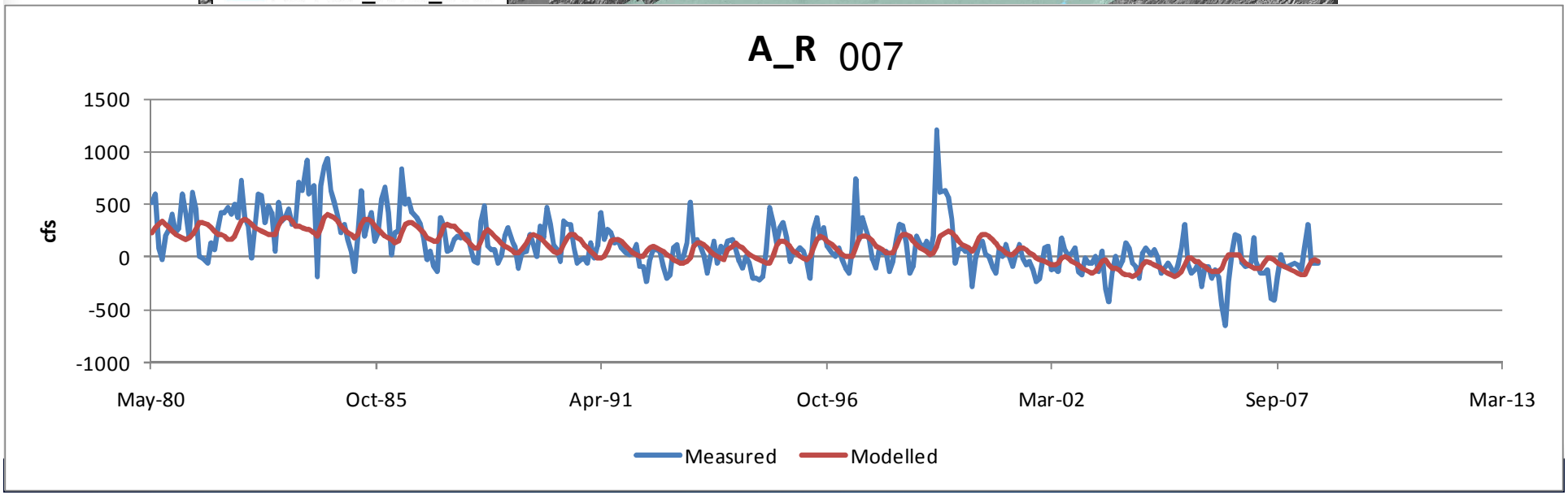


Ashton - Rexburg

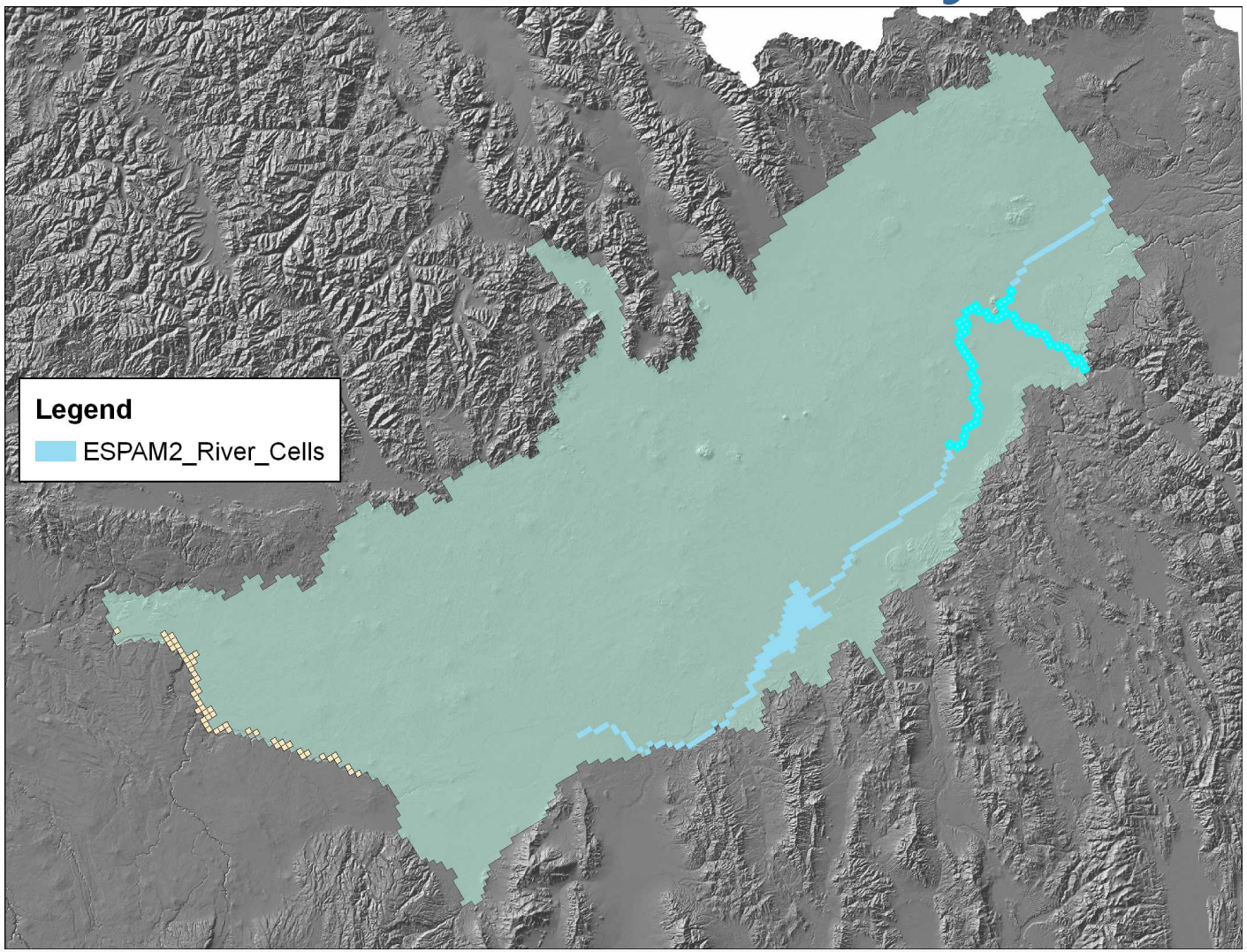


IDAHO Department of Water Resources

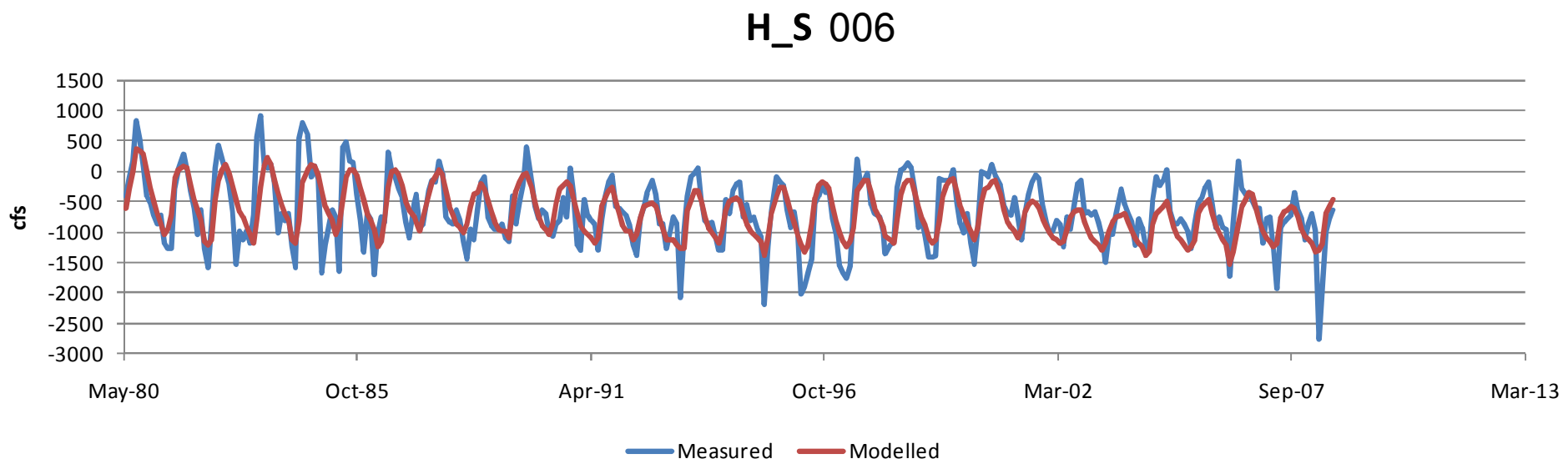


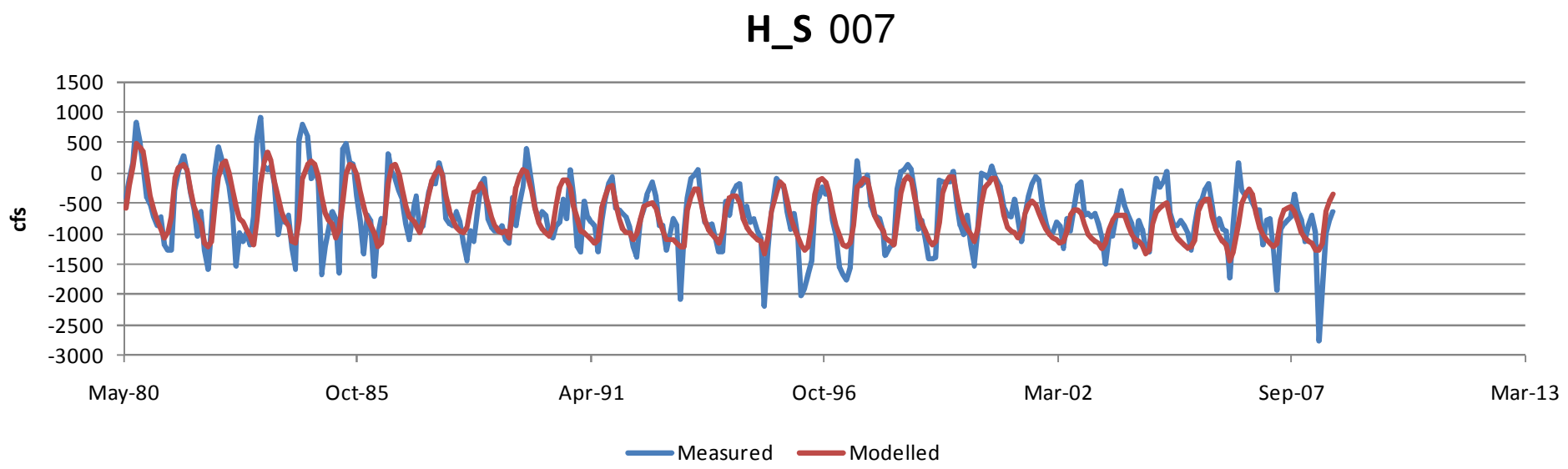


Heise - Shelley

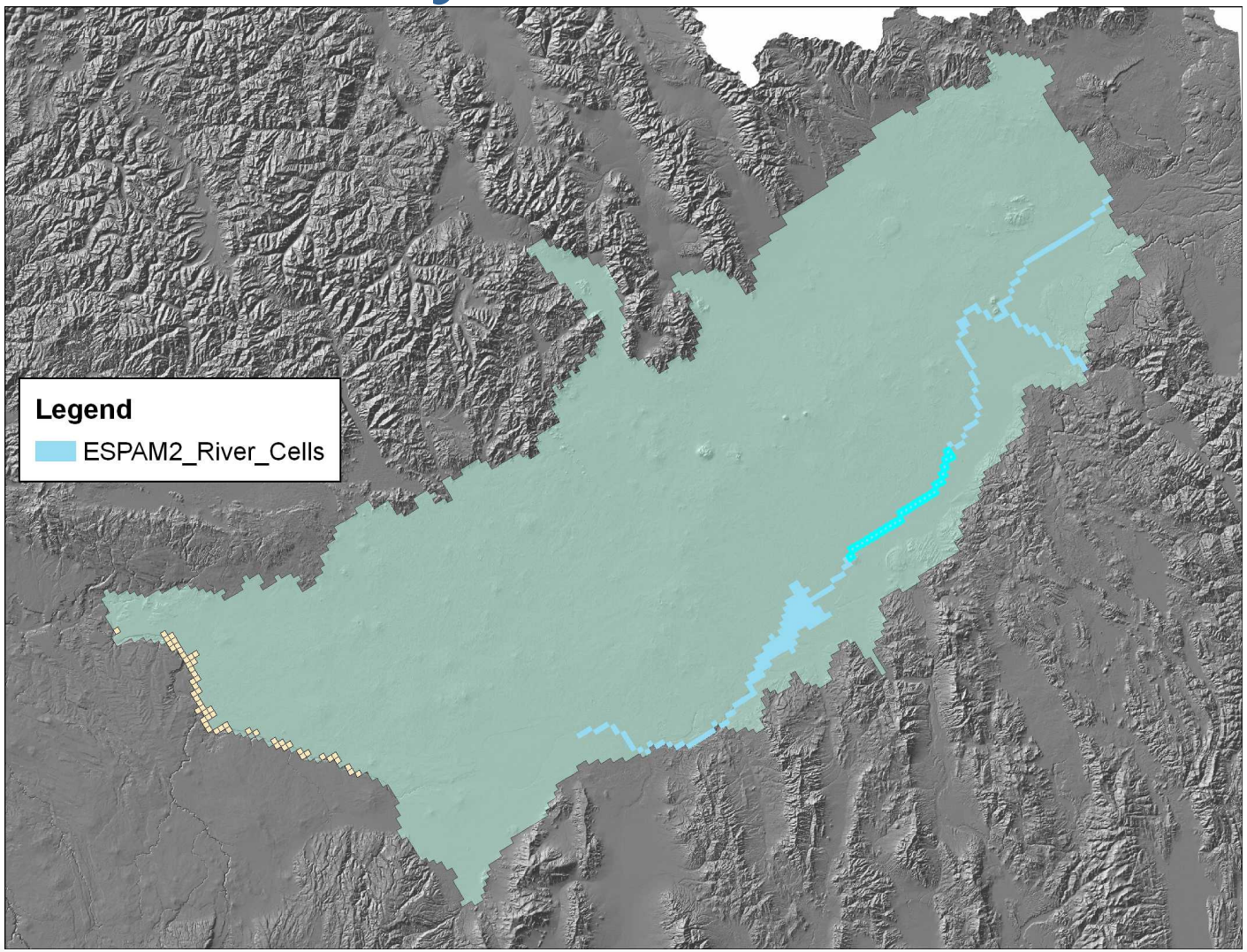


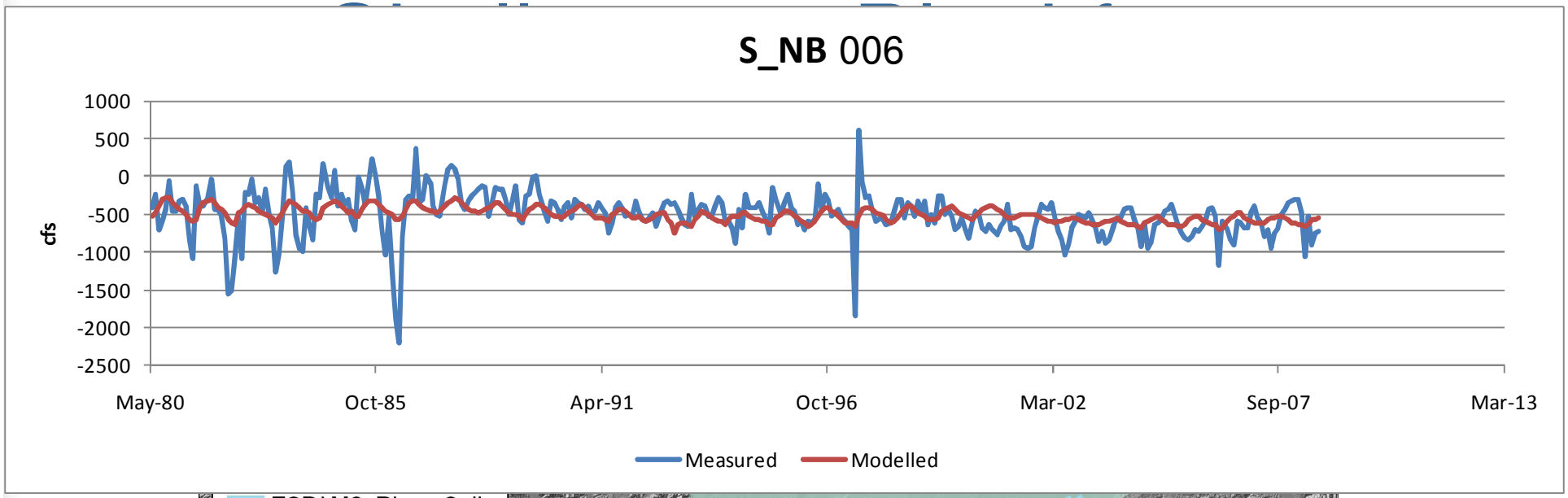
IDAHO Department of Water Resources





Shelley – nr Blackfoot

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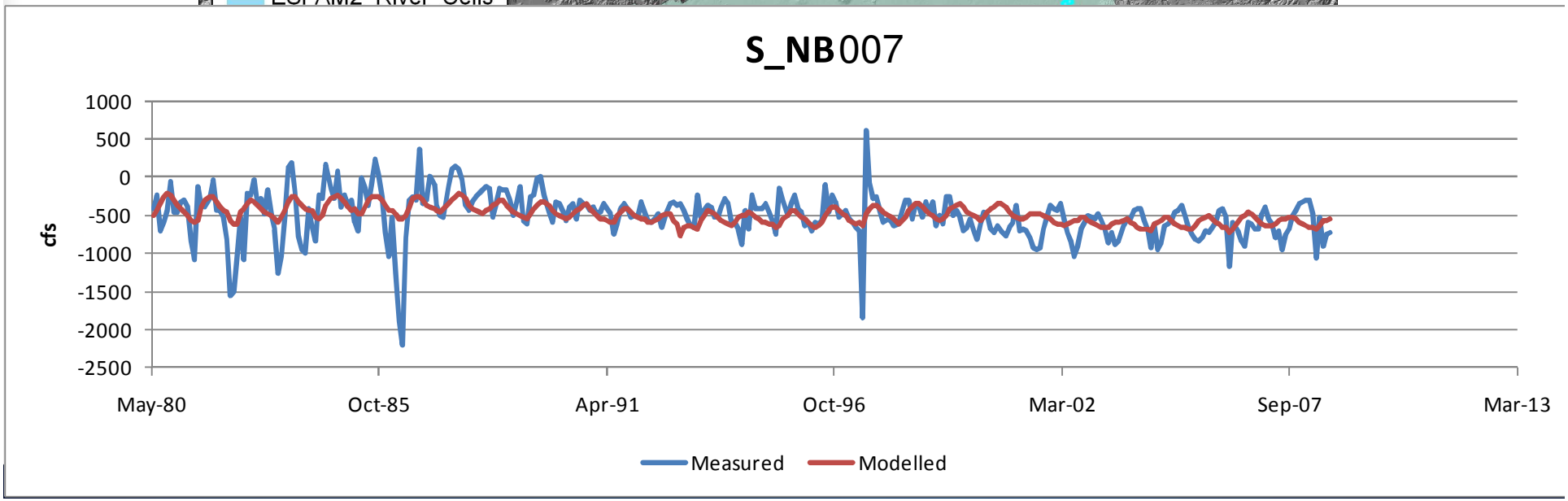
Mar-13
Measured
Modelled

ESPAM2 River Cells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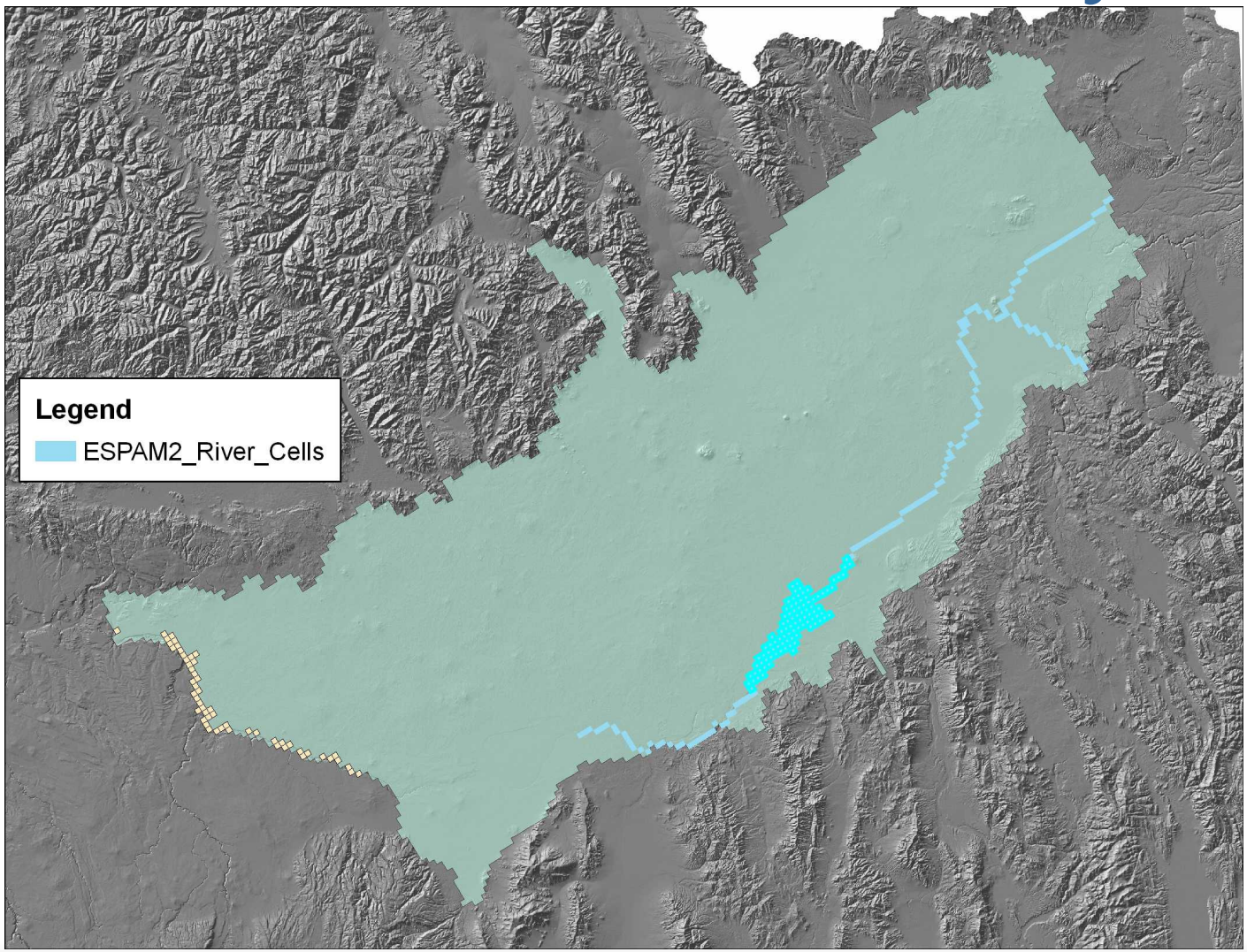
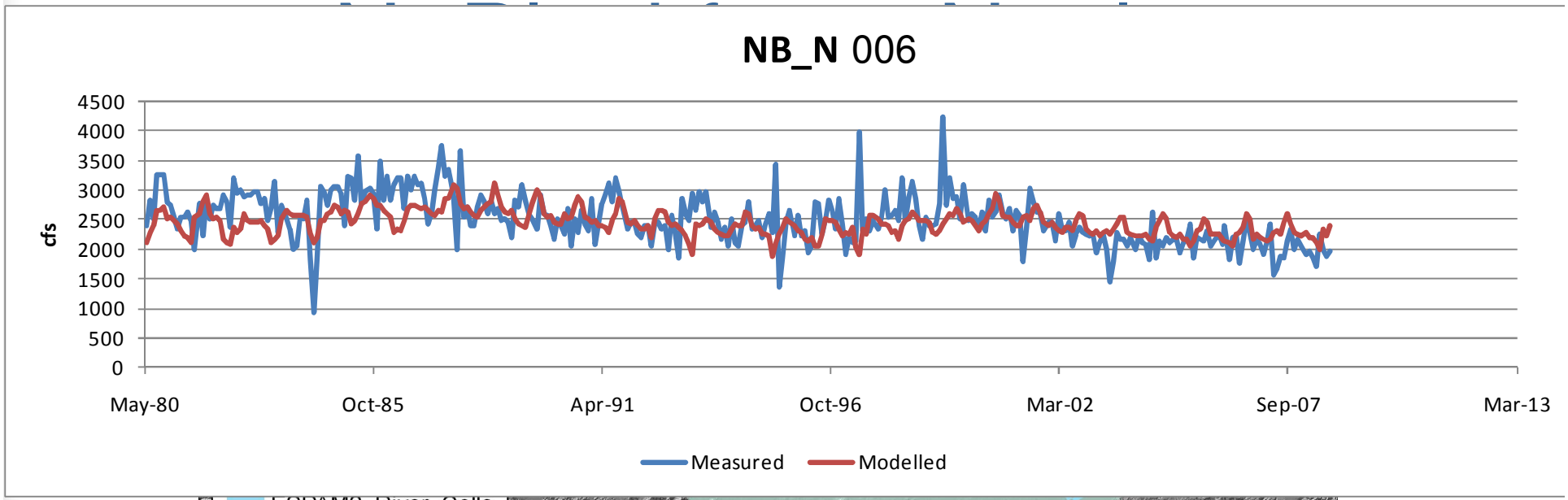
Mar-13
Measured
Modelled

Nr Blackfoot - Neeley

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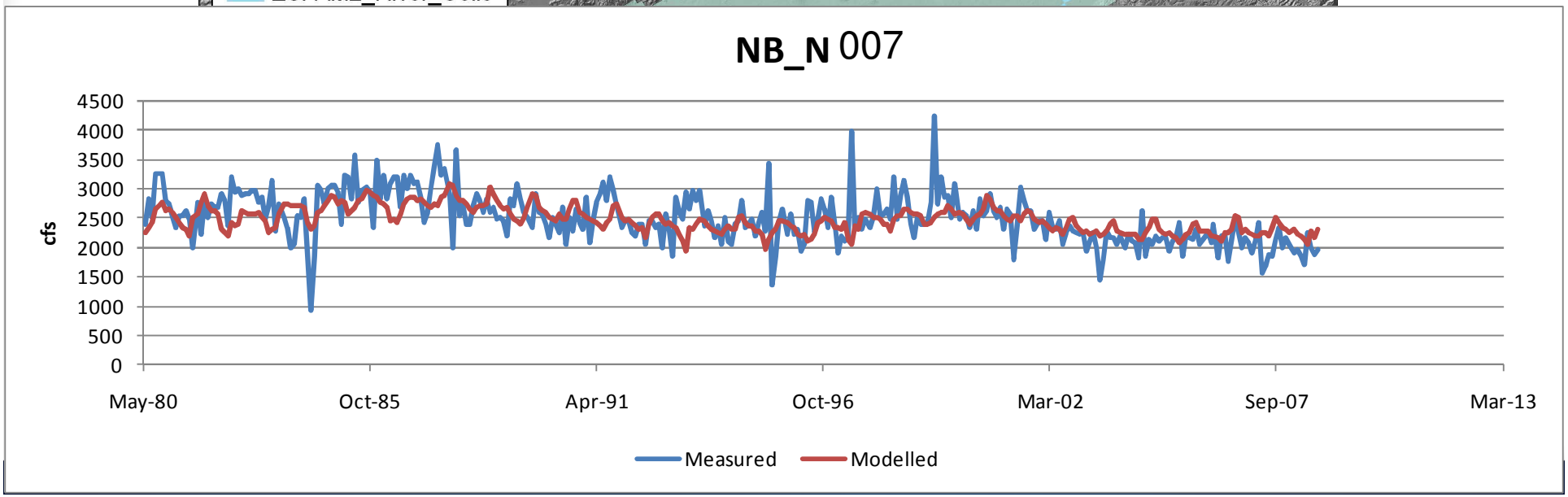
Measured
Modelled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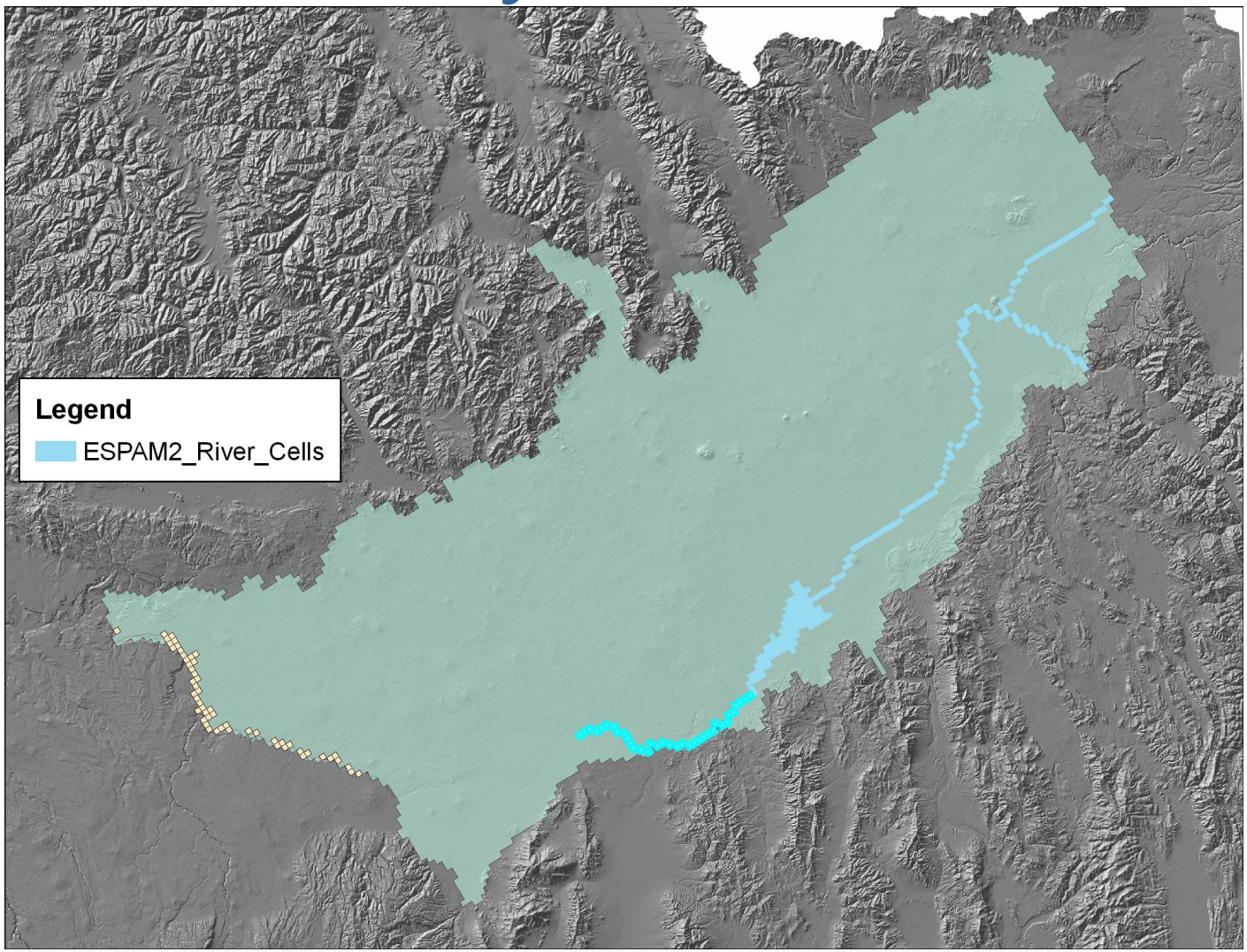
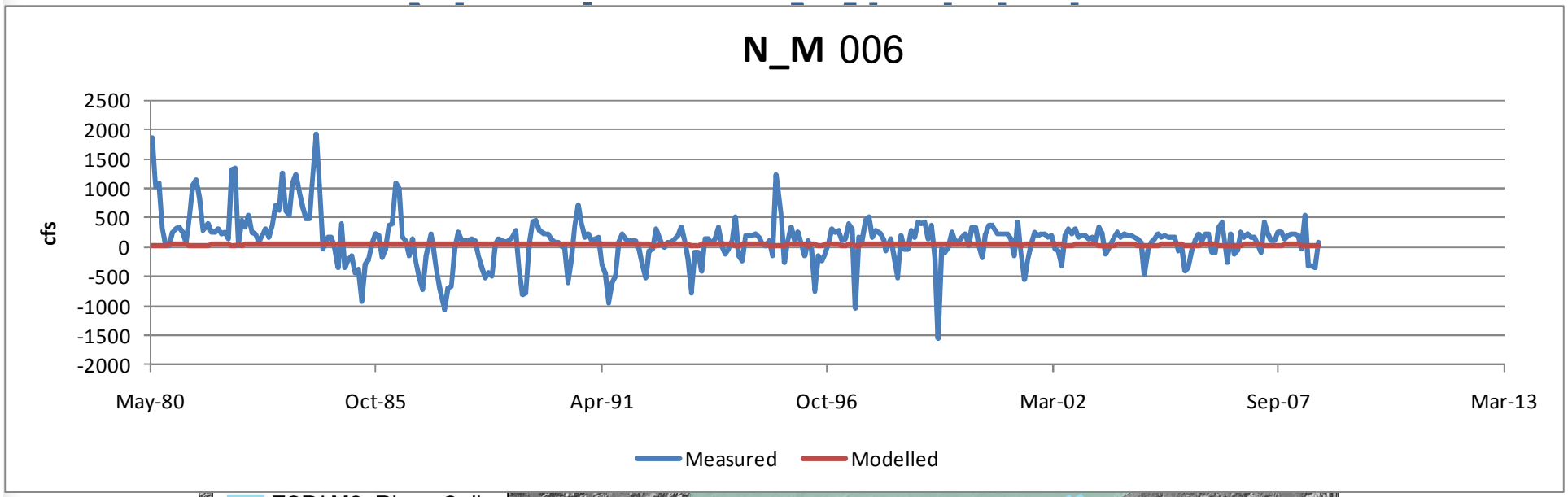
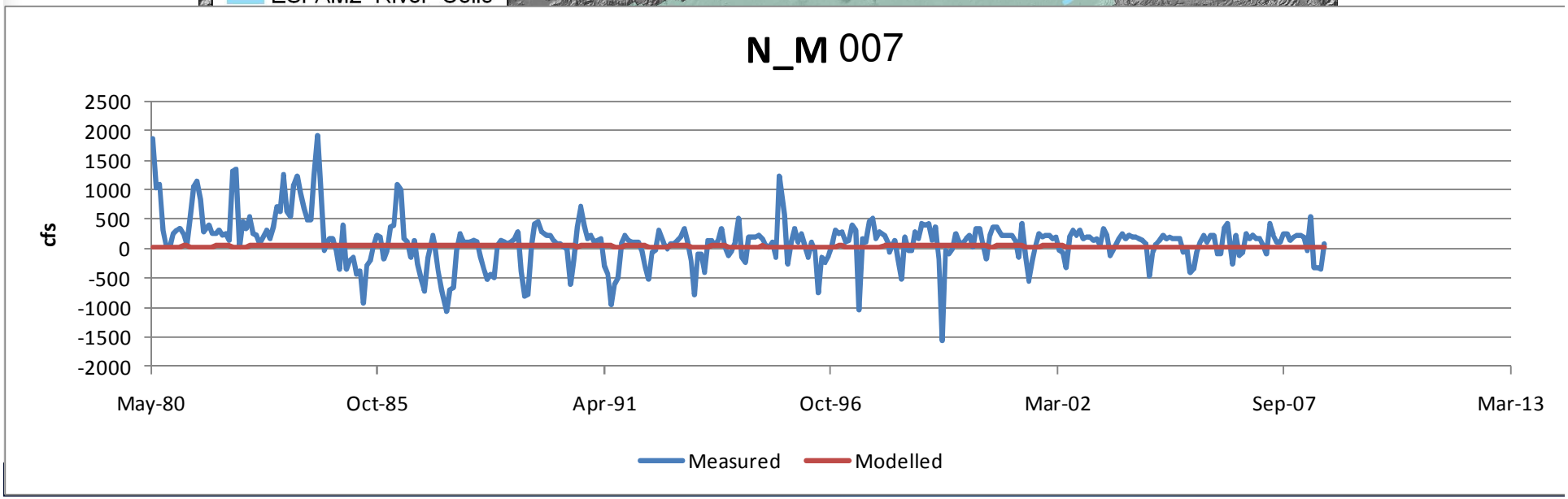
Measured
Modelled

Neeley - Minidoka

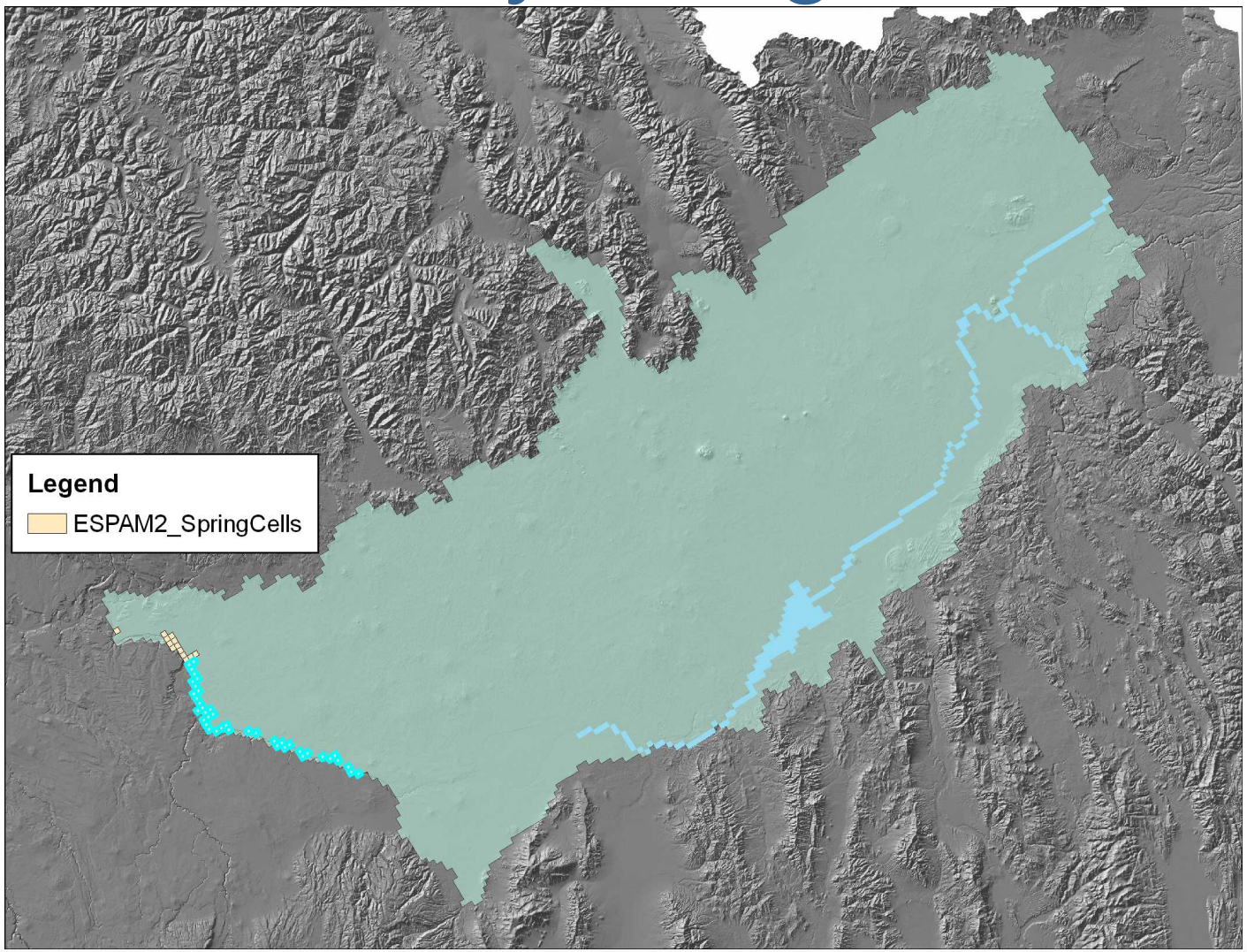




ESPAM2 River Cells

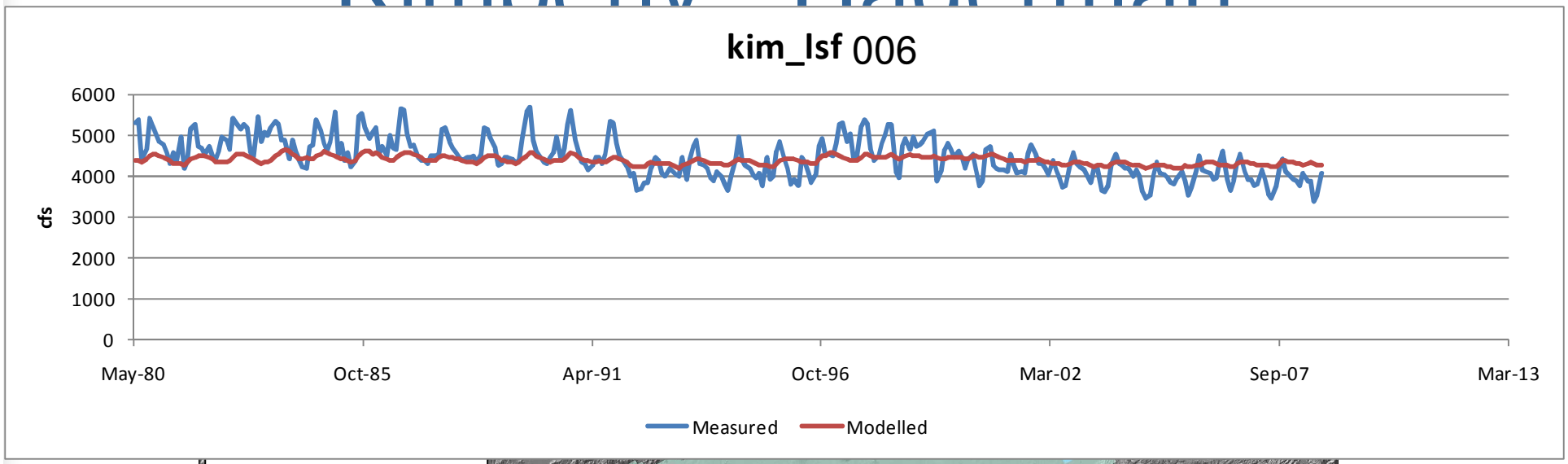


Kimberly - Hagerman



IDAHO Department of Water Resources

Kimberly - Hagerman



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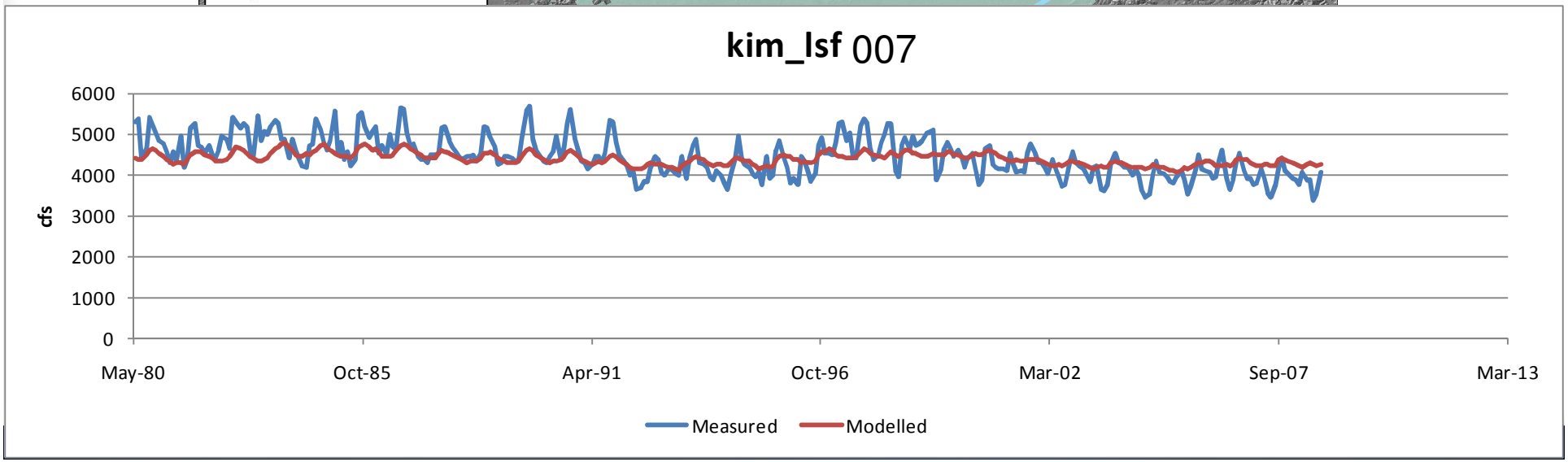
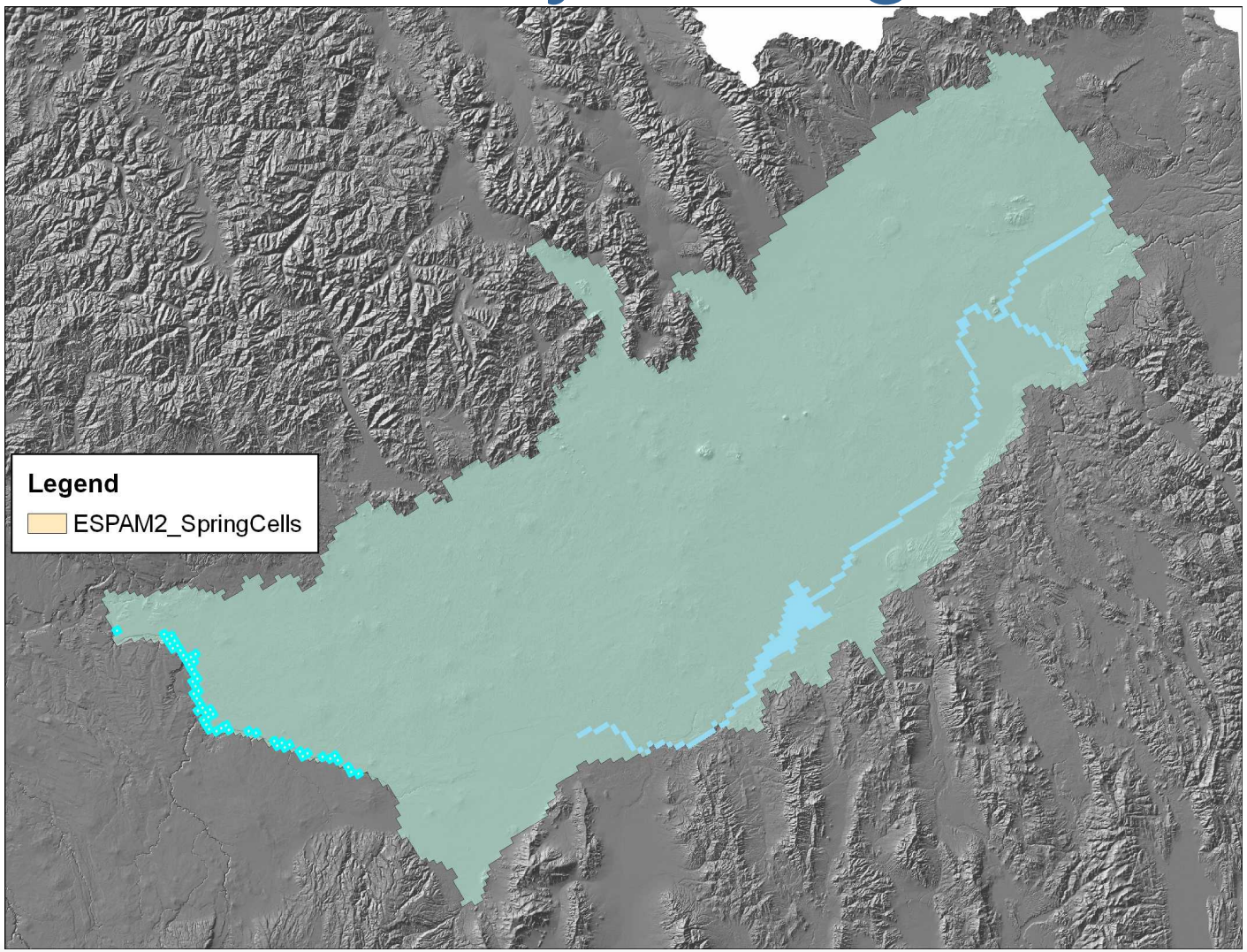
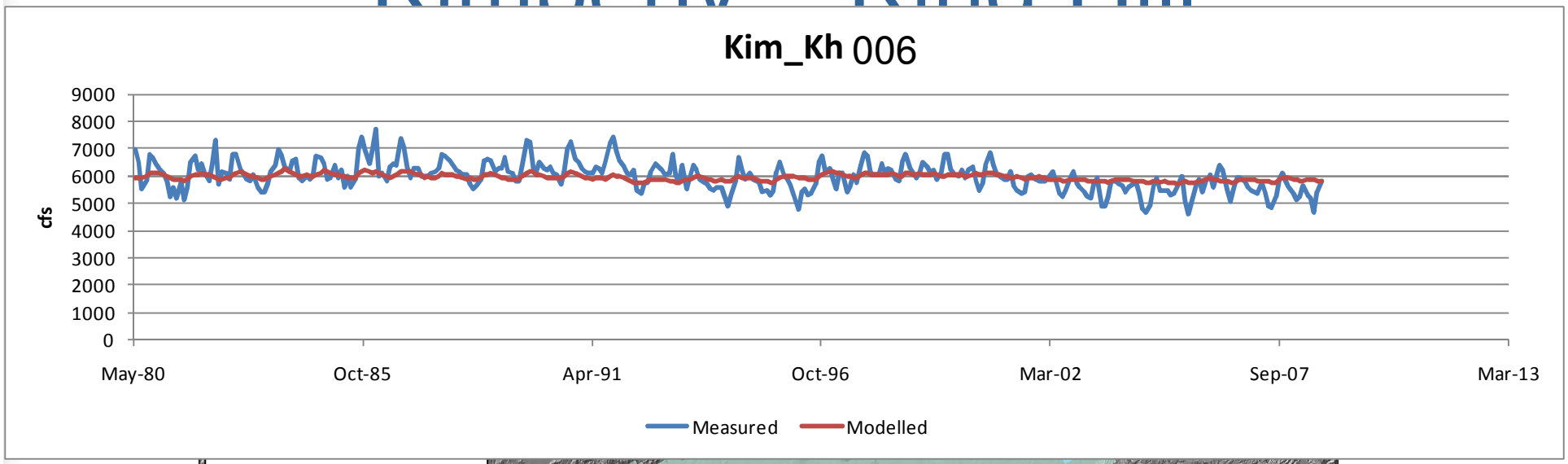


Kimberly – King Hill



IDAHO Department of Water Resources

Kimberly – King Hill



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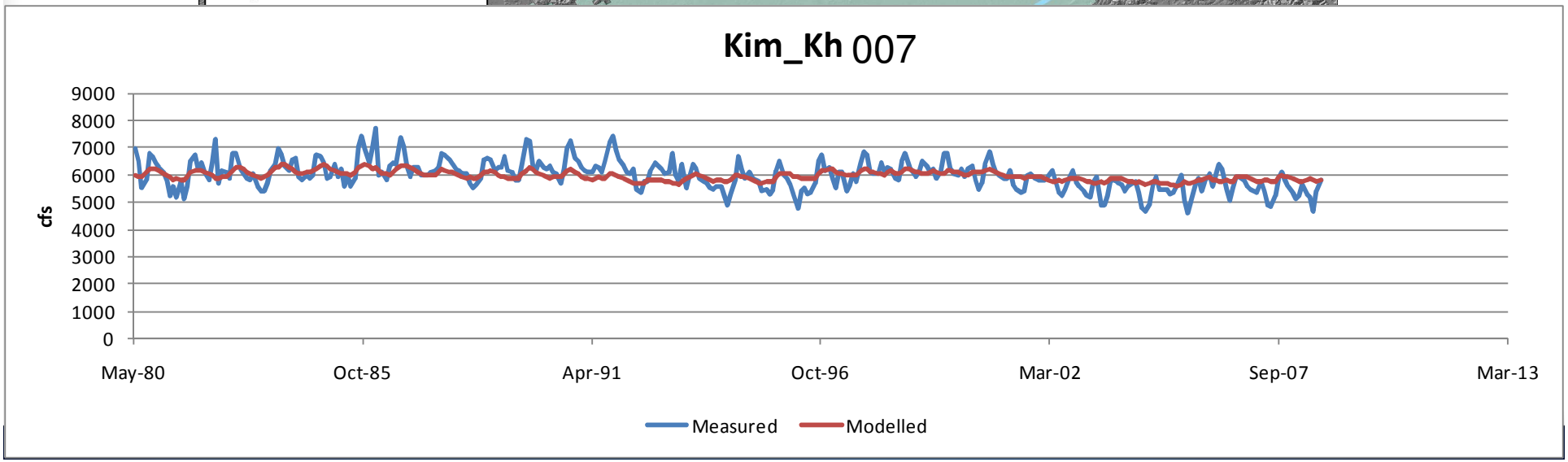
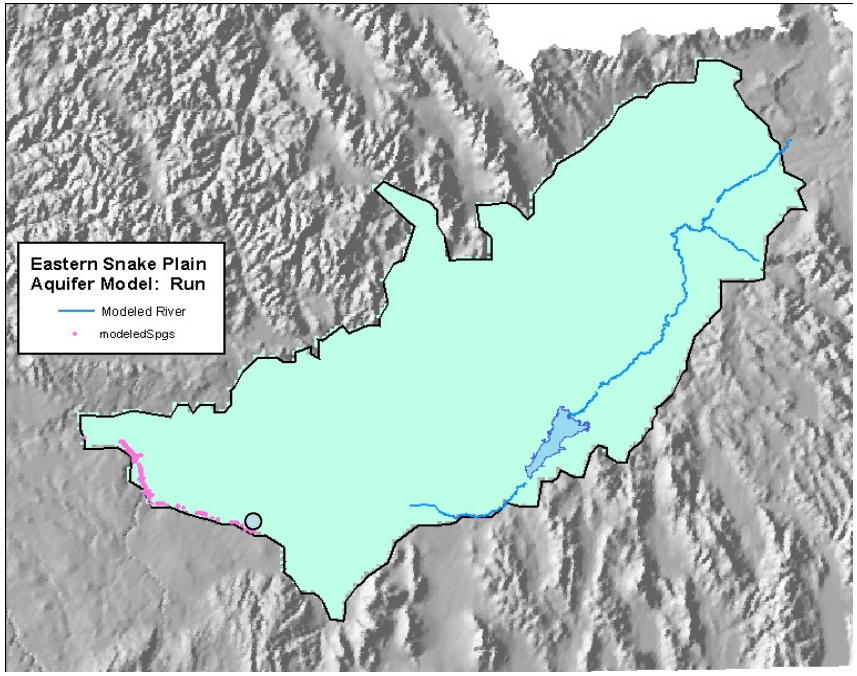
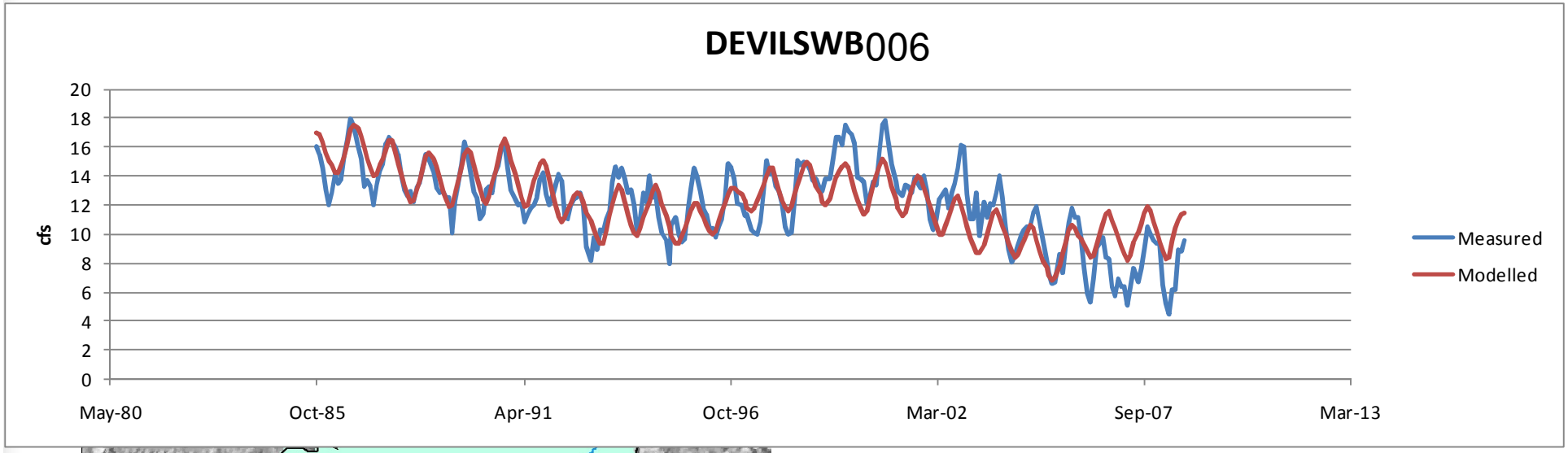




- Devils Washbowl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Measured
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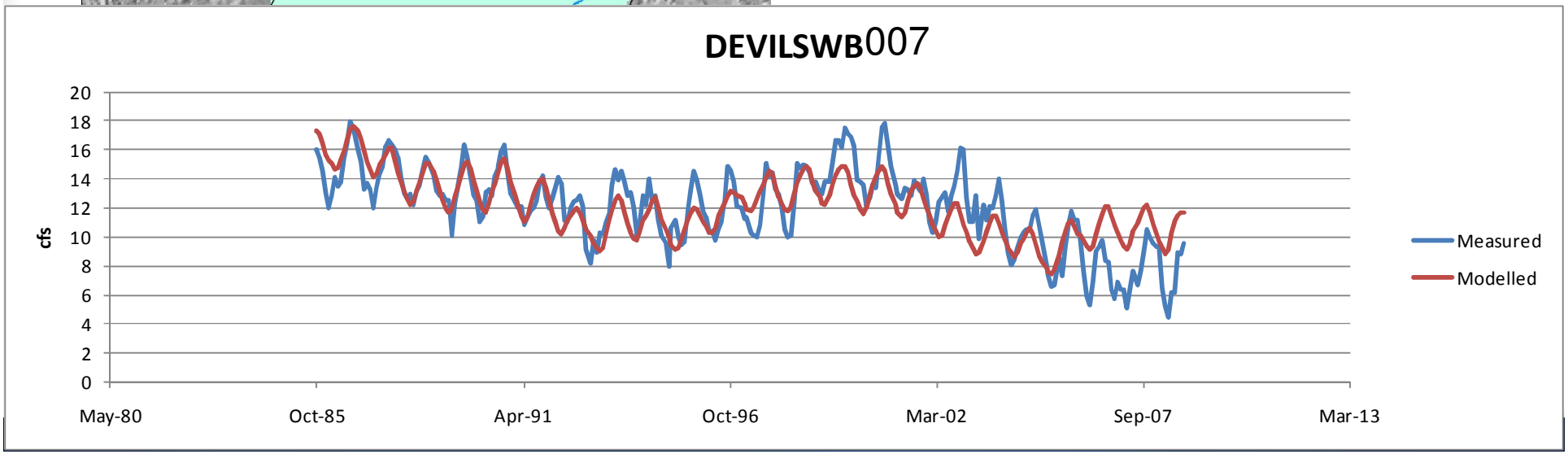
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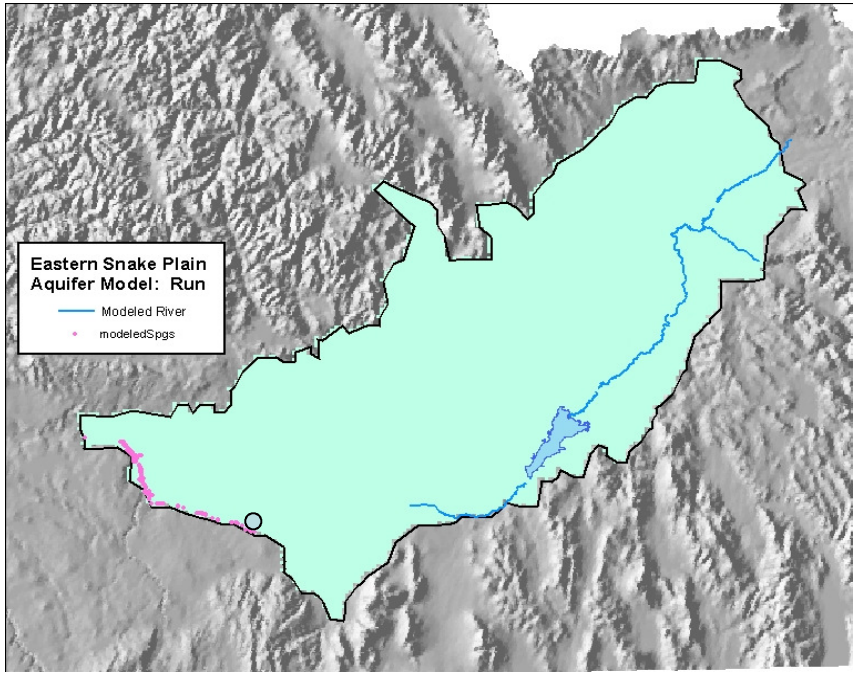
Measured
Modelled



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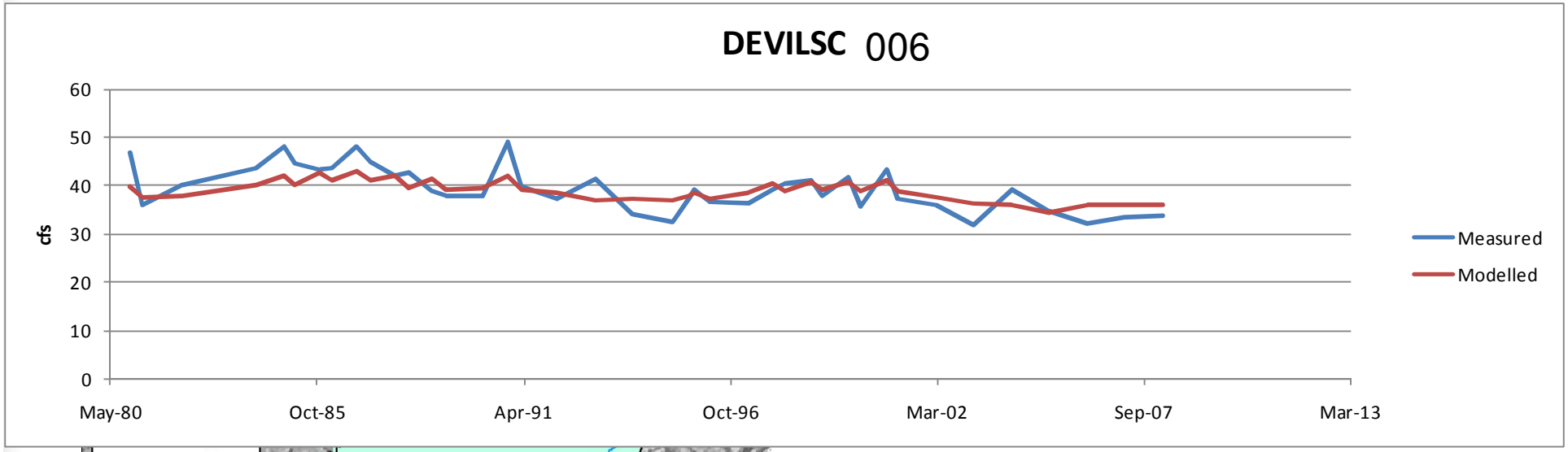
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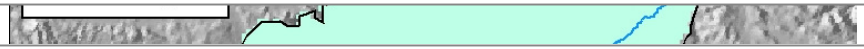
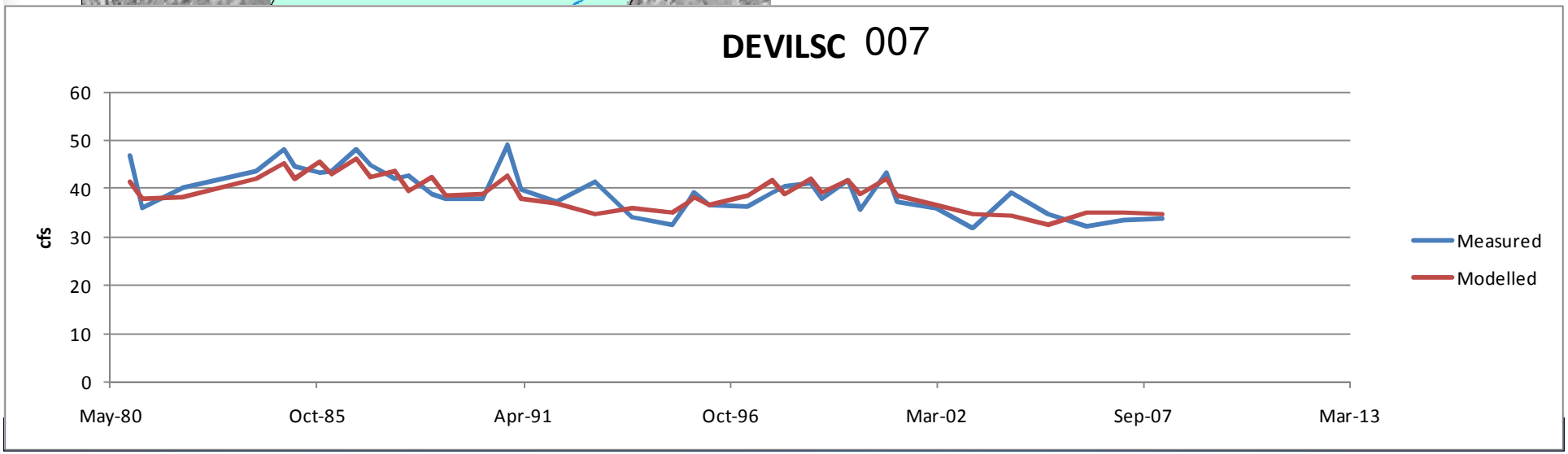
Measured
Modelled

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Measured
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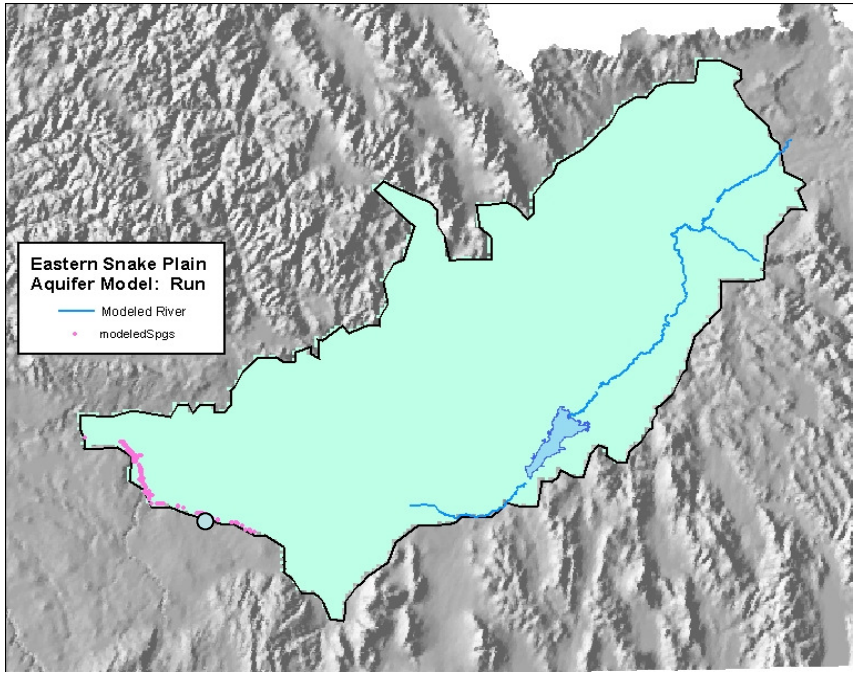
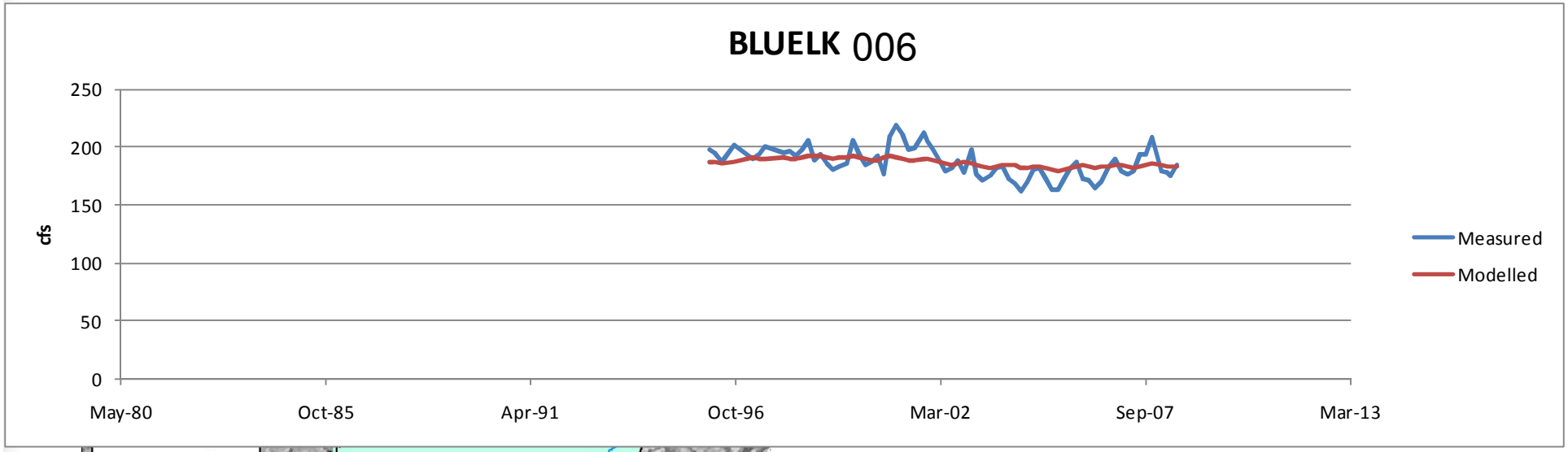

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Blue Lakes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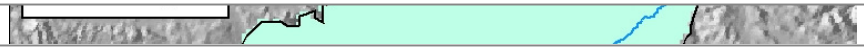
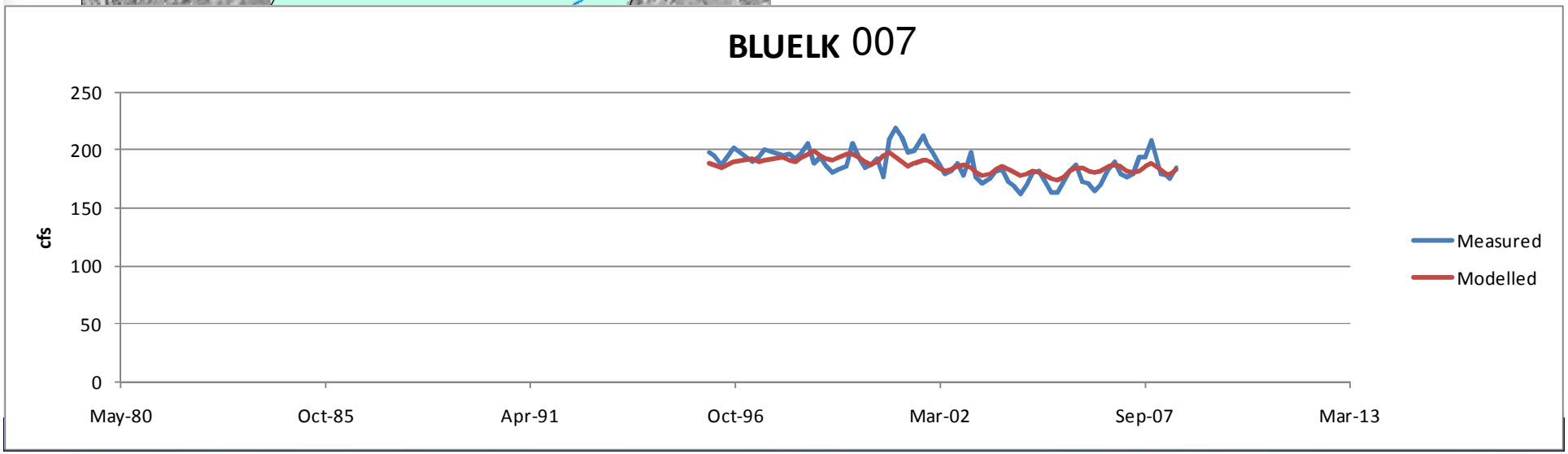
Mar-13
Measured
Modelled

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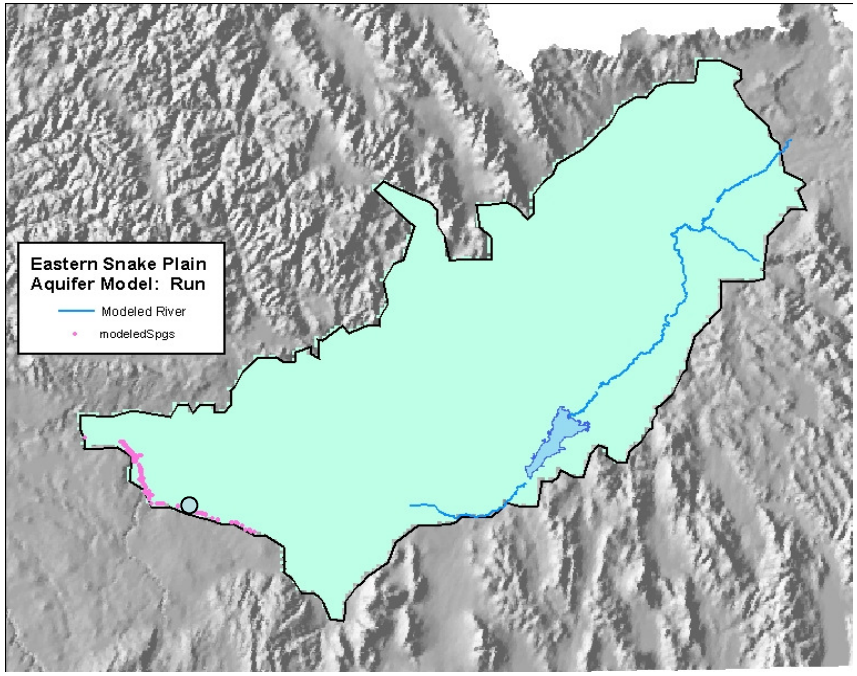
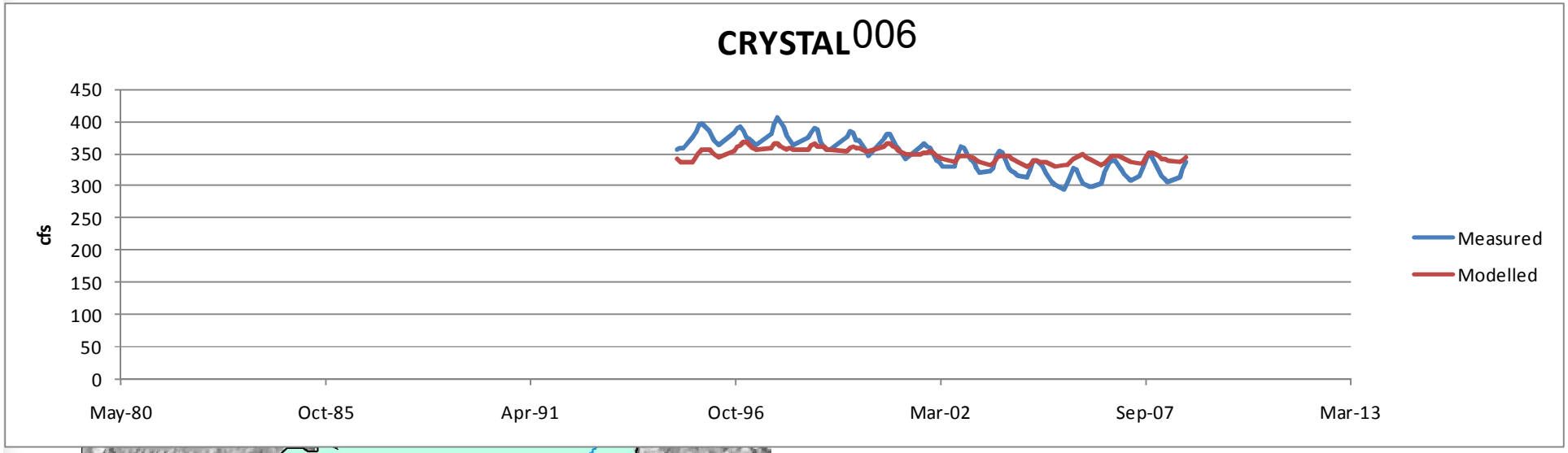
Measured
Modelled



- Crystal Springs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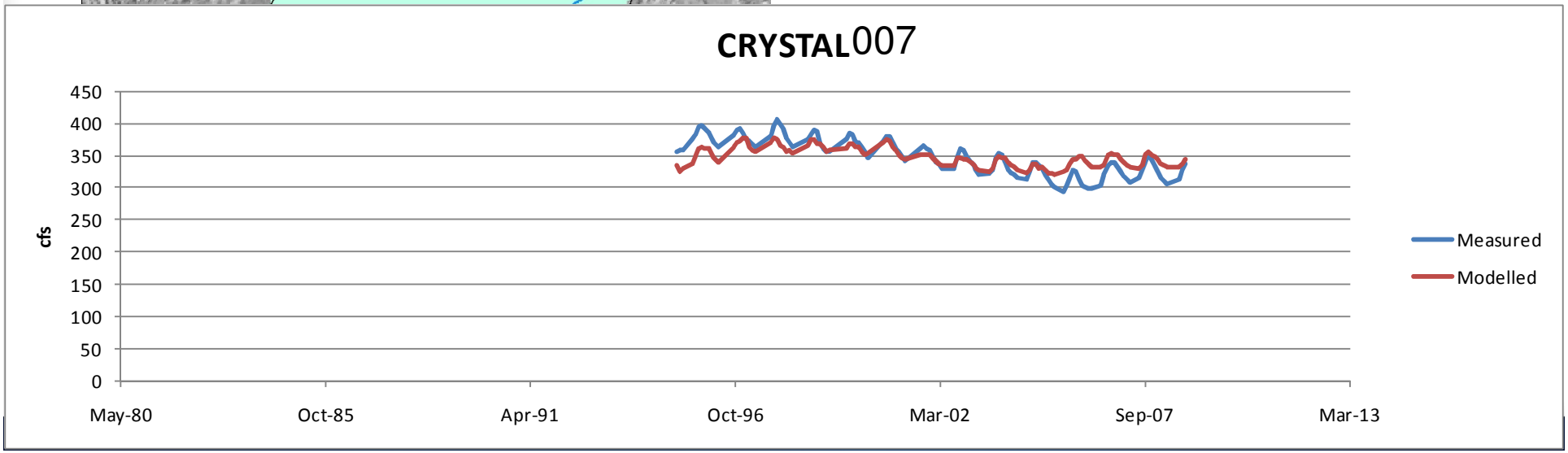
Measured
Modelled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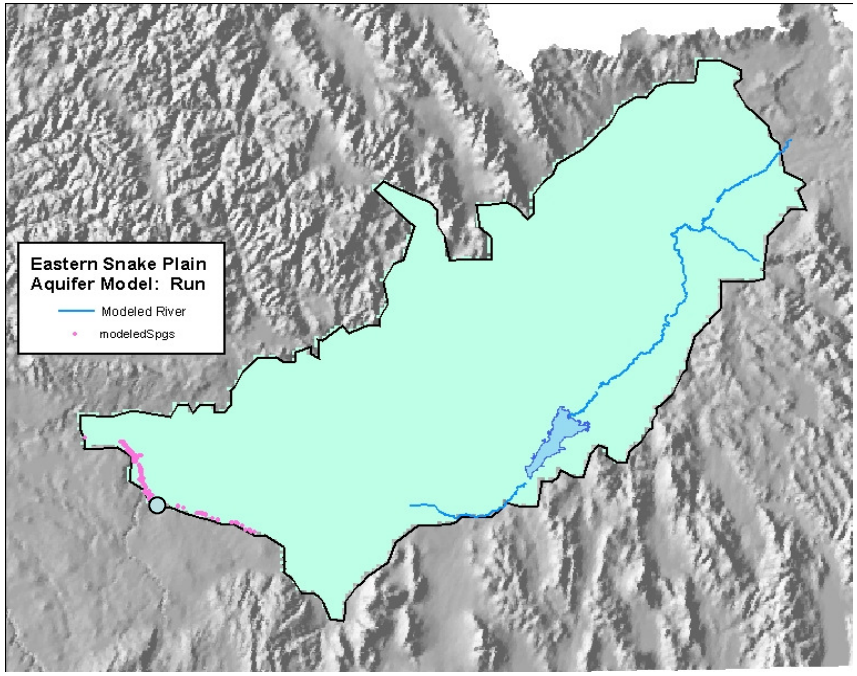
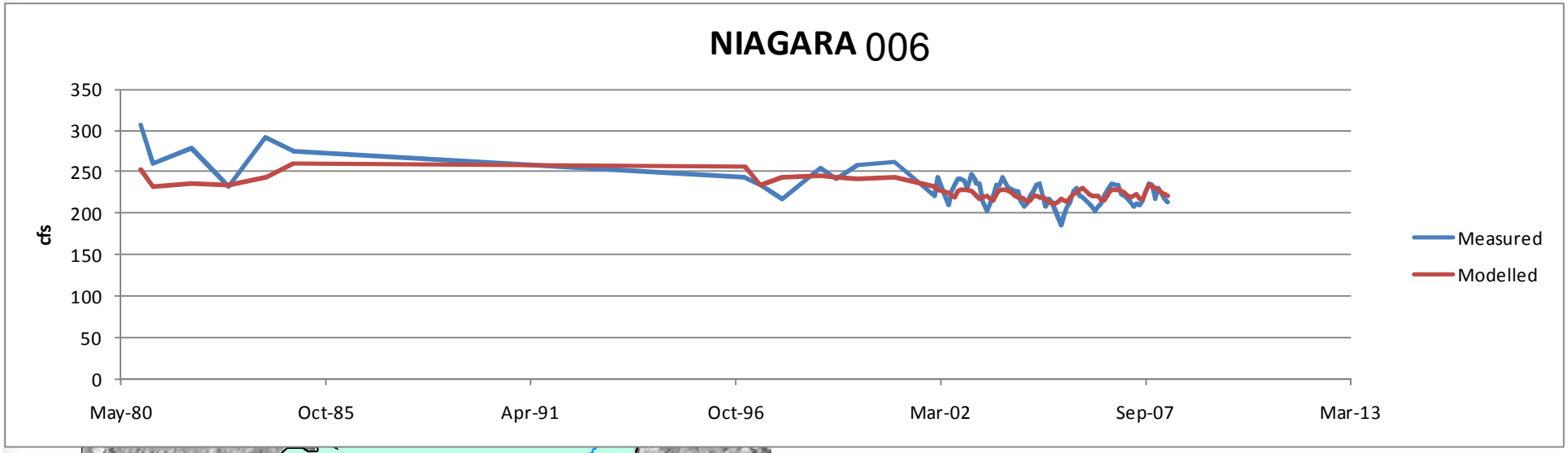
Measured
Modelled


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Niagara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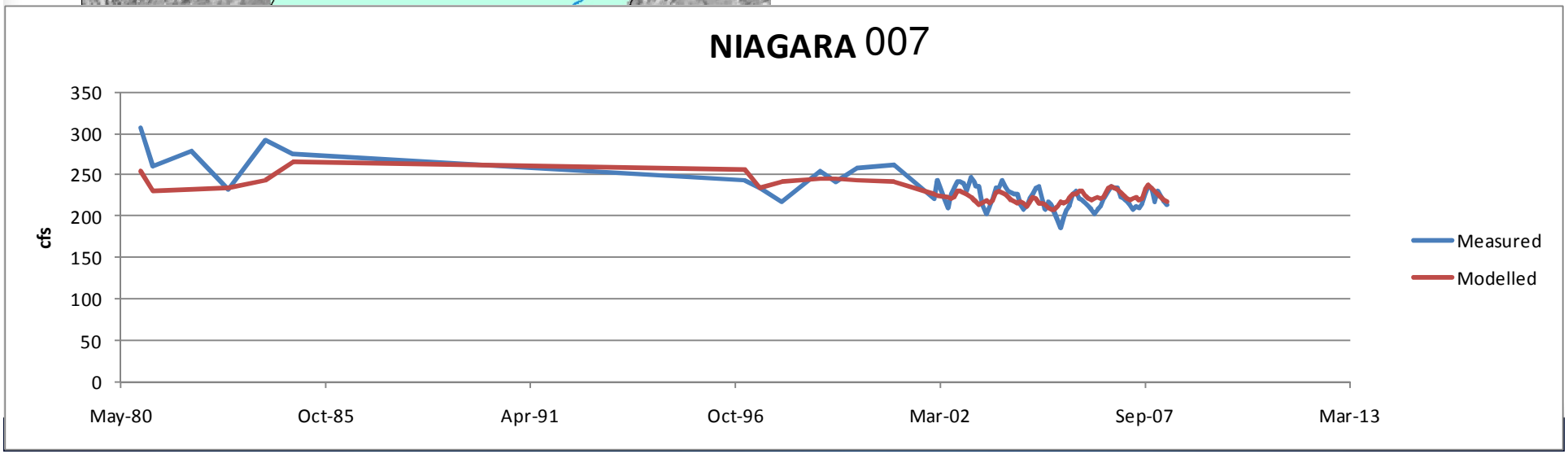
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Measured
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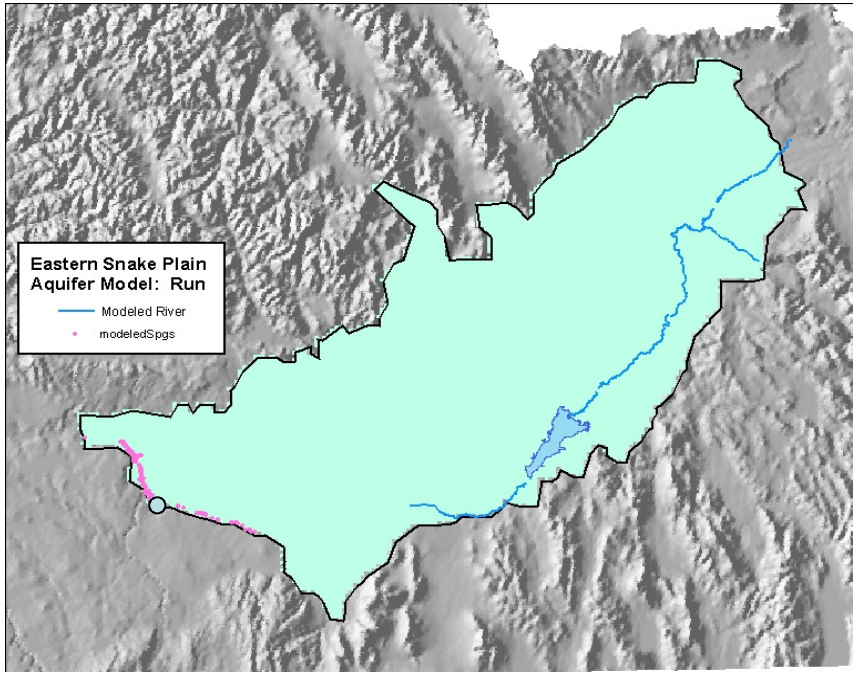
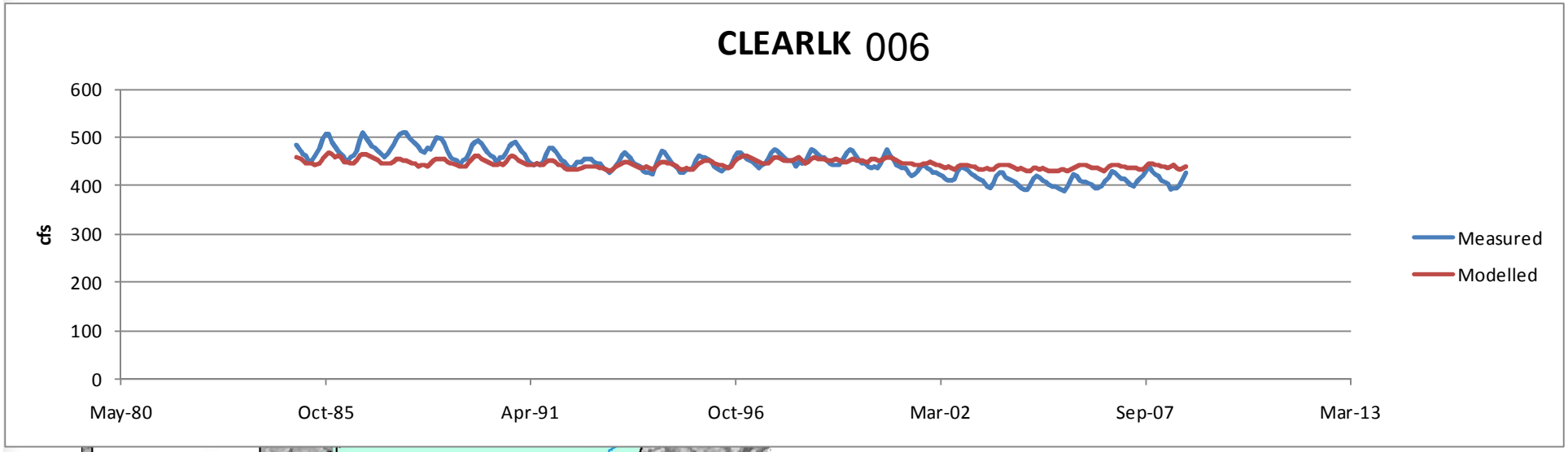

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Clear Lakes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Measured
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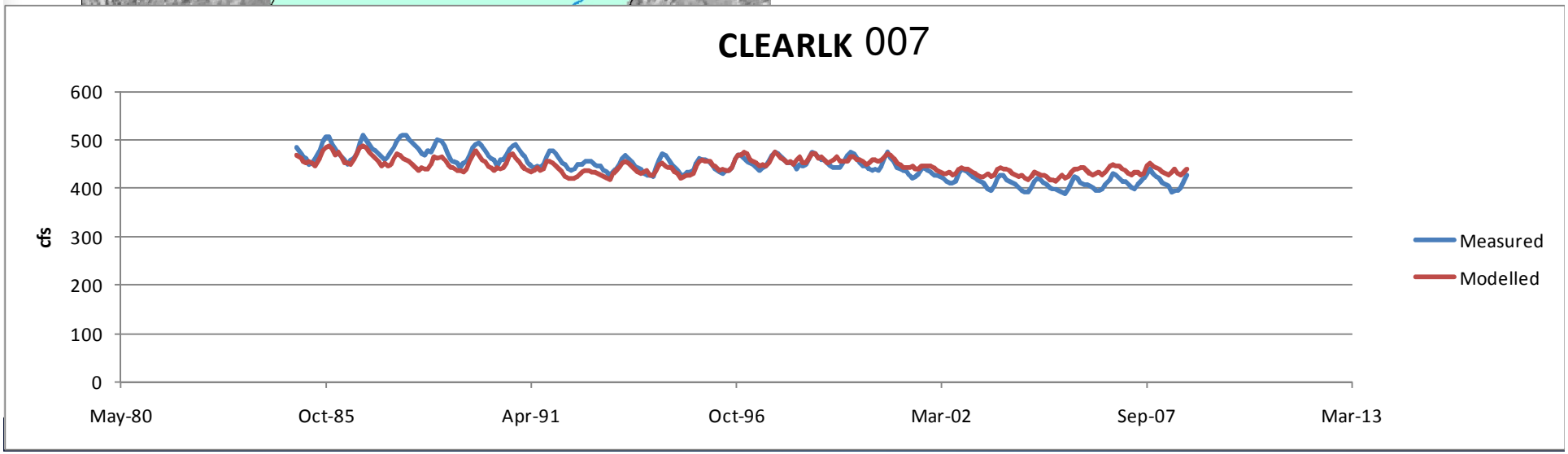
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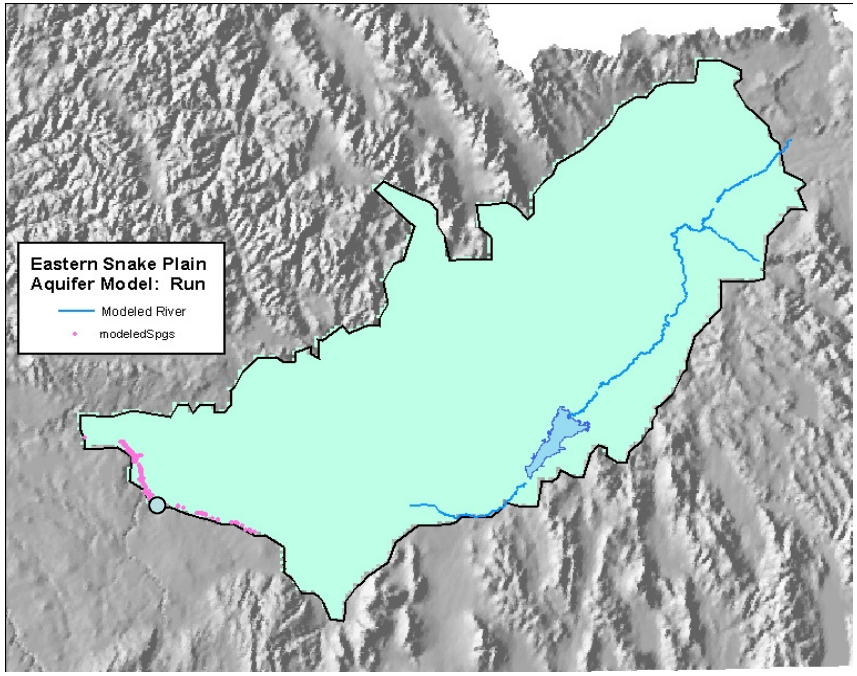
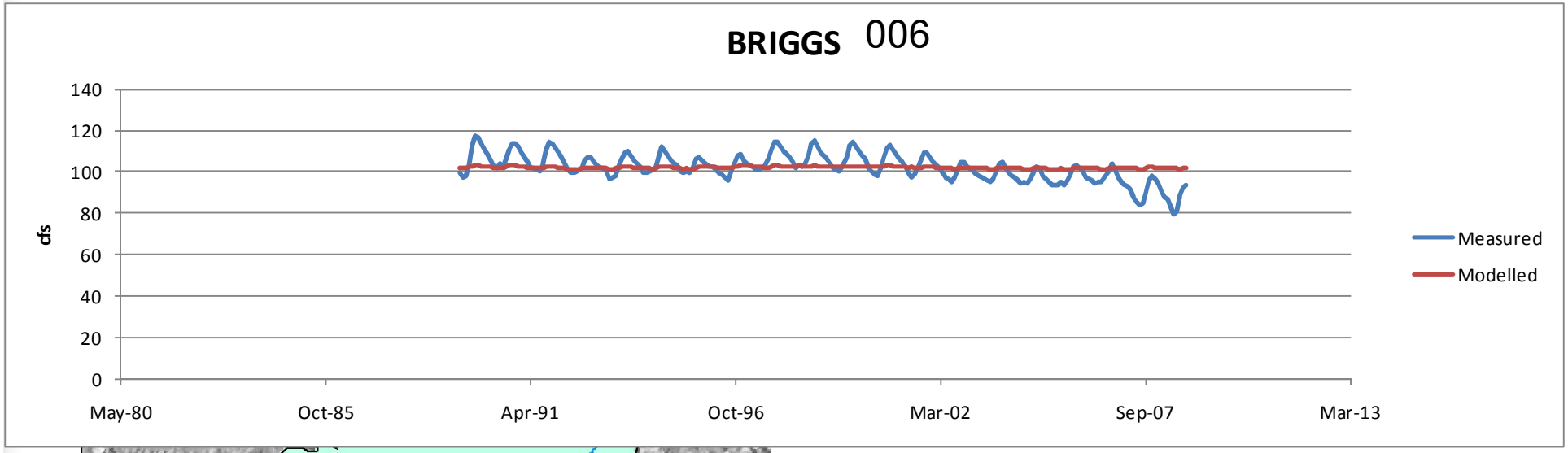


- Briggs Spring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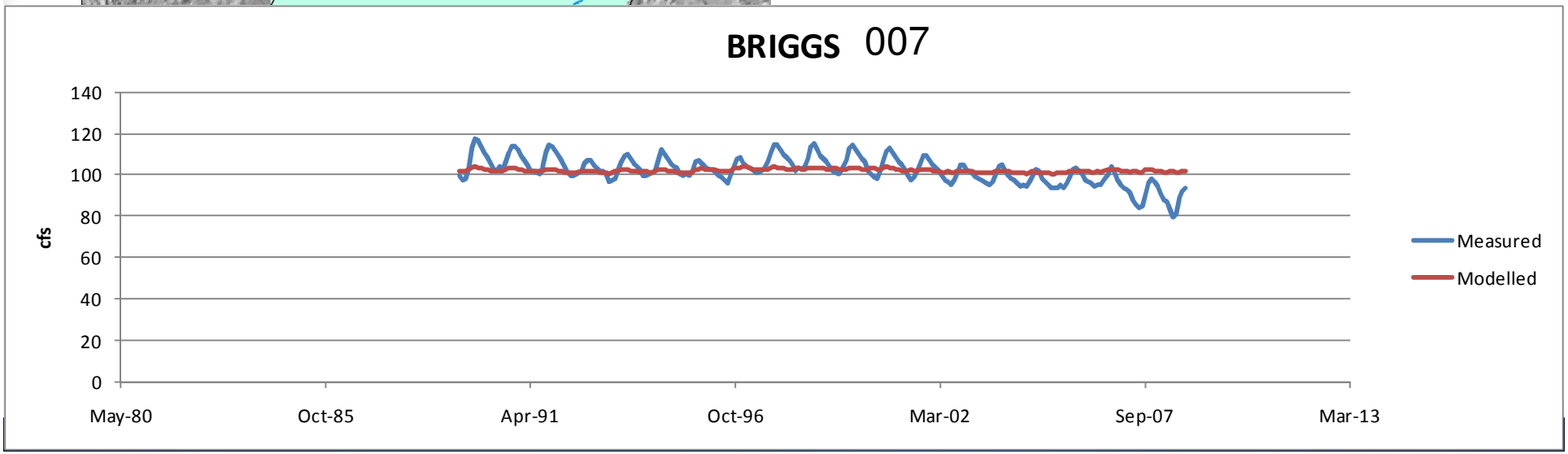
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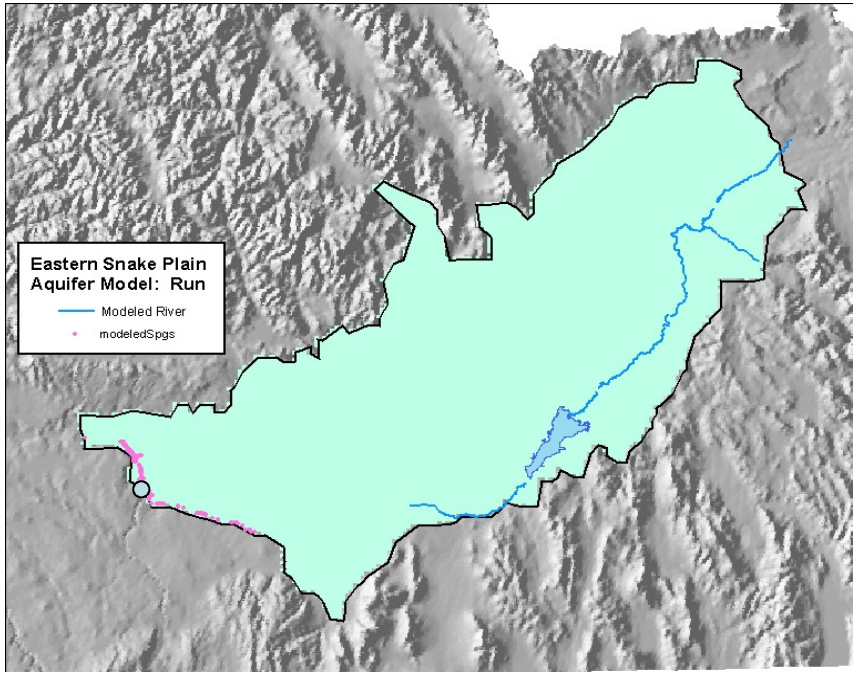
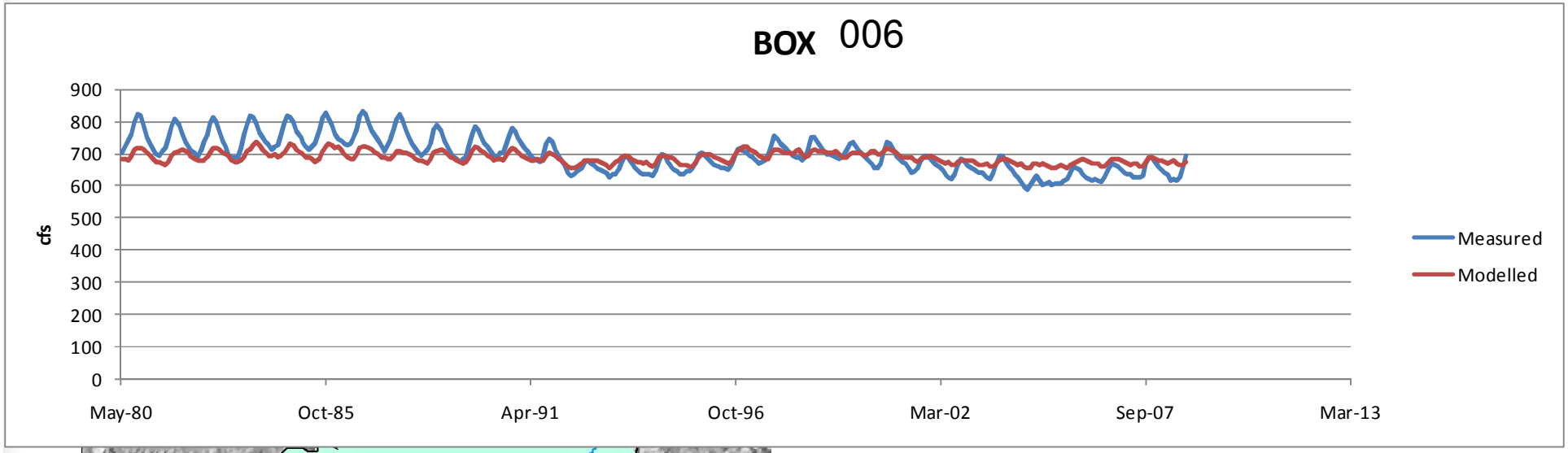


- Box Canyon Spring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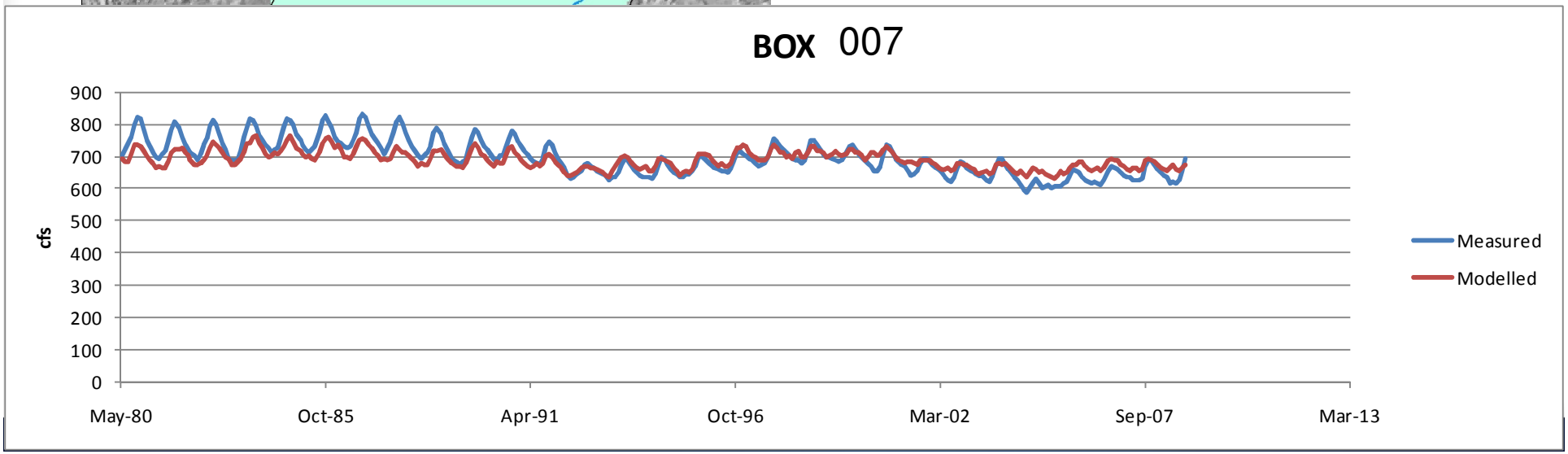
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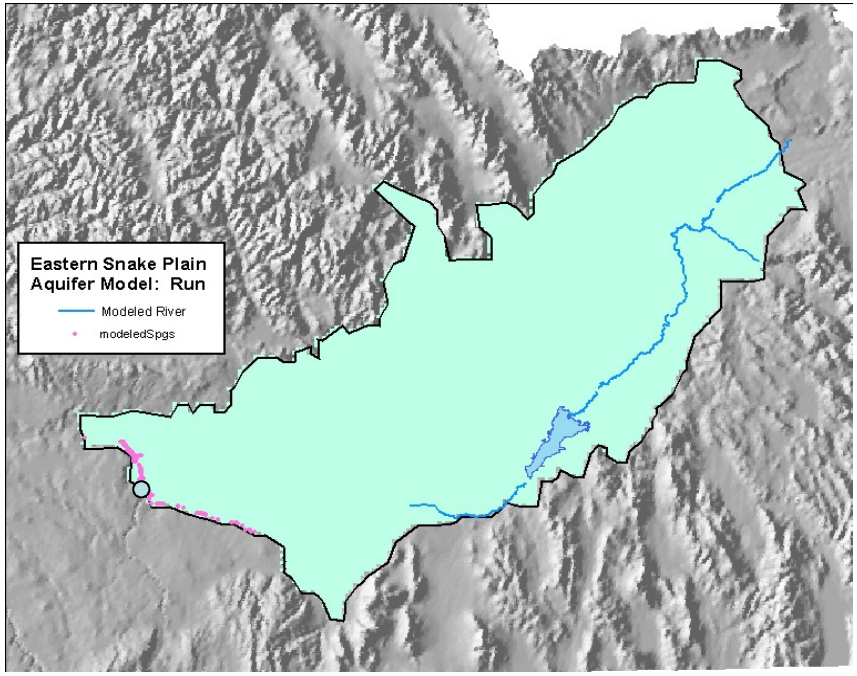
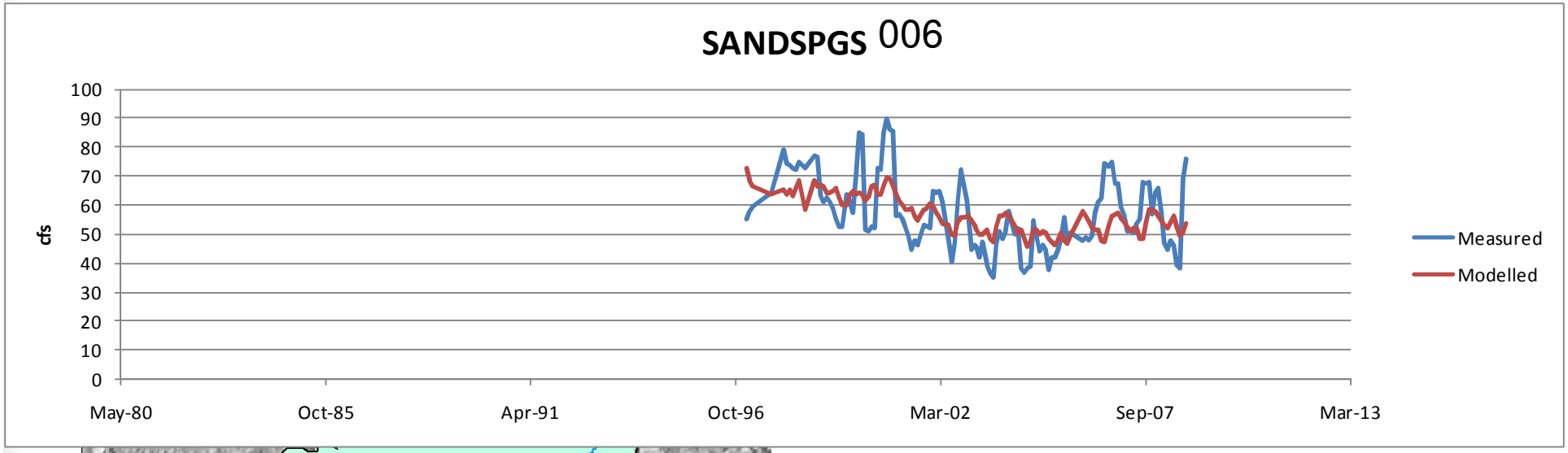


- Sand Springs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Measured
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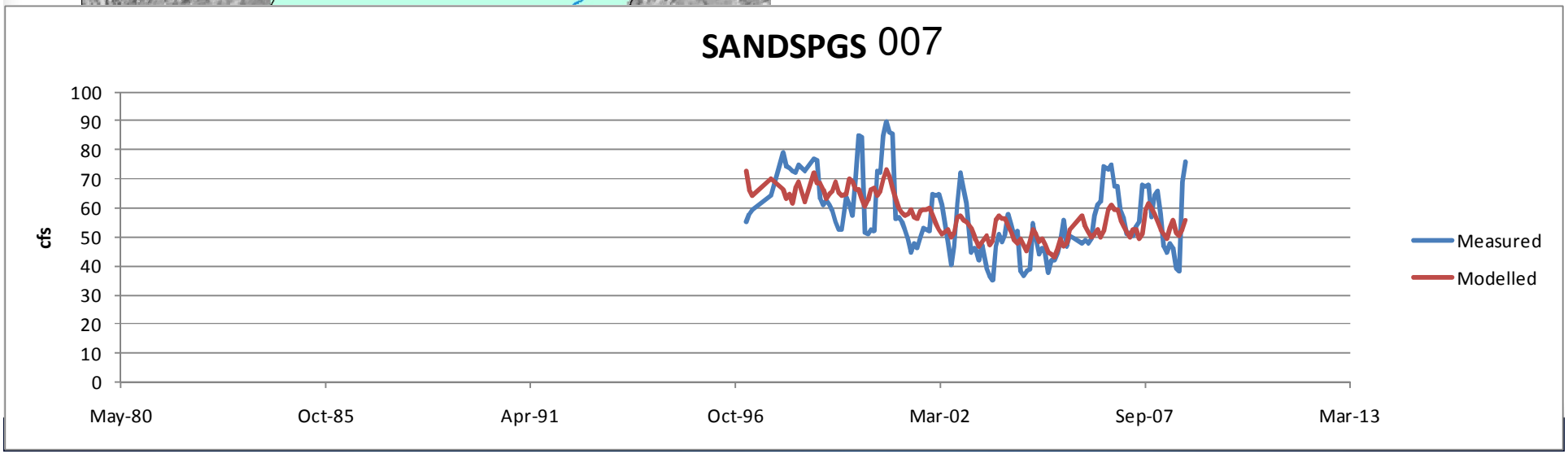
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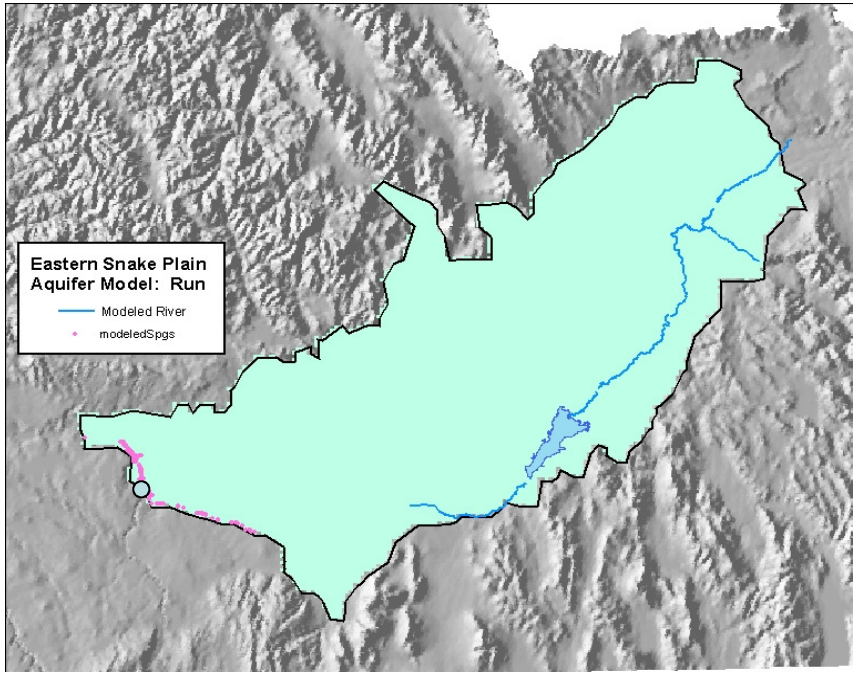
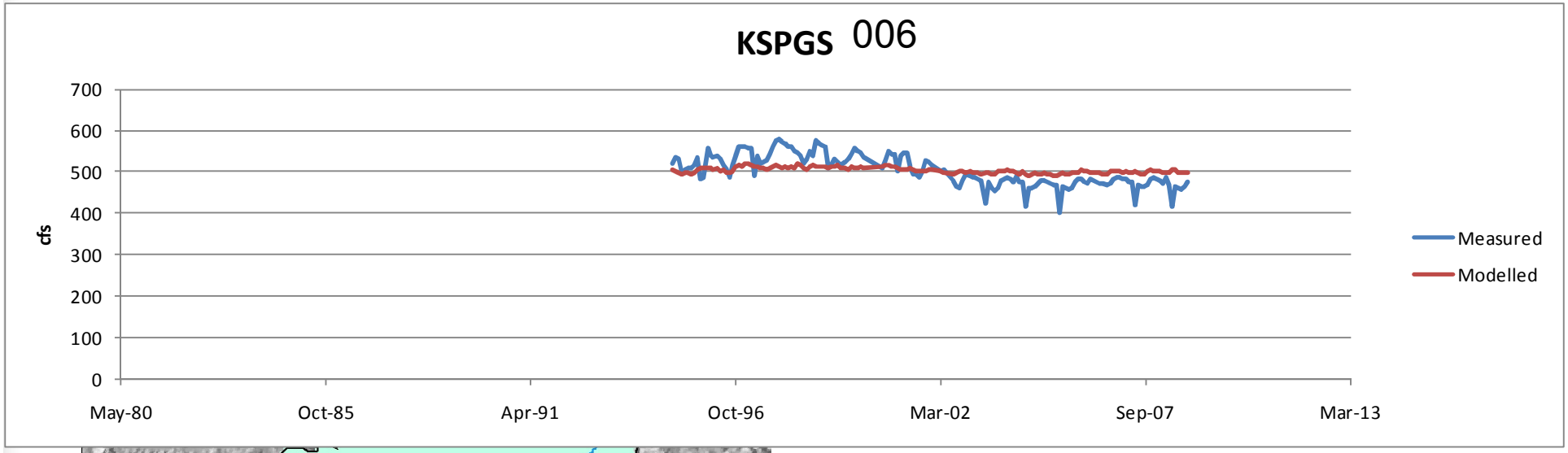


- Thousand Springs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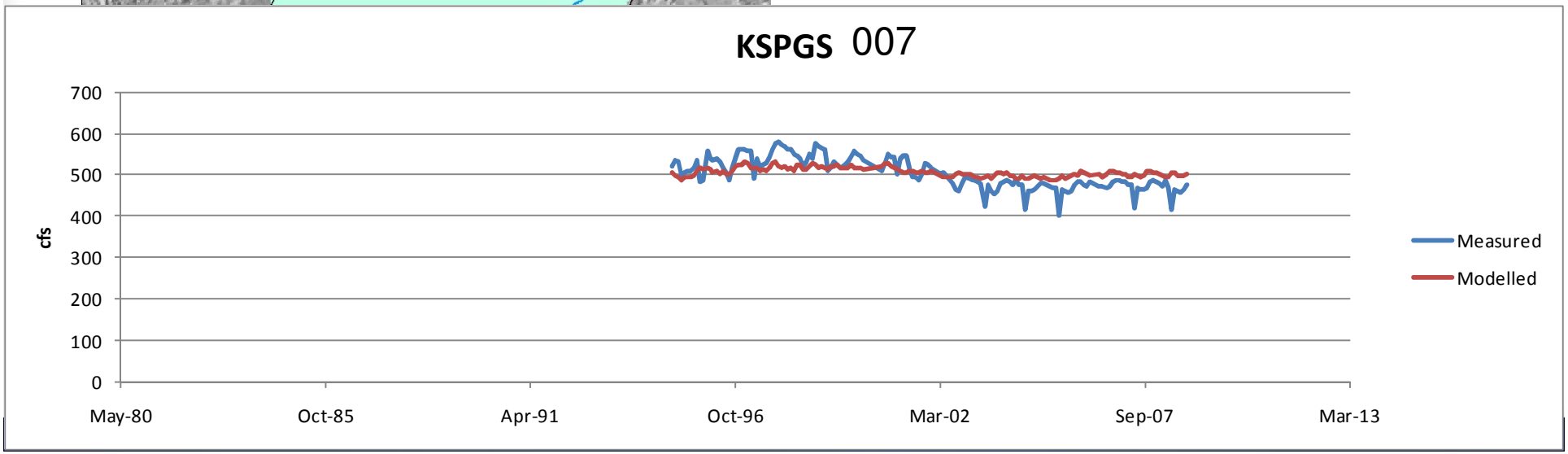
Measured
Modelled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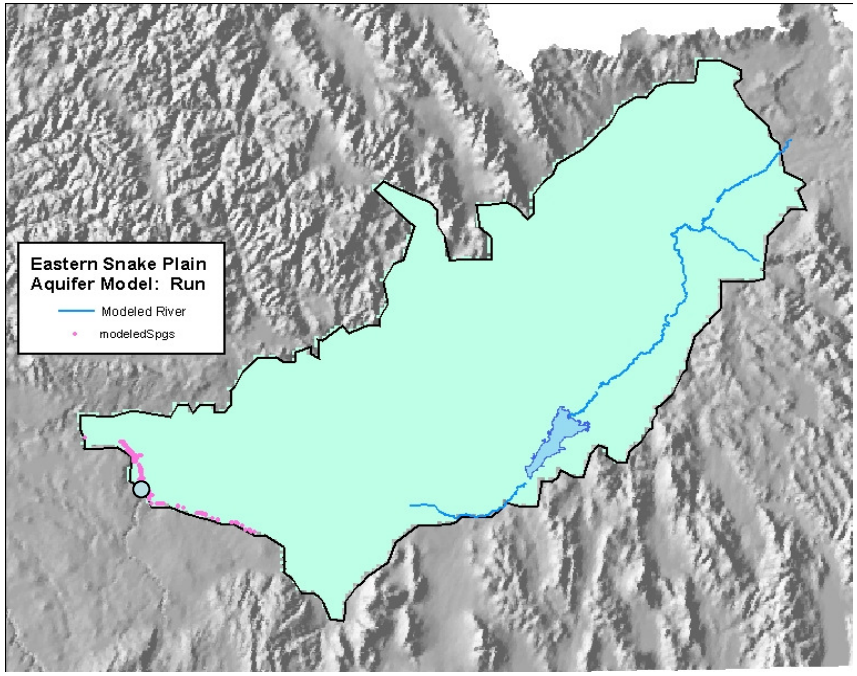
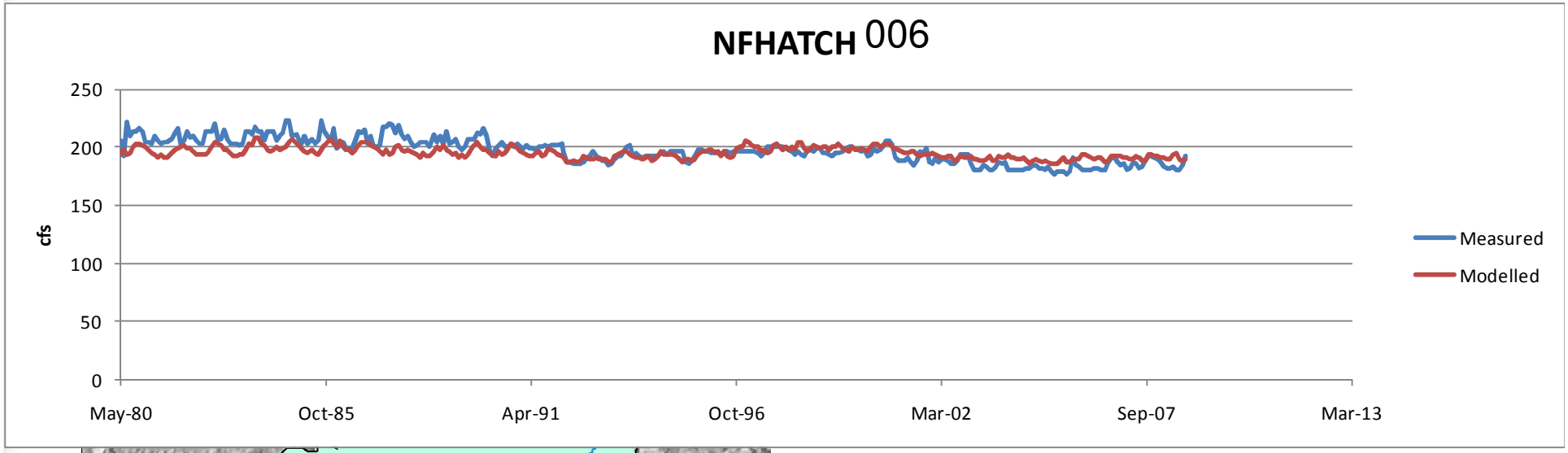
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled



- Ntl Fish Hatchery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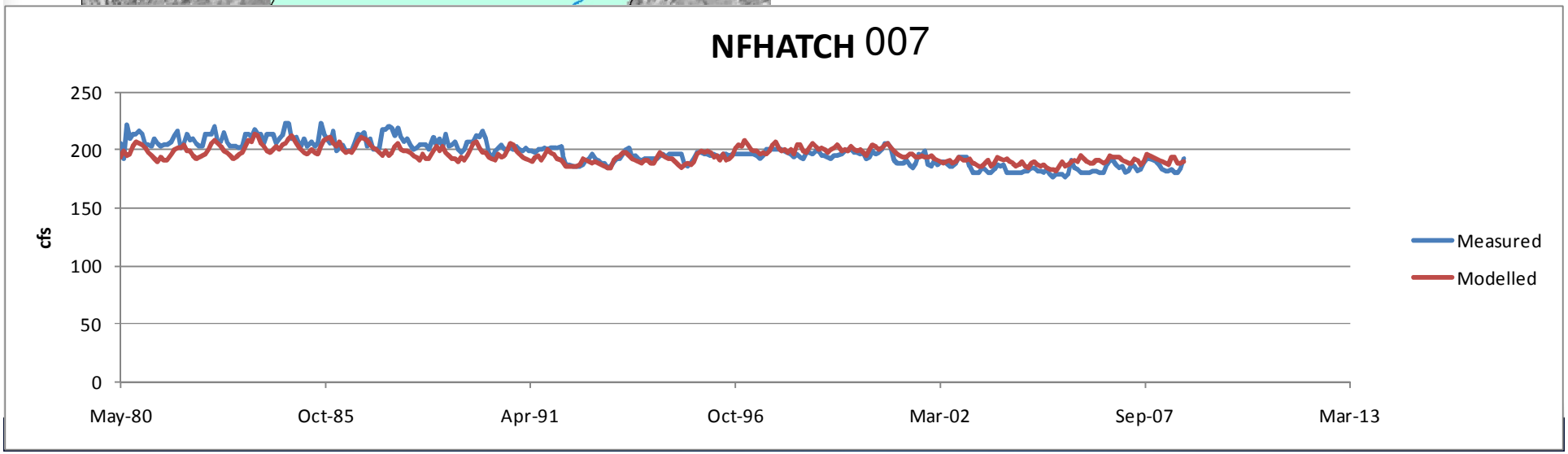
Measured
Modelled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Measured
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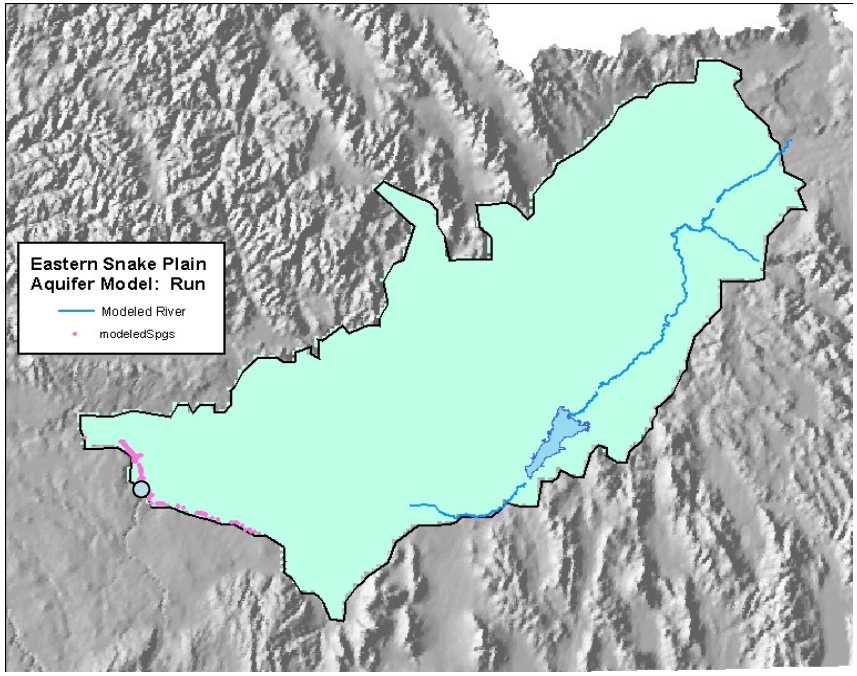
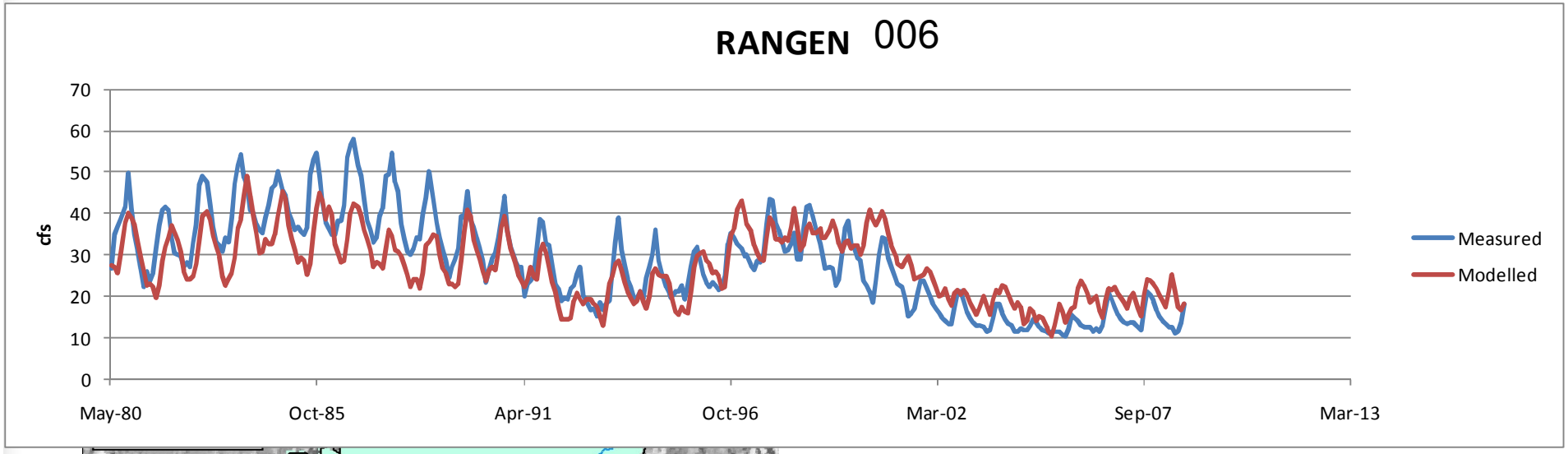


- Rangen Spring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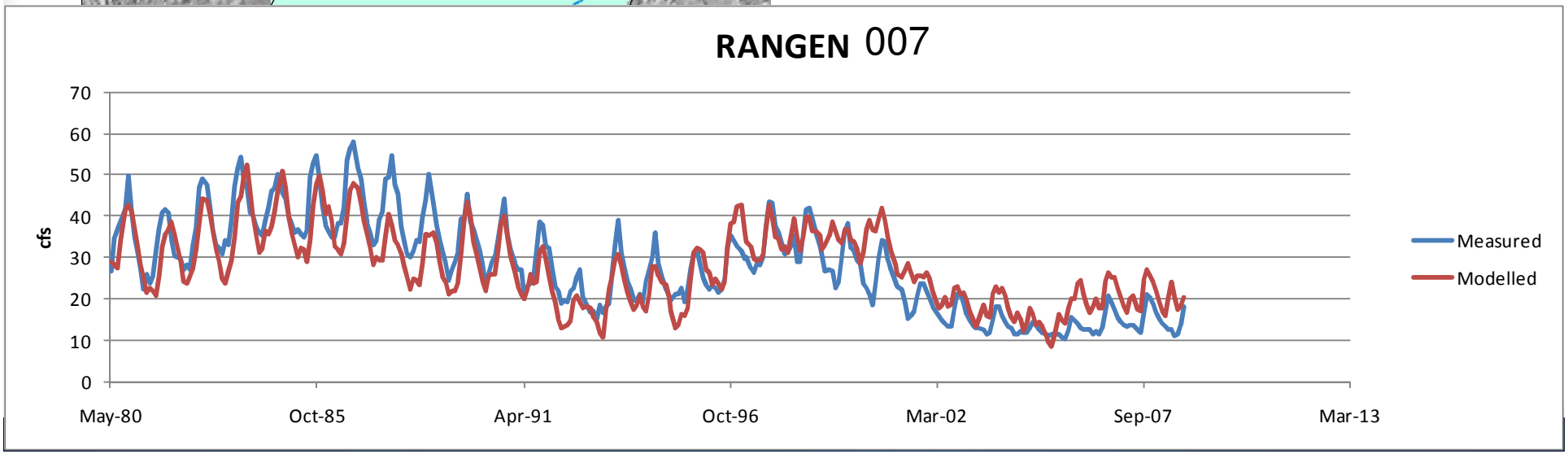
Measured
Modelled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Measured
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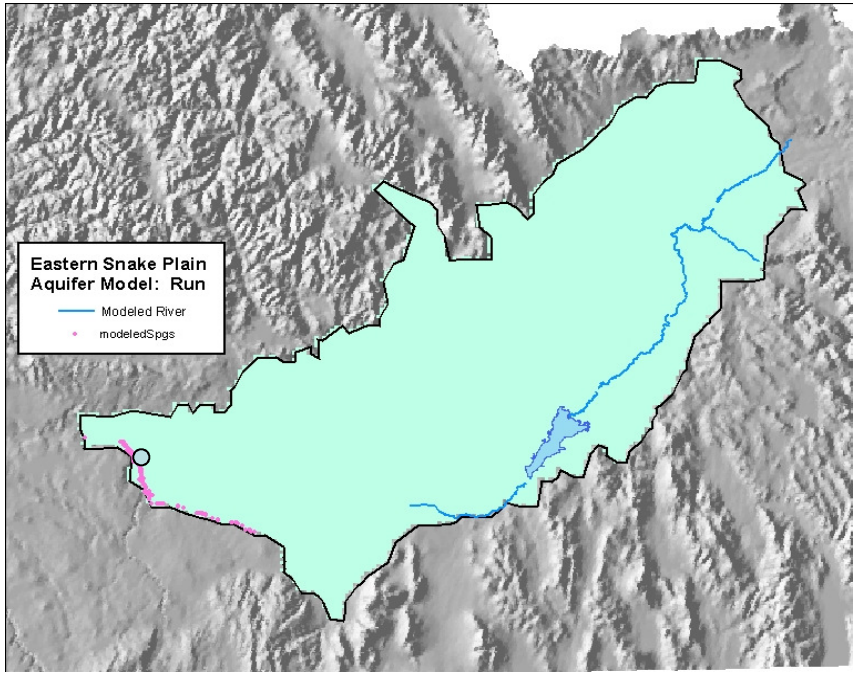
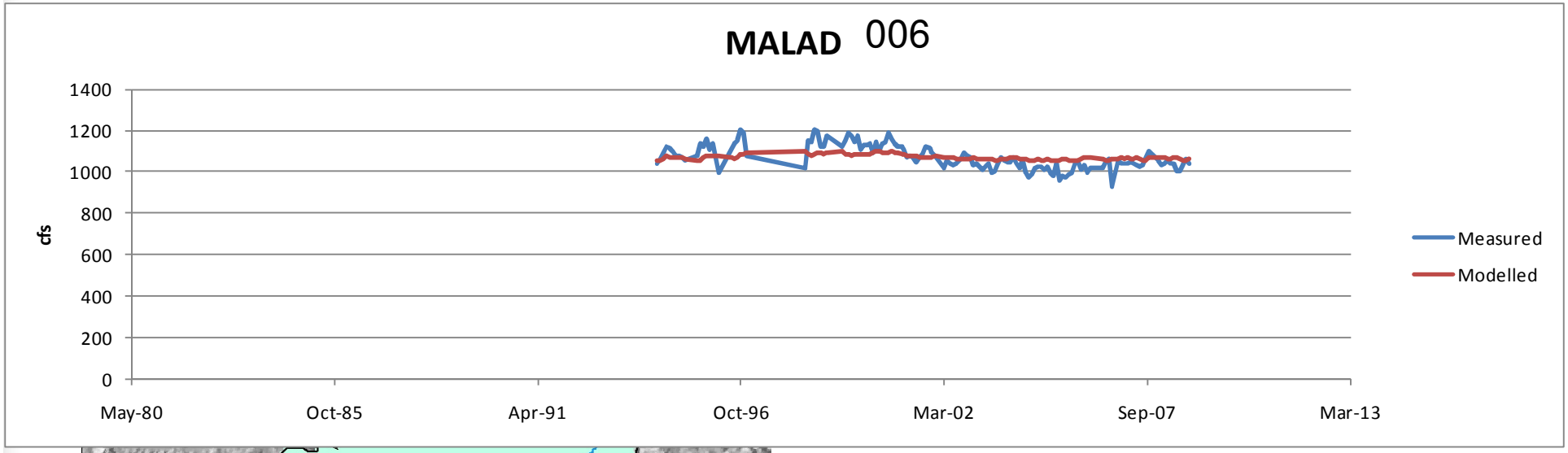

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Malad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Measured
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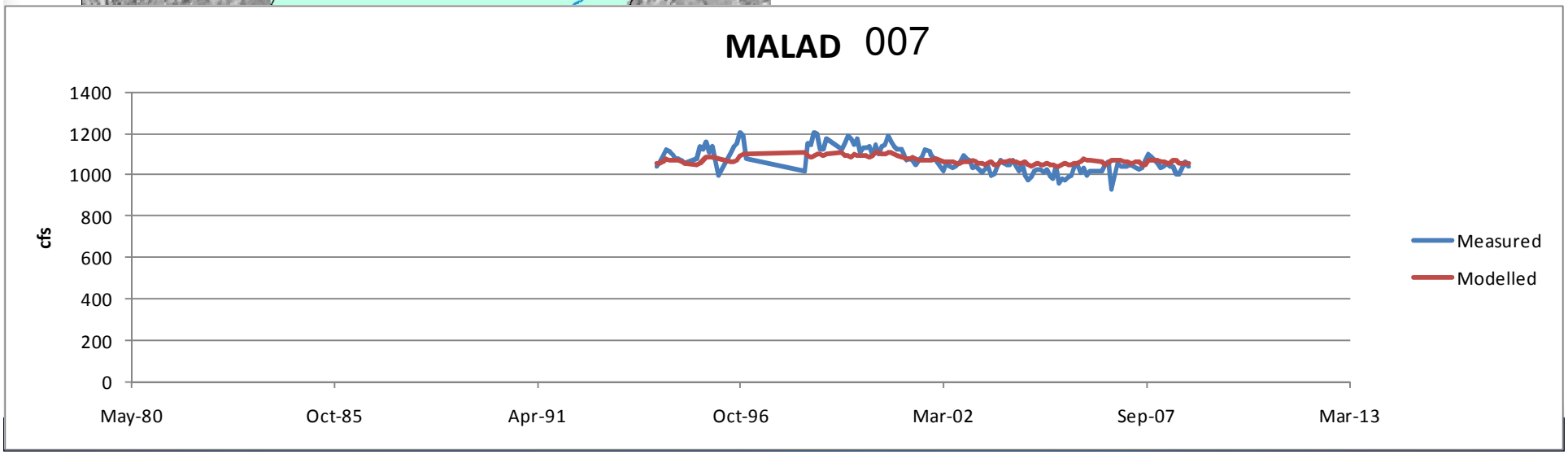
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Oct-85
Apr-91
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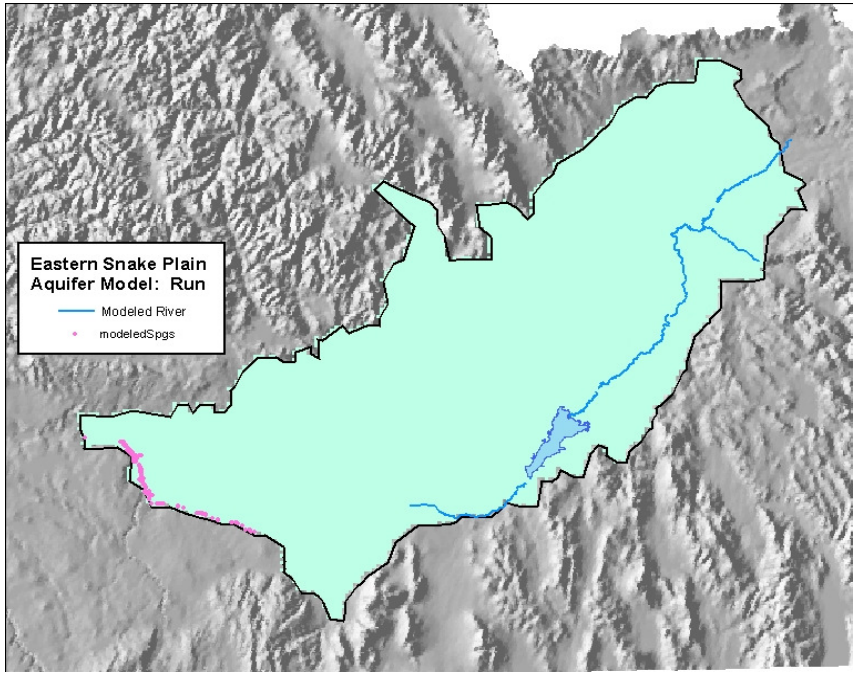
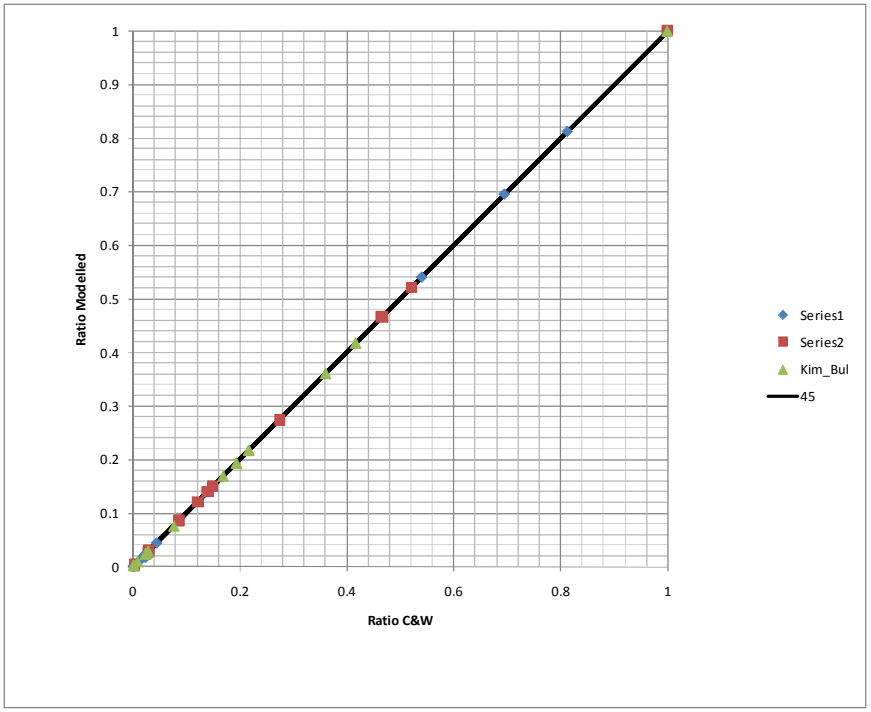
Mar-02
Sep-07
Mar-13
Measured
Modelled



- Group C Springs

006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Ratio C&W
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0.2
0.3
0.4
0.5
0.6
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0.6
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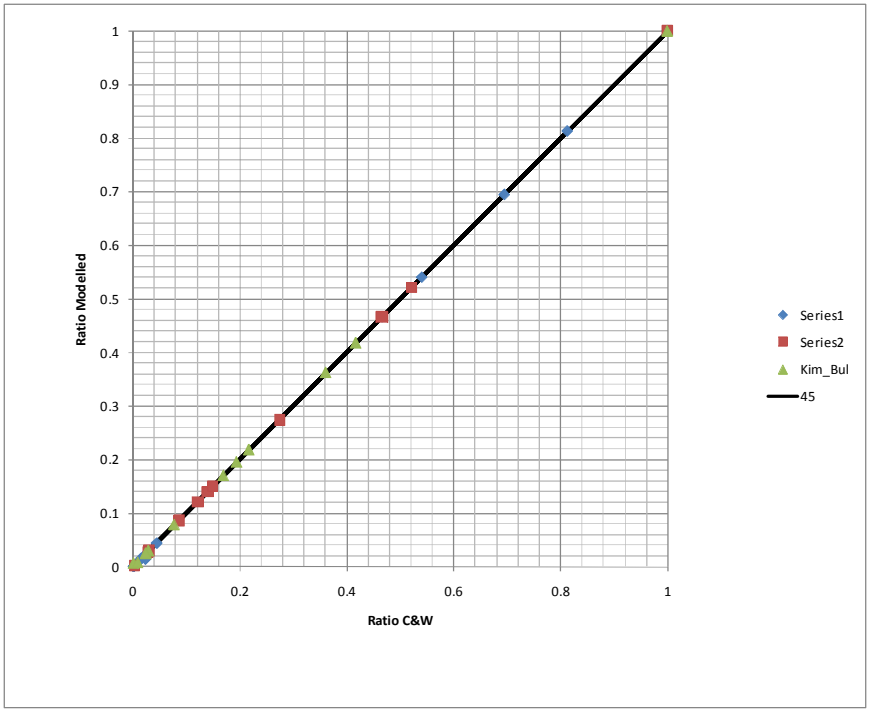
1
Series1
Series2
Kim_Bul
45

007


Ratio Modelled
Ratio C&W
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0.2
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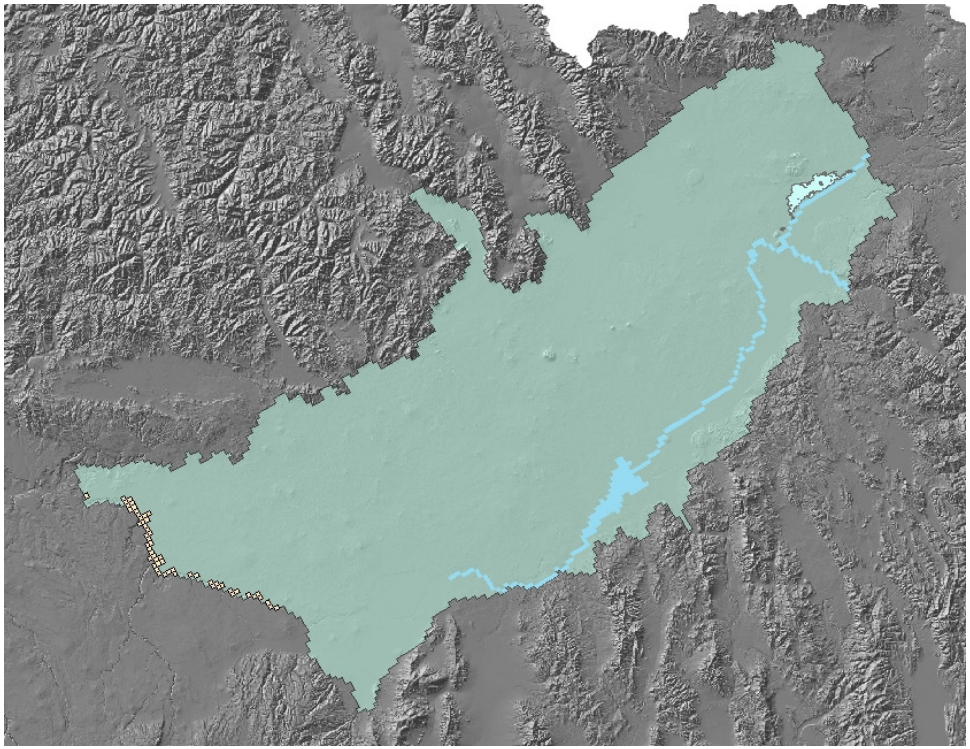
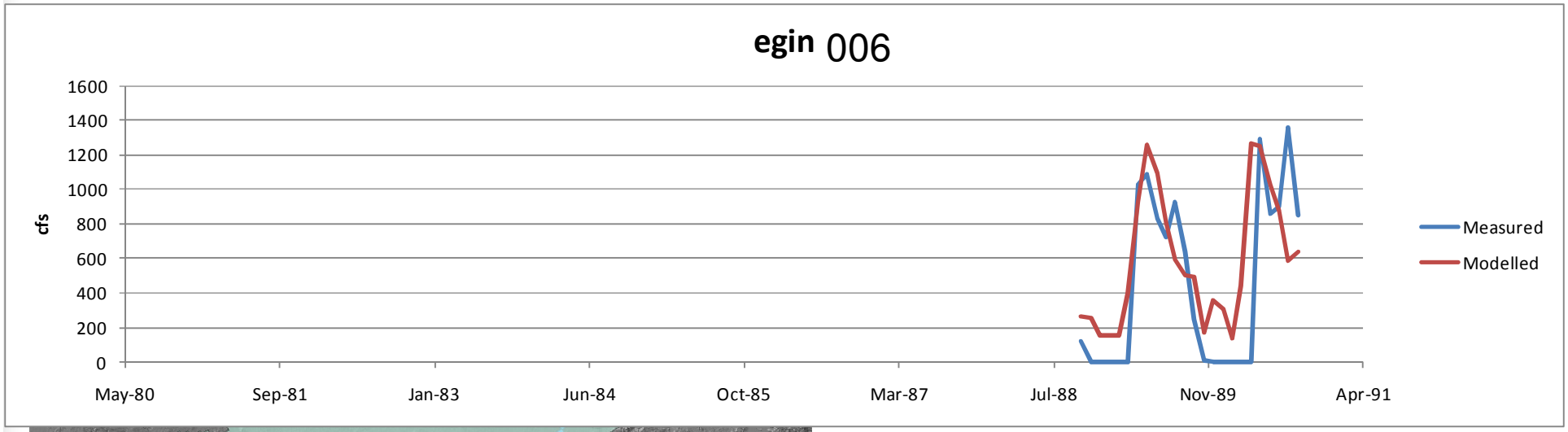
1
Series1
Series2
Kim_Bul
45



- Egin returns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1400
1200
1000
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400
200
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cfs
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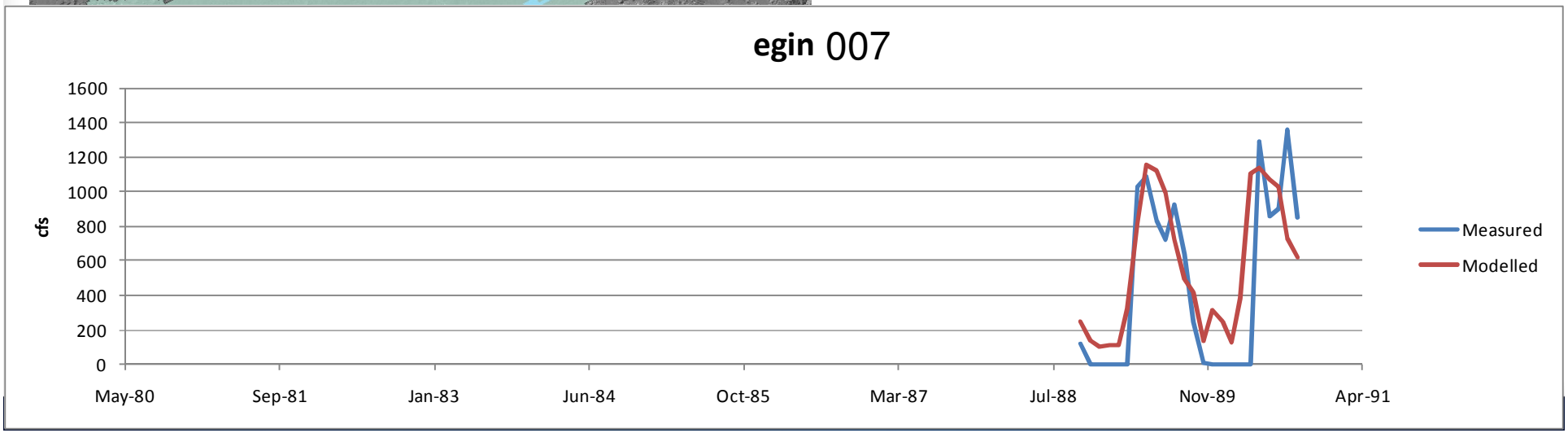
Sep-81
Jan-83
Jun-84
Oct-85
Mar-87
Jul-88
Nov-89
Apr-91
Measured
Modelled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Jan-83
Jun-84
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Jul-88
Nov-89
Apr-91
Measured
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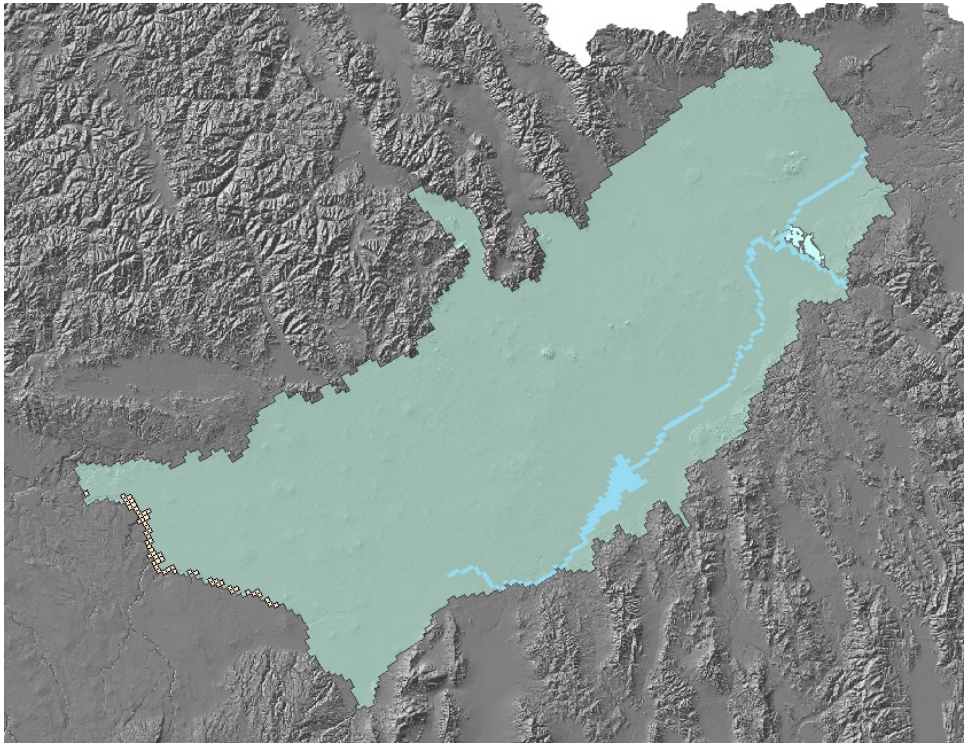
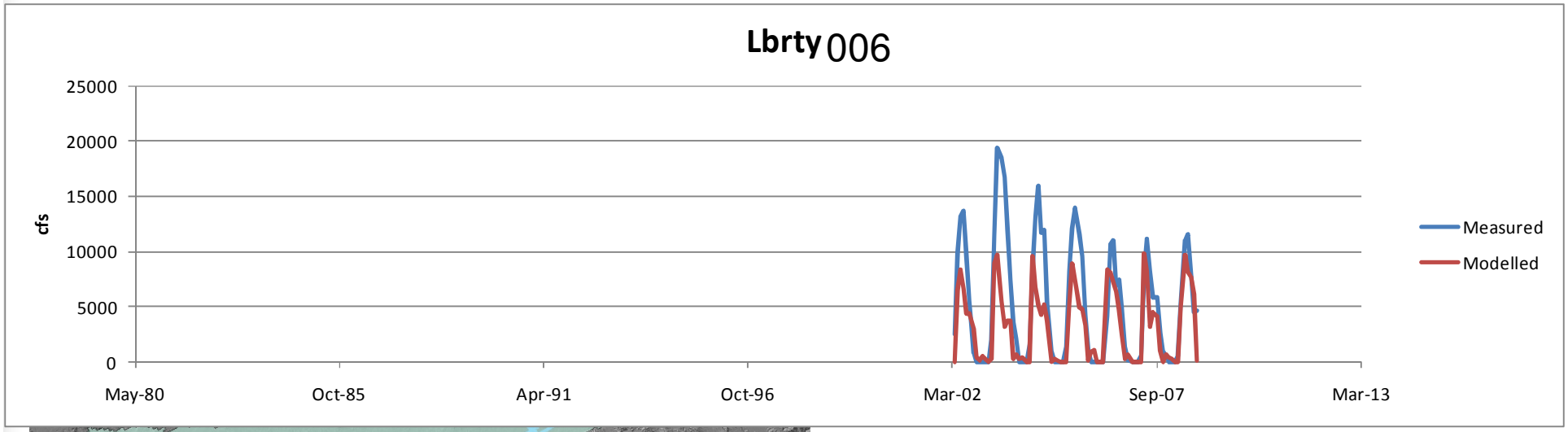


- Liberty returns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Measured
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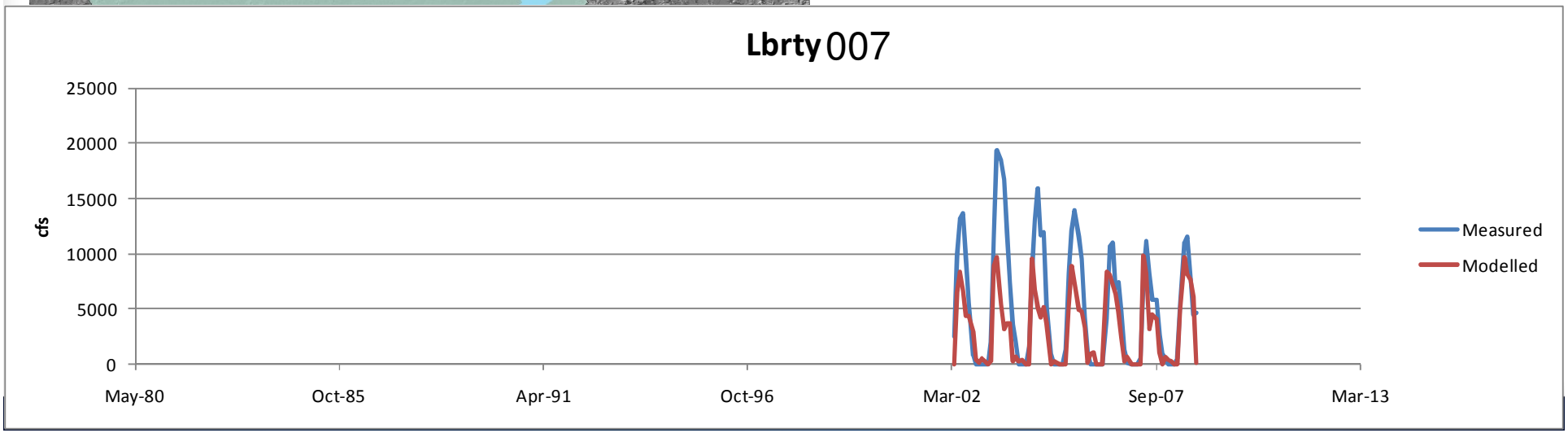
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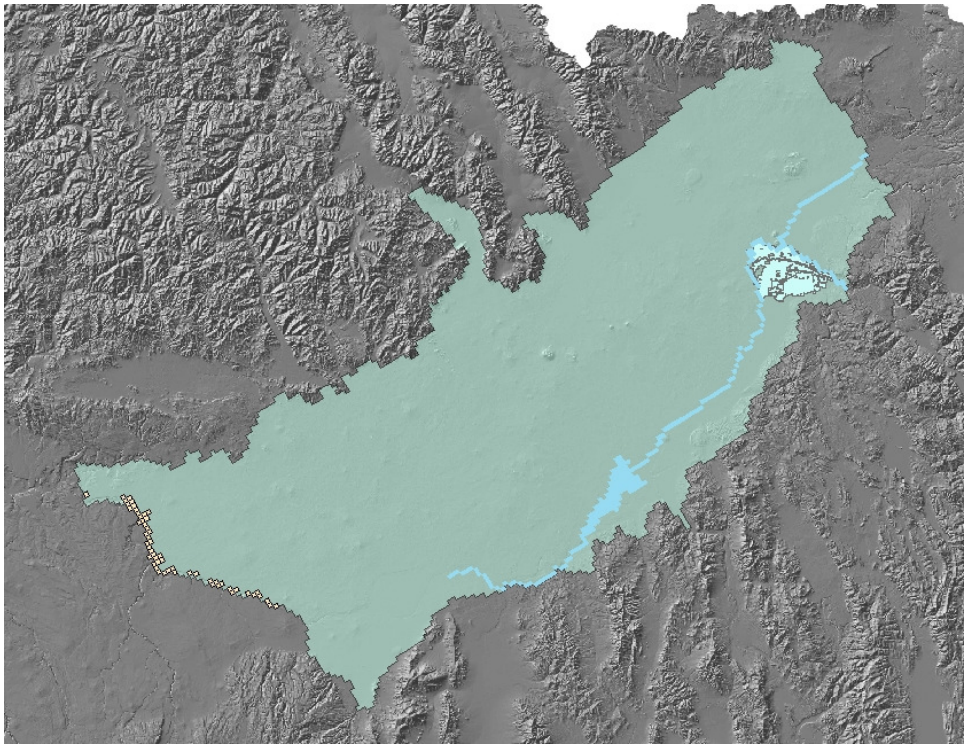
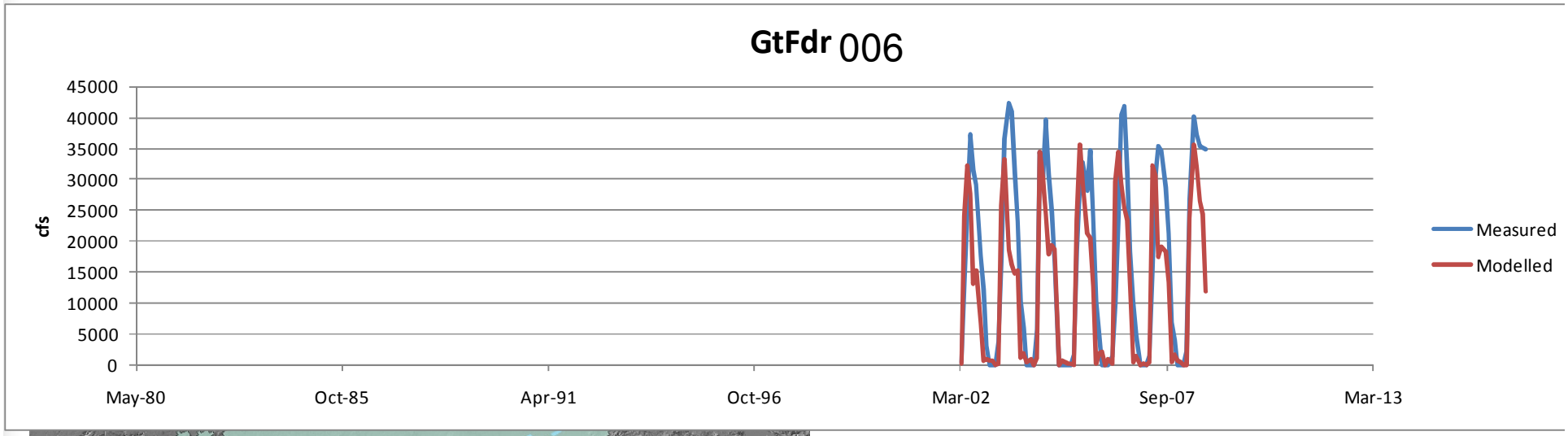
Measured
Modelled



- Great Feeder Group returns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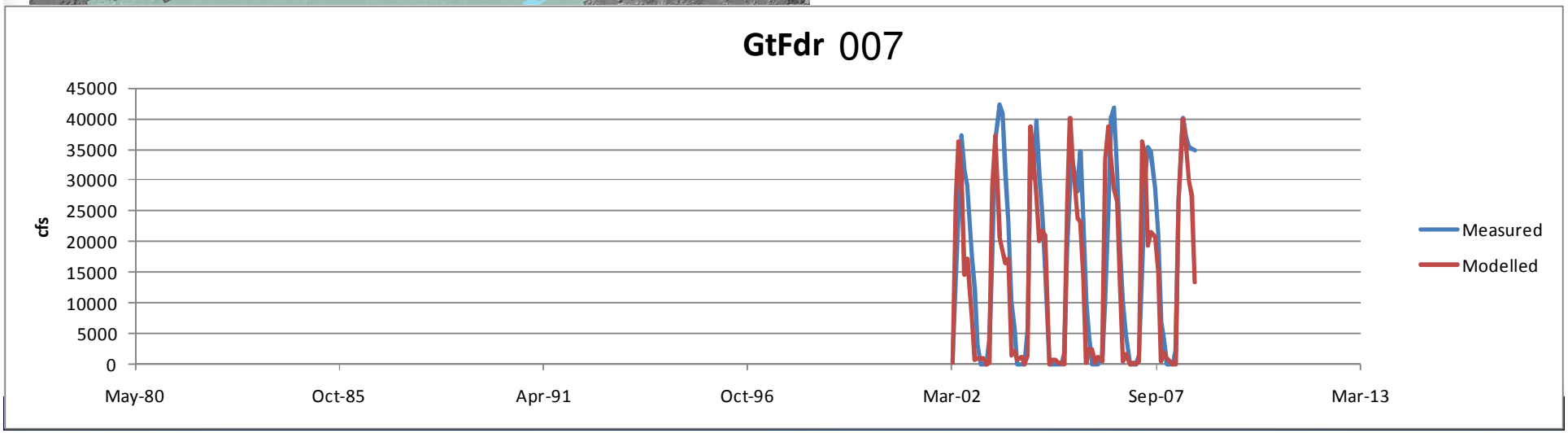
Mar-13
Measured
Modelled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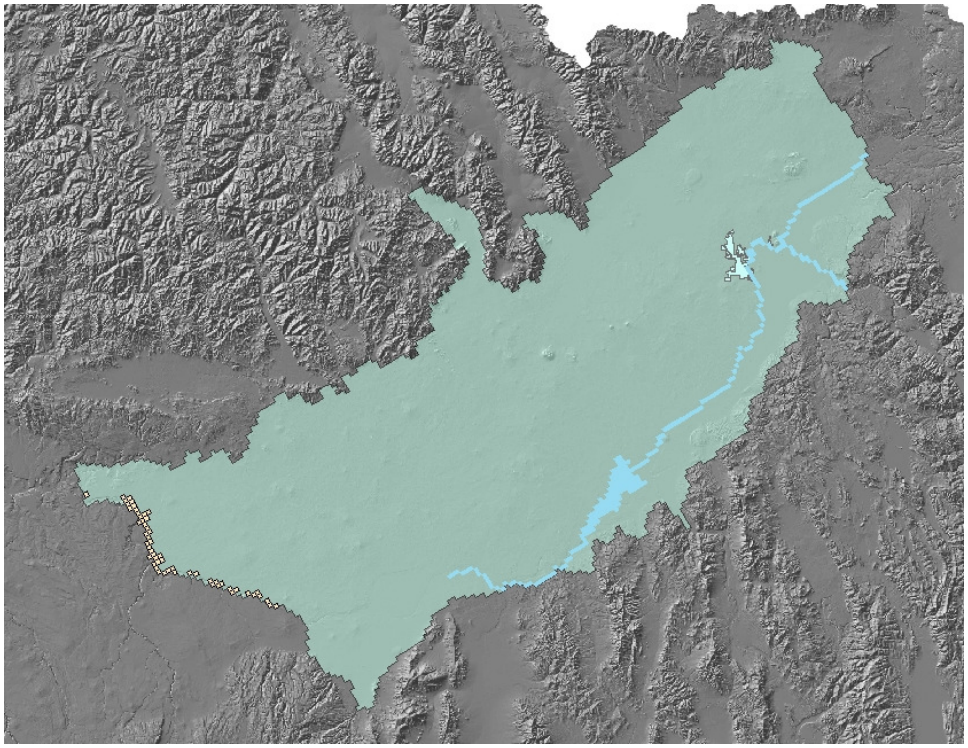
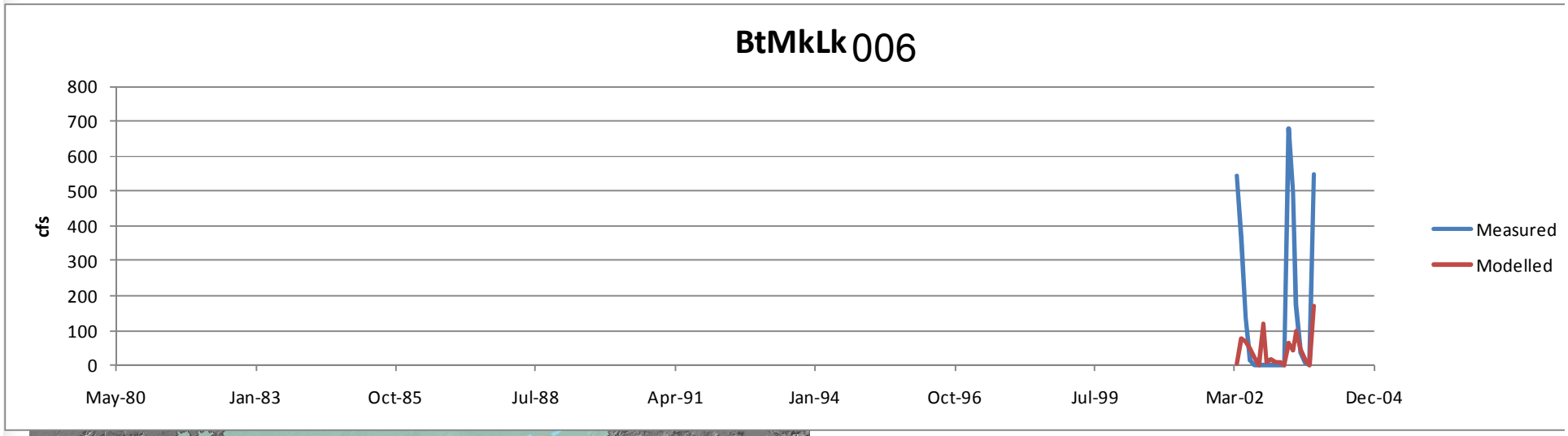
Sep-07
Mar-13
Measured
Modelled



- Butte-Market Lake returns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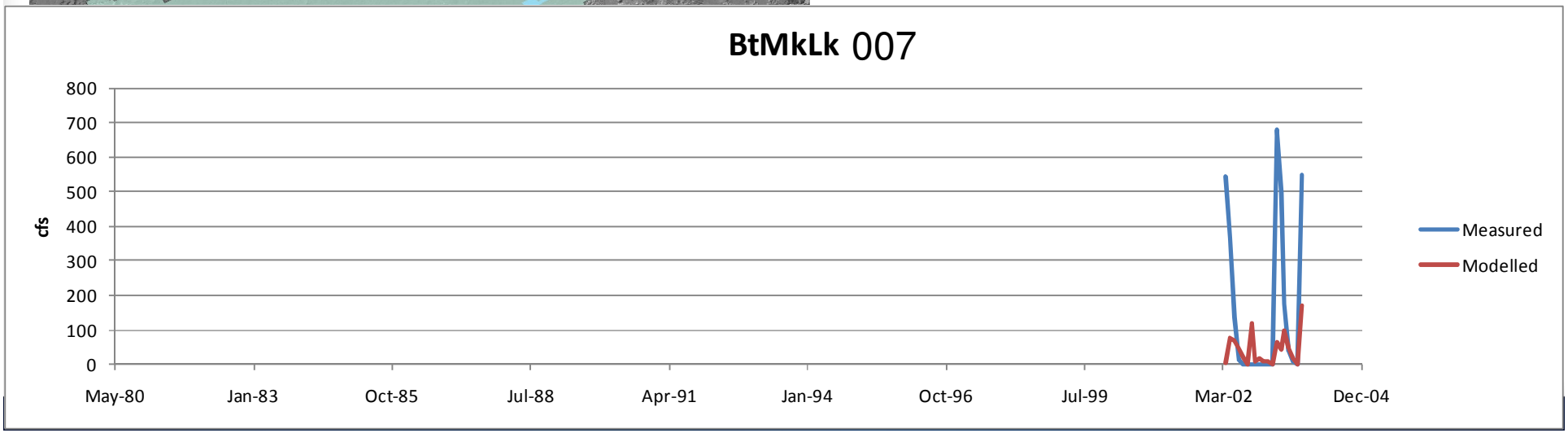
Dec-04
Measured
Modelled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Jan-94
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Jul-99
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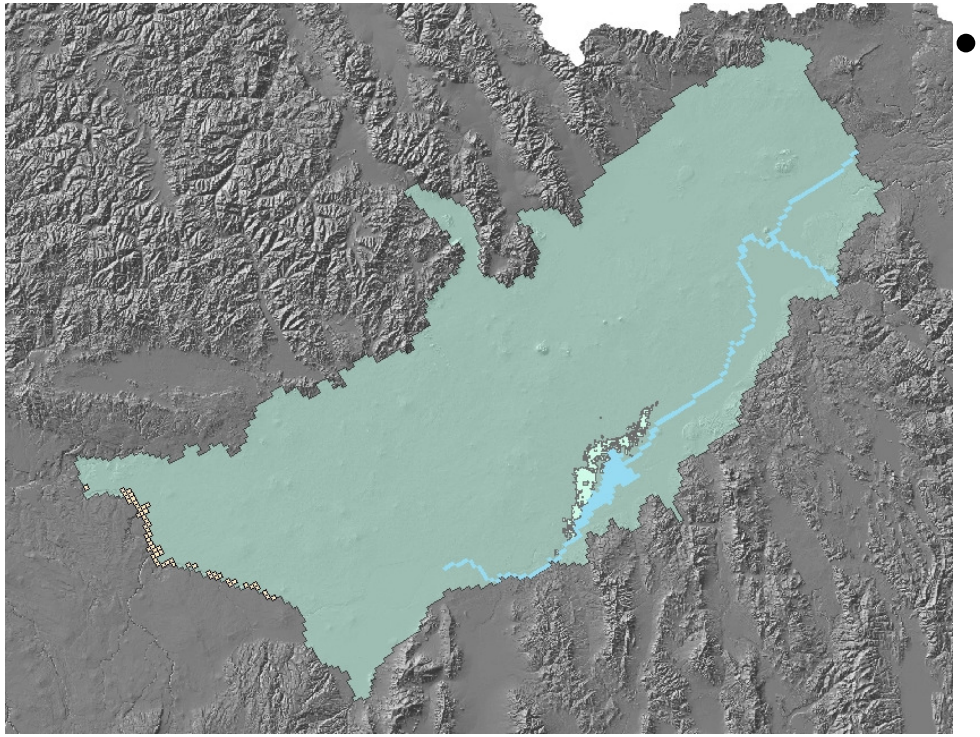
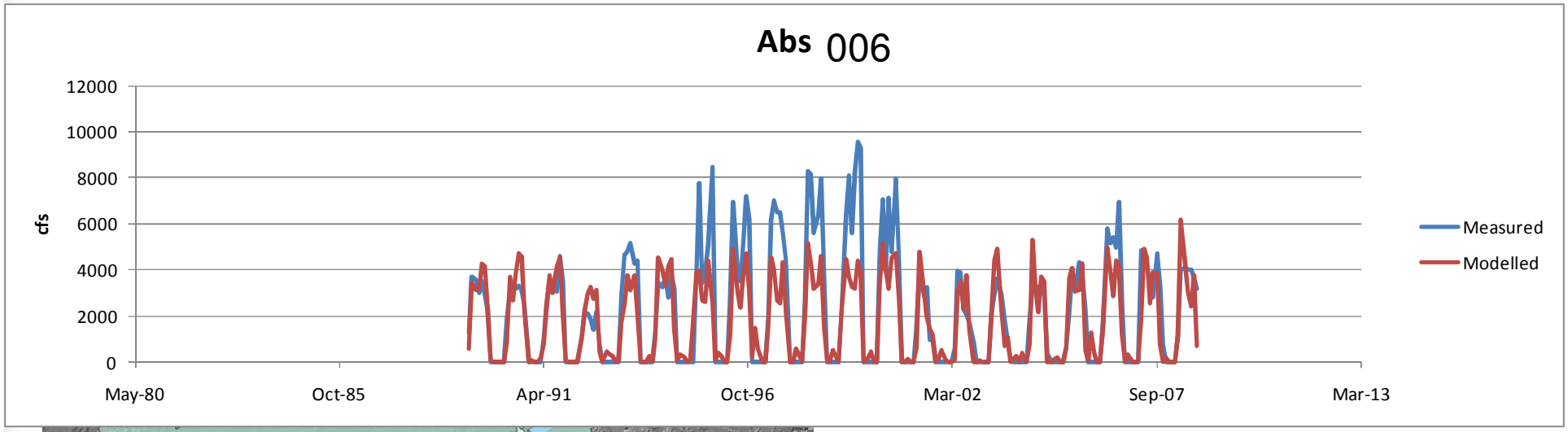
Dec-04
Measured
Modelled



- Aberdeen-Springfield returns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Mar-13
Measured
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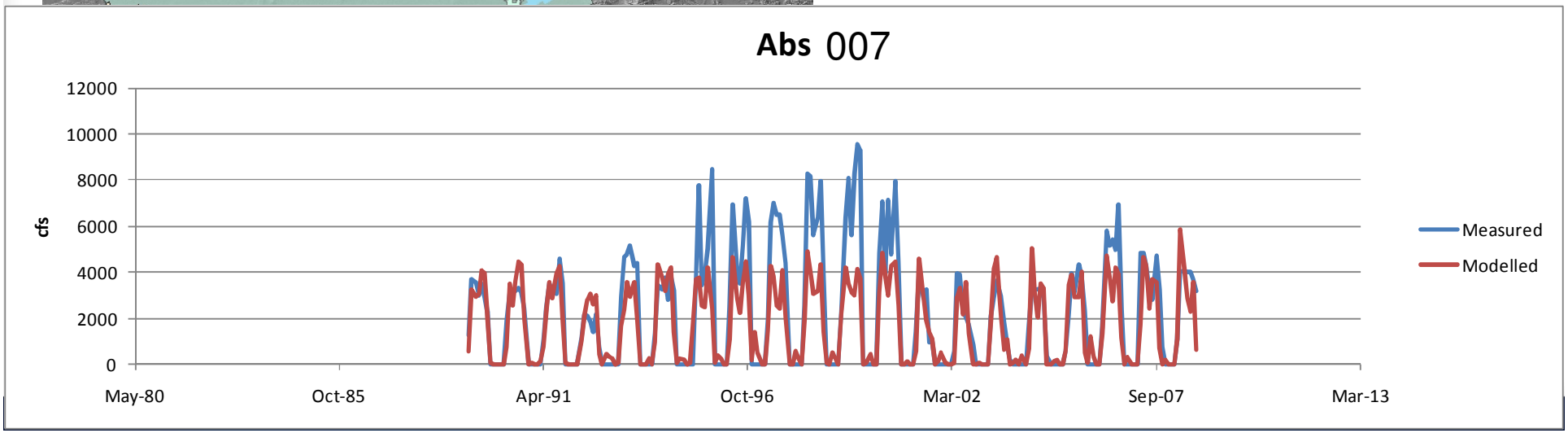
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Measured
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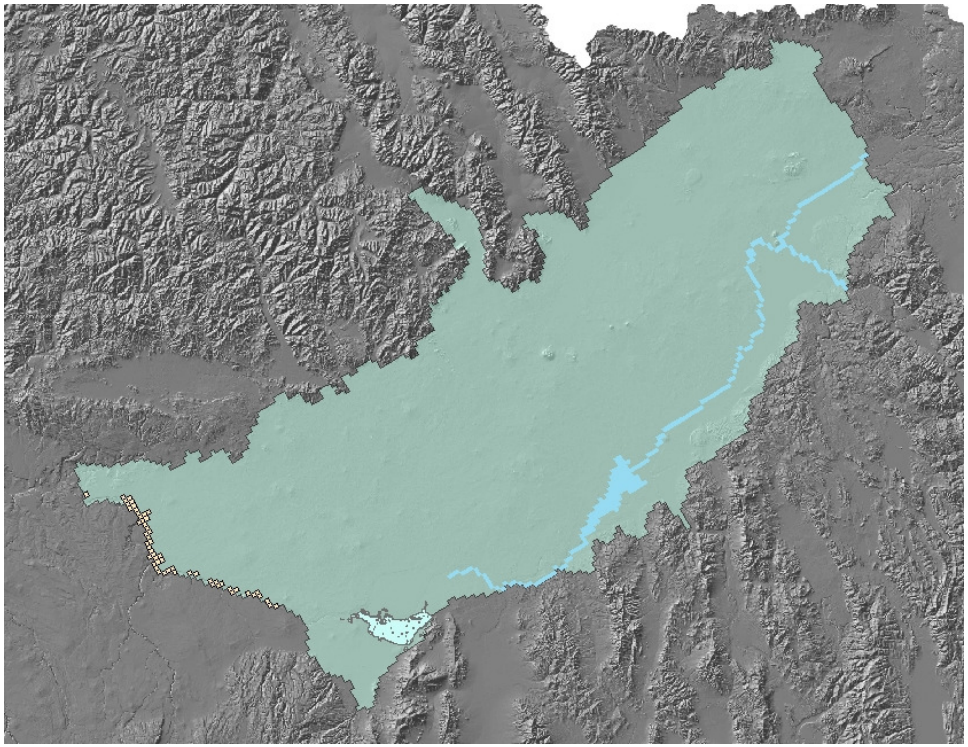
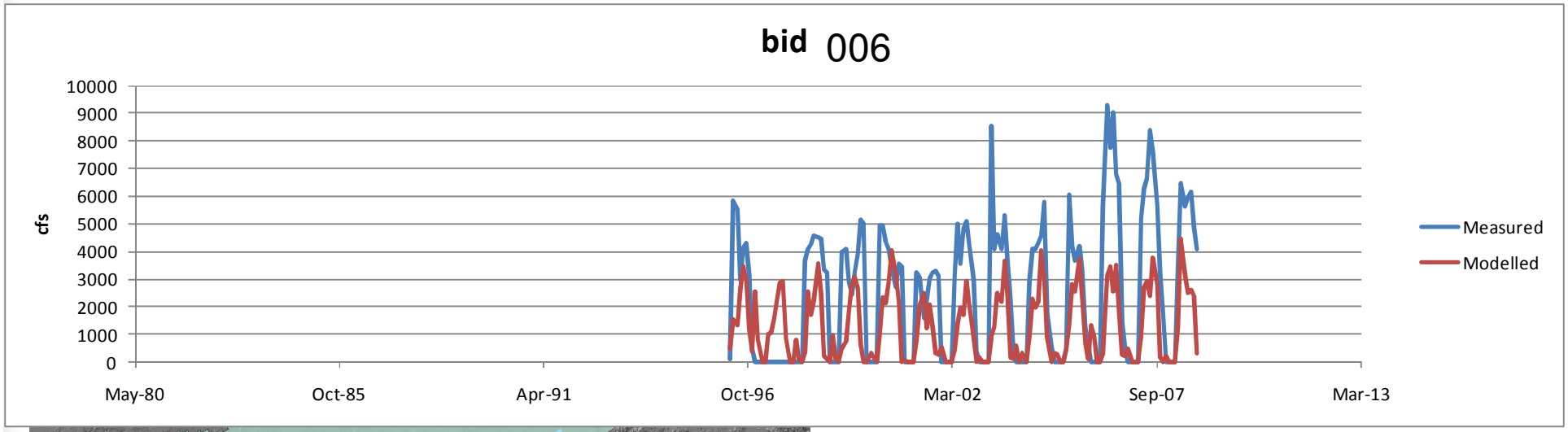


- Burley Irrigation District returns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Apr-91
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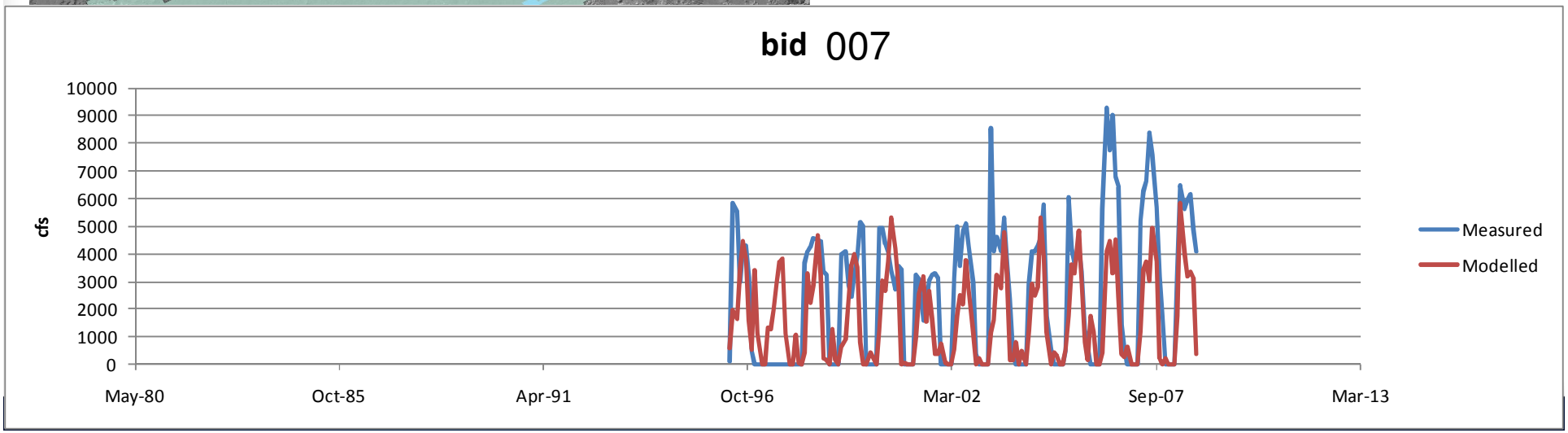
Sep-07
Mar-13
Measured
Modelled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Measured
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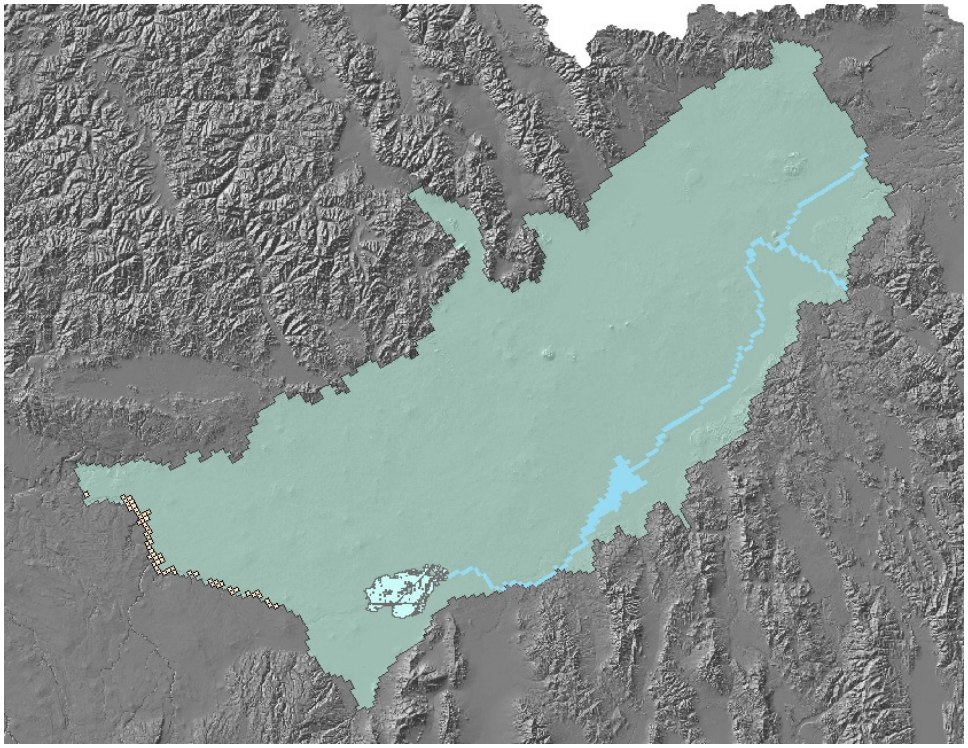
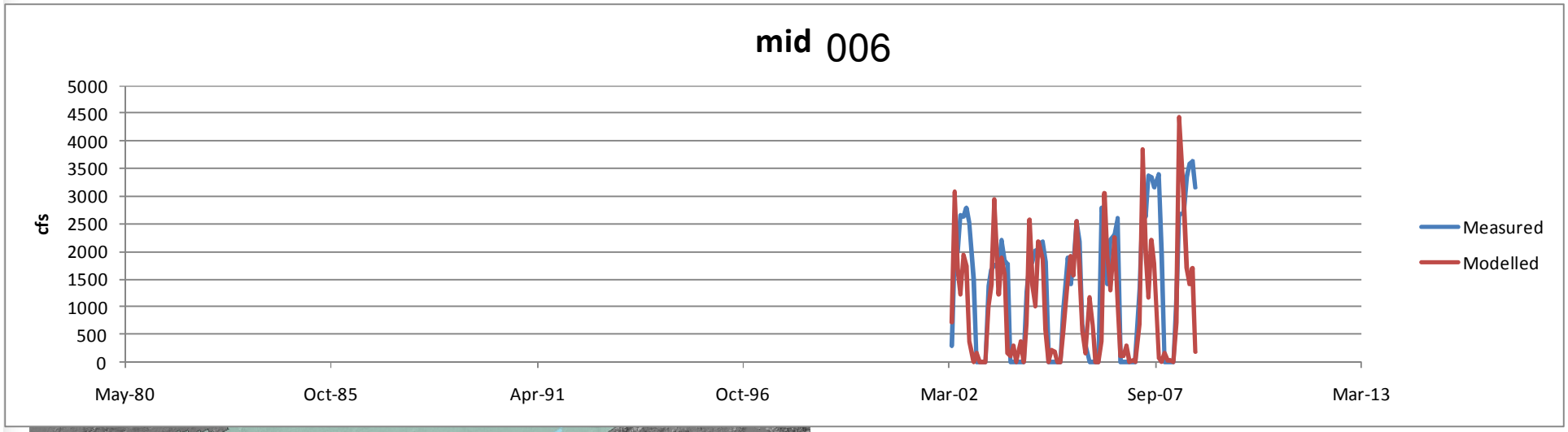


- Minidoka Irrigation District returns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Apr-91
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Mar-02
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Mar-13
Measured
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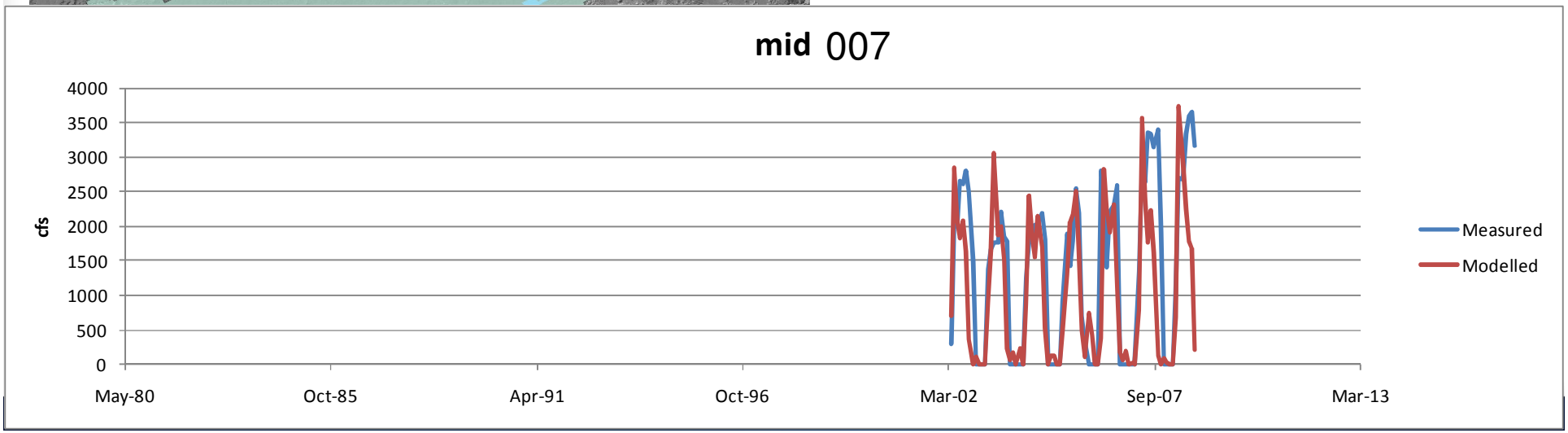
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Apr-91
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Mar-13
Measured
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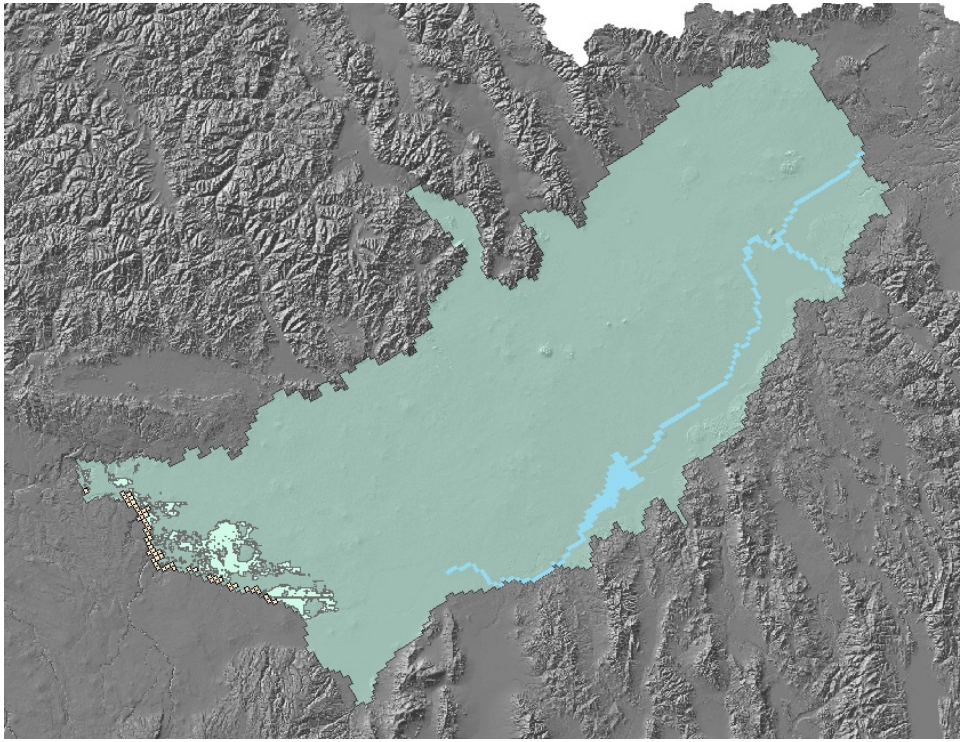
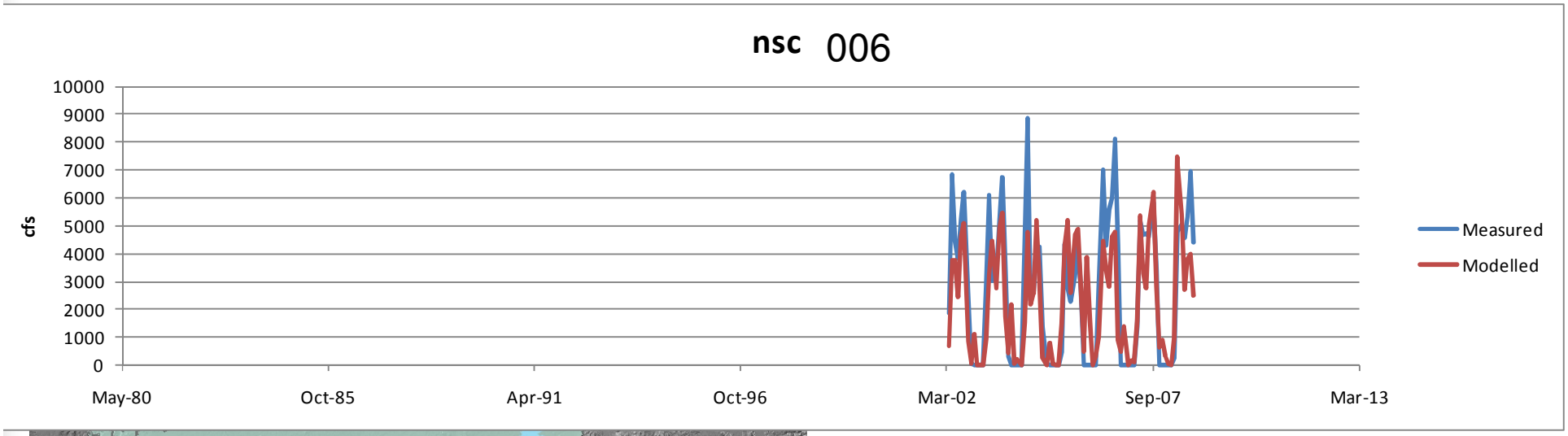


- North Side Canal Co returns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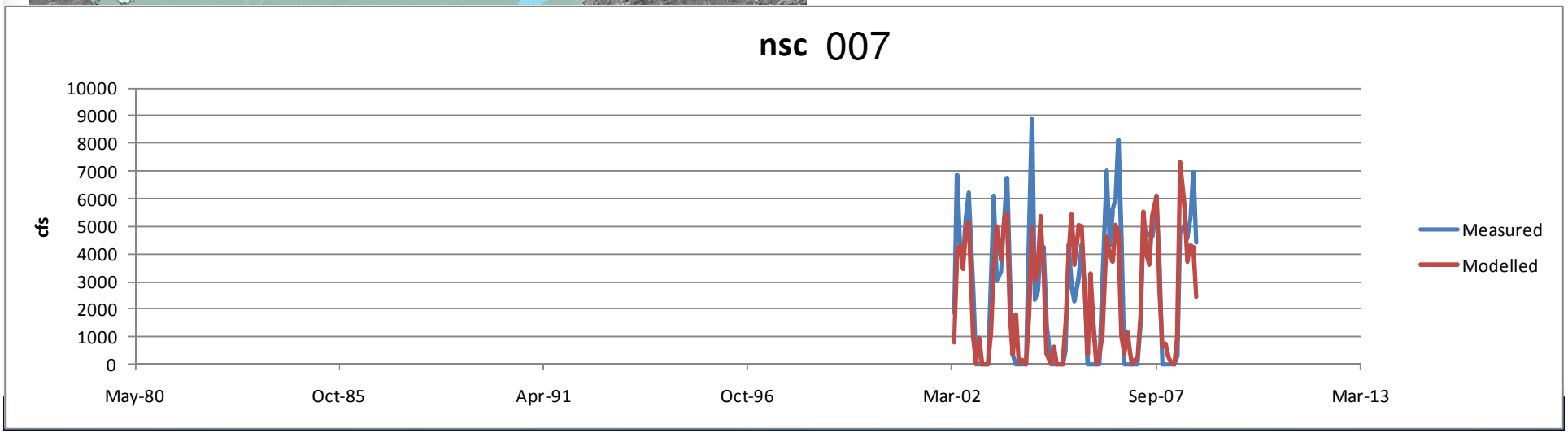
Sep-07
Mar-13
Measured
Modelled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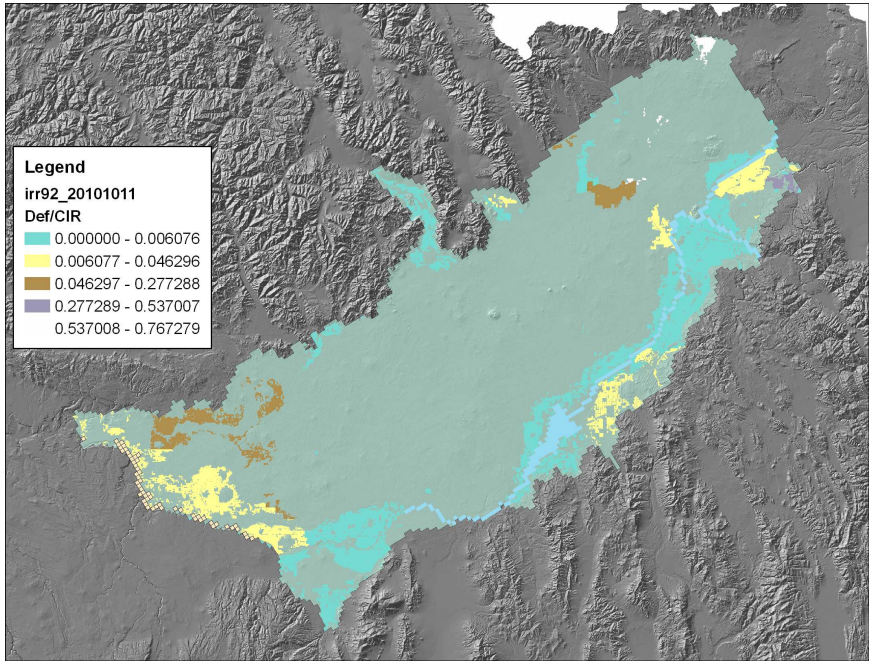
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled

006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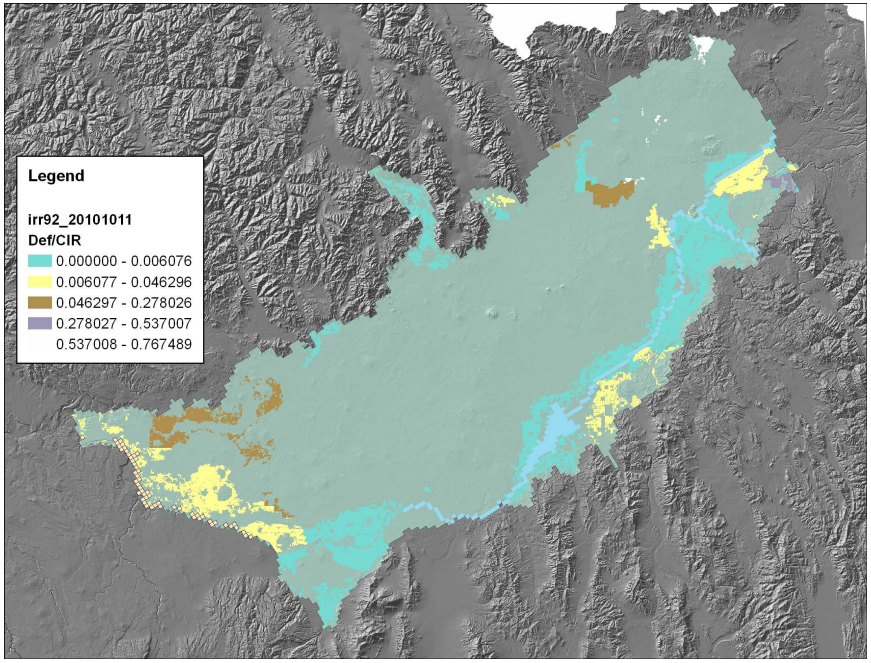
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END