2008 Reach Gain and Spring Discharge Targets

Allan Wylie IDWR

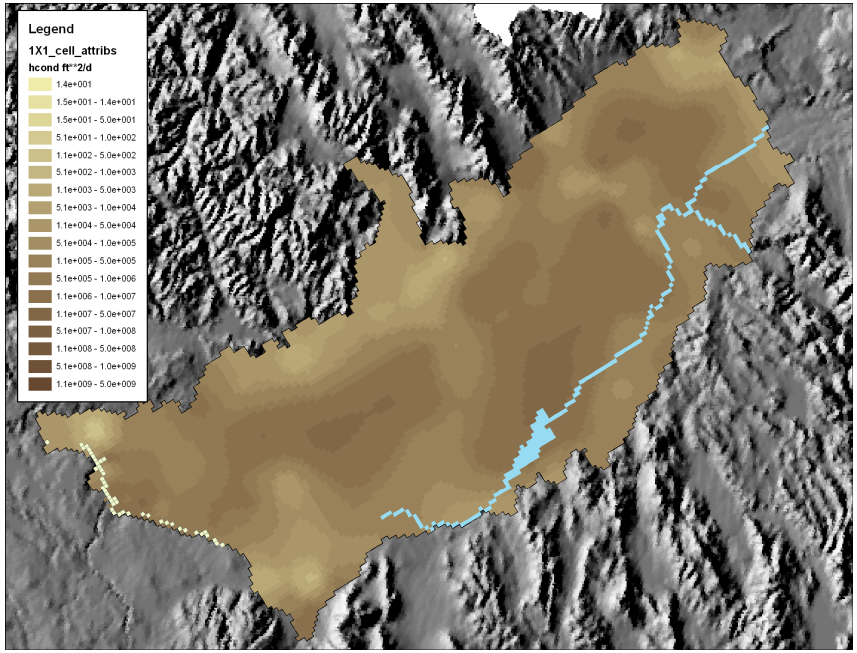
2008 Reach Gain and Spring Discharge Targets

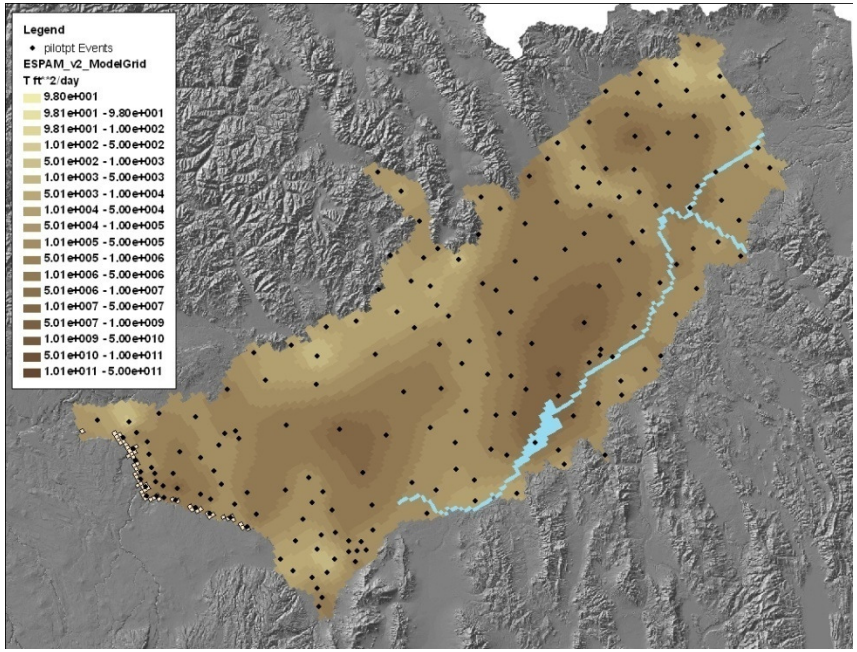
- Evaluate Monthly Stress Periods
  - Using
    - READINP2_0_2.exe
      - No On-Farm algorithm
    - P100108A
      - Assumes that the On-Farm algorithm would be used
      - All canal seepage is double counted
      - Place holder for non-irrigated recharge
    - No steady state targets
    - Aquifer head targets
      - Same
      - 1985-2002
    - Snake reach gain and loss targets
      - Updated through 2008 to match recharge data
      - 1985-2008
    - Spring discharge targets
      - Group A and B
        - » Updated to match recharge data
      - Group C

2008 Reach Gain and Spring Discharge Targets

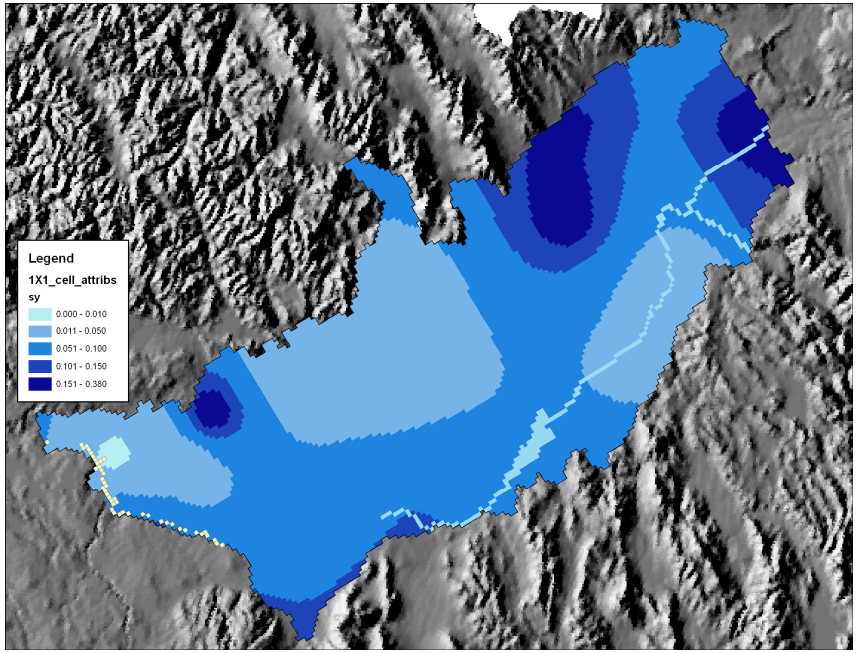
- Adjustable Parameters
  - Transmissivity
    - Pilot Points
      - 1e-10 – 1e+10
  - Specific Yield
    - Pilot Points
      - 0.001 – 0.30
  - Riverbed Conductance
    - By reach
      - 1.0 – 1e+10
  - Drain Conductance
    - By drain cell
      - Up to 3 drain cells per model cell
      - 1e-10 - 3e+8
  - Canal seepage
    - Uniform for all canals
      - 1e-6 – 1.2
  - Non-irrigated recharge
    - Thin Thick and Lava
      - 1e-6 – 20
      - READINP2_0_2.exe will not allow recharge > precipitation
  - ET
    - Surface Water Entity
      - Sprinkler and Gravity
      - +/-5%
    - Groundwater Entity
      - Sprinkler and Gravity
      - +/-5%
  - Perched River Seepage
    - River reach
    - +/-20%
  - Tributary Underflow
    - Tributary Basin
    - 0.5 - 2

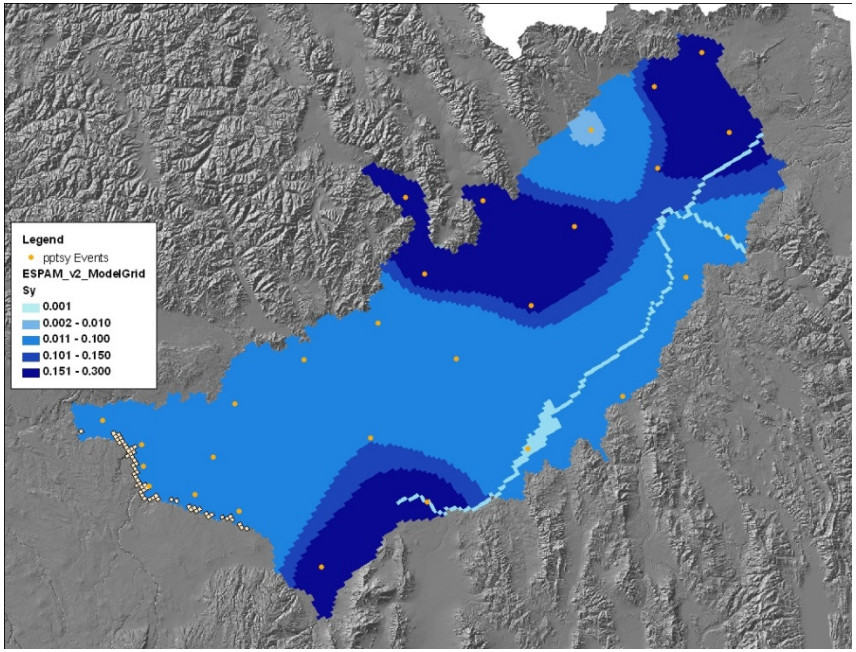
V 1.1


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

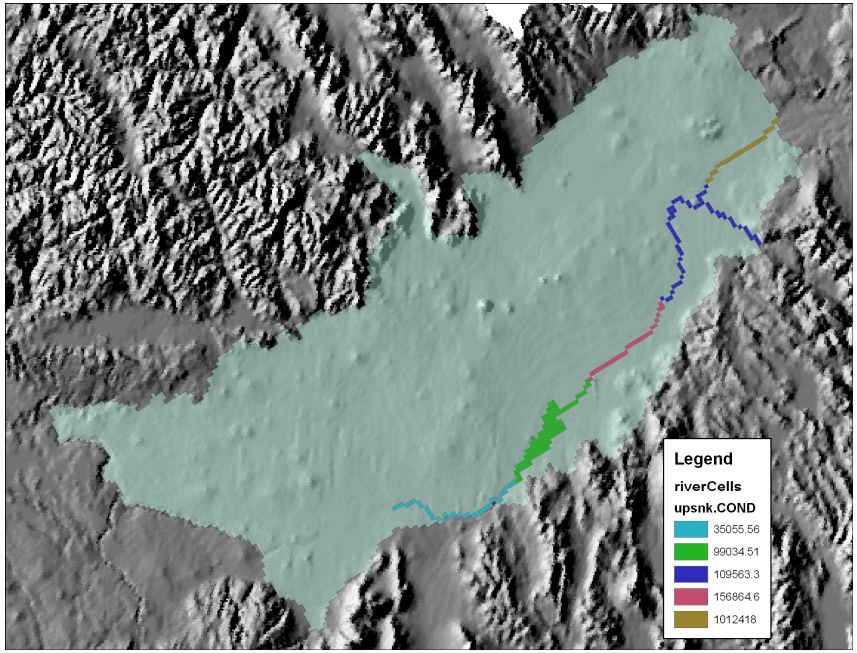

Legend
pilotpt Events
ESPAM_v2_ModelGrid
T ft**2/day
9.80e+001
9.81e+001 - 9.80e+001
9.81e+001 - 1.00e+002
1.01e+002 - 5.00e+002
5.01e+002 - 1.00e+003
1.01e+003 - 5.00e+003
5.01e+003 - 1.00e+004
1.01e+004 - 5.00e+004
5.01e+004 - 1.00e+005
1.01e+005 - 5.00e+005
5.01e+005 - 1.00e+006
1.01e+006 - 5.00e+006
5.01e+006 - 1.00e+007
1.01e+007 - 5.00e+007
5.01e+007 - 1.00e+009
1.01e+009 - 5.00e+010
5.01e+010 - 1.00e+011
1.01e+011 - 5.00e+011

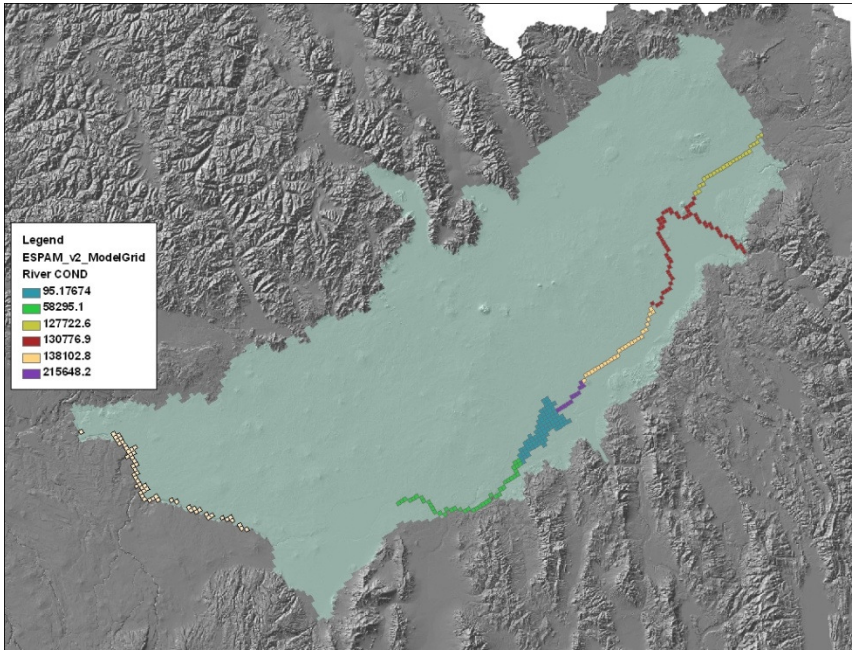
V 1.1


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

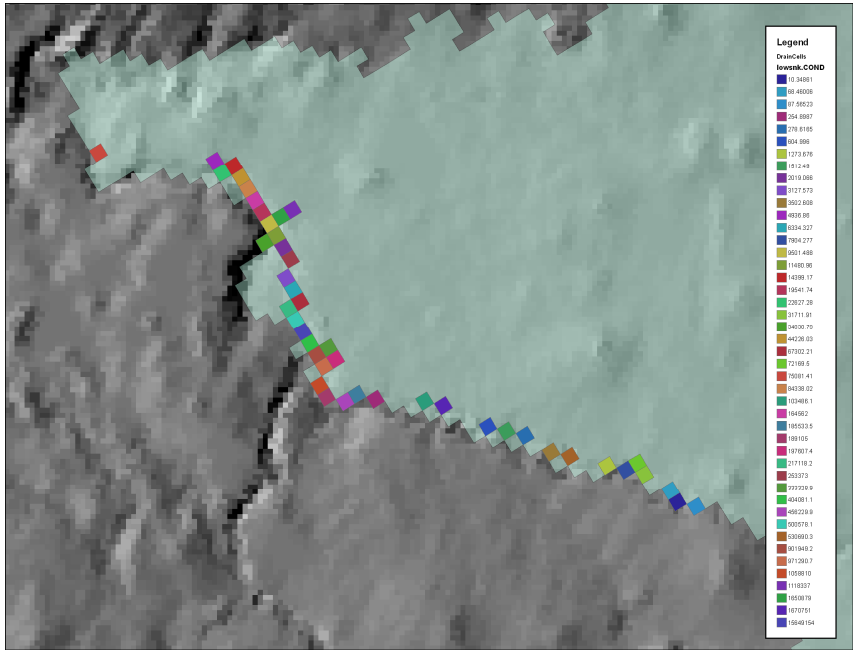

Legend
pptsy Events
ESPAM_v2_ModelGrid
Sy
0.001
0.002 - 0.010
0.011 - 0.100
0.101 - 0.150
0.151 - 0.300

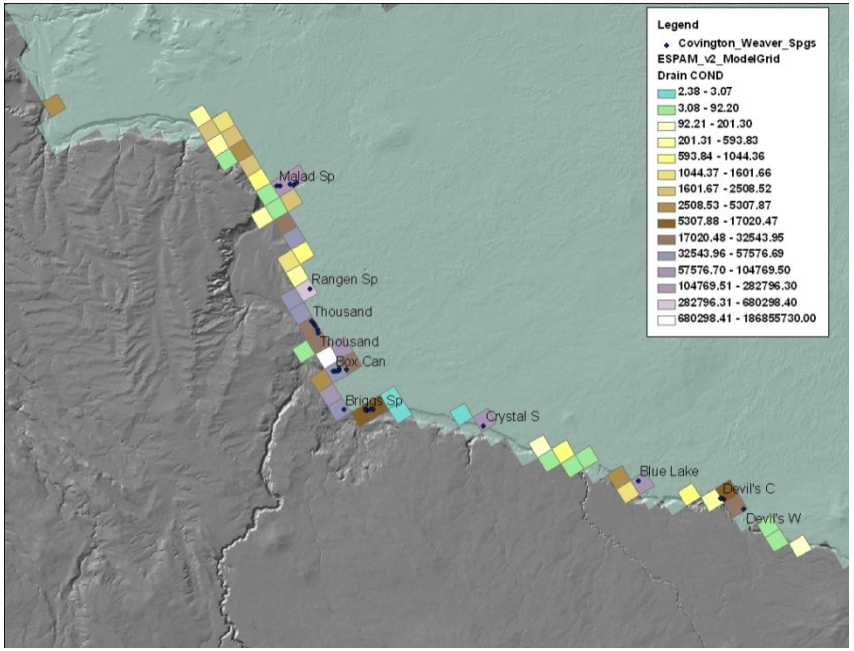
V 1.1


Legend
riverCells
upsnk.COND
35055.56
99034.51
109563.3
156864.6
1012418

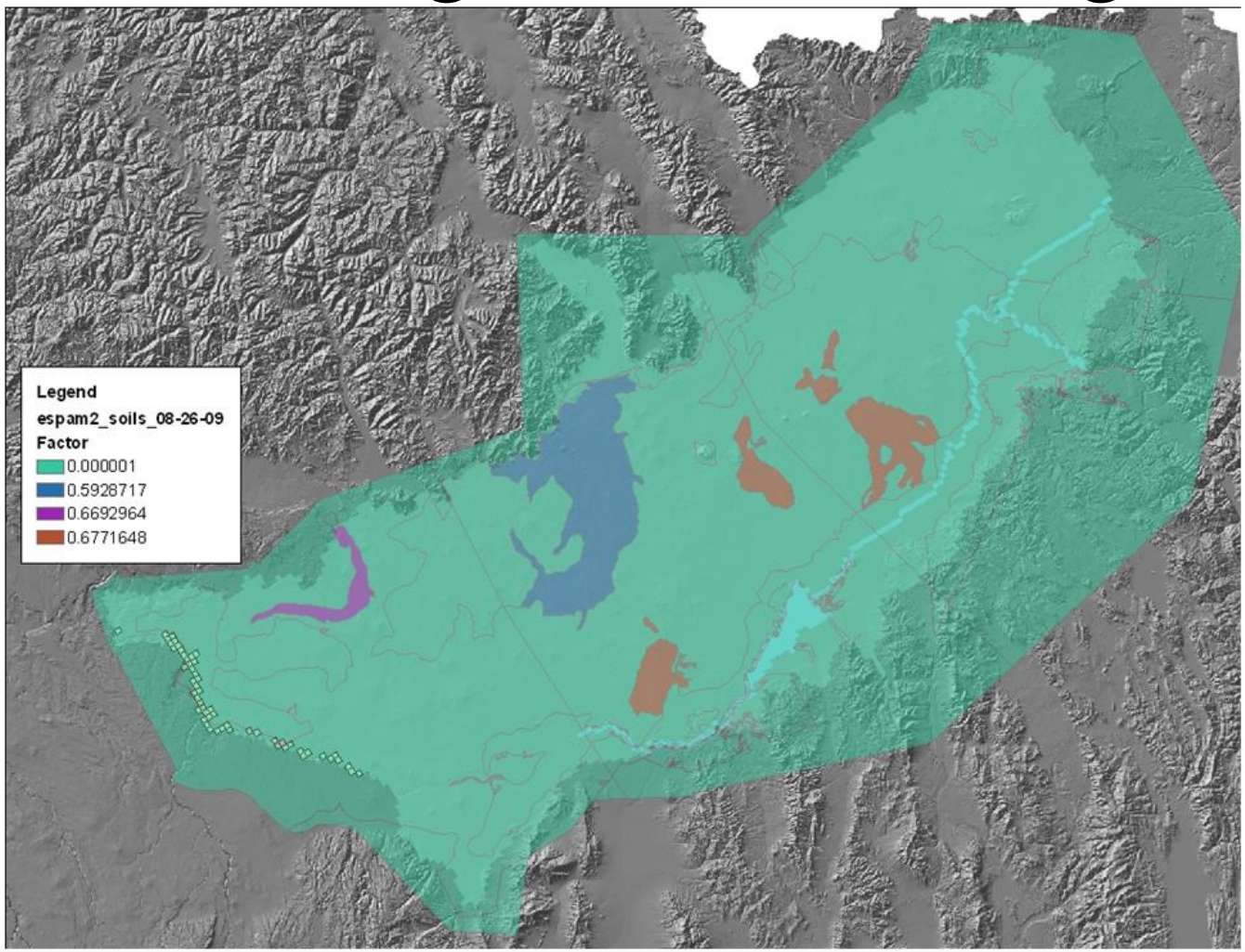

Legend
ESPAM_v2_ModelGrid
River COND
95.17674
58295.1
127722.6
130776.9
138102.8
215648.2

V 1.1

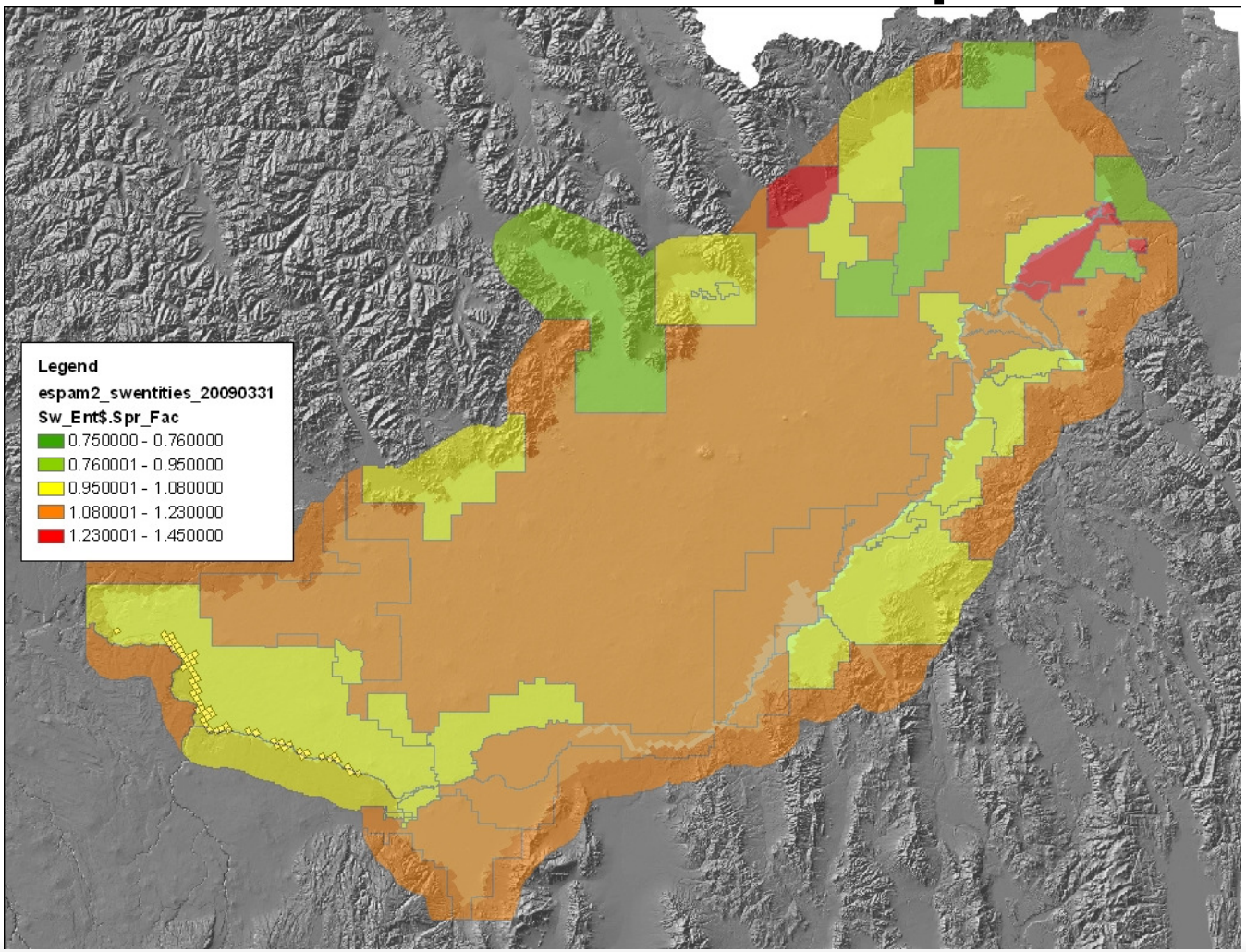

Legend
DrainCells
lowsnk.COND


Legend
Covington_Weaver_Spgs
ESPAM_v2_ModelGrid
Drain COND
2.38 - 3.07
3.08 - 92.20
92.21 - 201.30
201.31 - 593.83
593.84 - 1044.36
1044.37 - 1601.66
1601.67 - 2508.52
2508.53 - 5307.87
5307.88 - 17020.47
17020.48 - 32543.95
32543.96 - 57576.69
57576.70 - 104769.50
104769.51 - 282796.30
282796.31 - 680298.40
680298.41 - 186855730.00
Malad Sp
Rangen Sp
Thousand
Thousand
Box Can
Briggs Sp
Crystal S
Blue Lake
Devil's C
Devil's W

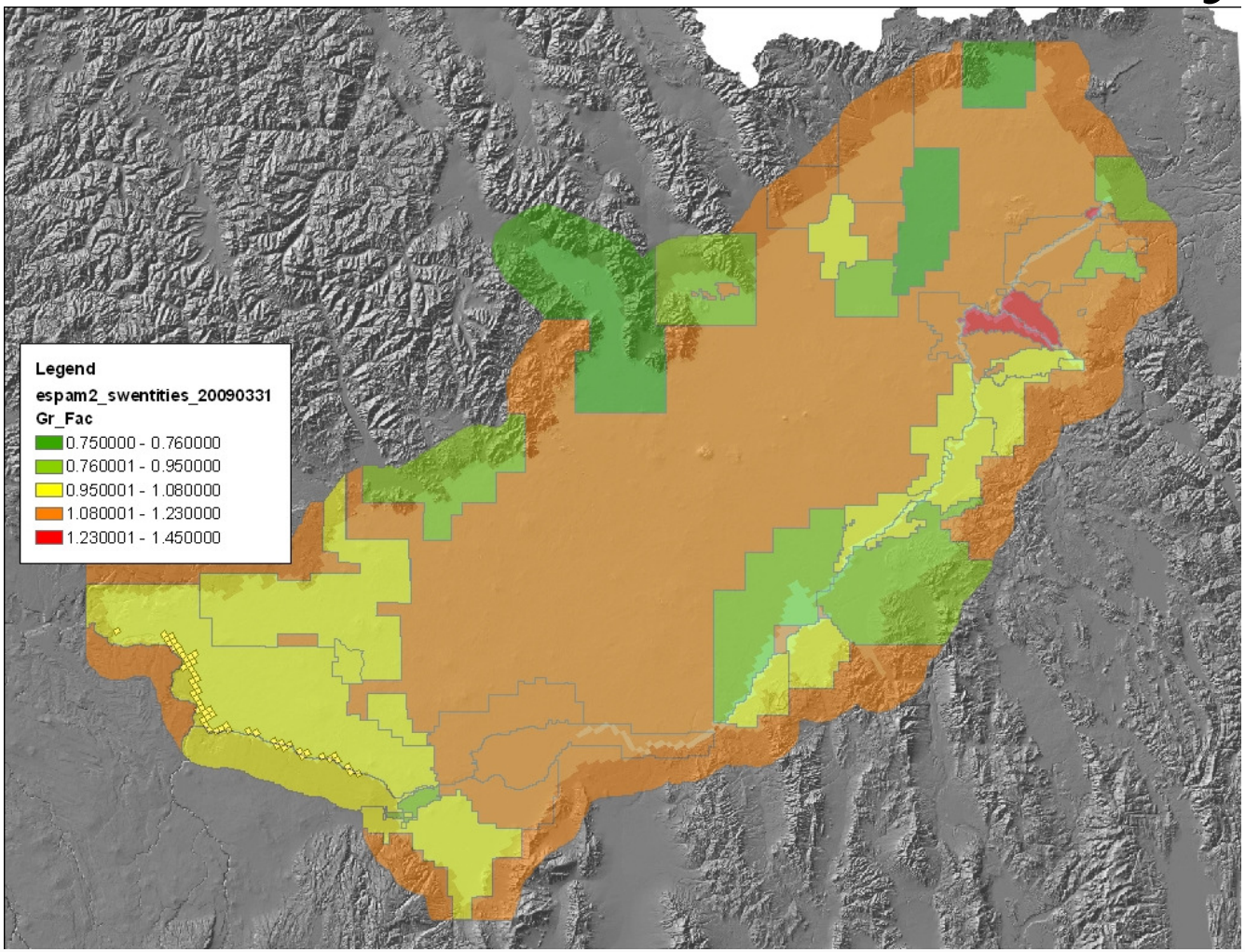
Non-irrigated Recharge



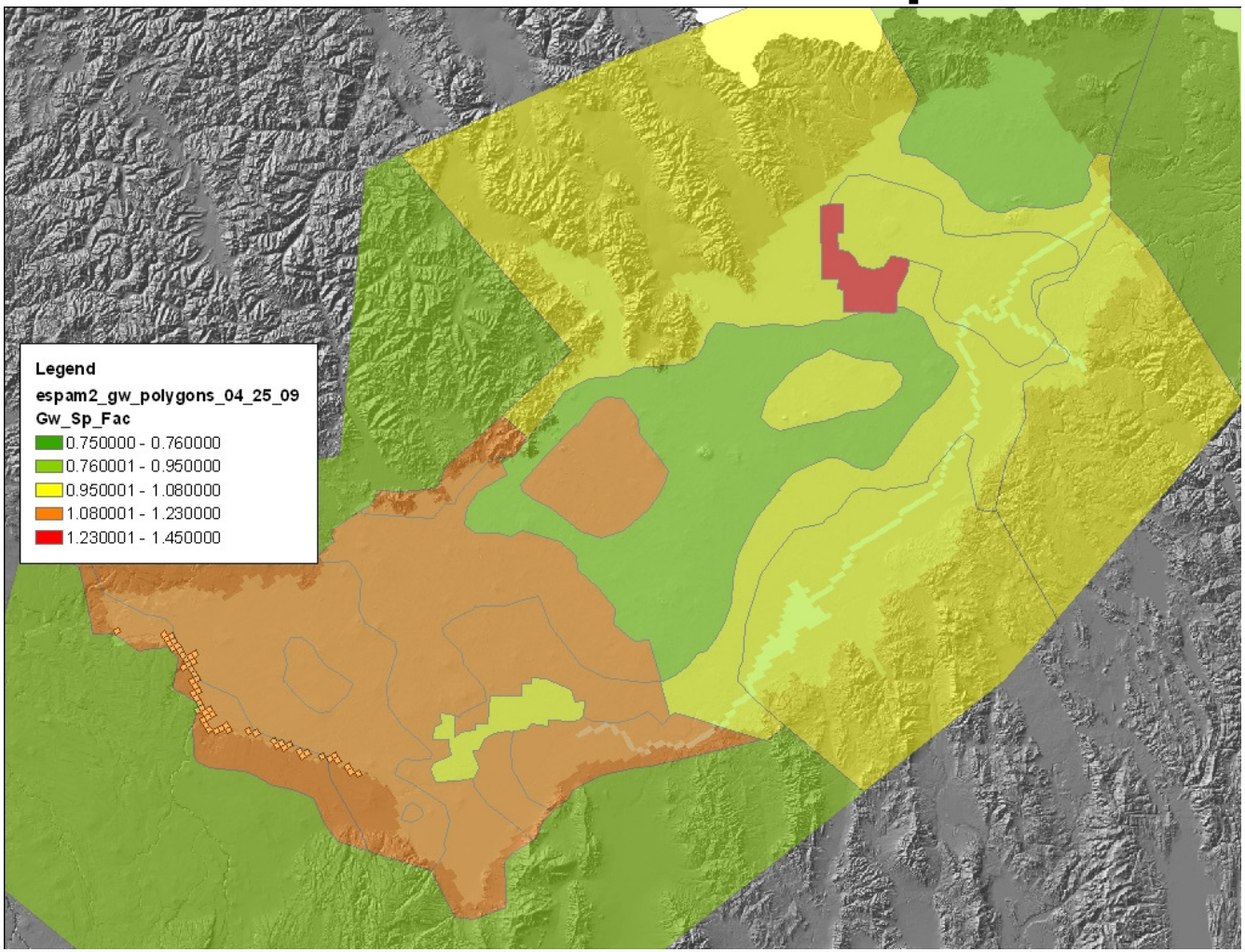
ET Surface Water Sprinkler



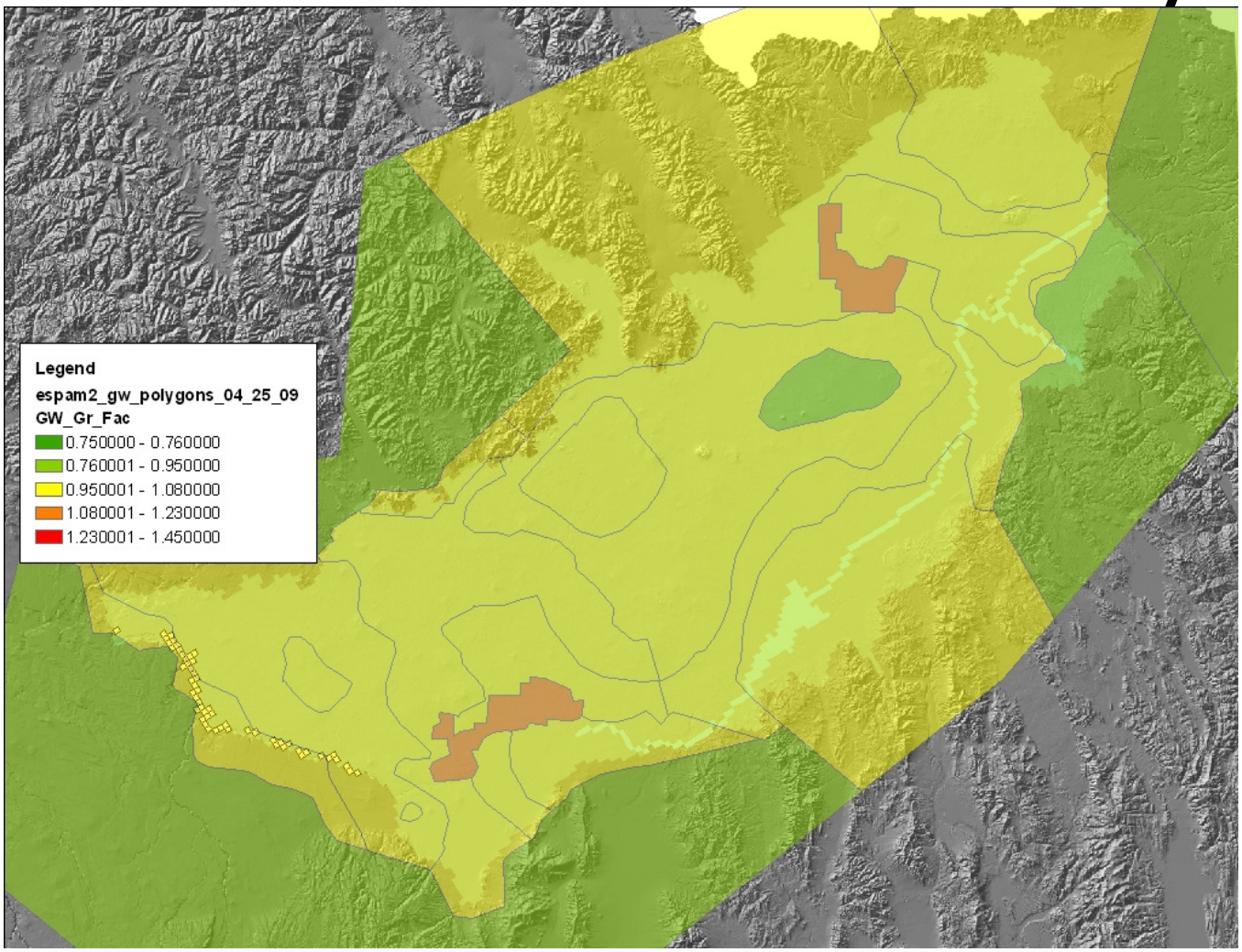
ET Surface Water Gravity



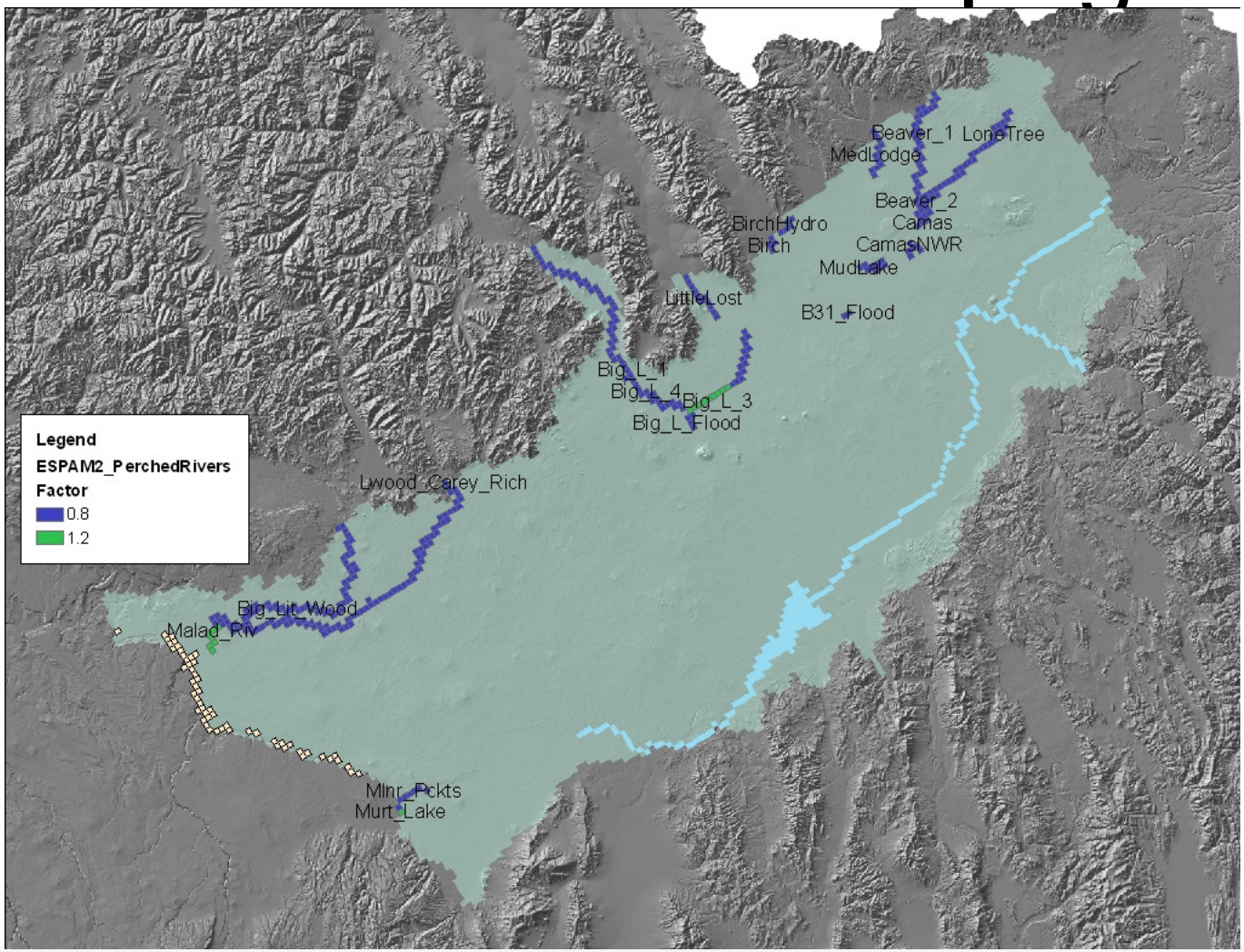
ET Groundwater Sprinkler



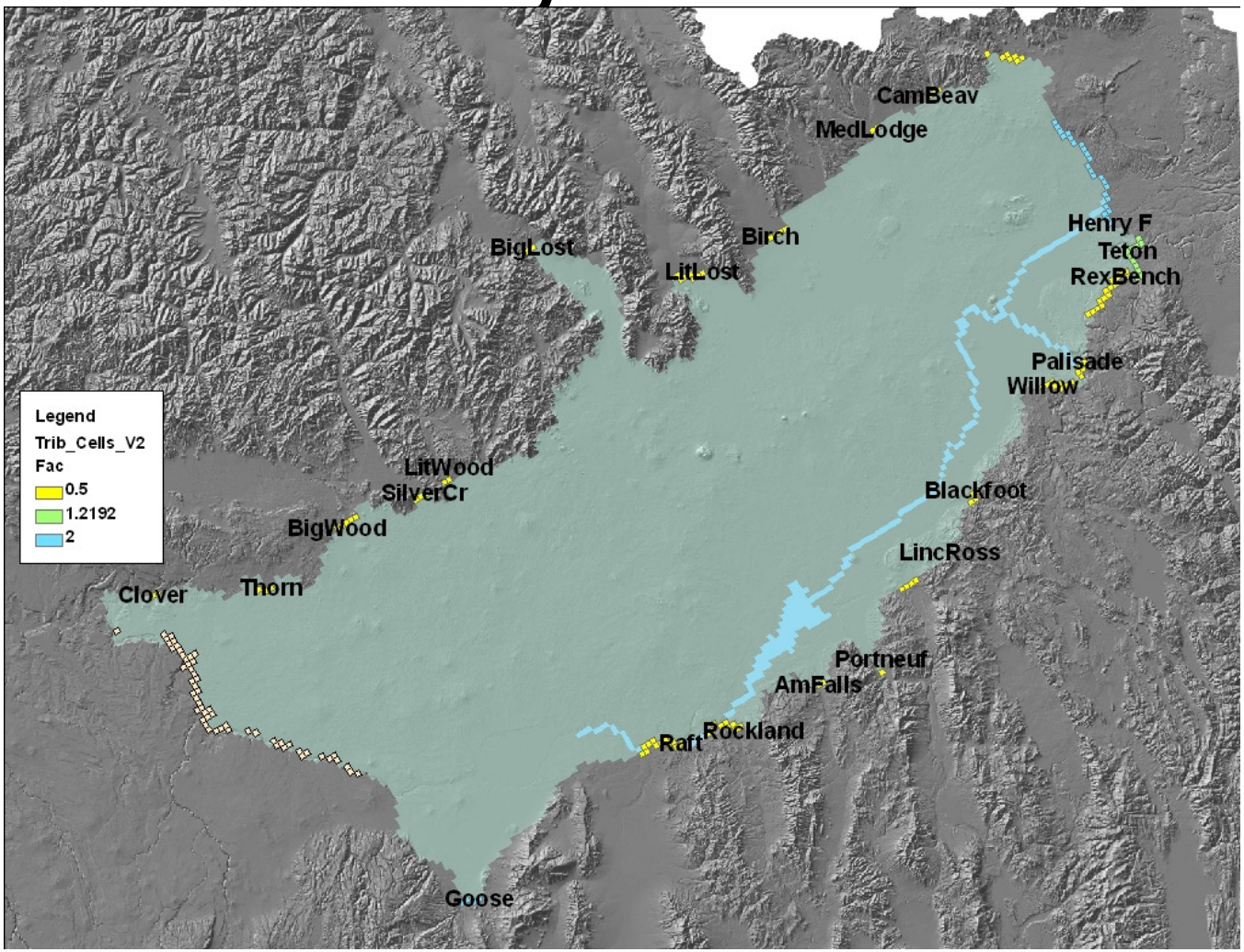
ET Groundwater Gravity

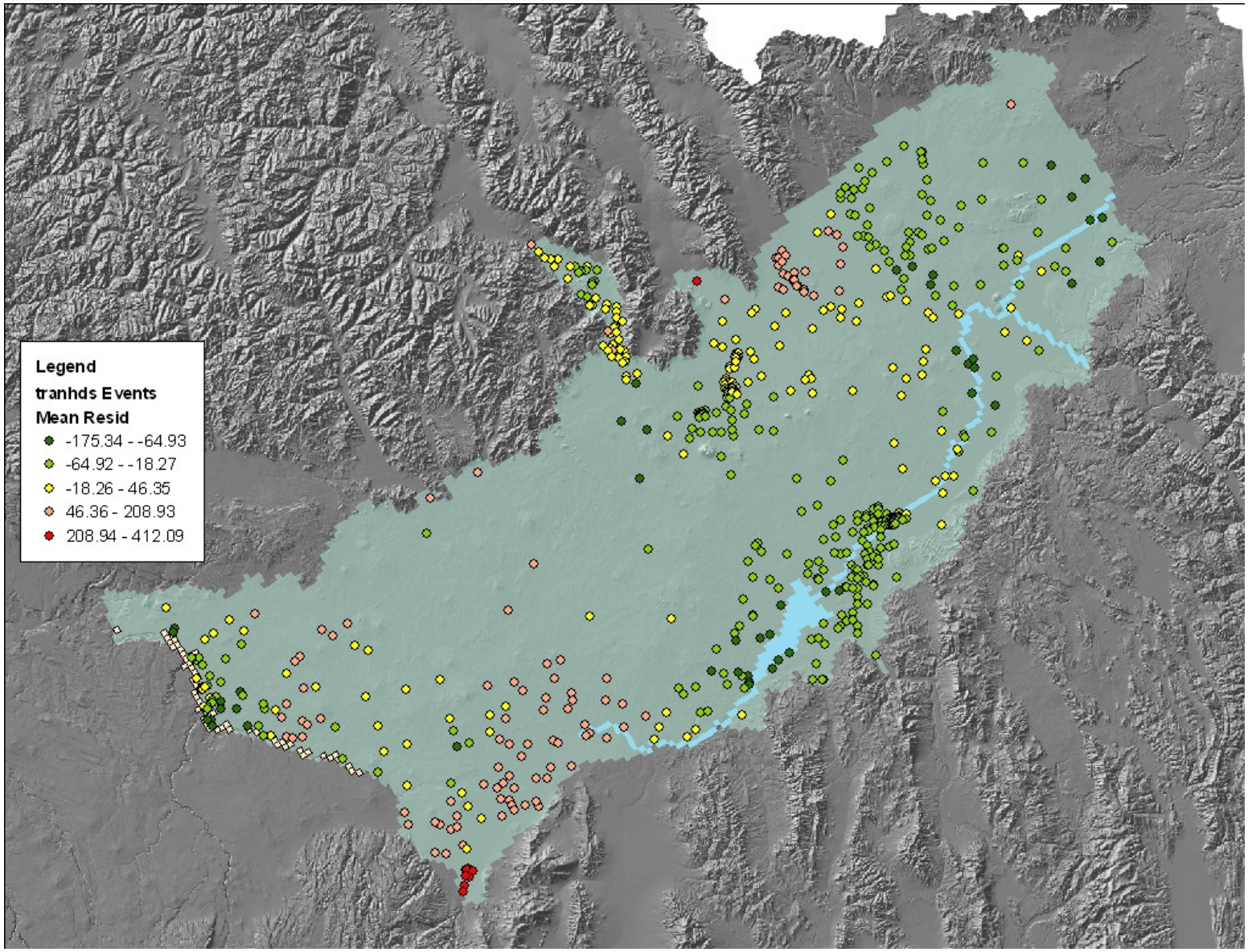


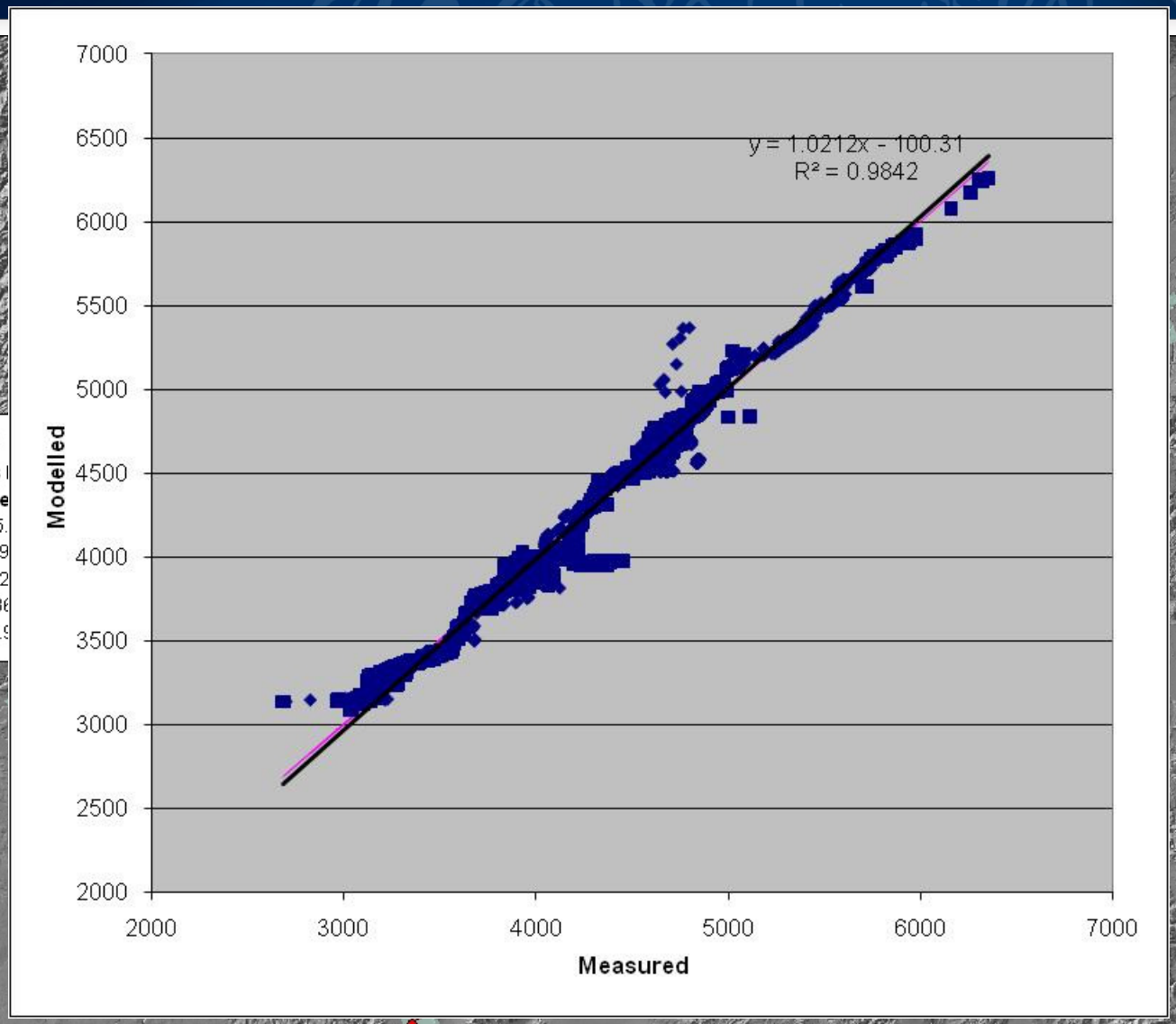
Perched River Seepage

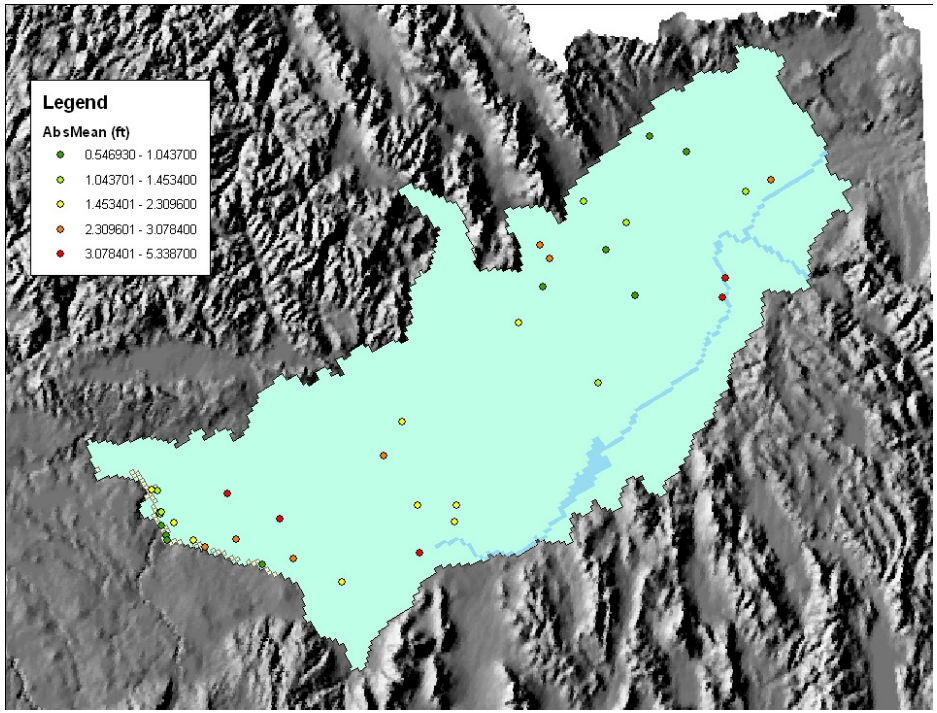


Tributary Underflow

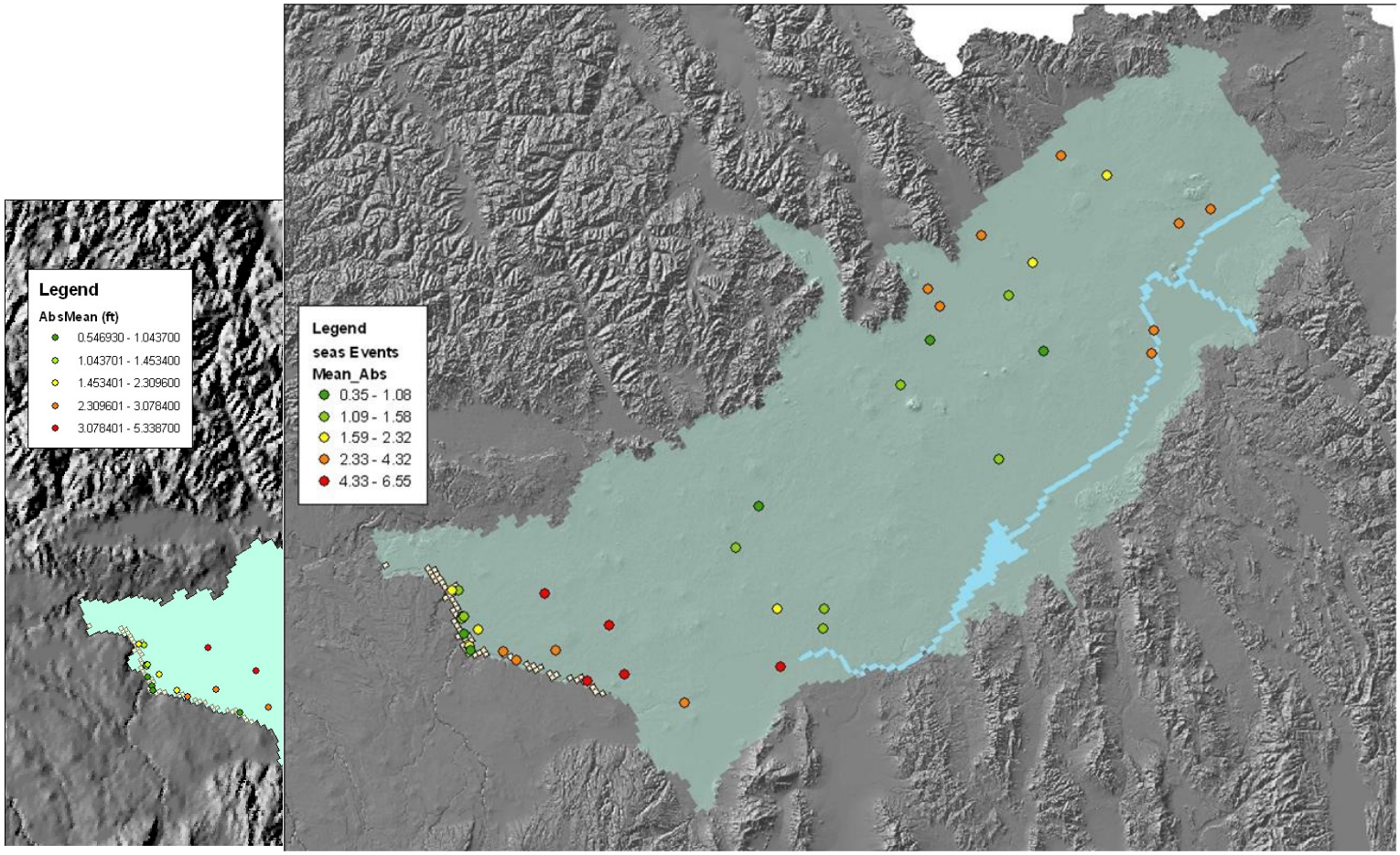



Legend
tranhds Events
Mean Resid
-175.34 - -64.93
-64.92 - -18.27
-18.26 - 46.35
46.36 - 208.93
208.94 - 412.09

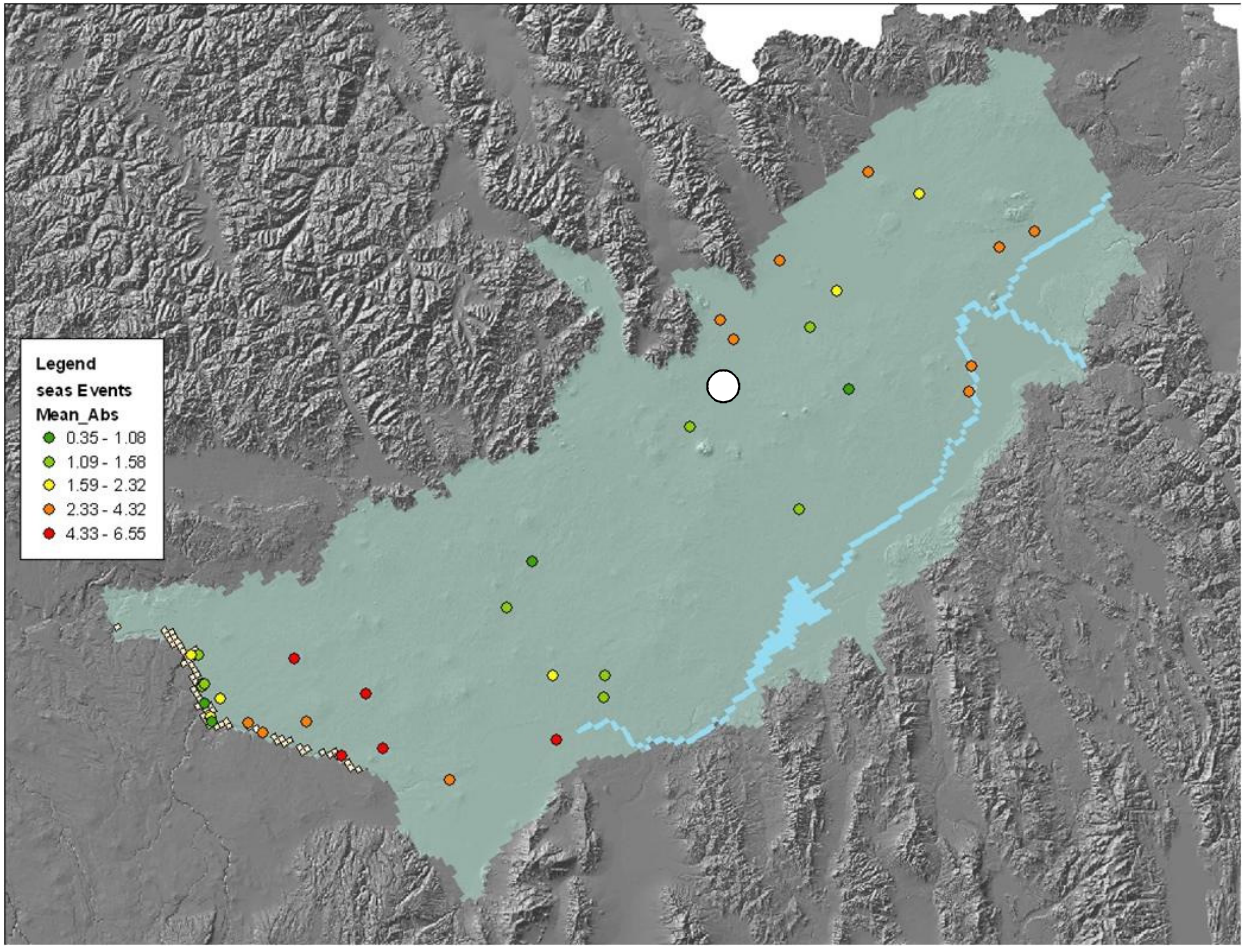

y = 1.0212x - 100.31
R² = 0.9842
Modelled
Measured
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
2000
3000
4000
5000
6000
7000

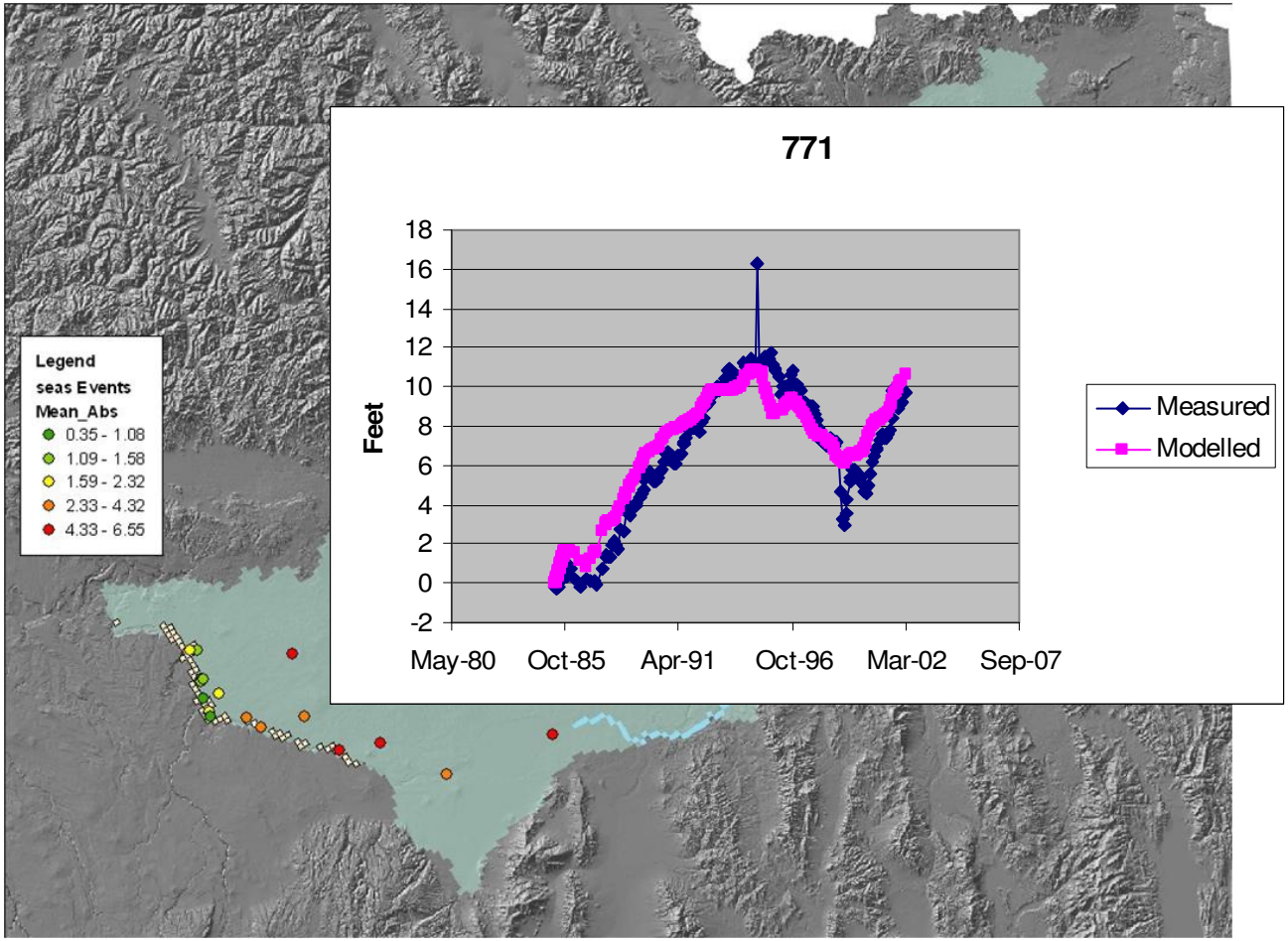


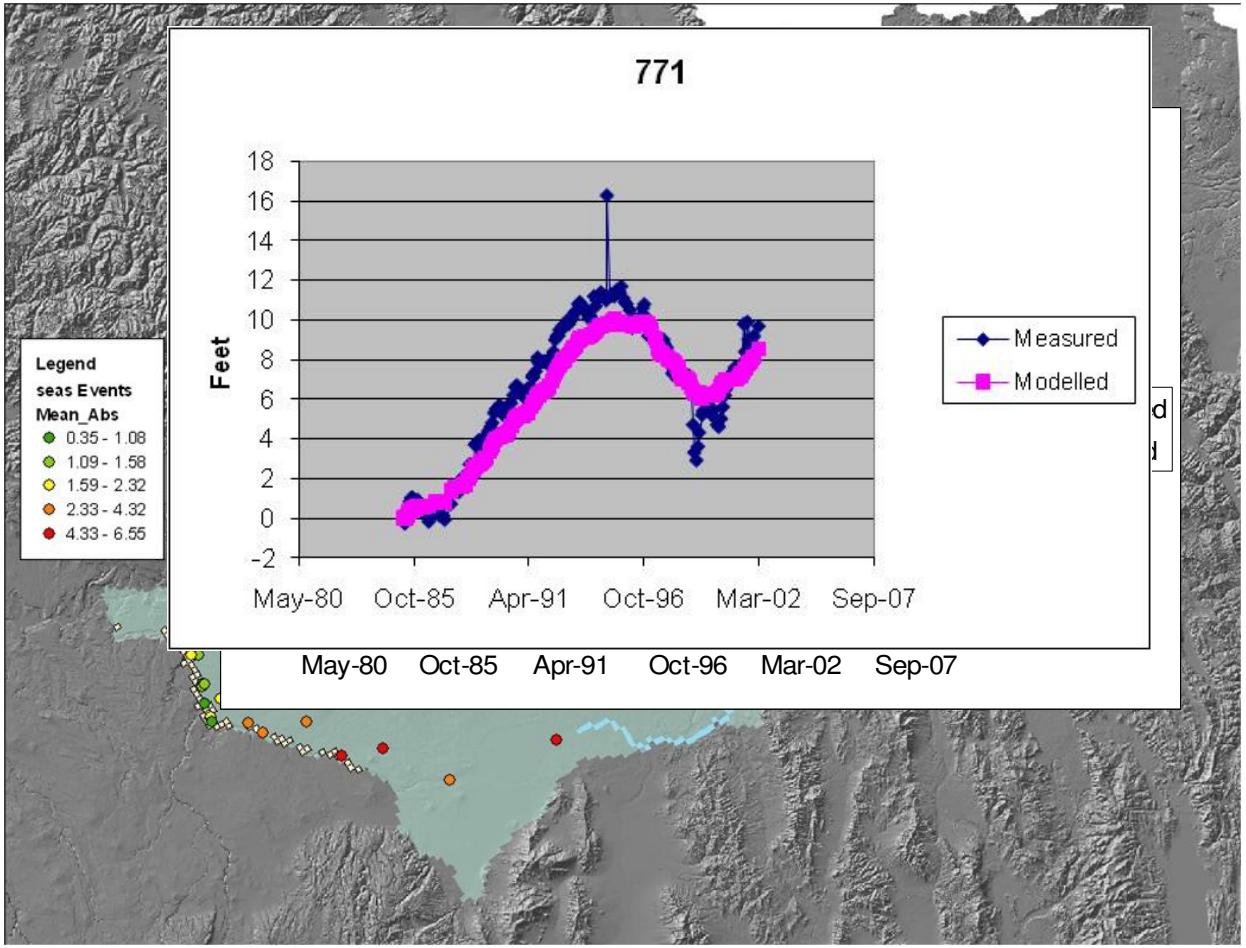
- Hundreds to thousands of observations
  - Lots of data
  - Limited spatial coverage

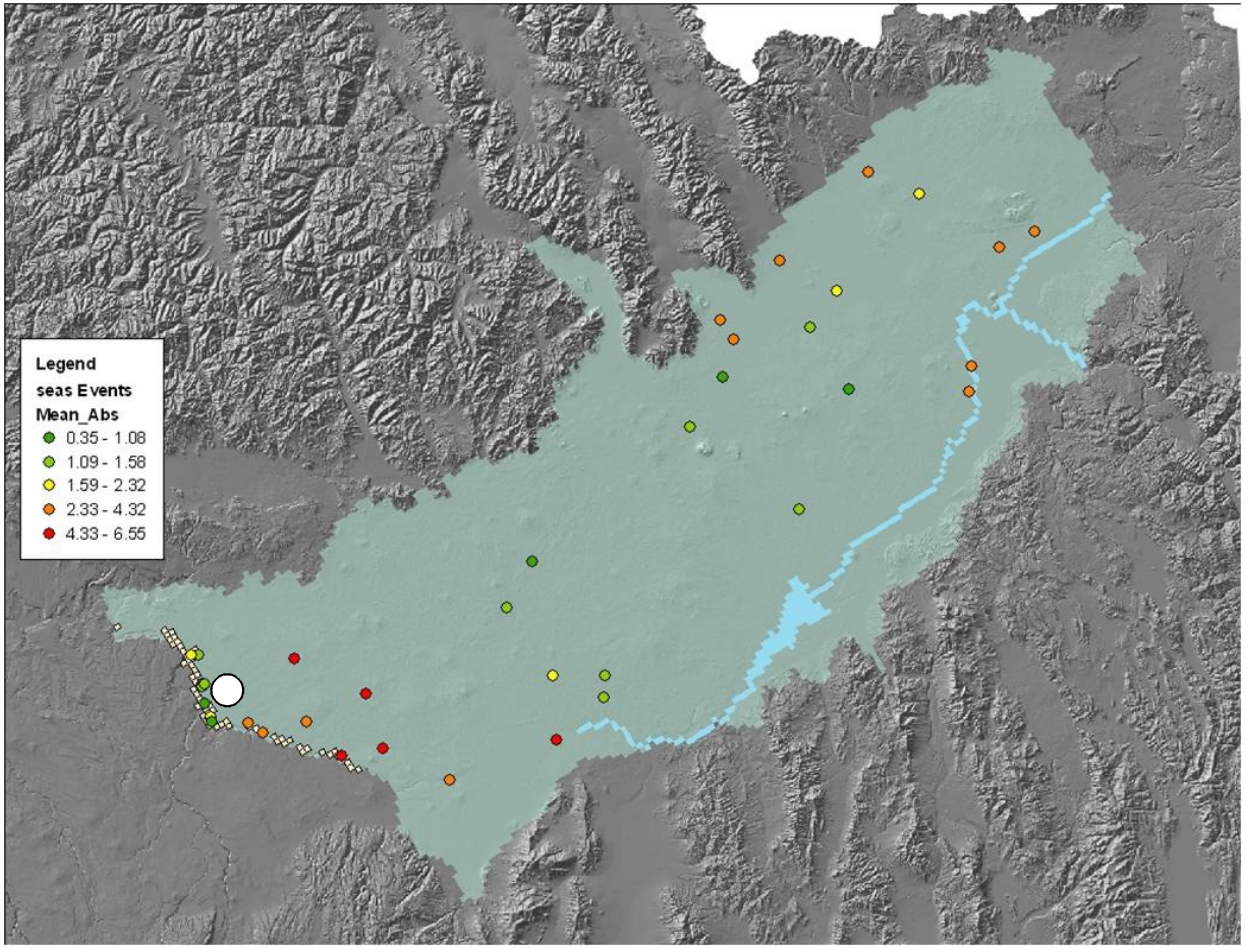

Legend
AbsMean (ft)
0.546930 - 1.043700
1.043701 - 1.453400
1.453401 - 2.309600
2.309601 - 3.078400
3.078401 - 5.338700
Legend
seas Events
Mean_Abs
0.35 - 1.08
1.09 - 1.58
1.59 - 2.32
2.33 - 4.32
4.33 - 6.55

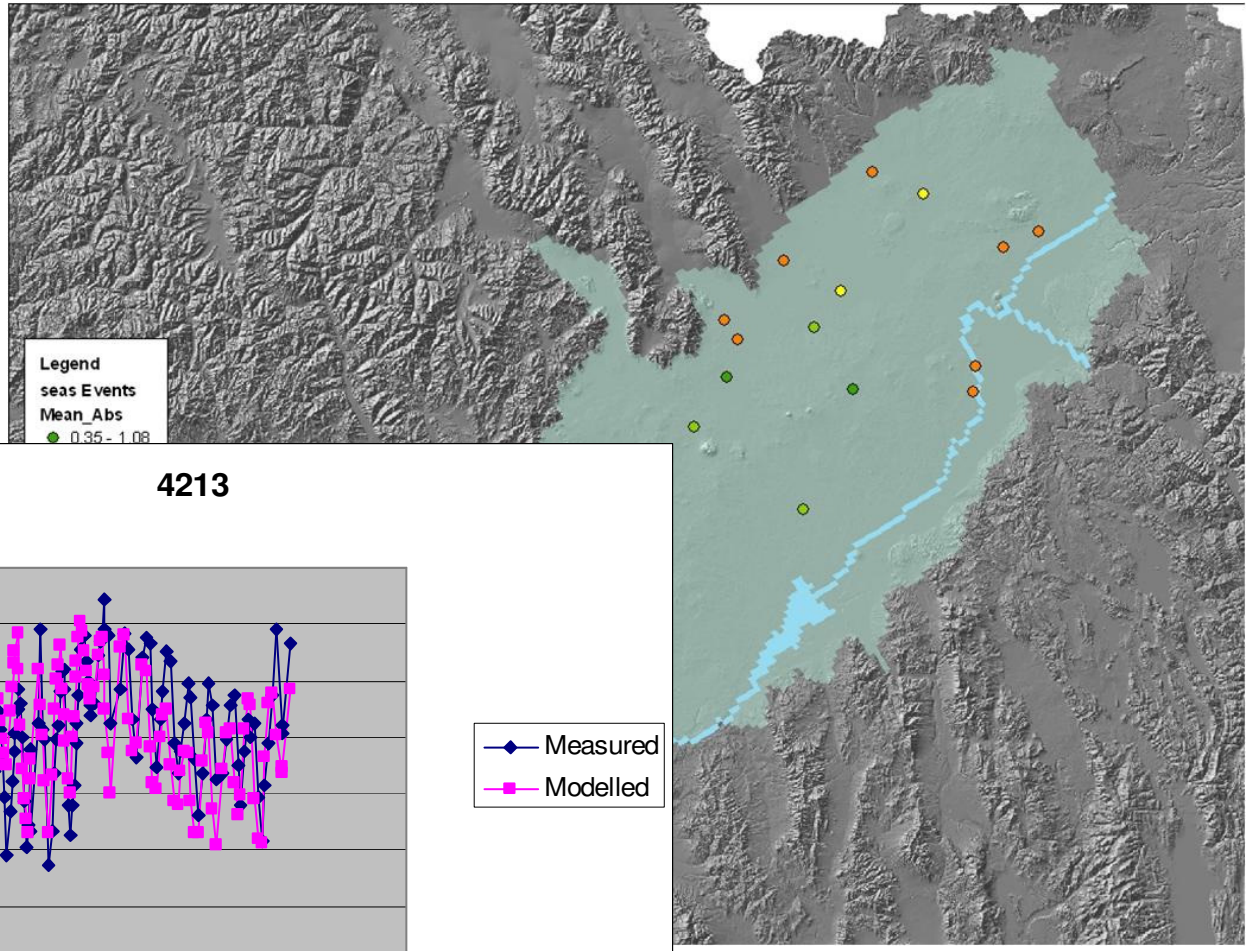
al

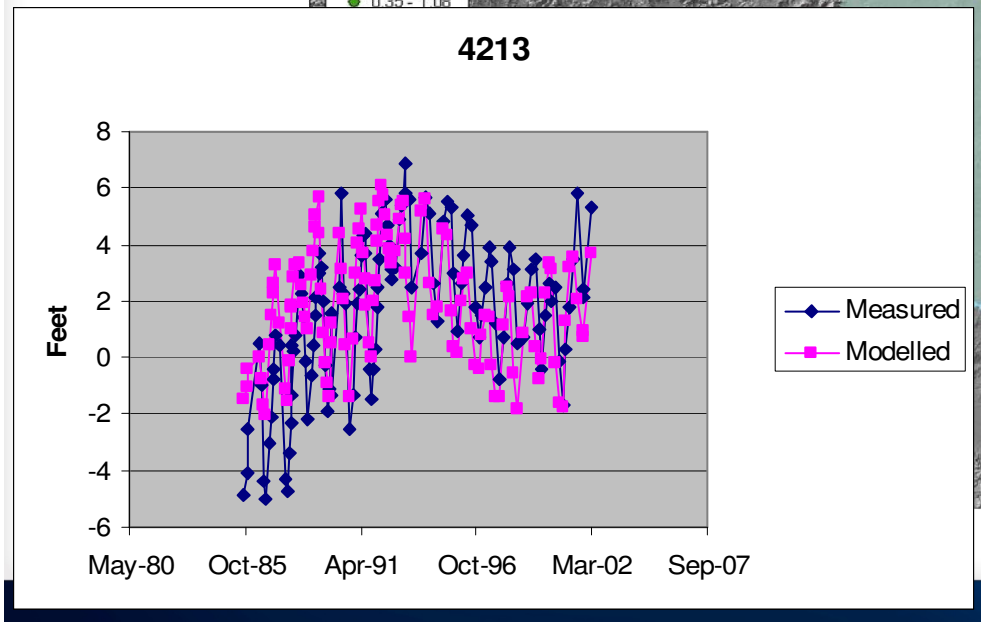

Legend
seas Events
Mean_Abs
0.35 - 1.08
1.09 - 1.58
1.59 - 2.32
2.33 - 4.32
4.33 - 6.55

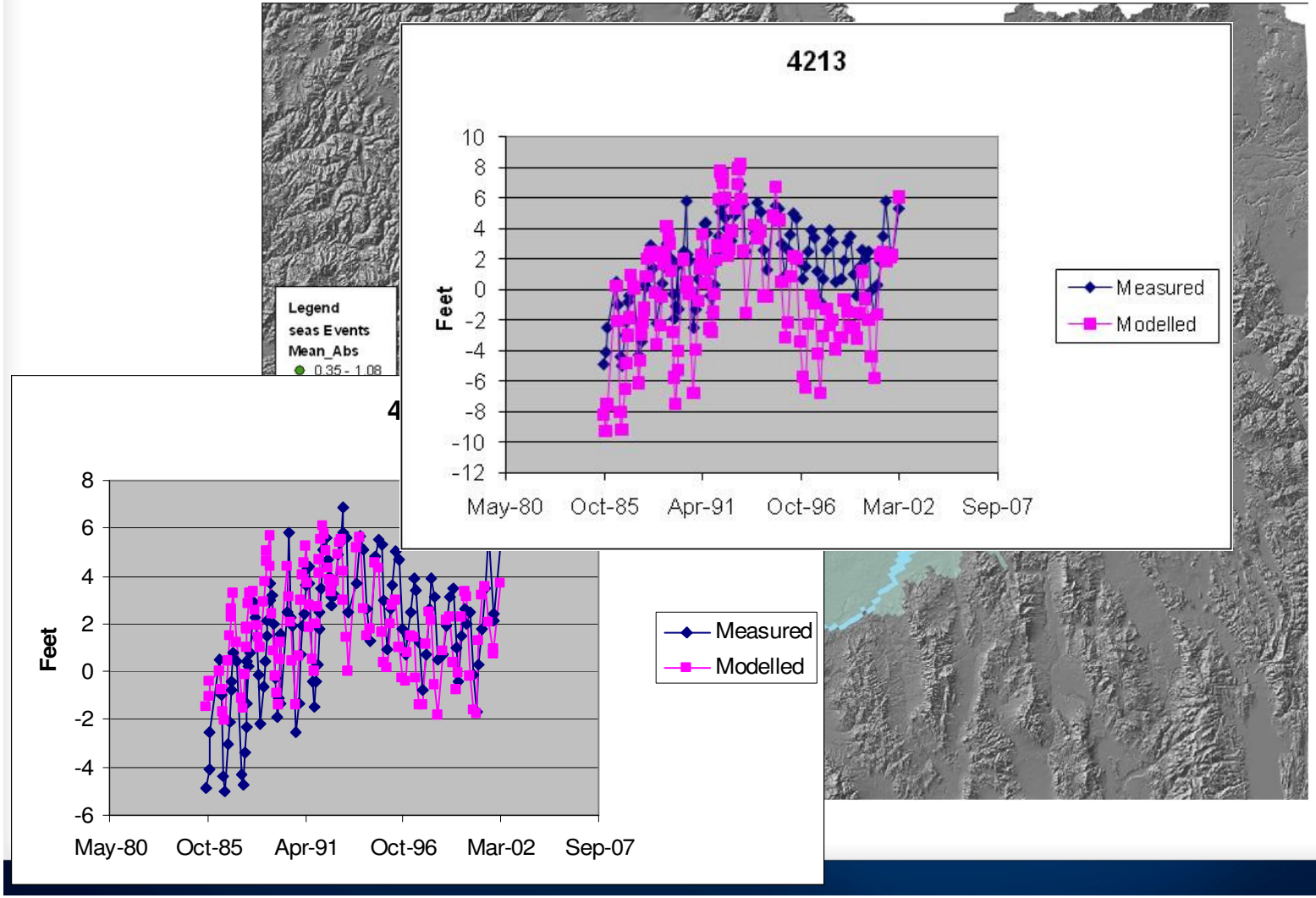

Legend
seas Events
Mean_Abs
0.35 - 1.08
1.09 - 1.58
1.59 - 2.32
2.33 - 4.32
4.33 - 6.55
771
Feet
18
16
14
12
10
8
6
4
2
0
-2
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled

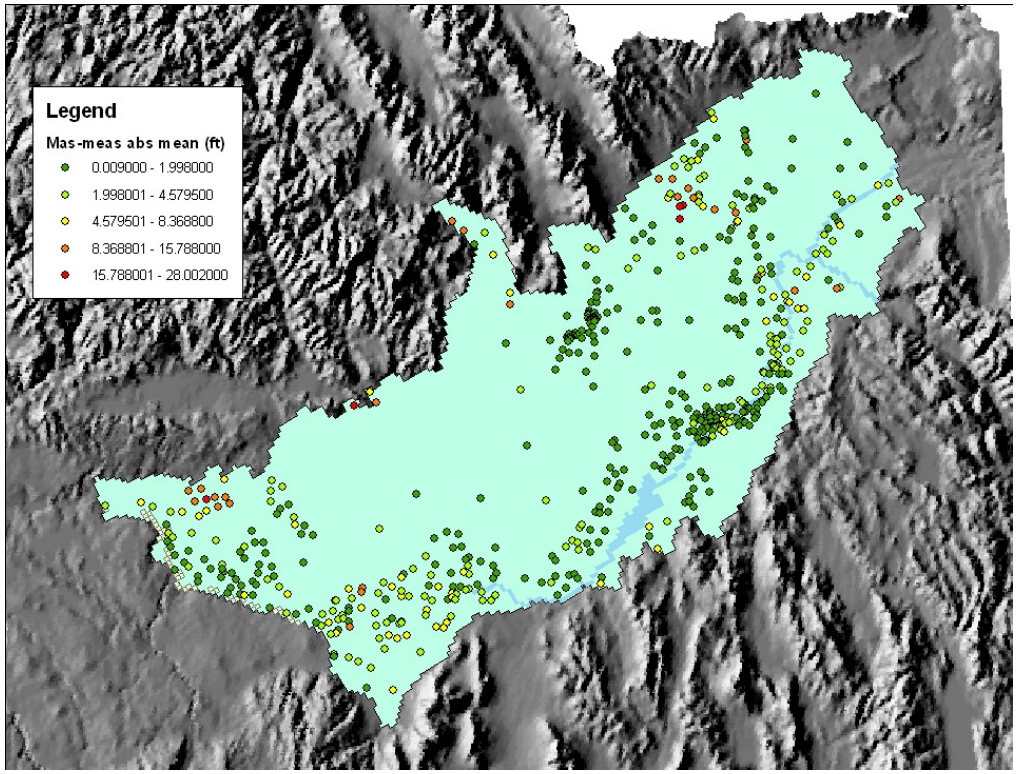

771
Feet
18
16
14
12
10
8
6
4
2
0
-2
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled
Legend
seas Events
Mean_Abs
0.35 - 1.08
1.09 - 1.58
1.59 - 2.32
2.33 - 4.32
4.33 - 6.55
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07


Legend
seas Events
Mean_Abs
0.35 - 1.08
1.09 - 1.58
1.59 - 2.32
2.33 - 4.32
4.33 - 6.55

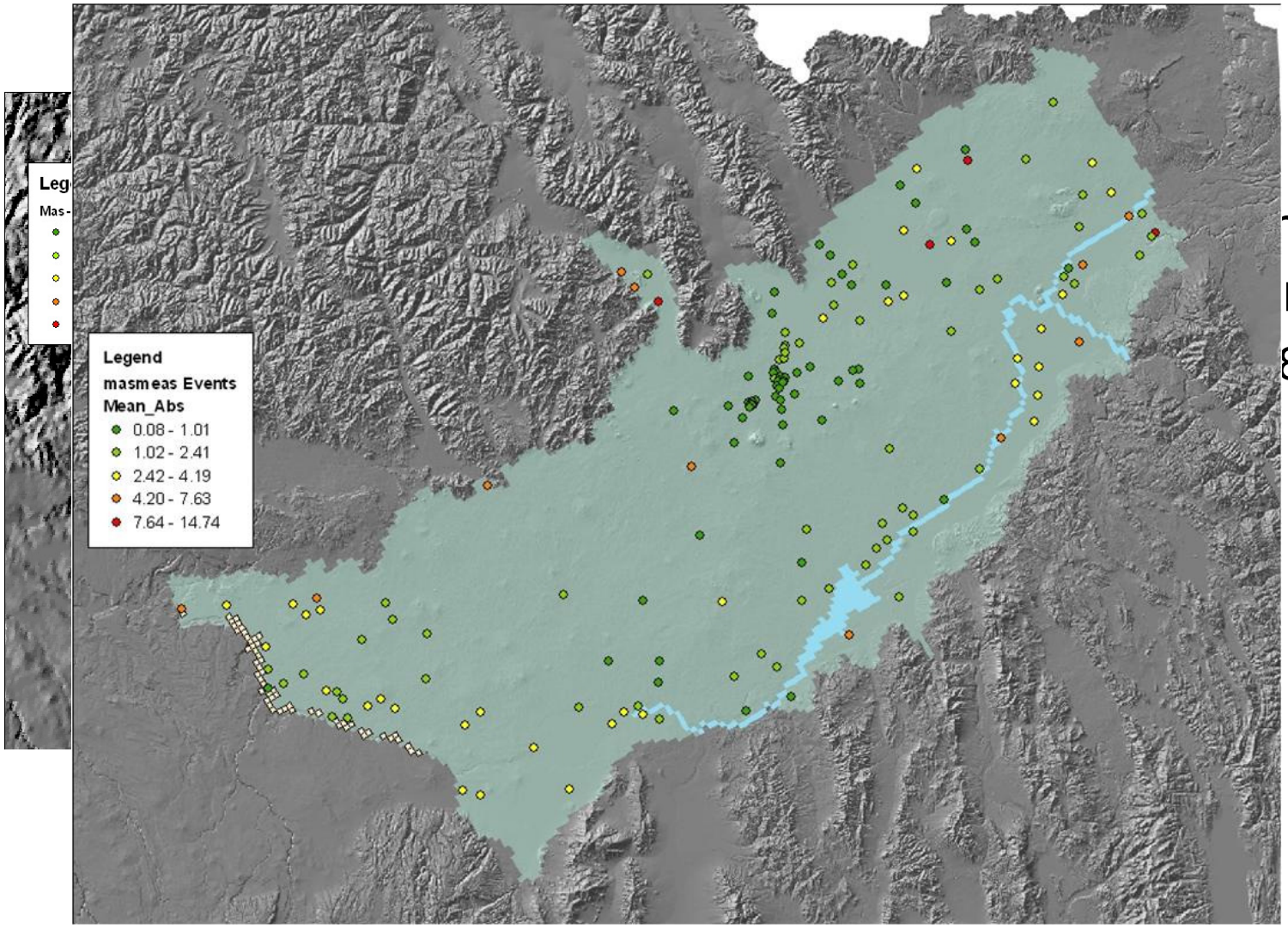

Legend
seas Events
Mean_Abs
0.35 - 1.08


4213
Feet
8
6
4
2
0
-2
-4
-6
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled

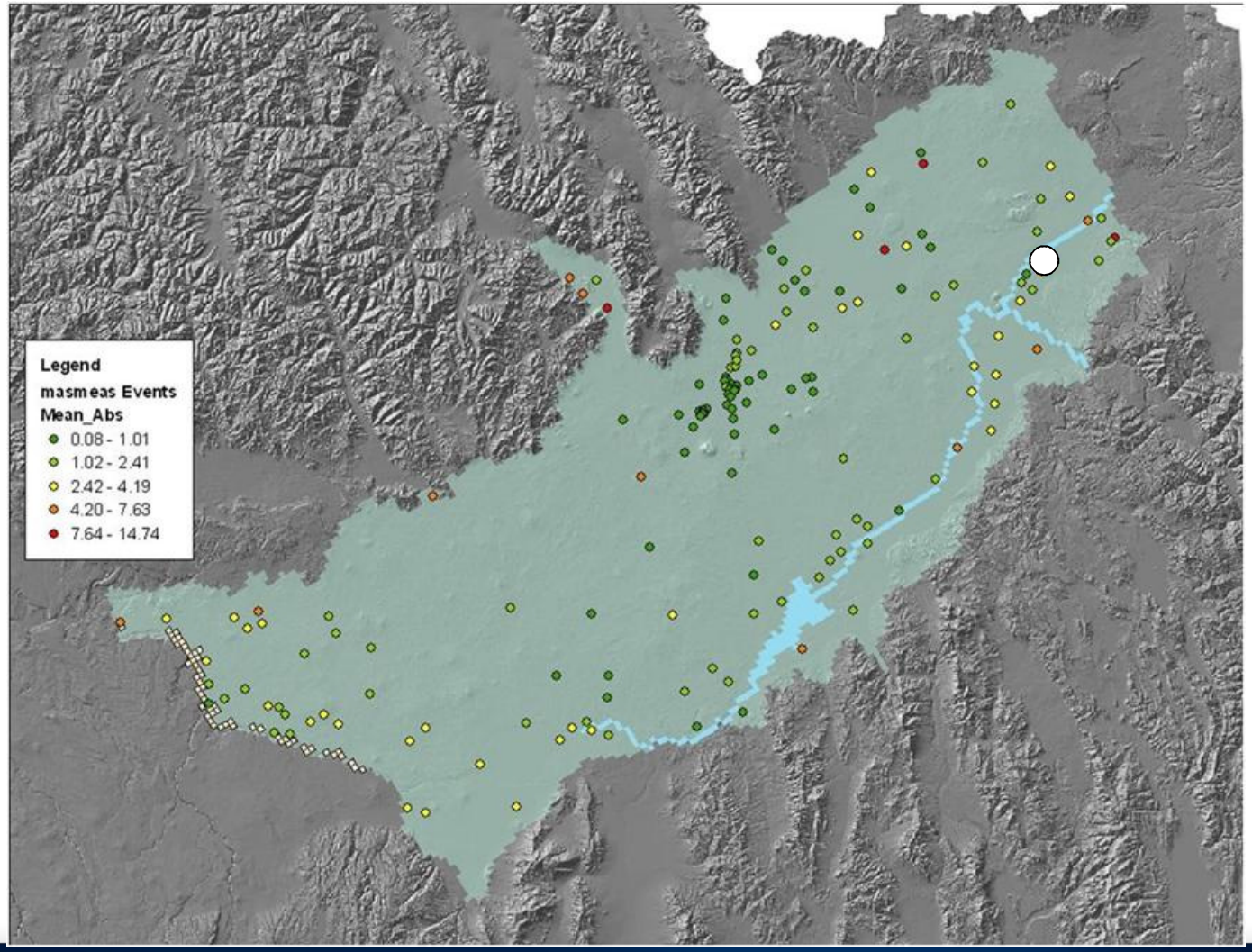

4213
Feet
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled
Legend
seas Events
Mean_Abs
0.35 - 1.08
Feet
8
6
4
2
0
-2
-4
-6
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled

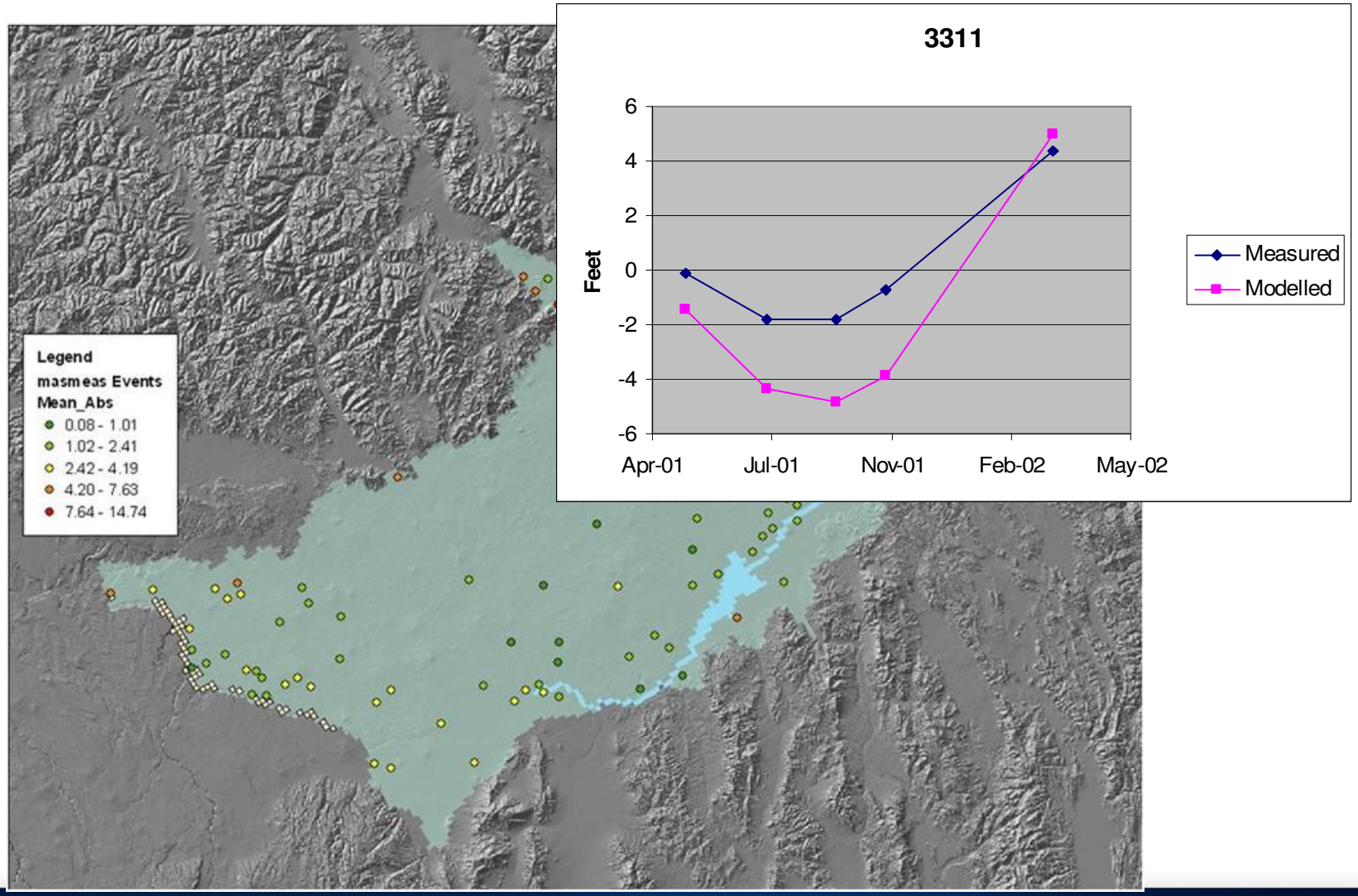


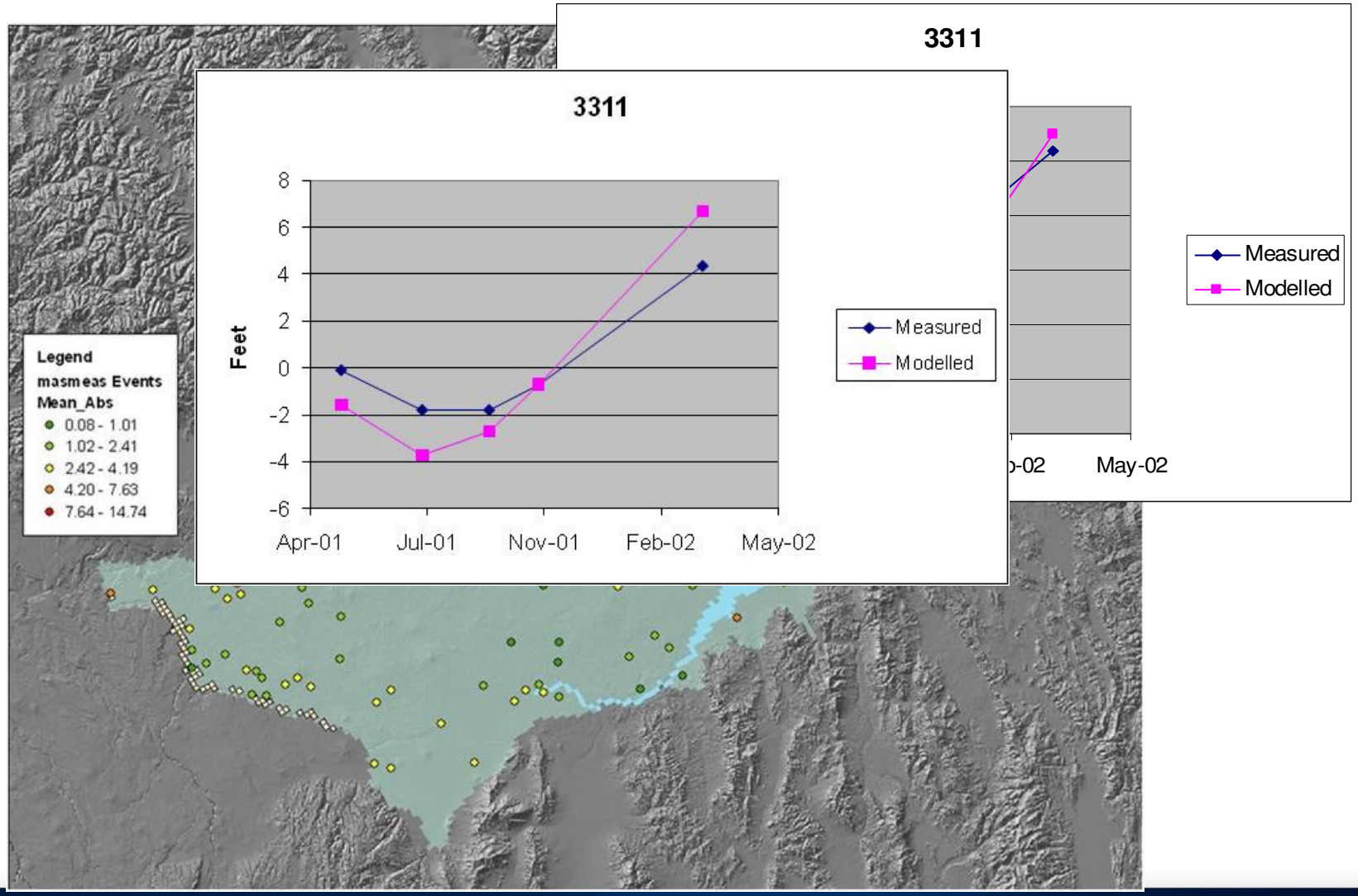
– Observations collected on behalf of this modeling effort
  - 3/1/2001 –5/8/2002

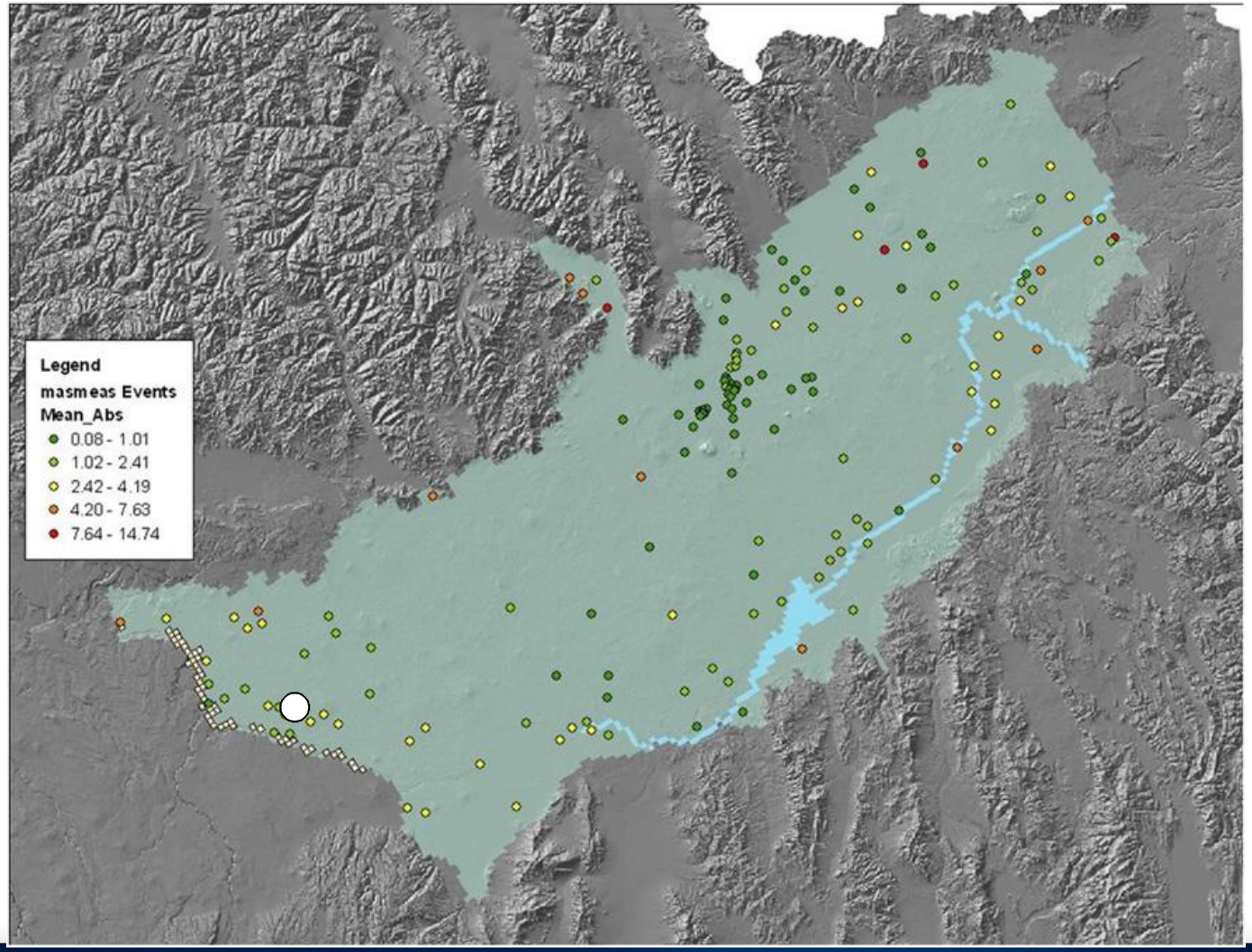


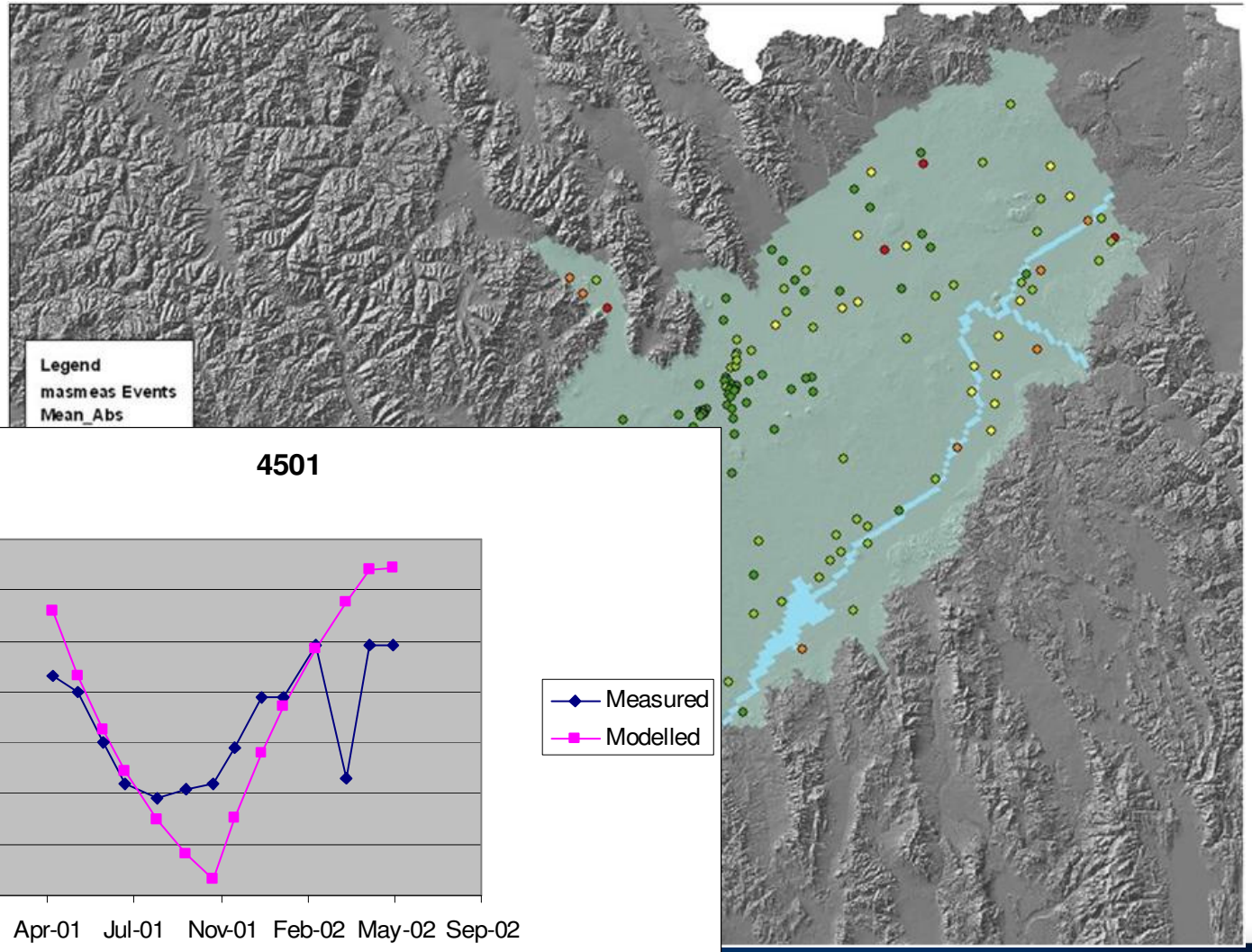
collected
his
rt
8/2002

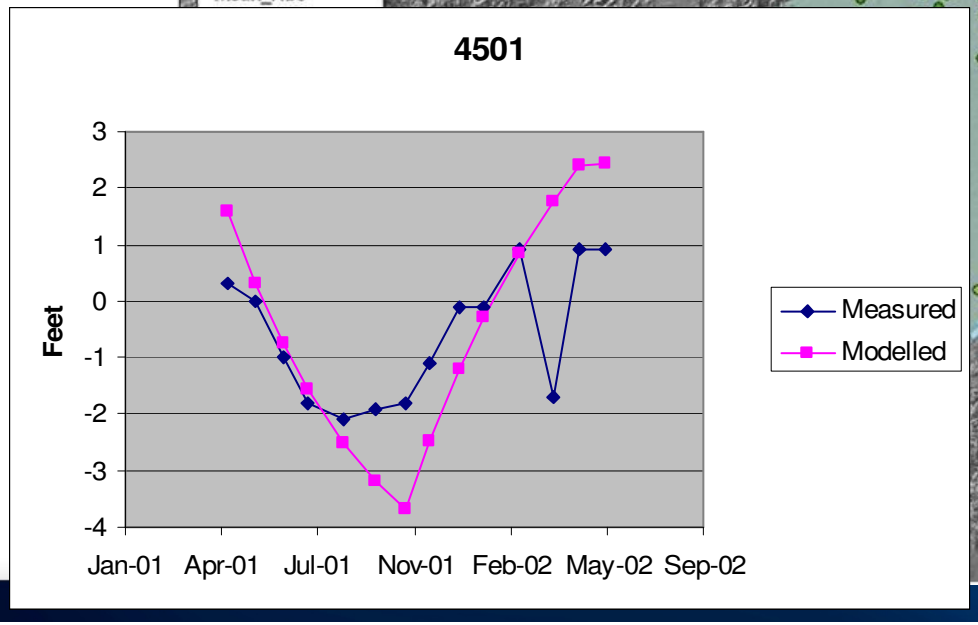

Legend
masmeas Events
Mean_Abs
0.08 - 1.01
1.02 - 2.41
2.42 - 4.19
4.20 - 7.63
7.64 - 14.74

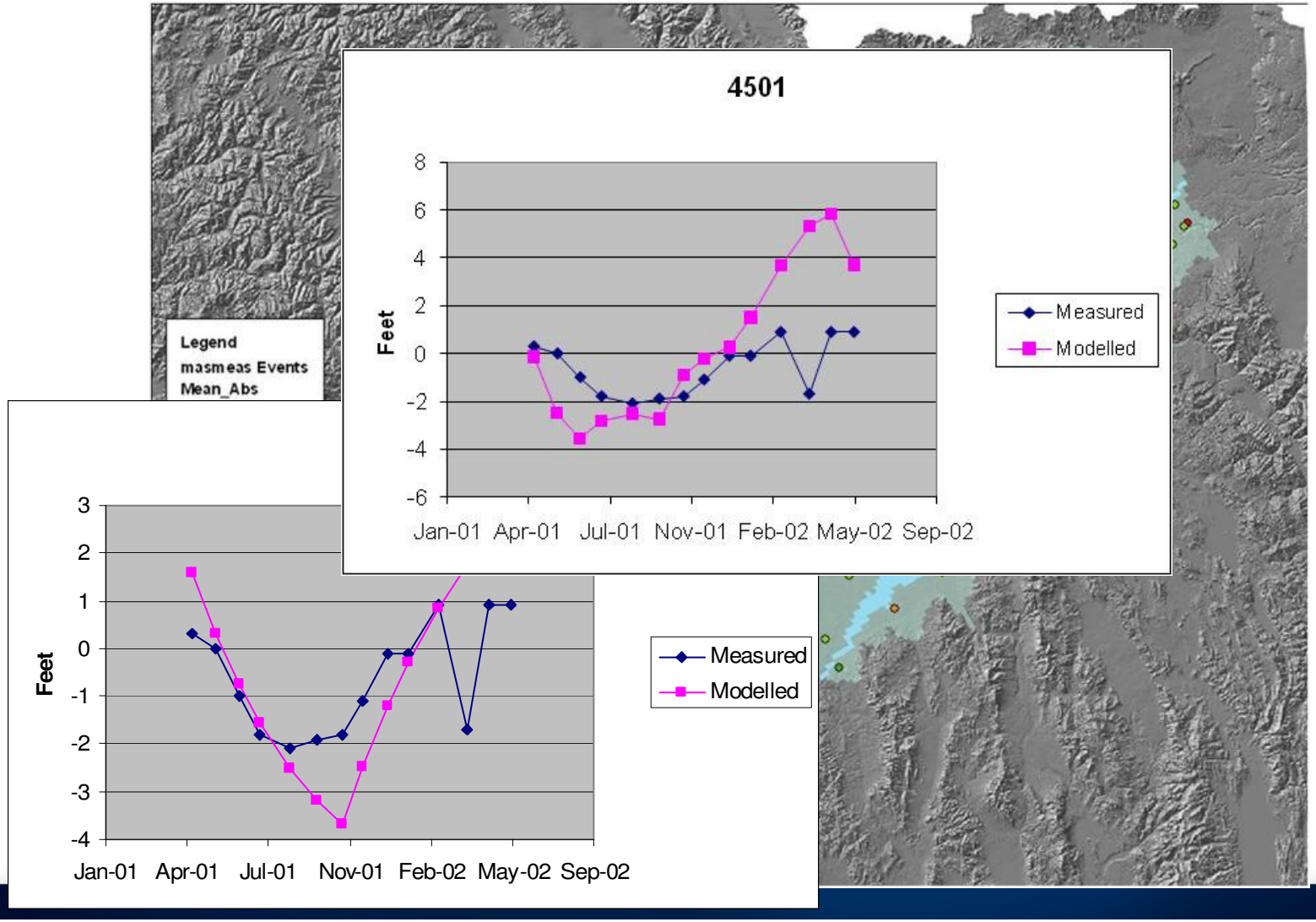

Legend
masmeas Events
Mean_Abs
0.08 - 1.01
1.02 - 2.41
2.42 - 4.19
4.20 - 7.63
7.64 - 14.74
3311
Feet
6
4
2
0
-2
-4
-6
Apr-01
Jul-01
Nov-01
Feb-02
May-02
Measured
Modelled

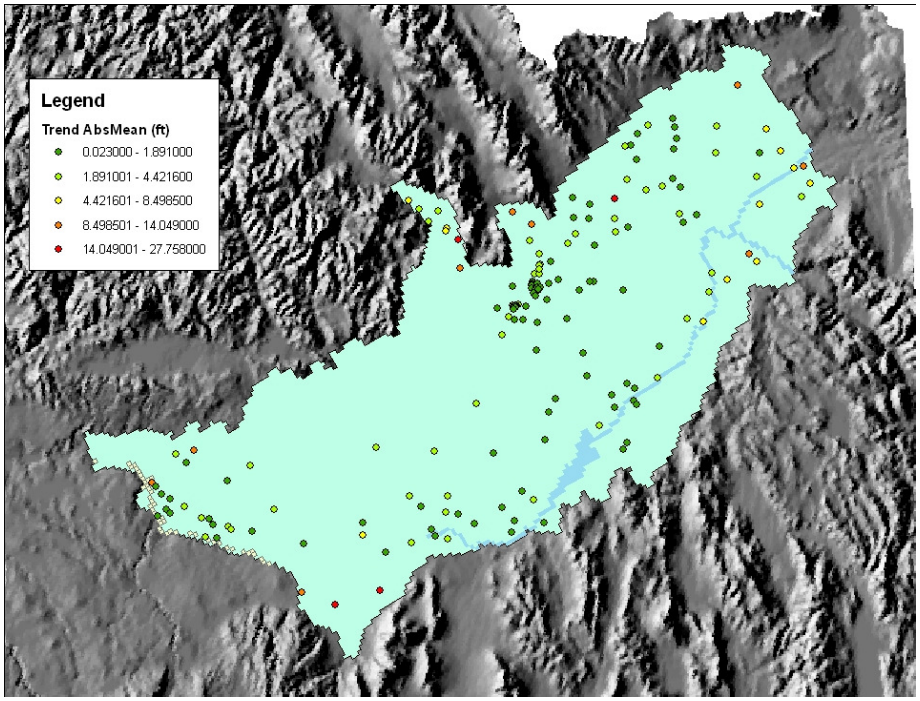

3311
Feet
8
6
4
2
0
-2
-4
-6
Apr-01
Jul-01
Nov-01
Feb-02
May-02
Measured
Modelled
3311
Measured
Modelled
May-02
Legend
masmeas Events
Mean_Abs
0.08 - 1.01
1.02 - 2.41
2.42 - 4.19
4.20 - 7.63
7.64 - 14.74


Legend
masmeas Events
Mean_Abs
0.08 - 1.01
1.02 - 2.41
2.42 - 4.19
4.20 - 7.63
7.64 - 14.74

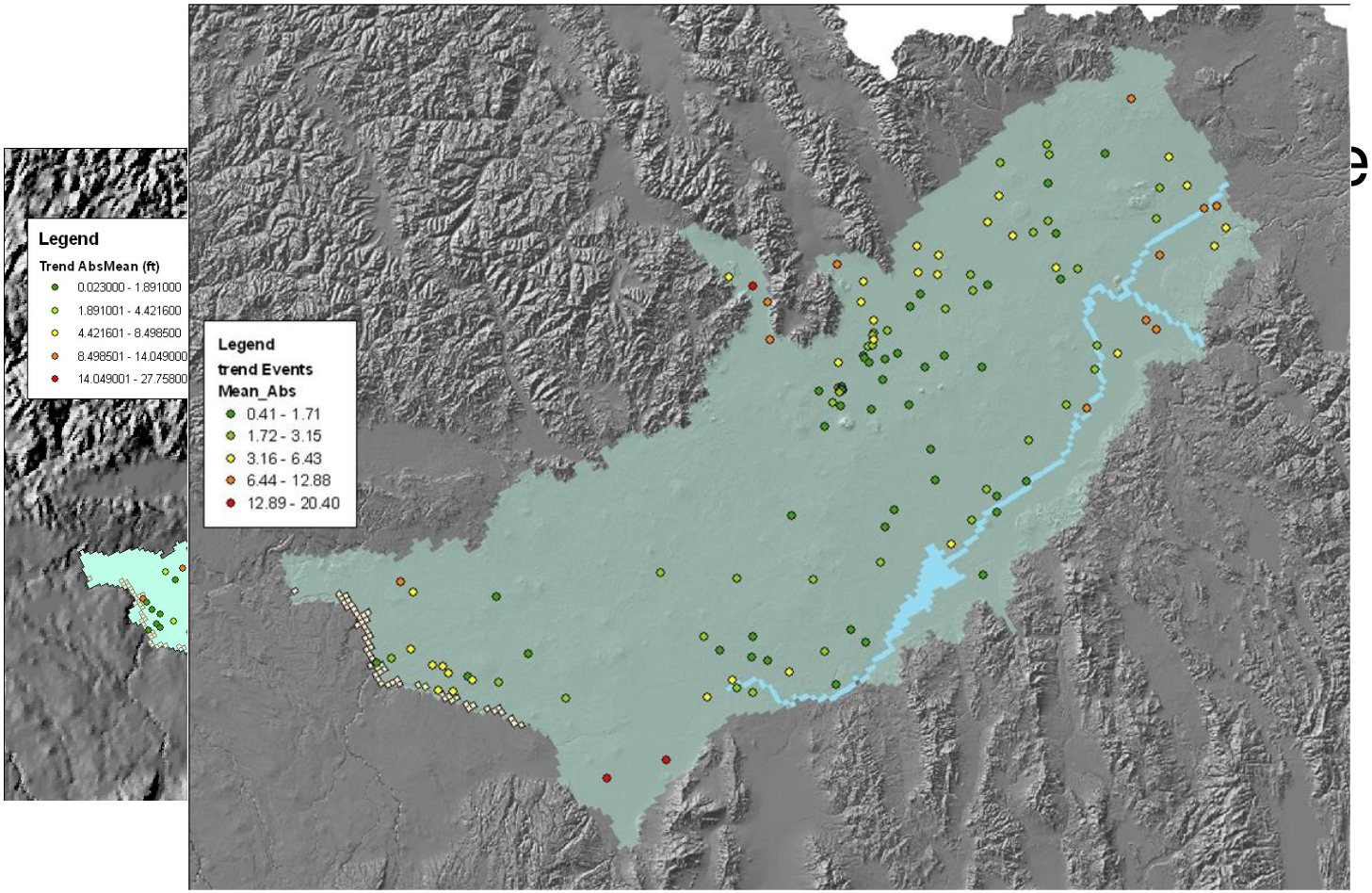

Legend
masmeas Events
Mean_Abs


4501
Feet
3
2
1
0
-1
-2
-3
-4
Jan-01
Apr-01
Jul-01
Nov-01
Feb-02
May-02
Sep-02
Measured
Modelled

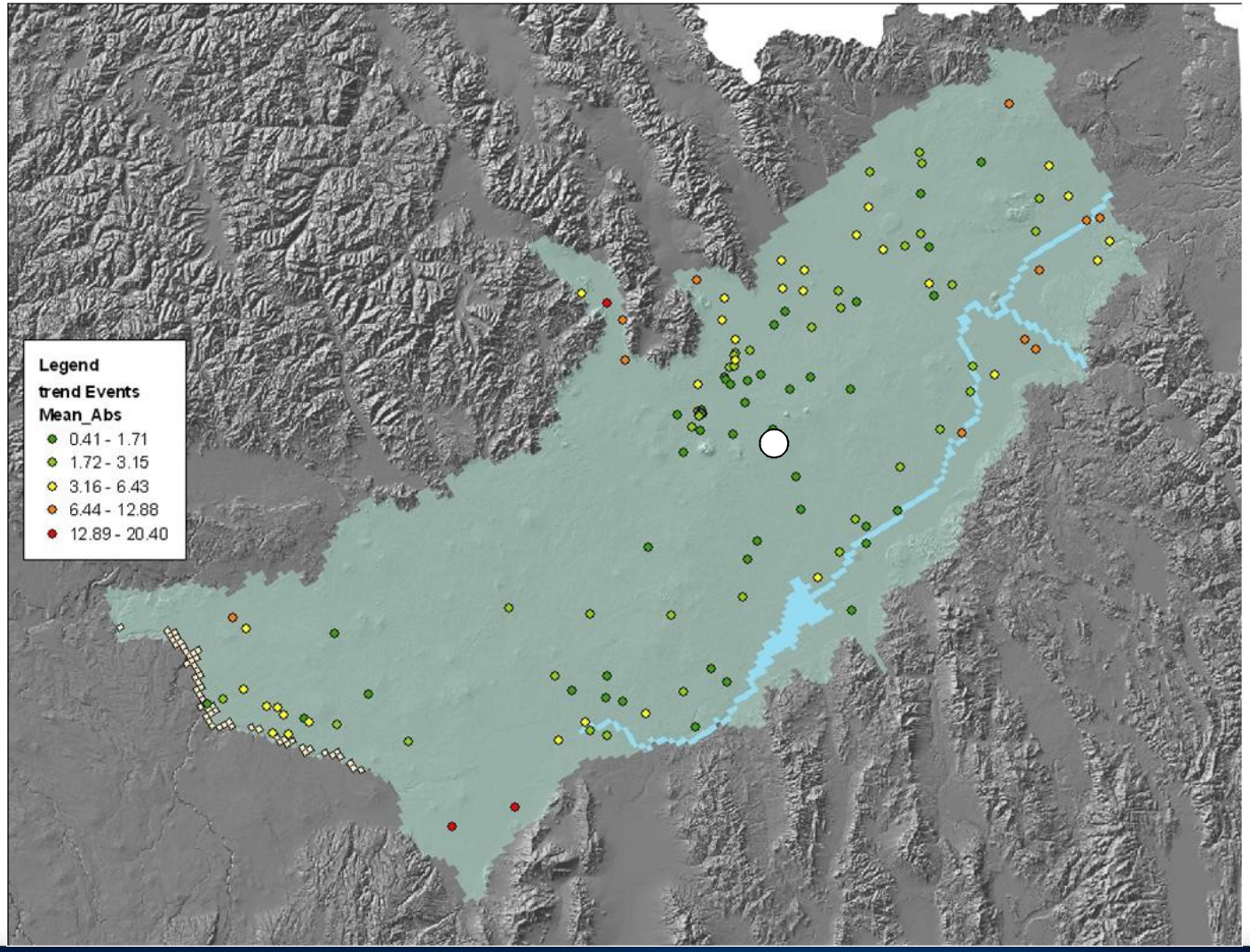

Legend
masmeas Events
Mean_Abs
4501
Feet
8
6
4
2
0
-2
-4
-6
Jan-01
Apr-01
Jul-01
Nov-01
Feb-02
May-02
Sep-02
Measured
Modelled
Feet
3
2
1
0
-1
-2
-3
-4
Jan-01
Apr-01
Jul-01
Nov-01
Feb-02
May-02
Sep-02
Measured
Modelled

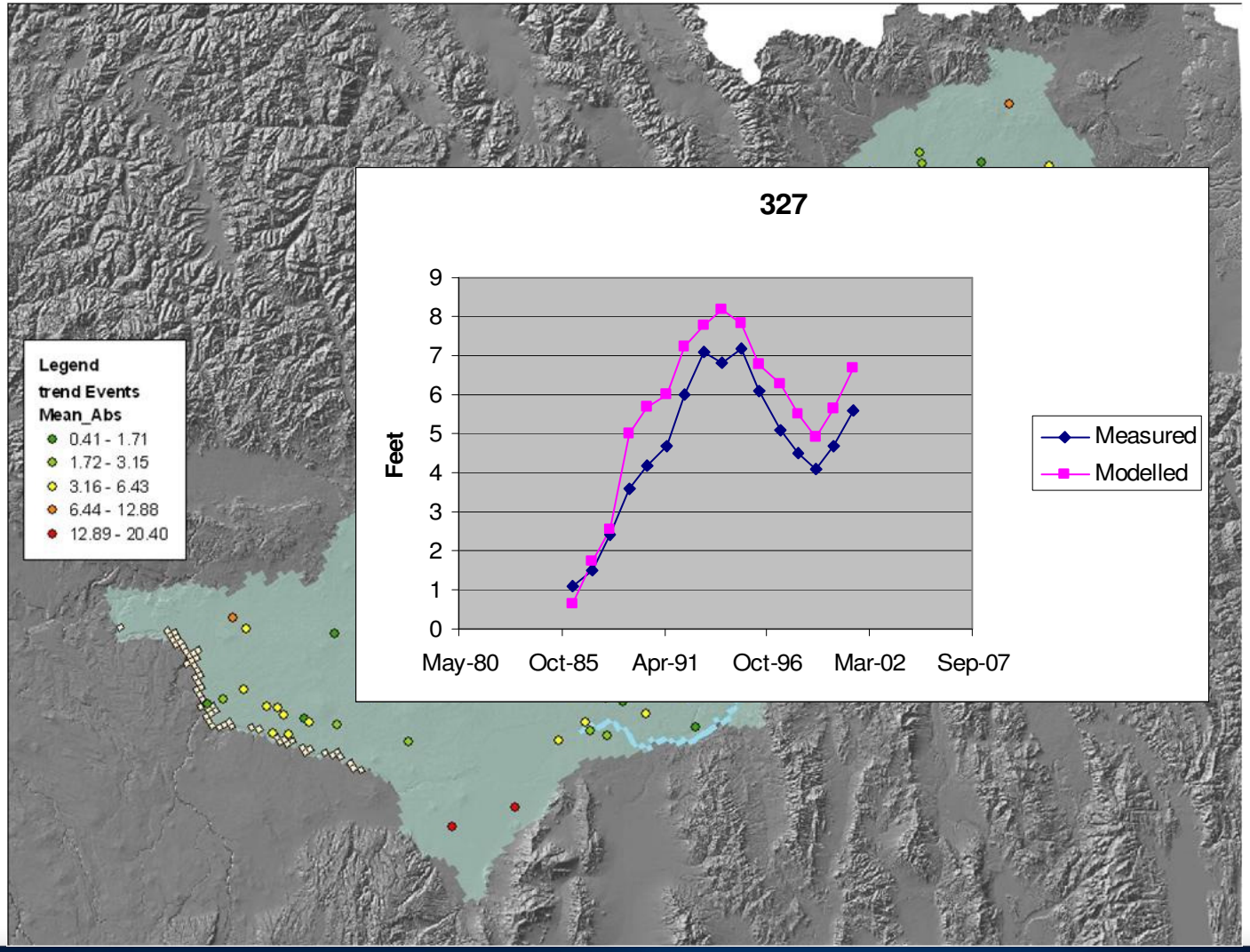


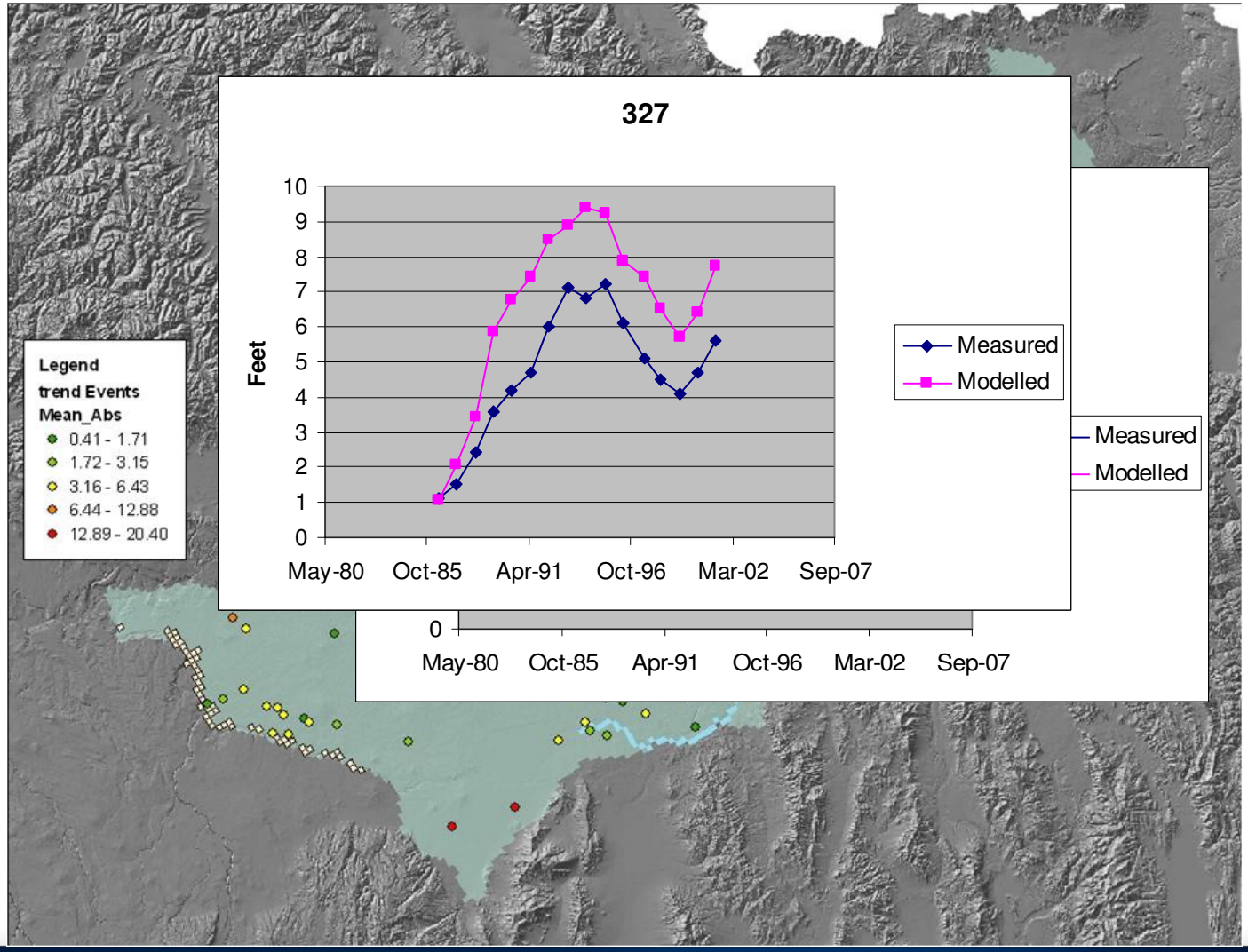
- Annual observations in wells

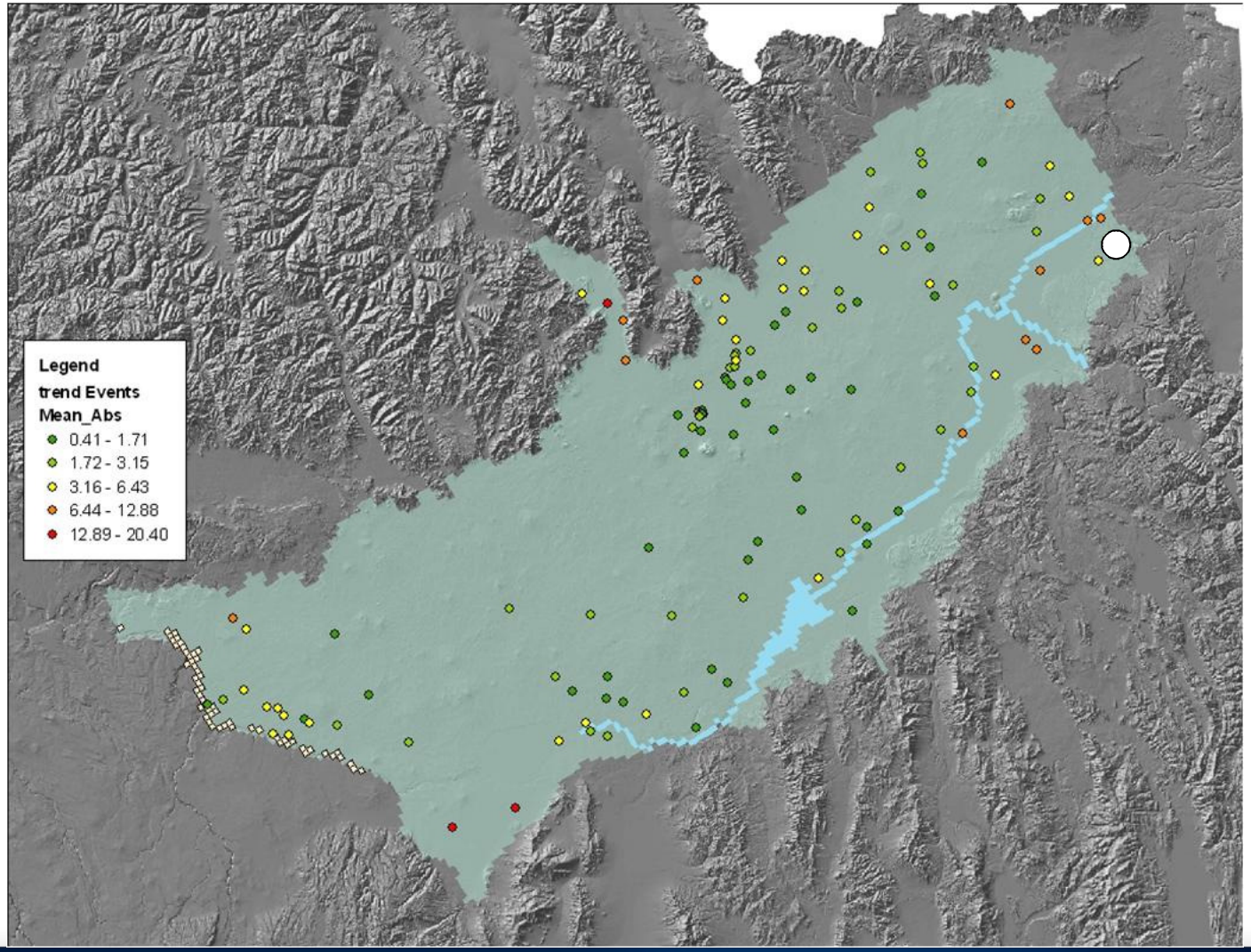

Legend
Trend AbsMean (ft)
0.023000 - 1.891000
1.891001 - 4.421600
4.421601 - 8.498500
8.498501 - 14.049000
14.049001 - 27.75800
Legend
trend Events
Mean_Abs
0.41 - 1.71
1.72 - 3.15
3.16 - 6.43
6.44 - 12.88
12.89 - 20.40

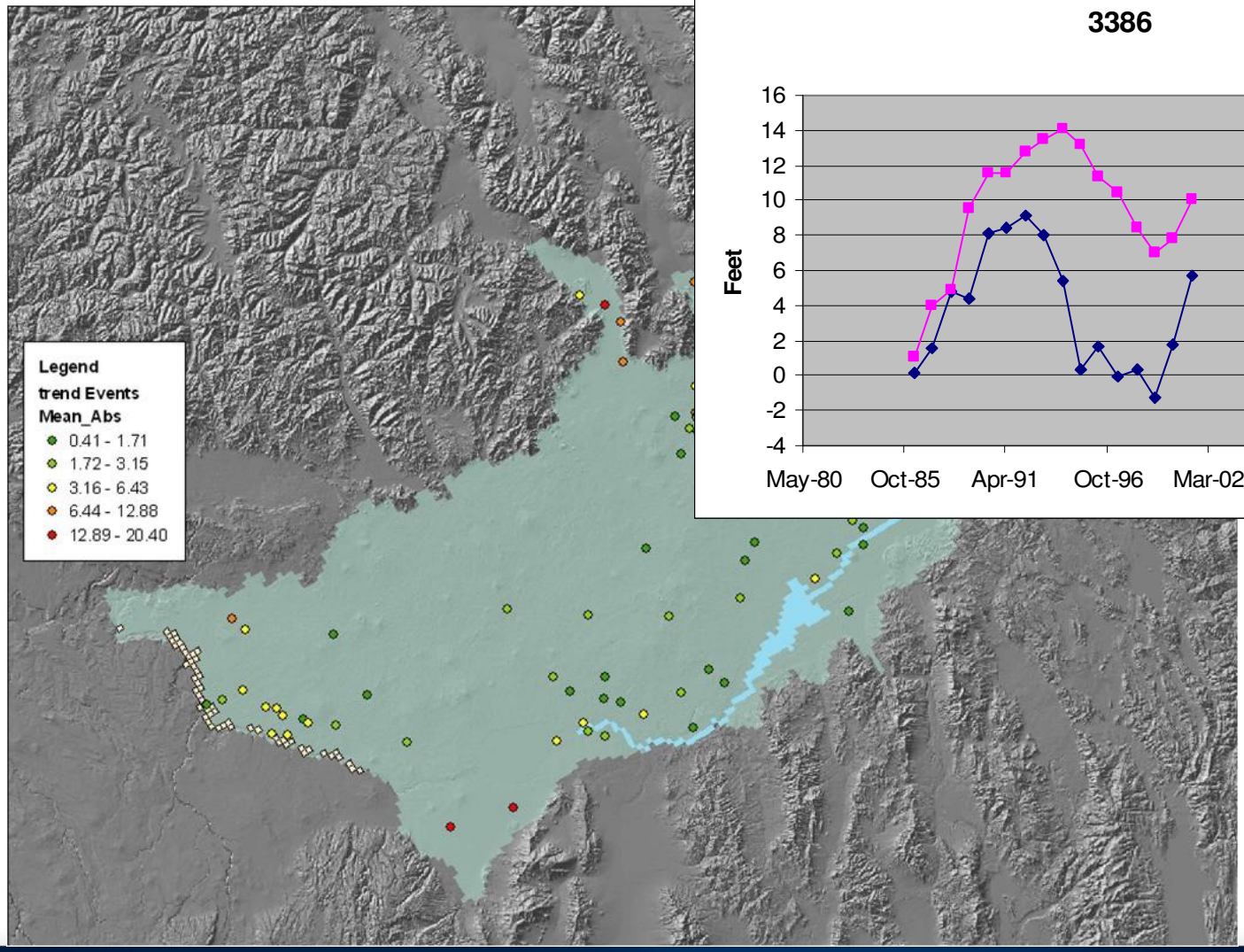
ervations

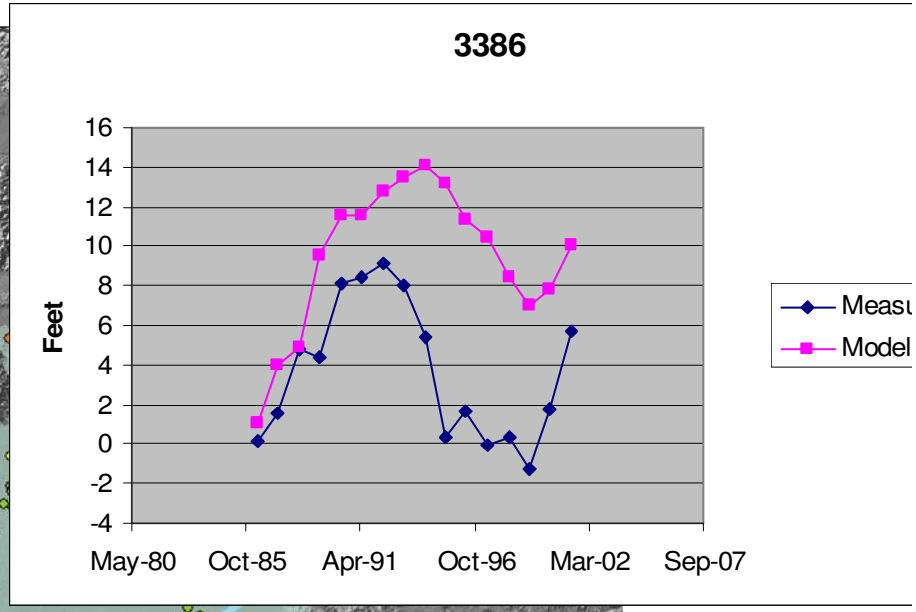

Legend
trend Events
Mean_Abs
0.41 - 1.71
1.72 - 3.15
3.16 - 6.43
6.44 - 12.88
12.89 - 20.40

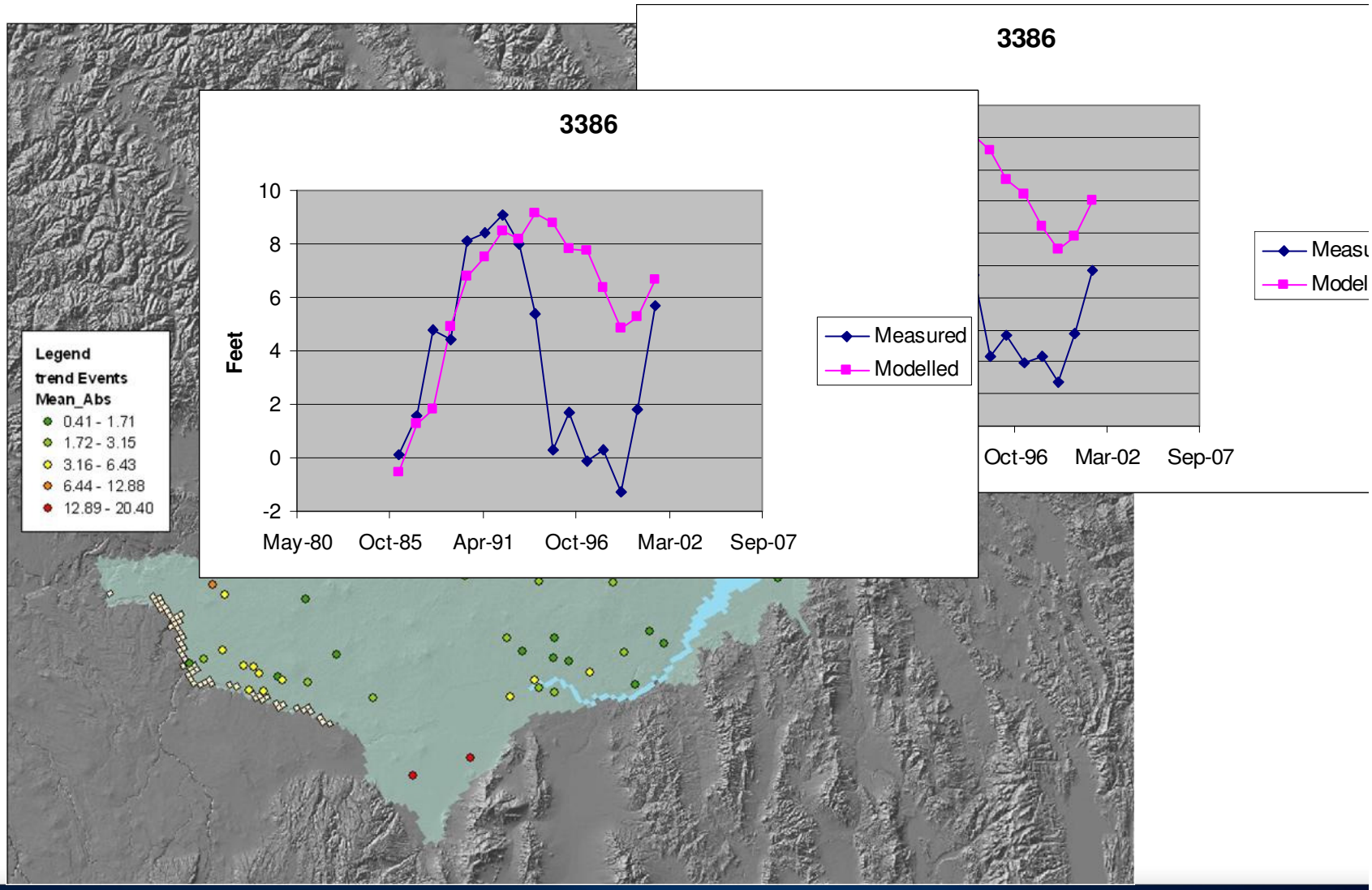

Legend
trend Events
Mean_Abs
0.41 - 1.71
1.72 - 3.15
3.16 - 6.43
6.44 - 12.88
12.89 - 20.40
327
Feet
9
8
7
6
5
4
3
2
1
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled

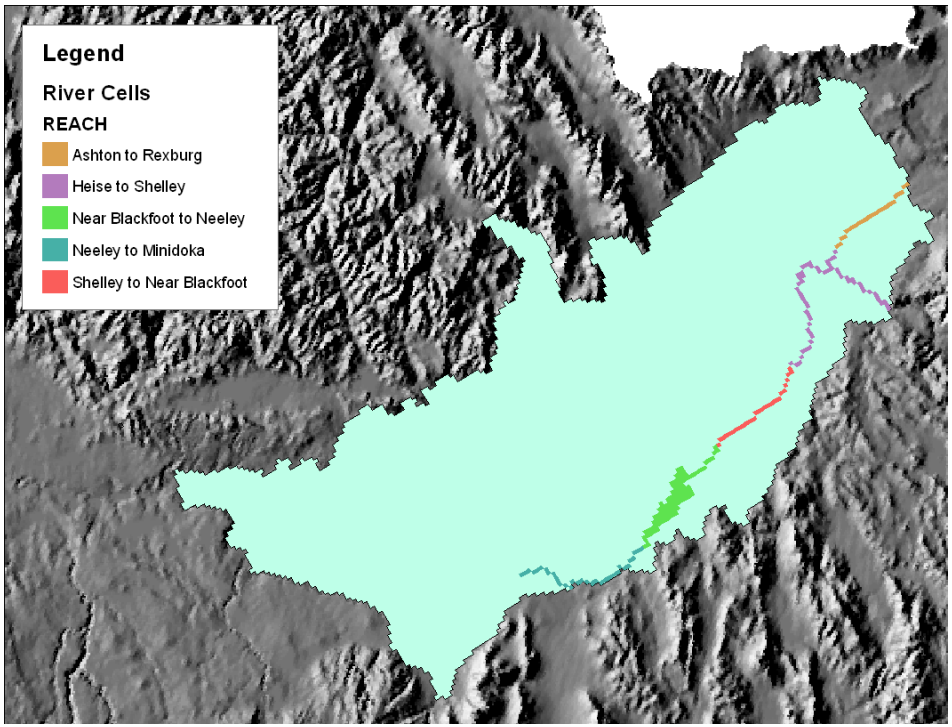

327
Feet
10
9
8
7
6
5
4
3
2
1
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled
Legend
trend Events
Mean_Abs
0.41 - 1.71
1.72 - 3.15
3.16 - 6.43
6.44 - 12.88
12.89 - 20.40
Measured
Modelled
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07


Legend
trend Events
Mean_Abs
0.41 - 1.71
1.72 - 3.15
3.16 - 6.43
6.44 - 12.88
12.89 - 20.40

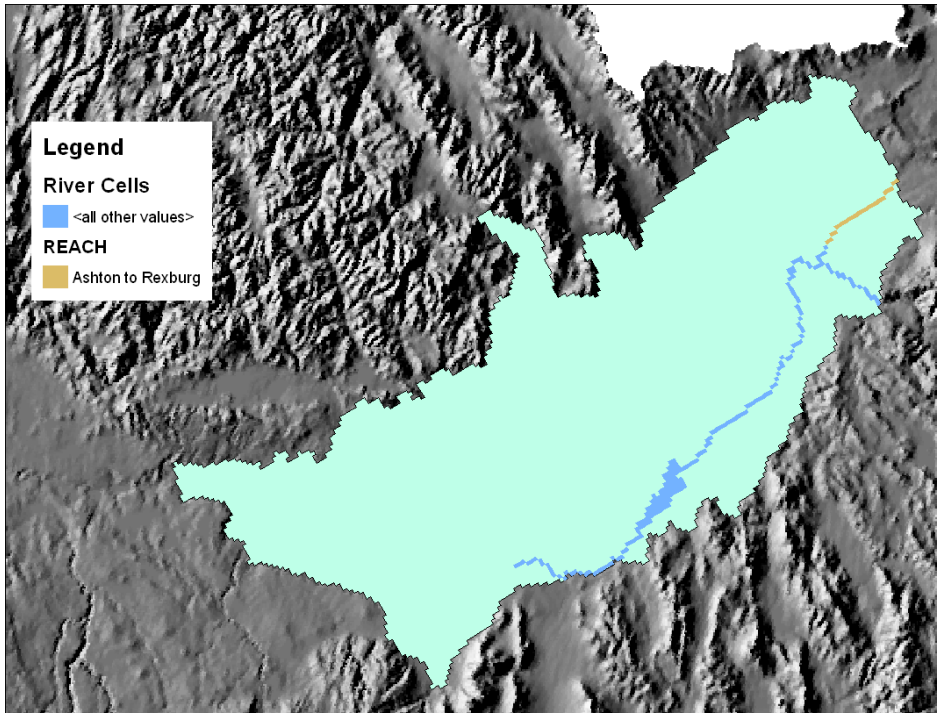

Legend
trend Events
Mean_Abs
0.41 - 1.71
1.72 - 3.15
3.16 - 6.43
6.44 - 12.88
12.89 - 20.40


3386
Feet
16
14
12
10
8
6
4
2
0
-2
-4
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measu
Model

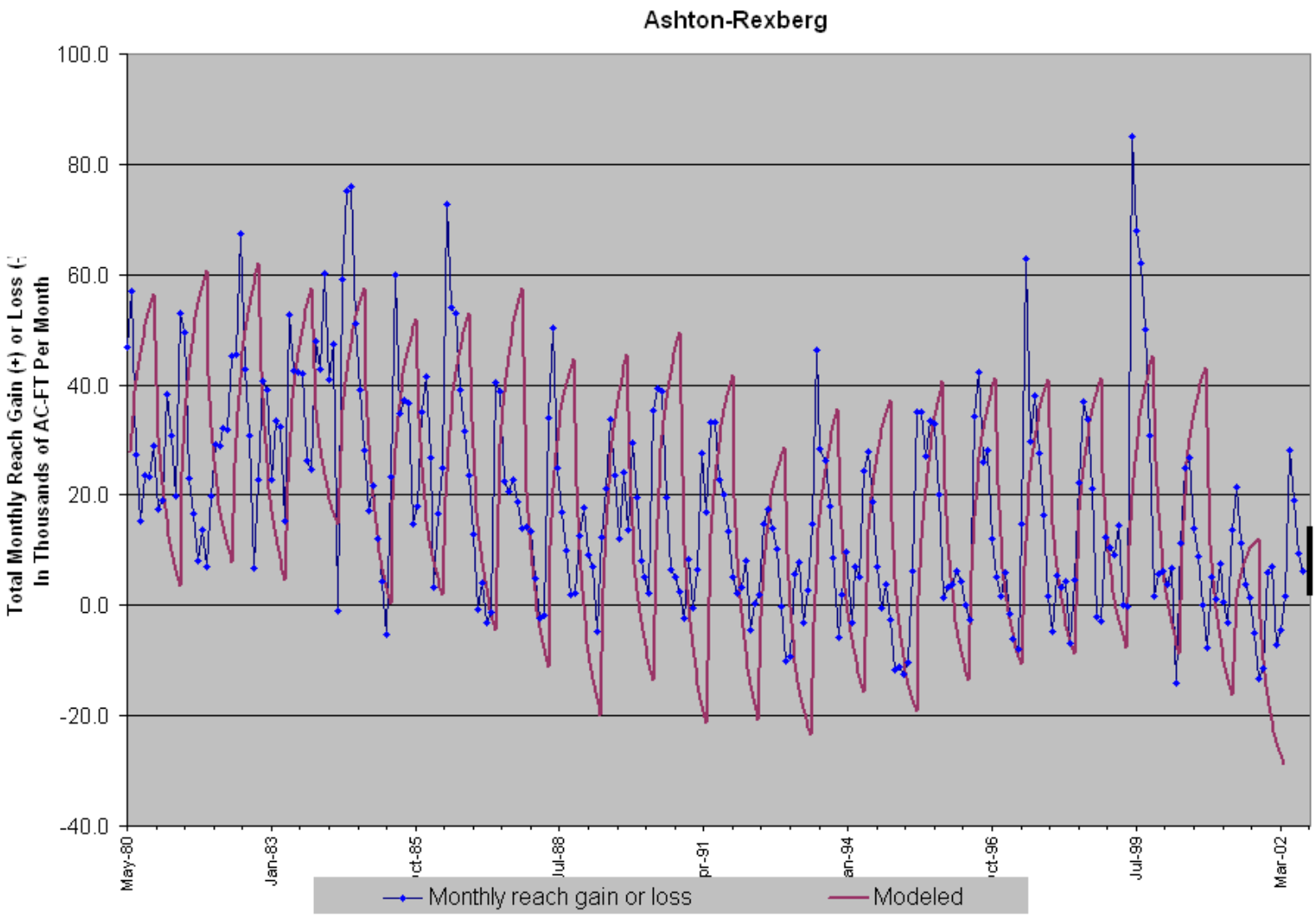

Legend
trend Events
Mean_Abs
0.41 - 1.71
1.72 - 3.15
3.16 - 6.43
6.44 - 12.88
12.89 - 20.40
3386
Feet
10
8
6
4
2
0
-2
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled
3386
Oct-96
Mar-02
Sep-07

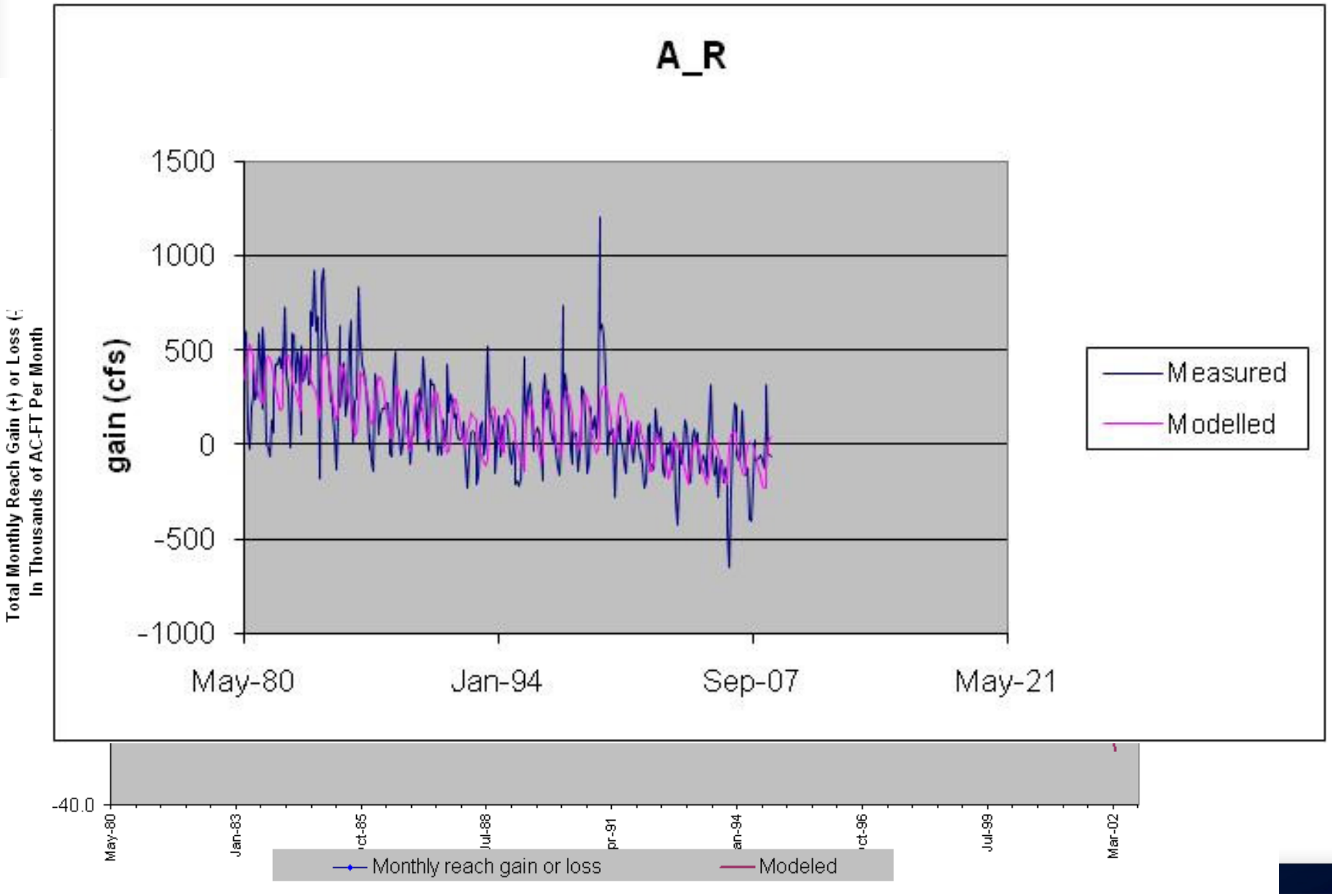


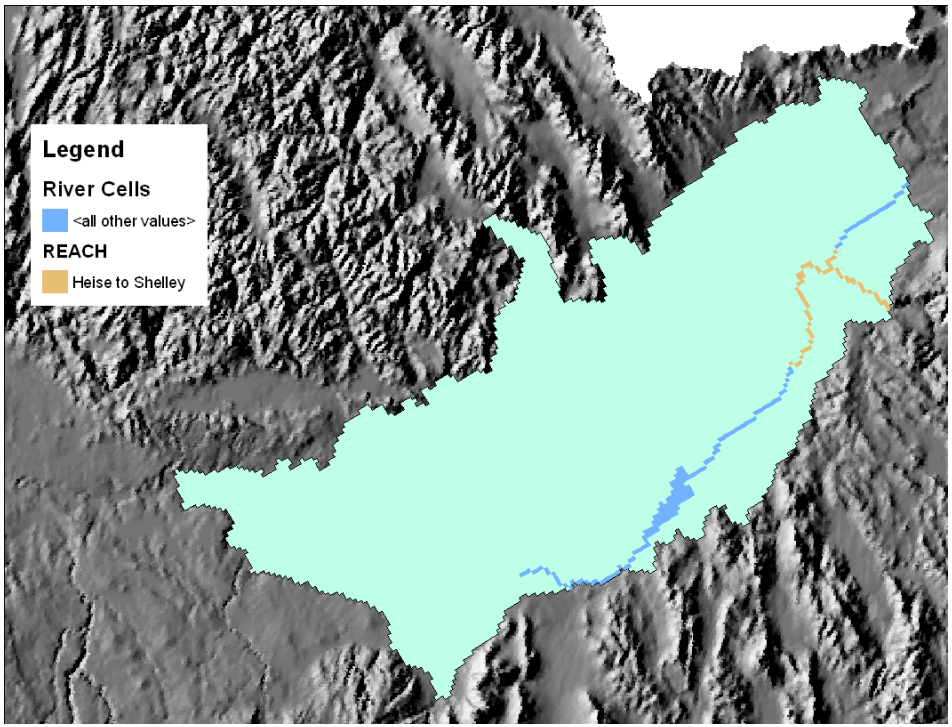
- Snake River reaches



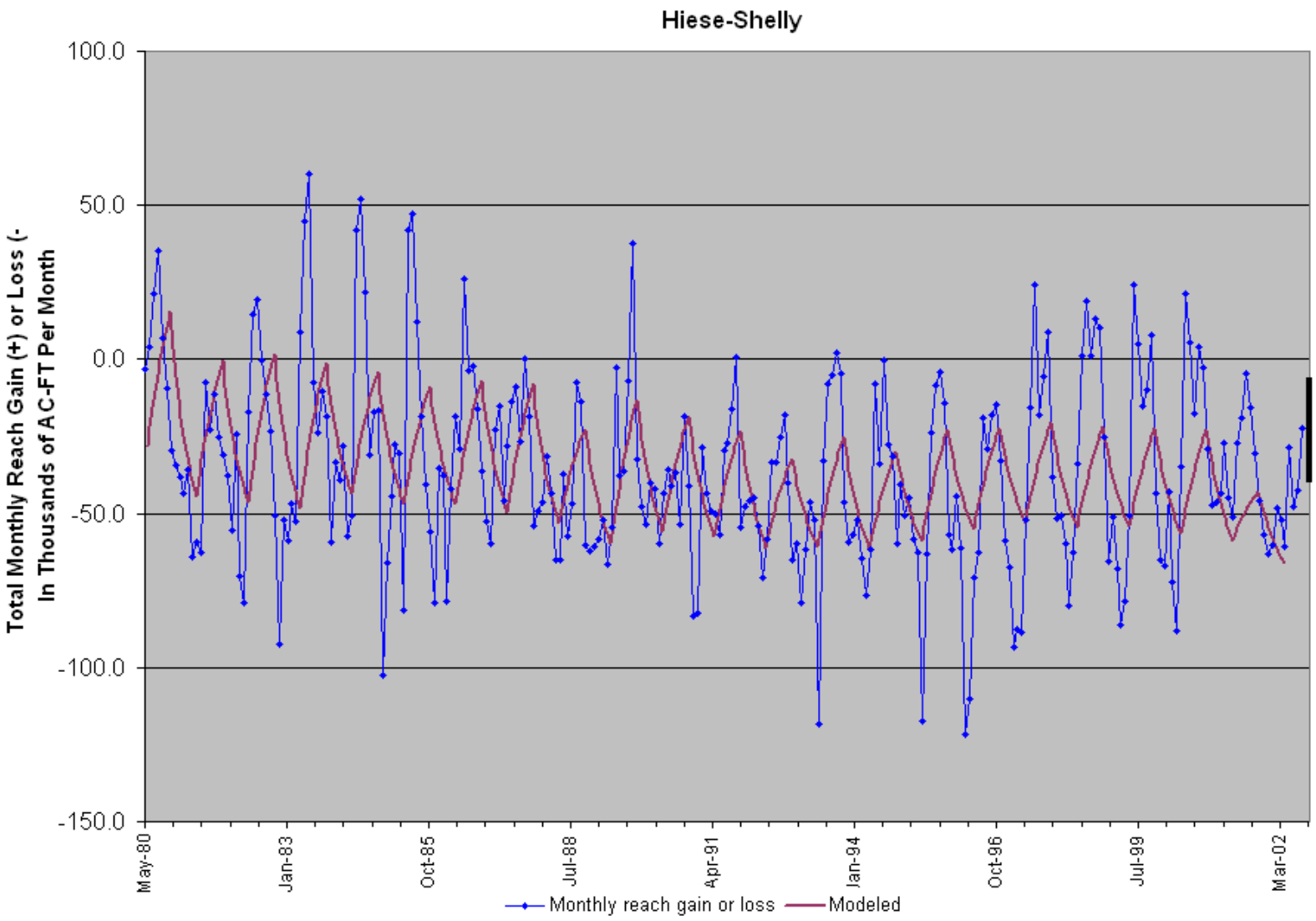
- Ashton to Rexburg

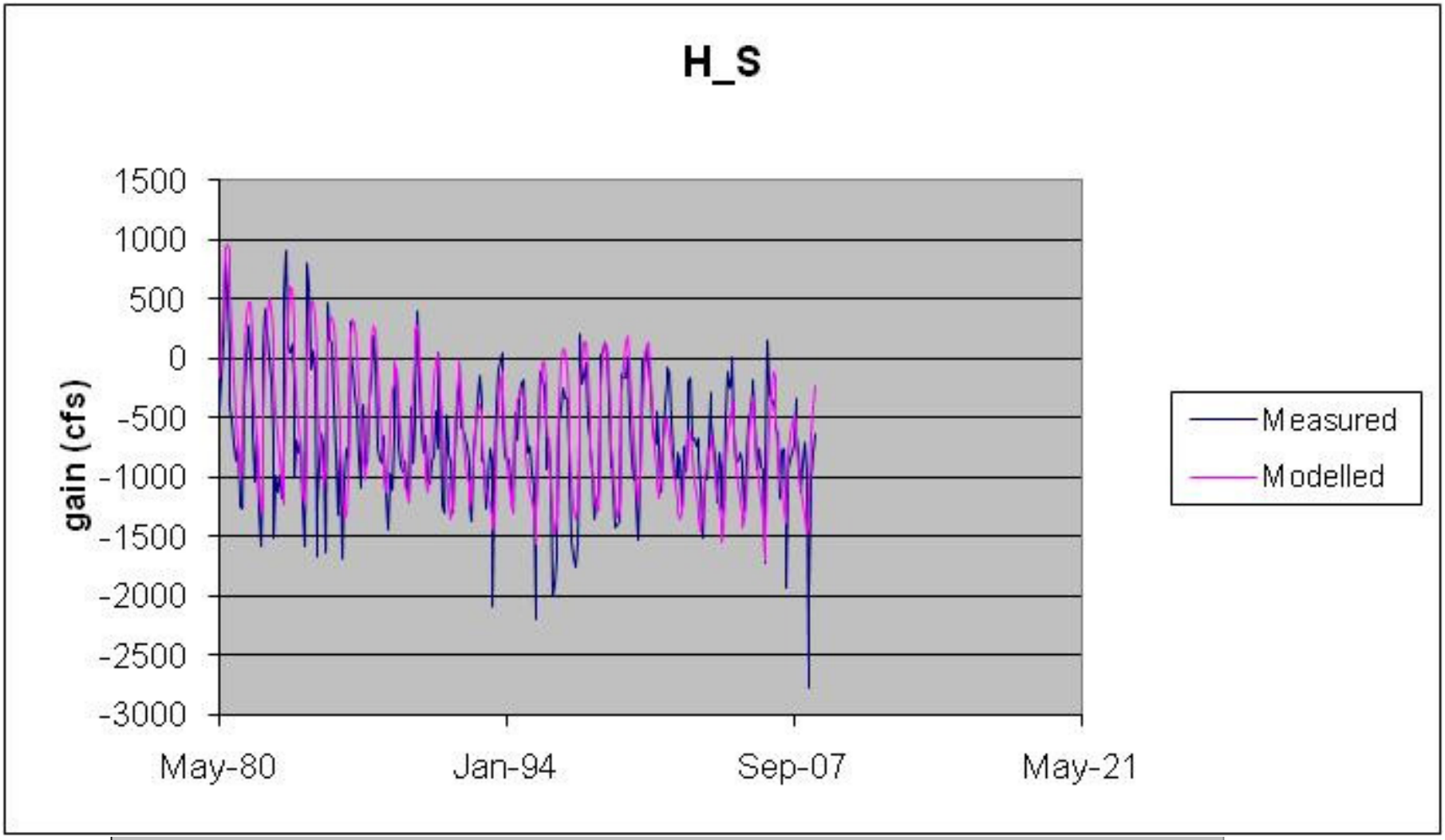

Ashton-Rexberg
Total Monthly Reach Gain (+) or Loss (-)
In Thousands of AC-FT Per Month
100.0
80.0
60.0
40.0
20.0
0.0
-20.0
-40.0
May-80
Jan-83
ct-85
Jul-88
pr-91
an-94
ct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

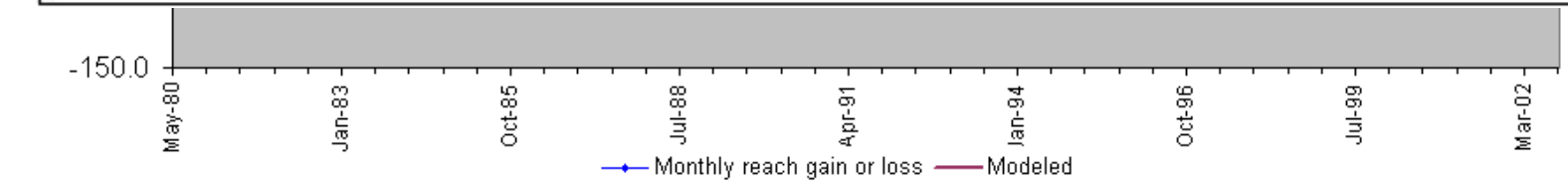

A_R
1500
1000
500
0
-500
-1000
gain (cfs)
May-80
Jan-94
Sep-07
May-21
Measured
Modelled
Total Monthly Reach Gain (+) or Loss (-)
In Thousands of AC-FT Per Month
-40.0
May-80
Jan-83
Jul-88
Jan-94
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

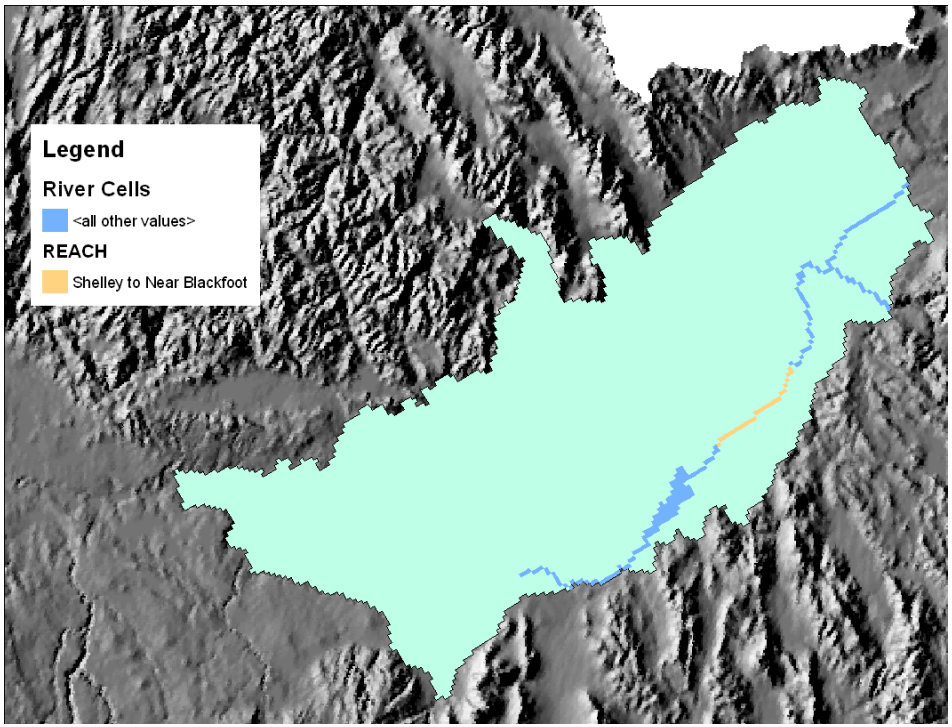


- Heise to Shelly

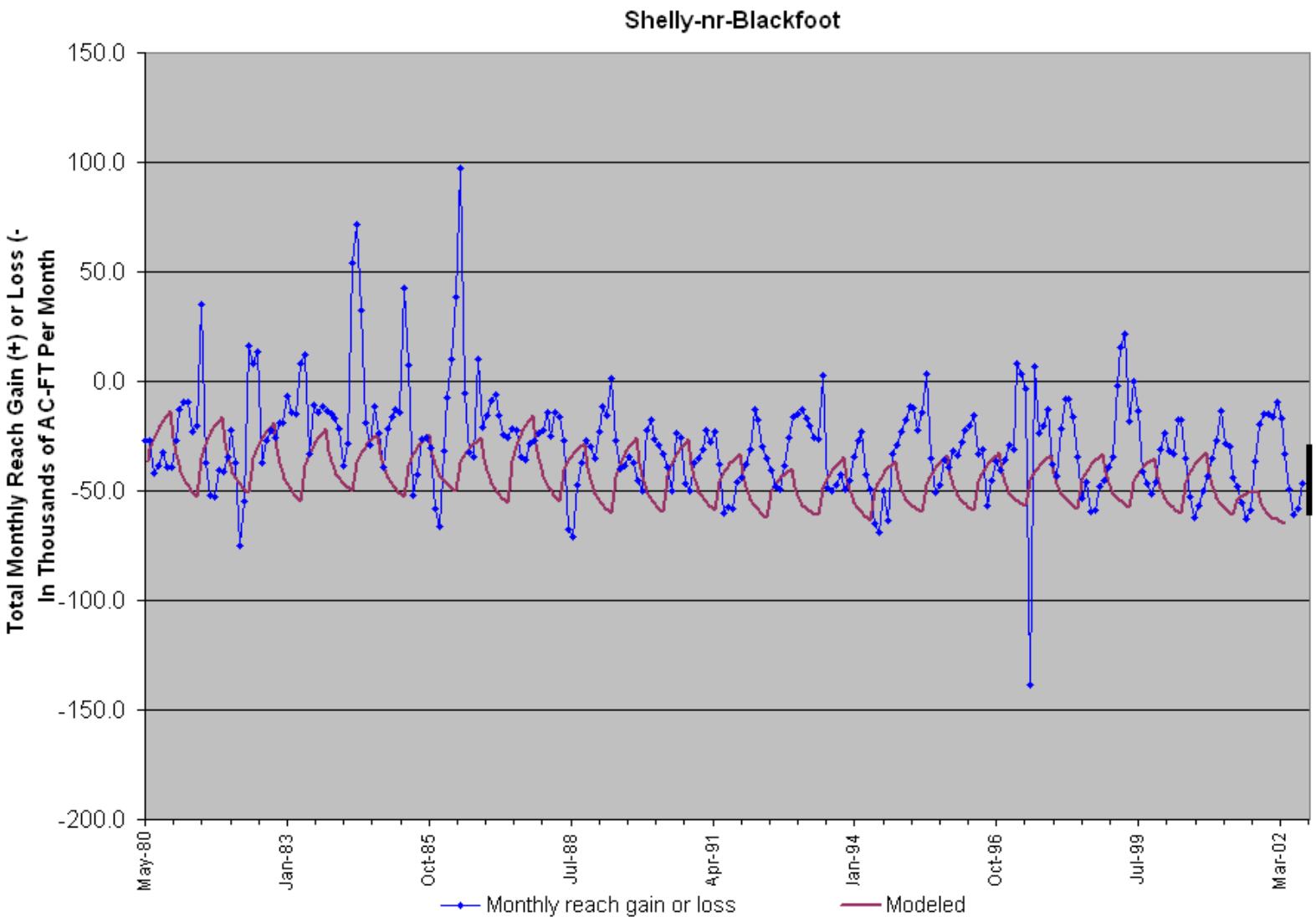

Hiese-Shelly
Total Monthly Reach Gain (+) or Loss (-
In Thousands of AC-FT Per Month
100.0
50.0
0.0
-50.0
-100.0
-150.0
May-80
Jan-83
Oct-85
Jul-88
Apr-91
Jan-94
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

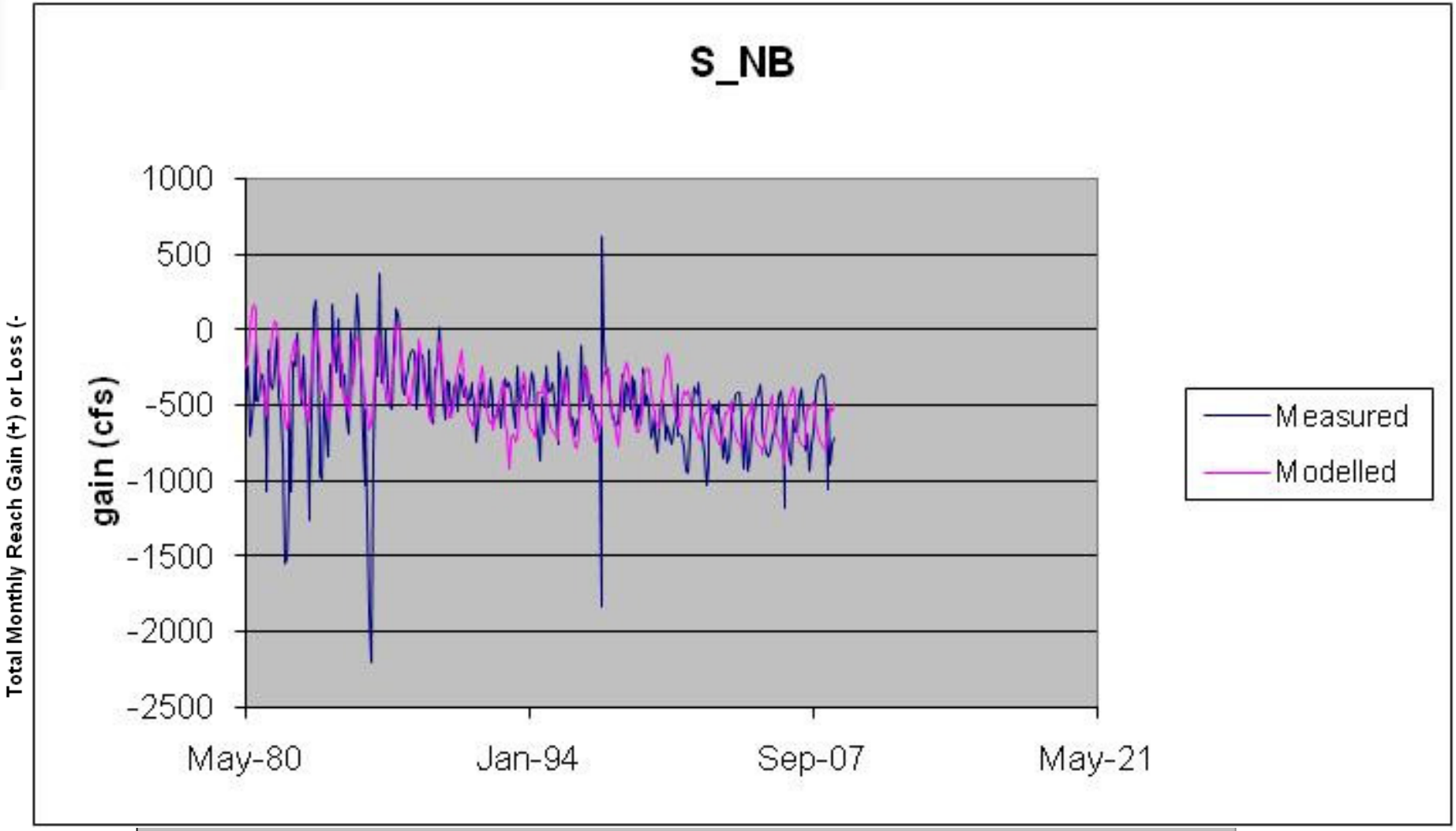

H_S
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
gain (cfs)
May-80
Jan-94
Sep-07
May-21
Measured
Modelled

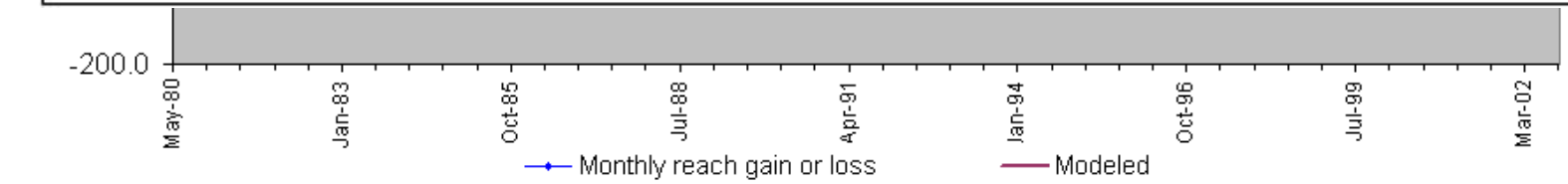

Total Monthly Reach Gain (+) or Loss (-
-150.0
May-80
Jan-83
Oct-85
Jul-88
Apr-91
Jan-94
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

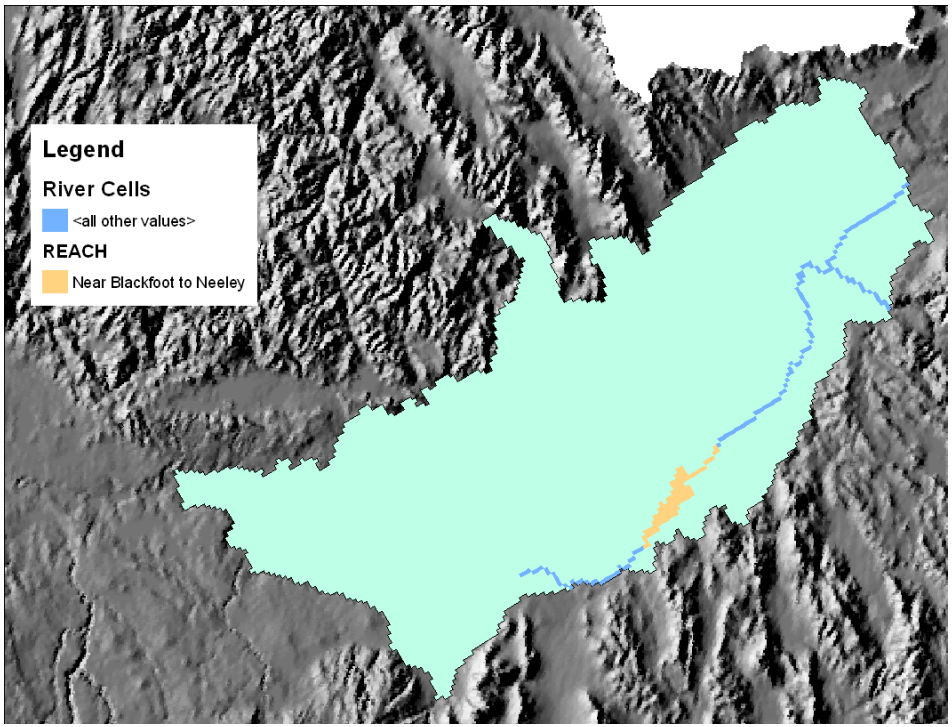


- Shelly - Blackfoot

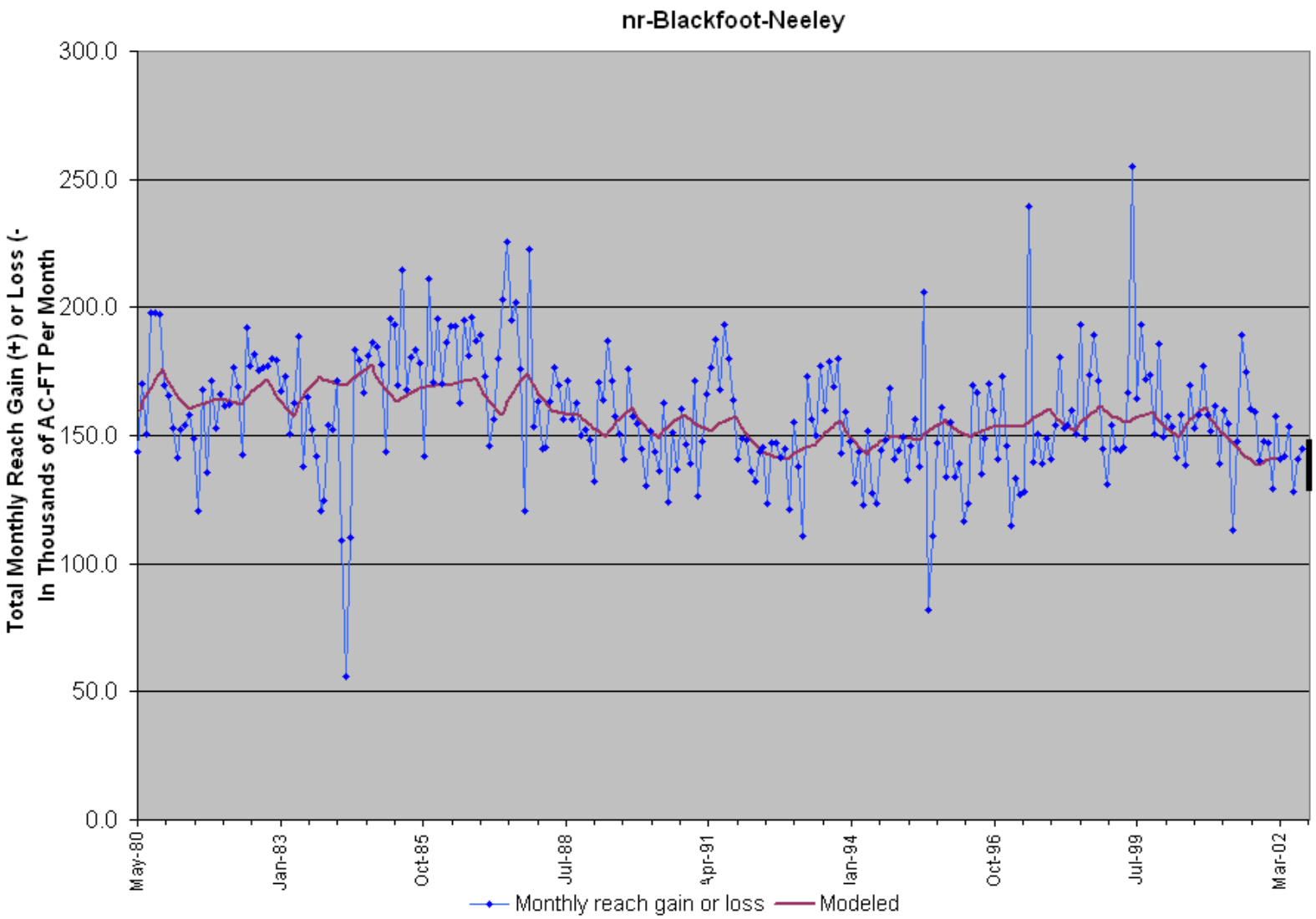

Shelly-nr-Blackfoot
Total Monthly Reach Gain (+) or Loss (-
In Thousands of AC-FT Per Month
150.0
100.0
50.0
0.0
-50.0
-100.0
-150.0
-200.0
May-80
Jan-83
Oct-85
Jul-88
Apr-91
Jan-94
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

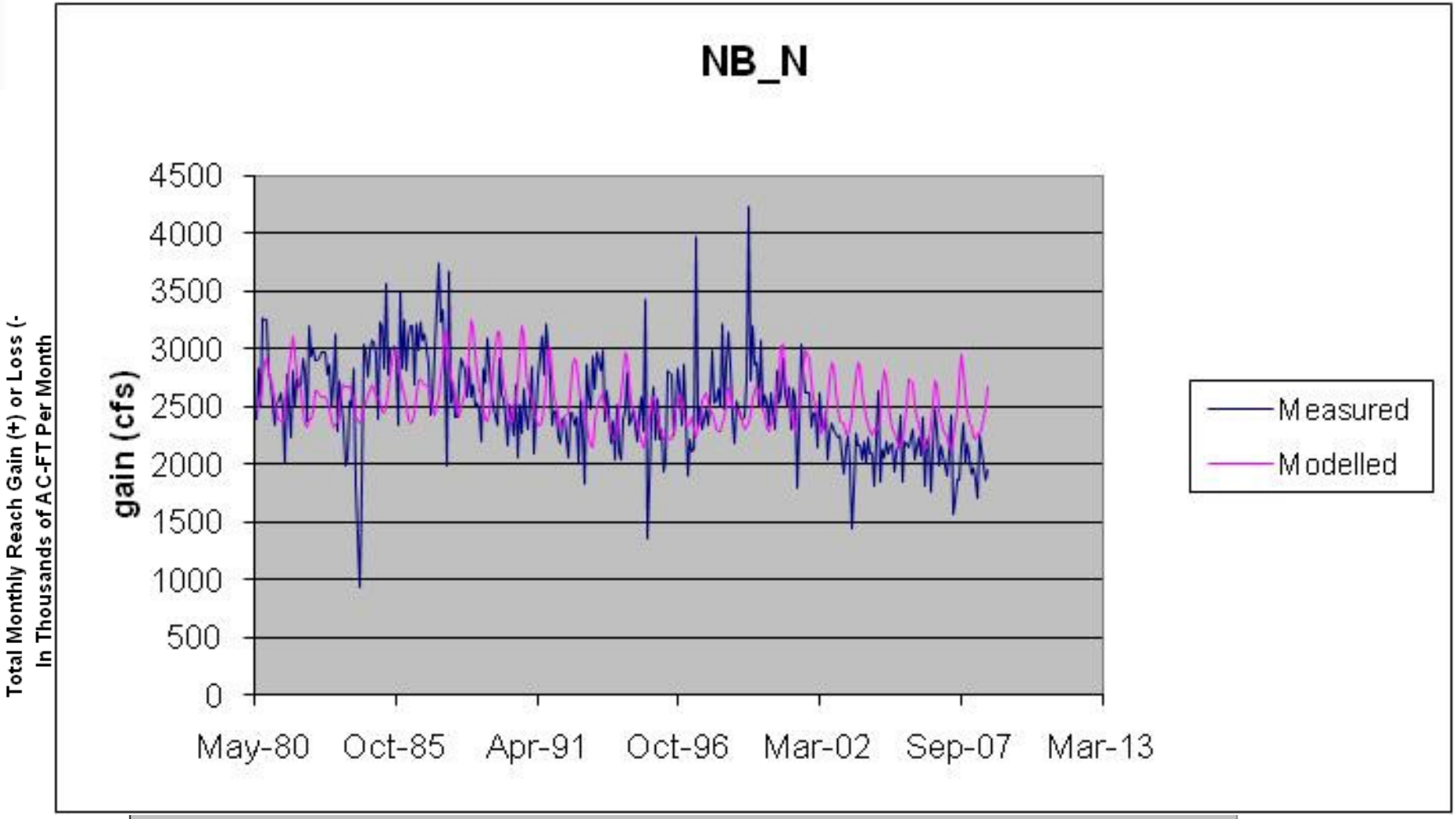

S_NB
1000
500
0
-500
-1000
-1500
-2000
-2500
gain (cfs)
May-80
Jan-94
Sep-07
May-21
Measured
Modelled

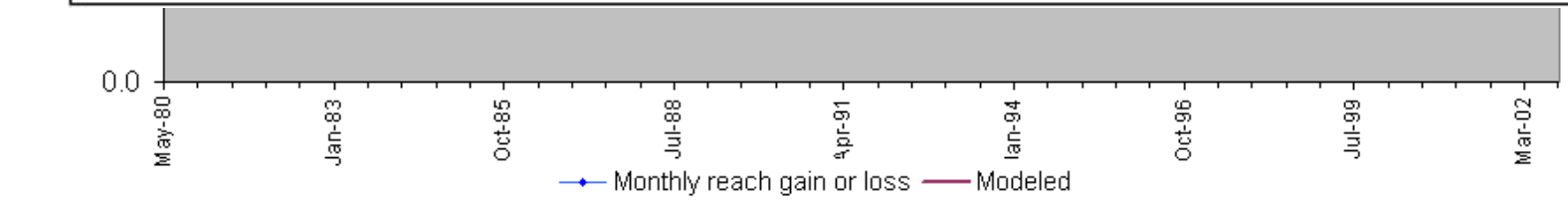

Total Monthly Reach Gain (+) or Loss (-
-200.0
May-80
Jan-83
Oct-85
Jul-88
Apr-91
Jan-94
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

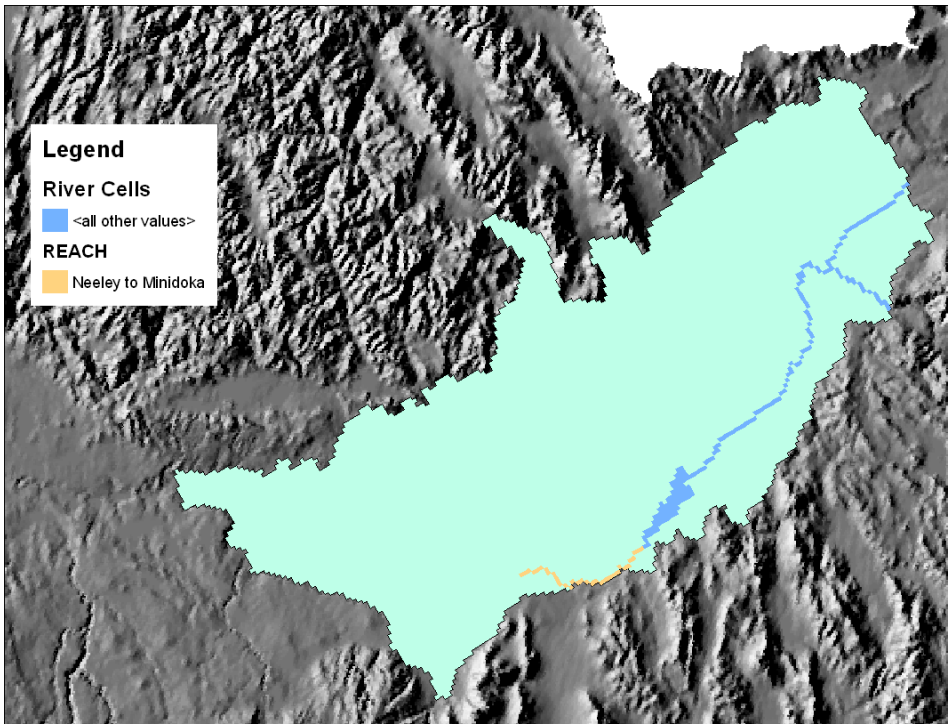


- Blackfoot – Neeley

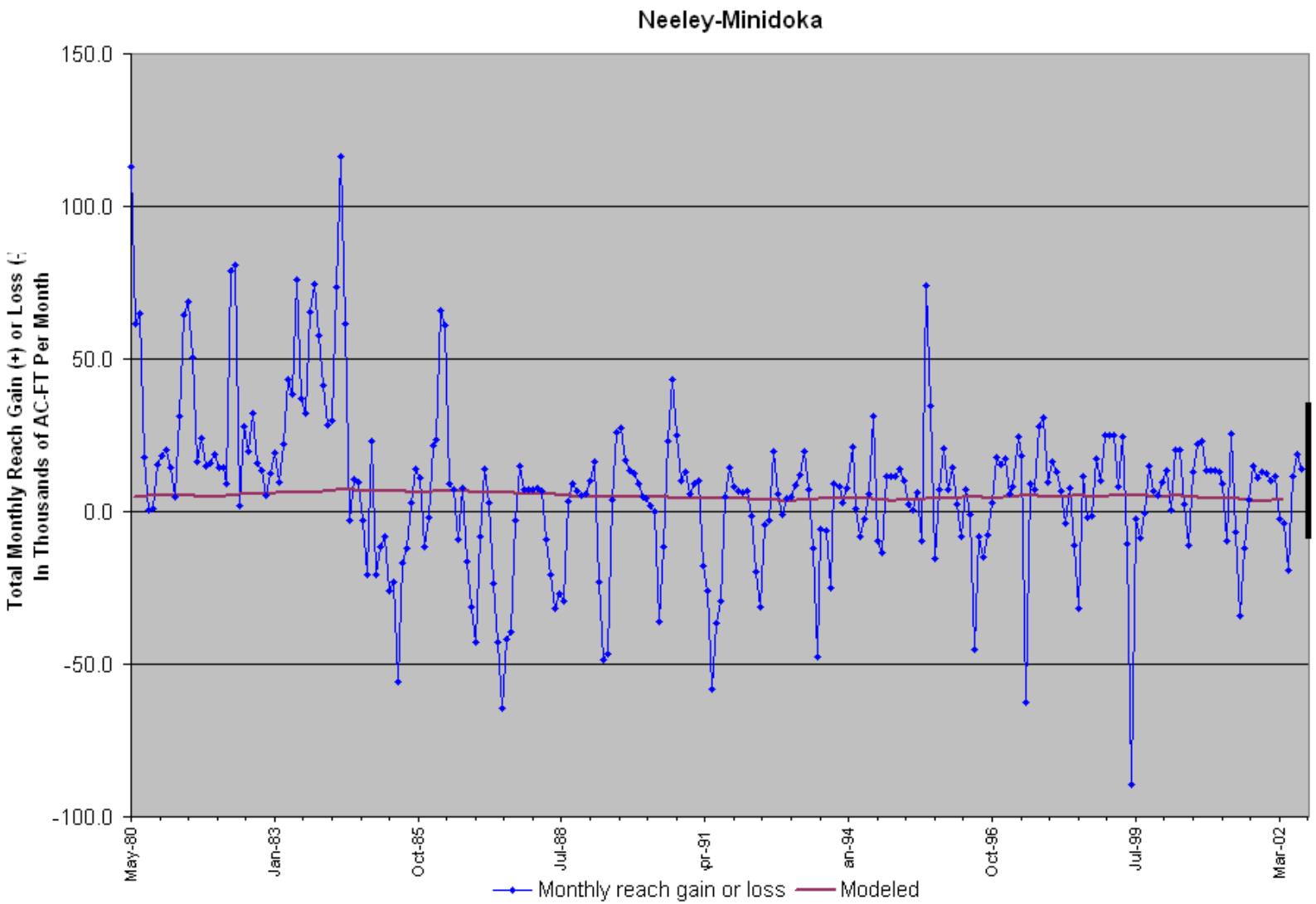

nr-Blackfoot-Neeley
Total Monthly Reach Gain (+) or Loss (-
In Thousands of AC-FT Per Month
300.0
250.0
200.0
150.0
100.0
50.0
0.0
May-80
Jan-83
Oct-85
Jul-88
Apr-91
Jan-94
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

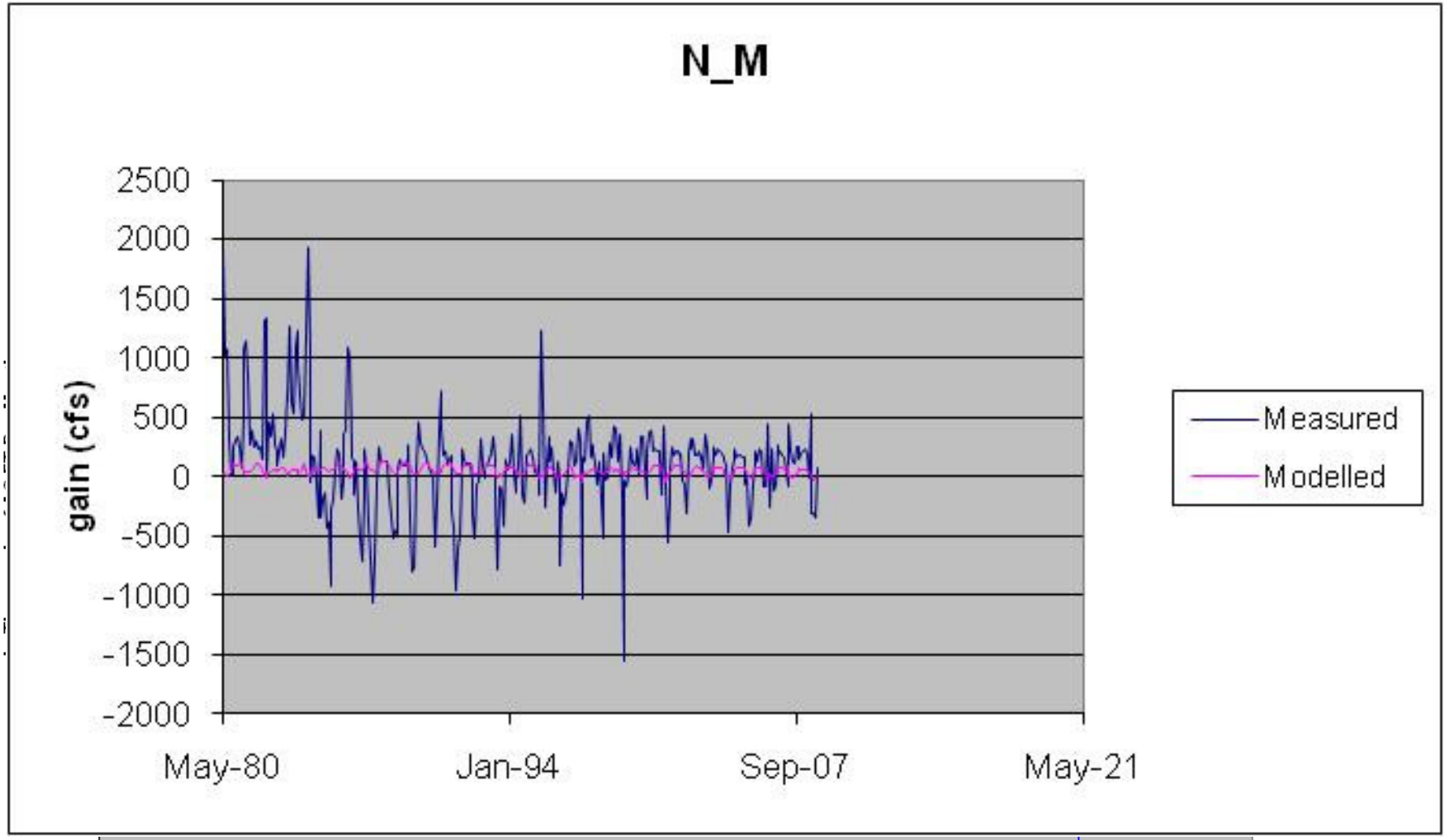

NB_N
gain (cfs)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled

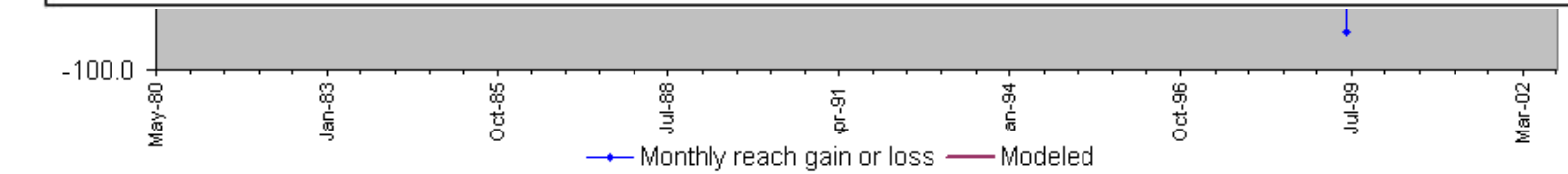

Total Monthly Reach Gain (+) or Loss (-
In Thousands of AC-FT Per Month
0.0
May-80
Jan-83
Oct-85
Jul-88
Apr-91
Jan-94
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

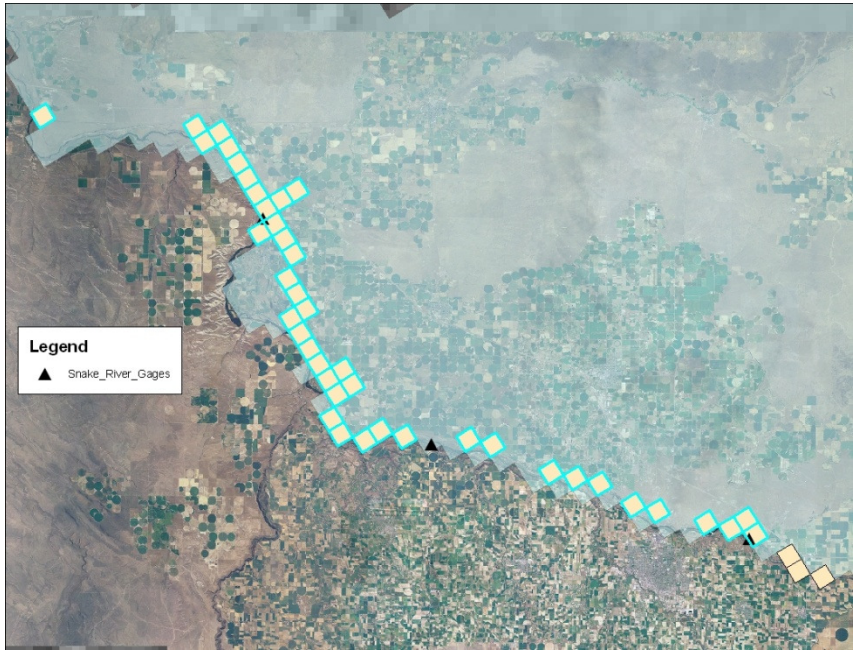


- Neeley – Minidoka

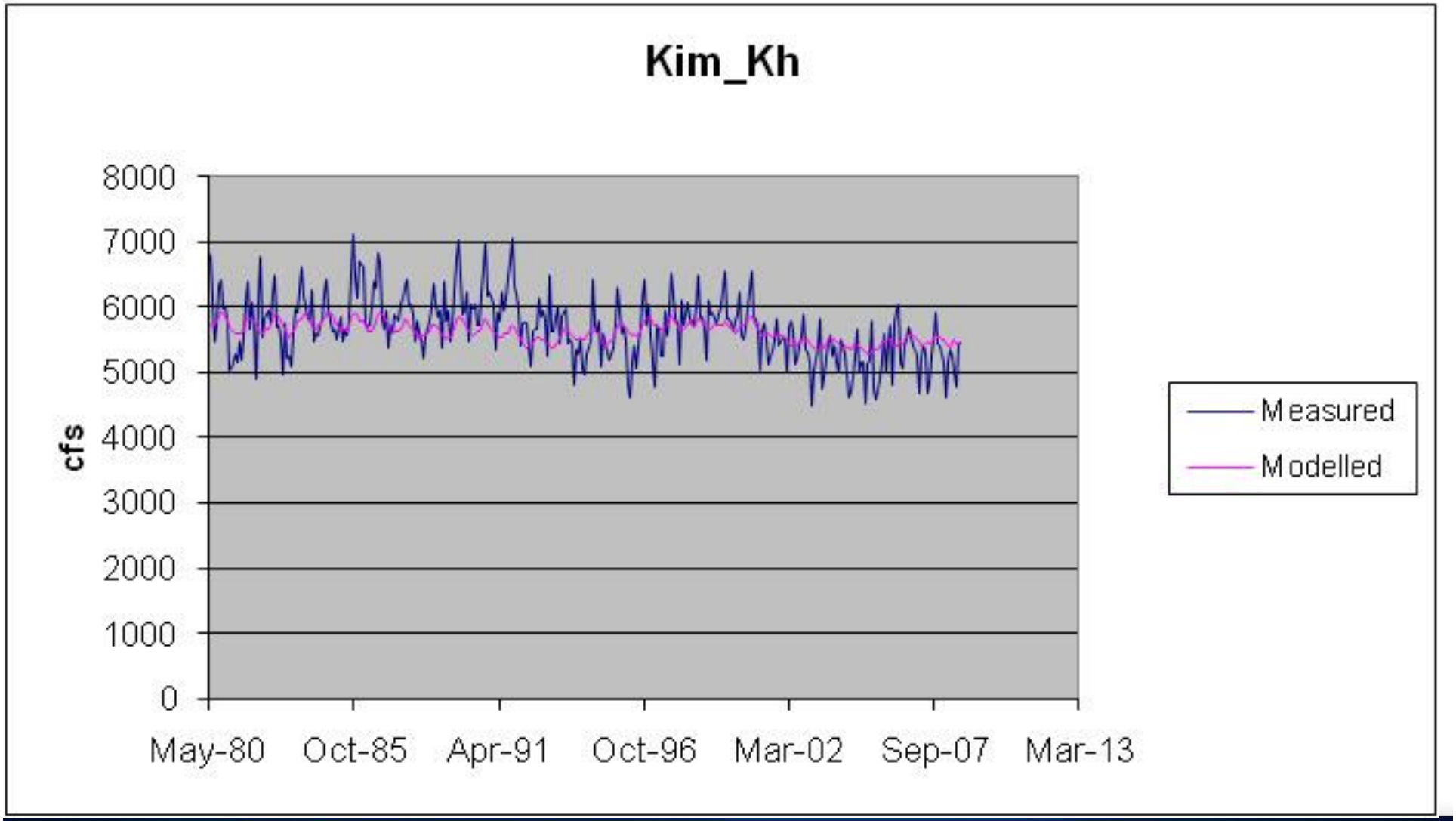

Neeley-Minidoka
Total Monthly Reach Gain (+) or Loss (
In Thousands of AC-FT Per Month
150.0
100.0
50.0
0.0
-50.0
-100.0
May-80
Jan-83
Oct-85
Jul-88
pr-91
an-94
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

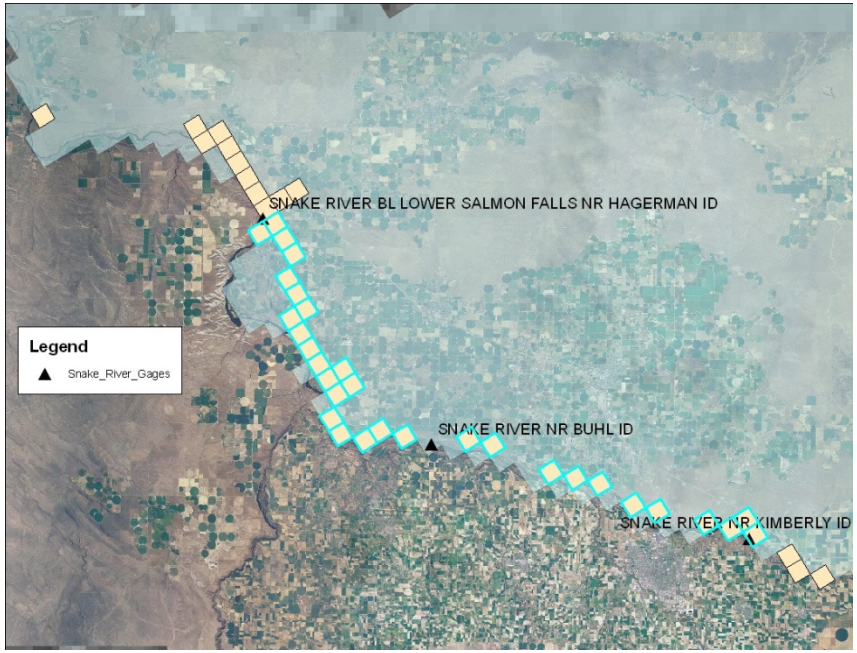

N_M
gain (cfs)
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
May-80
Jan-94
Sep-07
May-21
Measured
Modelled


-100.0
May-80
Jan-83
Oct-85
Jul-88
Oct-96
Jul-99
Mar-02
Monthly reach gain or loss
Modeled

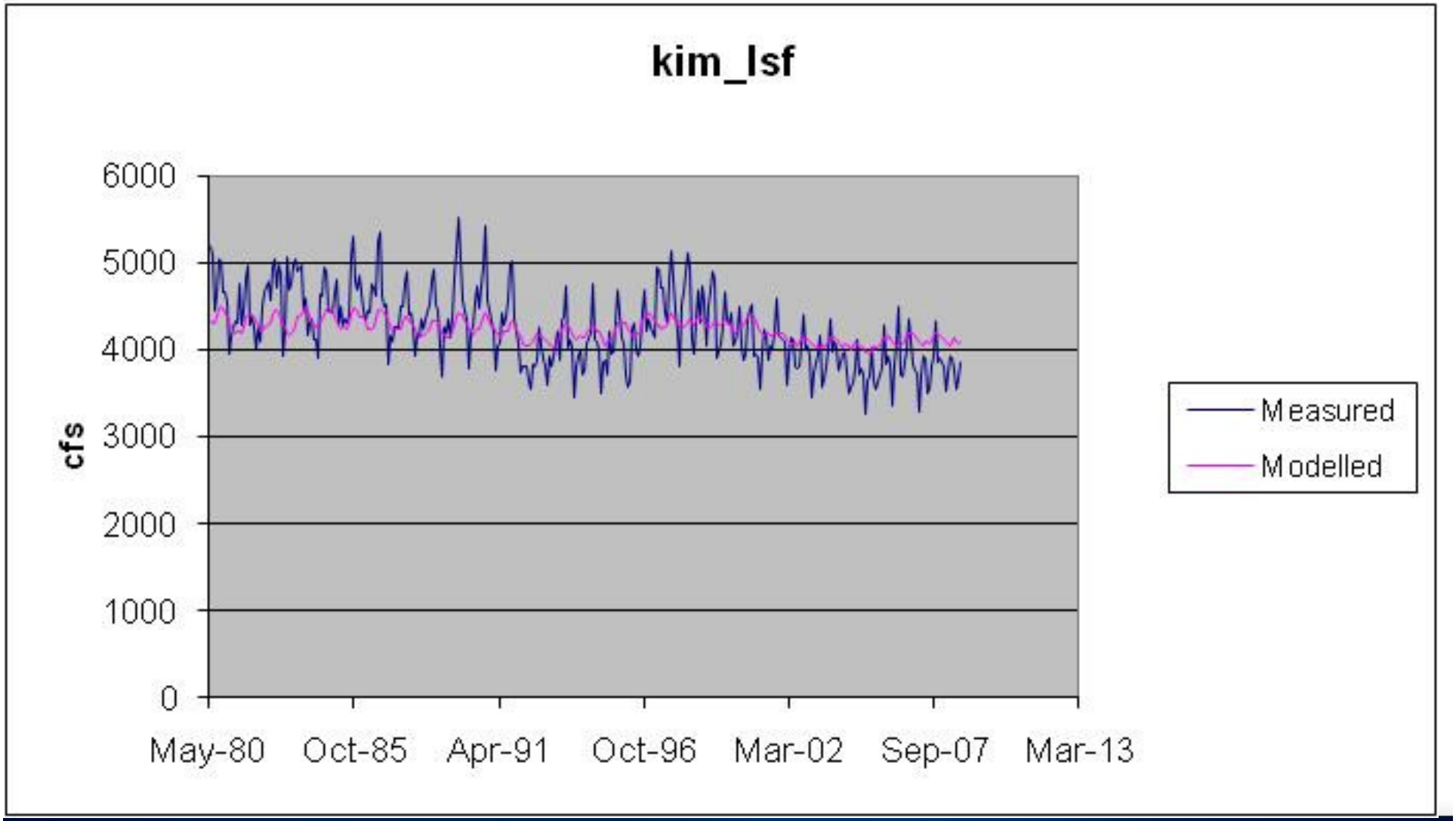


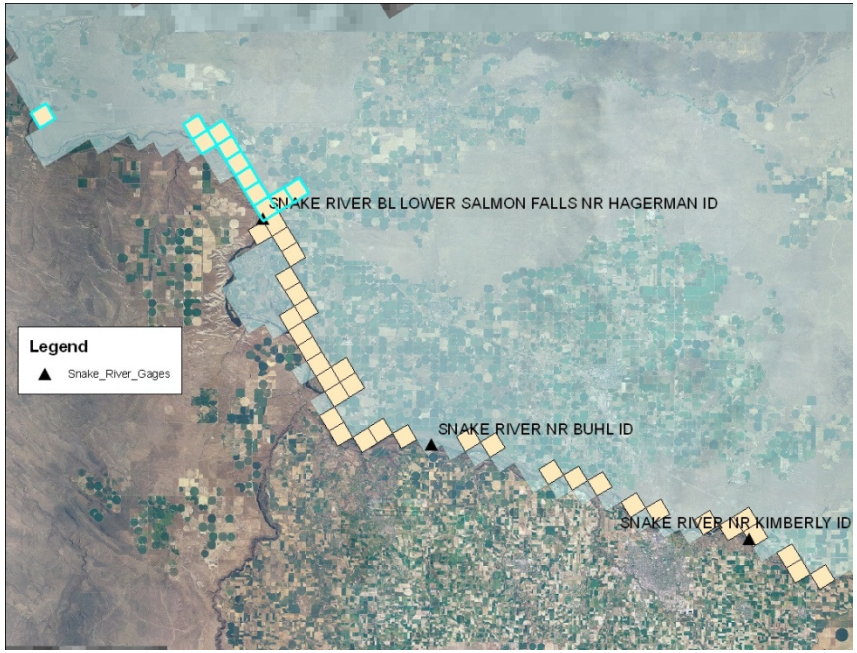
- Kimberly-King Hill


Kim_Kh
8000
7000
6000
5000
4000
3000
2000
1000
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled

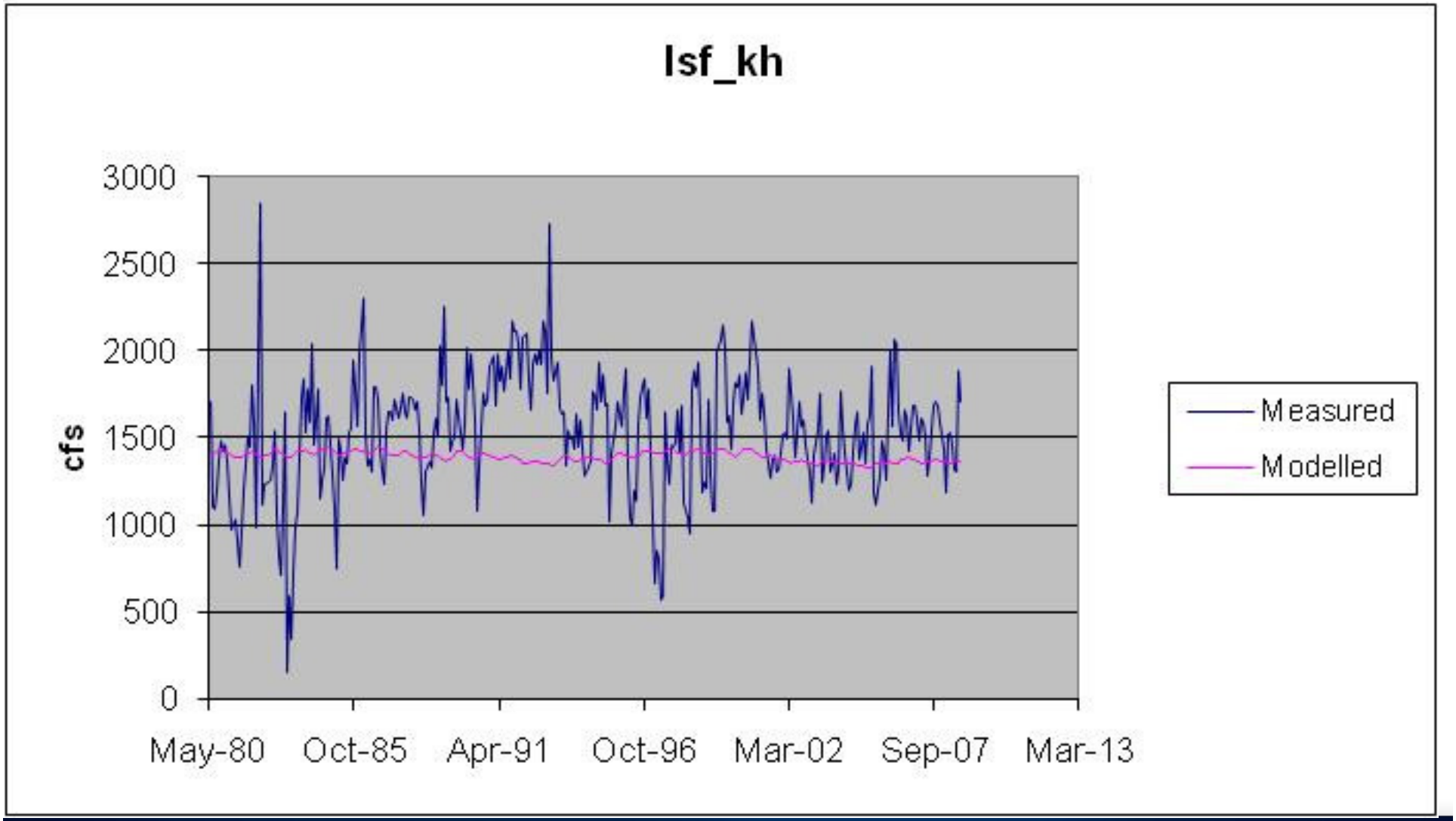


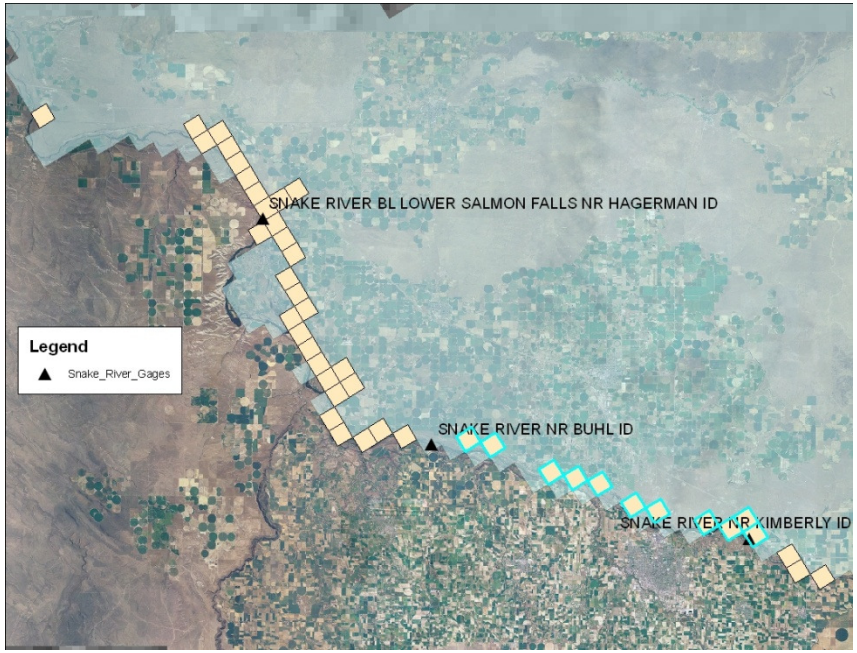
- Kimberly-Lower Salmon Falls


kim_lsf
6000
5000
4000
3000
2000
1000
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled

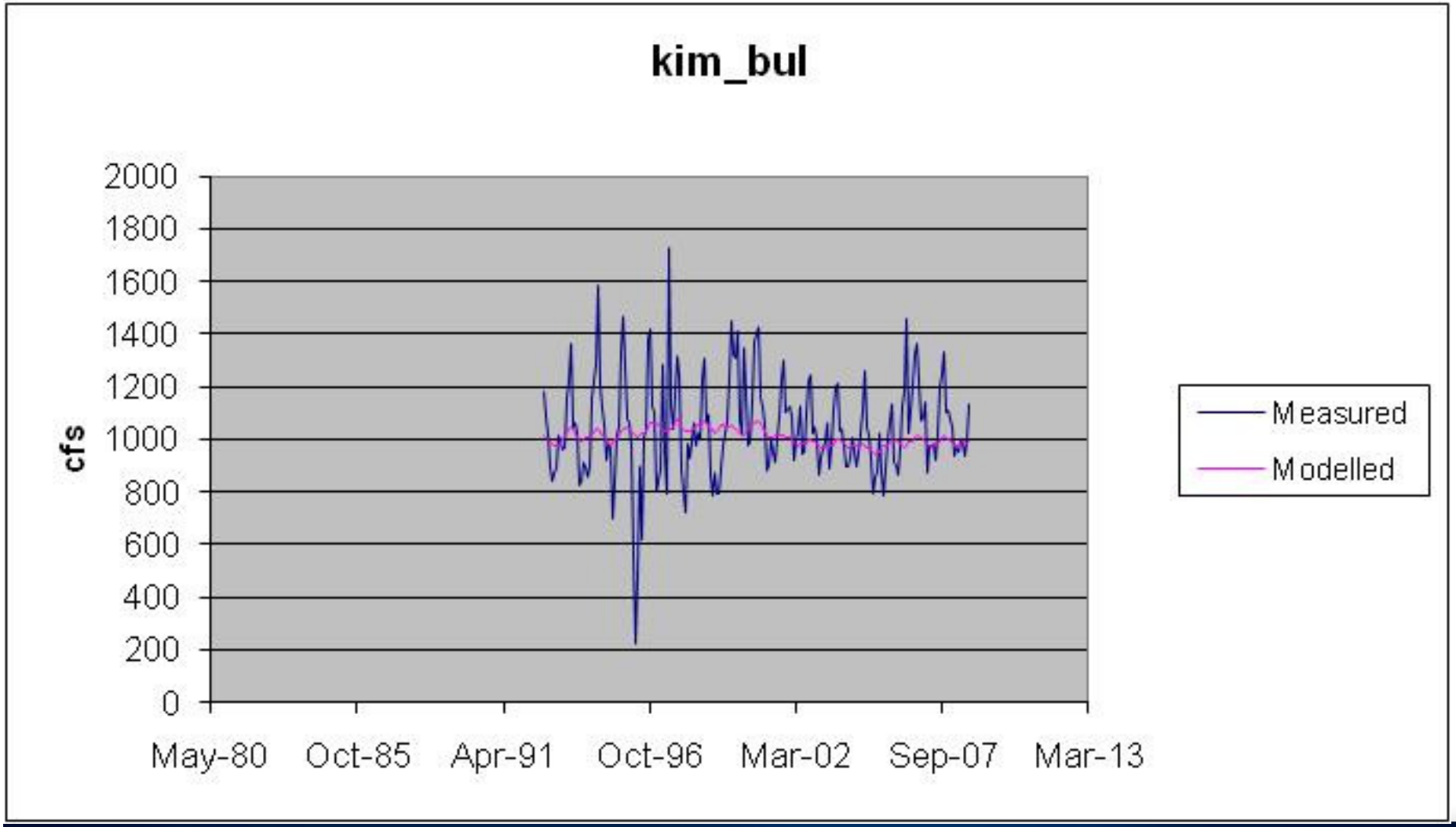


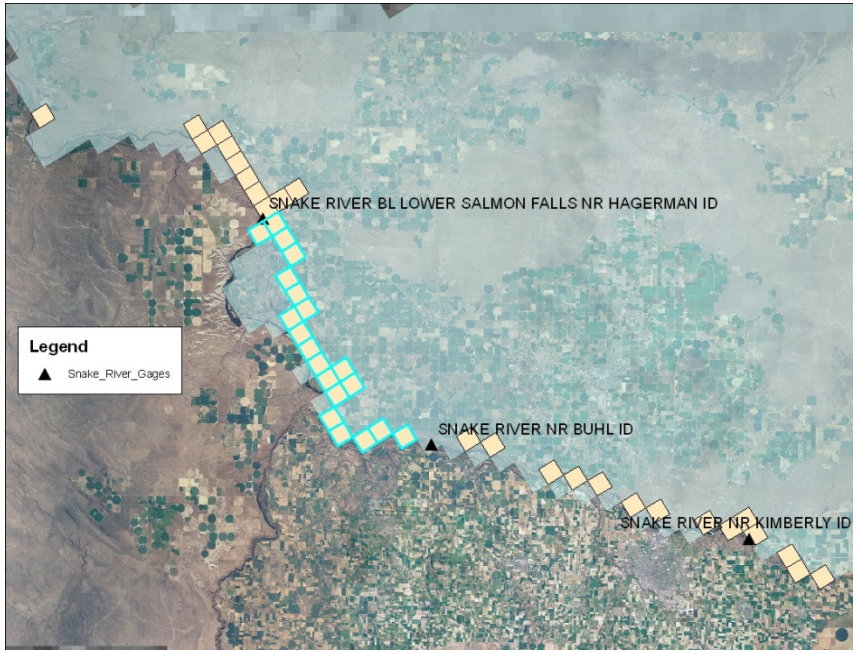
- Lower Salmon Falls – King Hill


lsf_kh
3000
2500
2000
1500
1000
500
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled

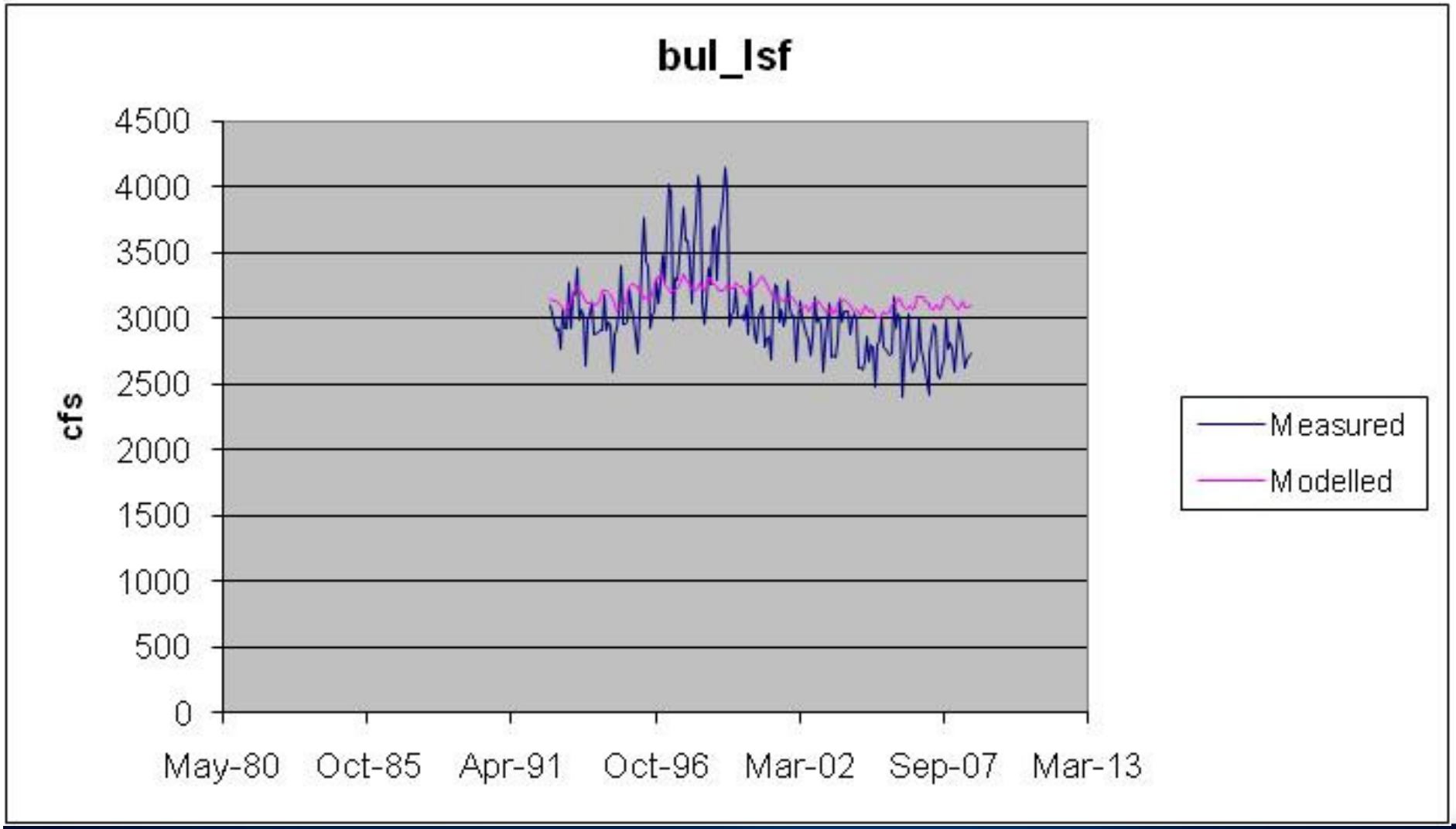


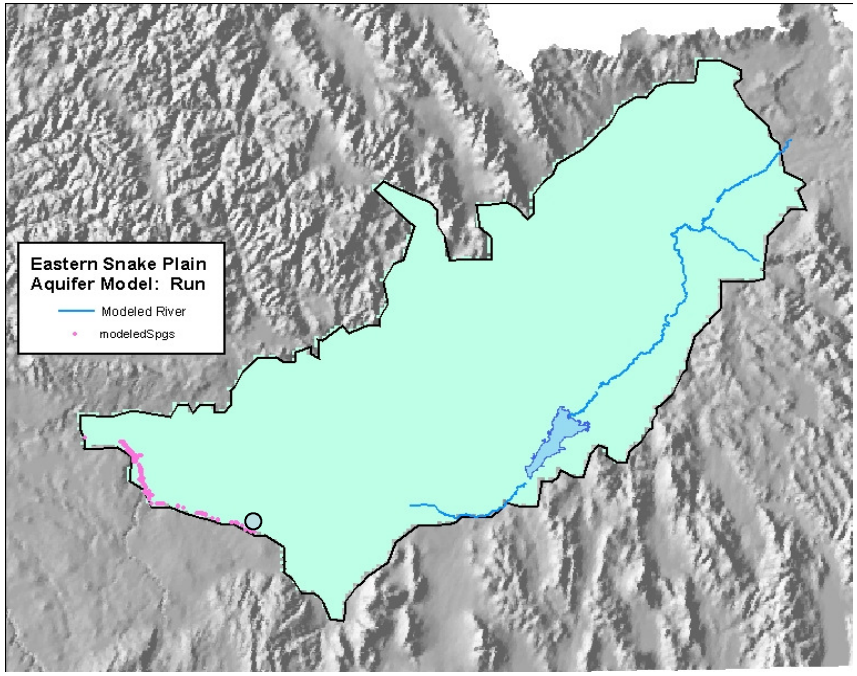
- Kimberly-Buhl


kim_bul
cfs
2000
1800
1600
1400
1200
1000
800
600
400
200
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled



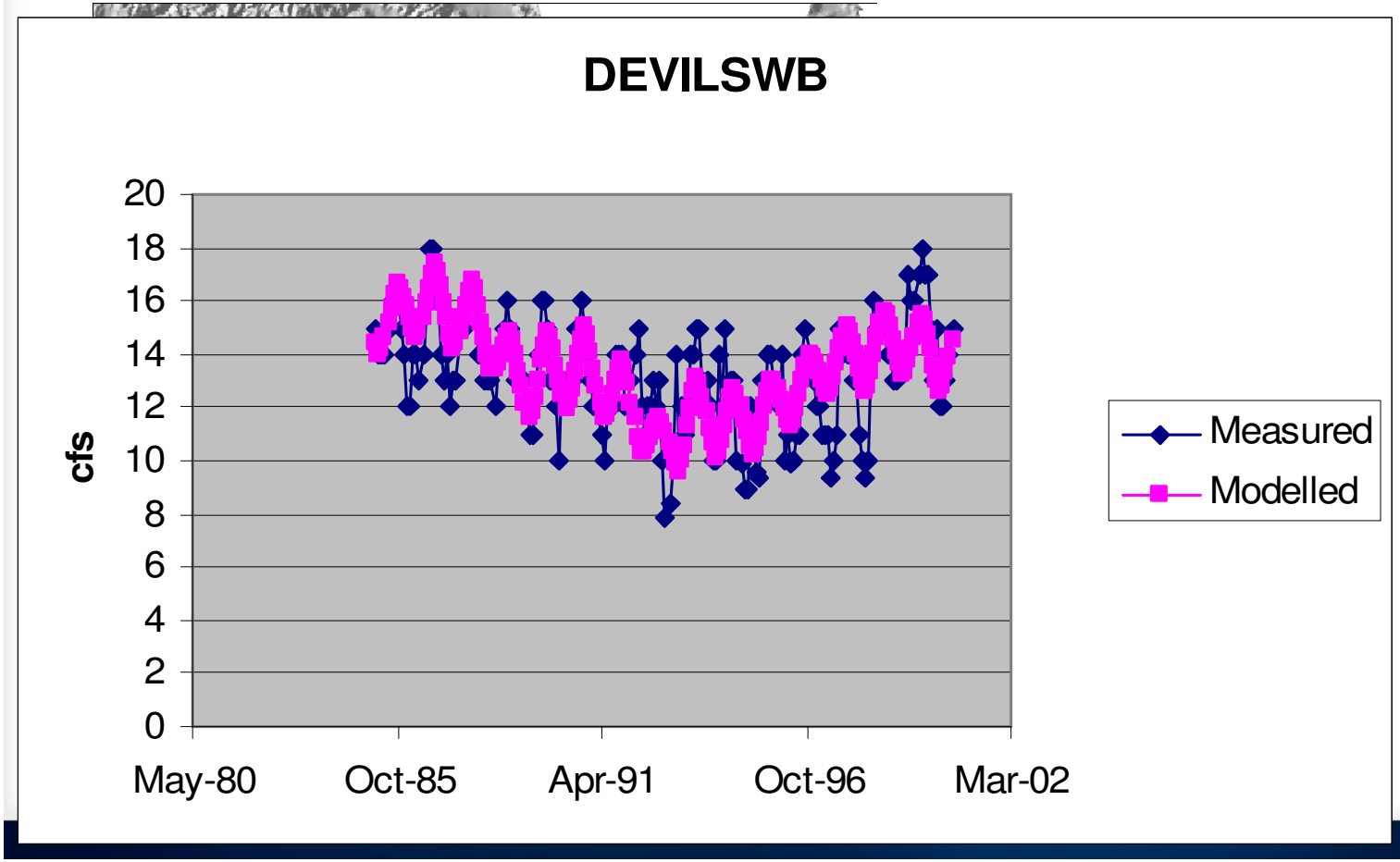
- Buhl-Lower Salmon Falls


bul_lsf
cfs
4500
4000
3500
3000
2500
2000
1500
1000
500
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled

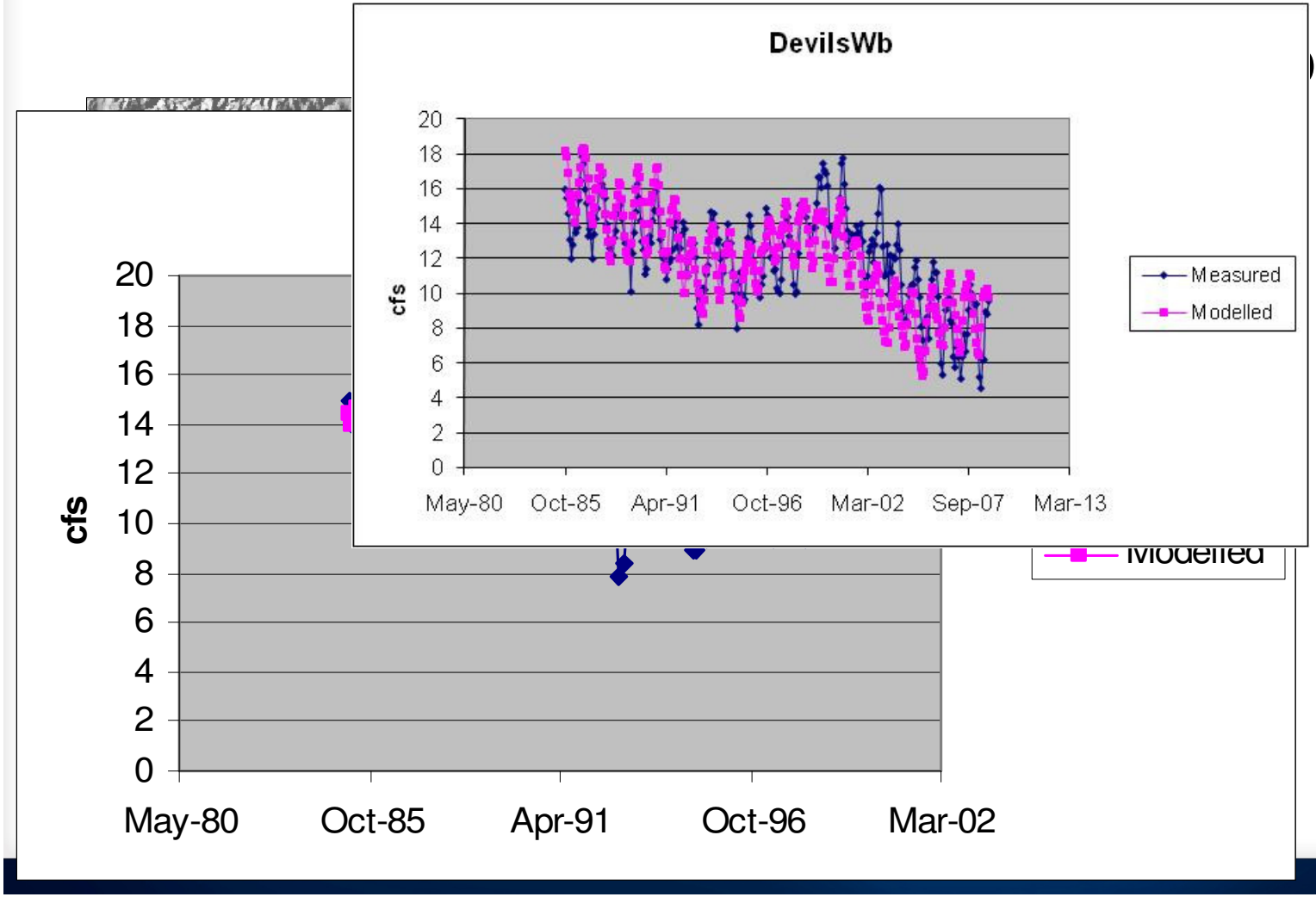


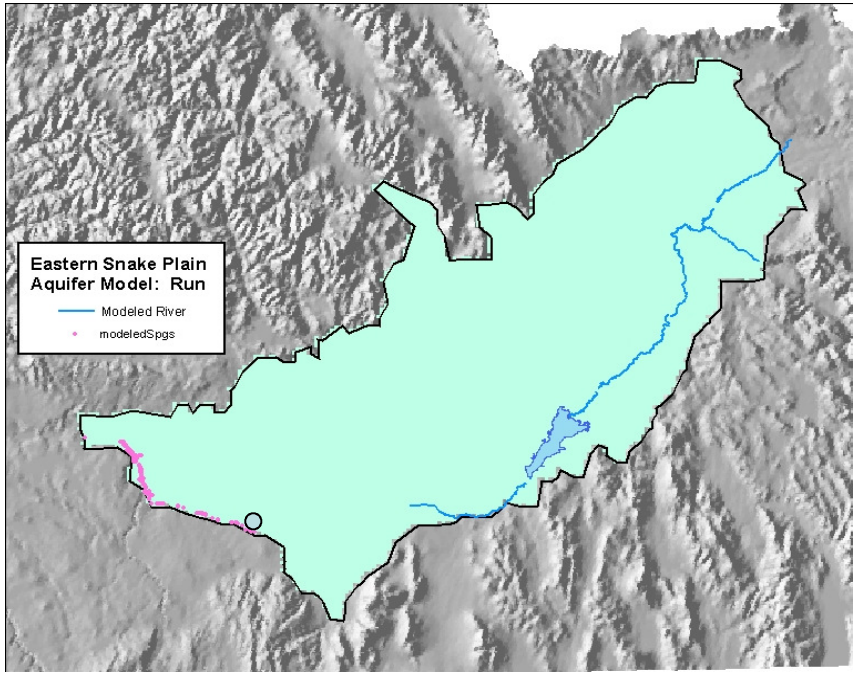
- Devils Washbowl

- Devils Washbowl



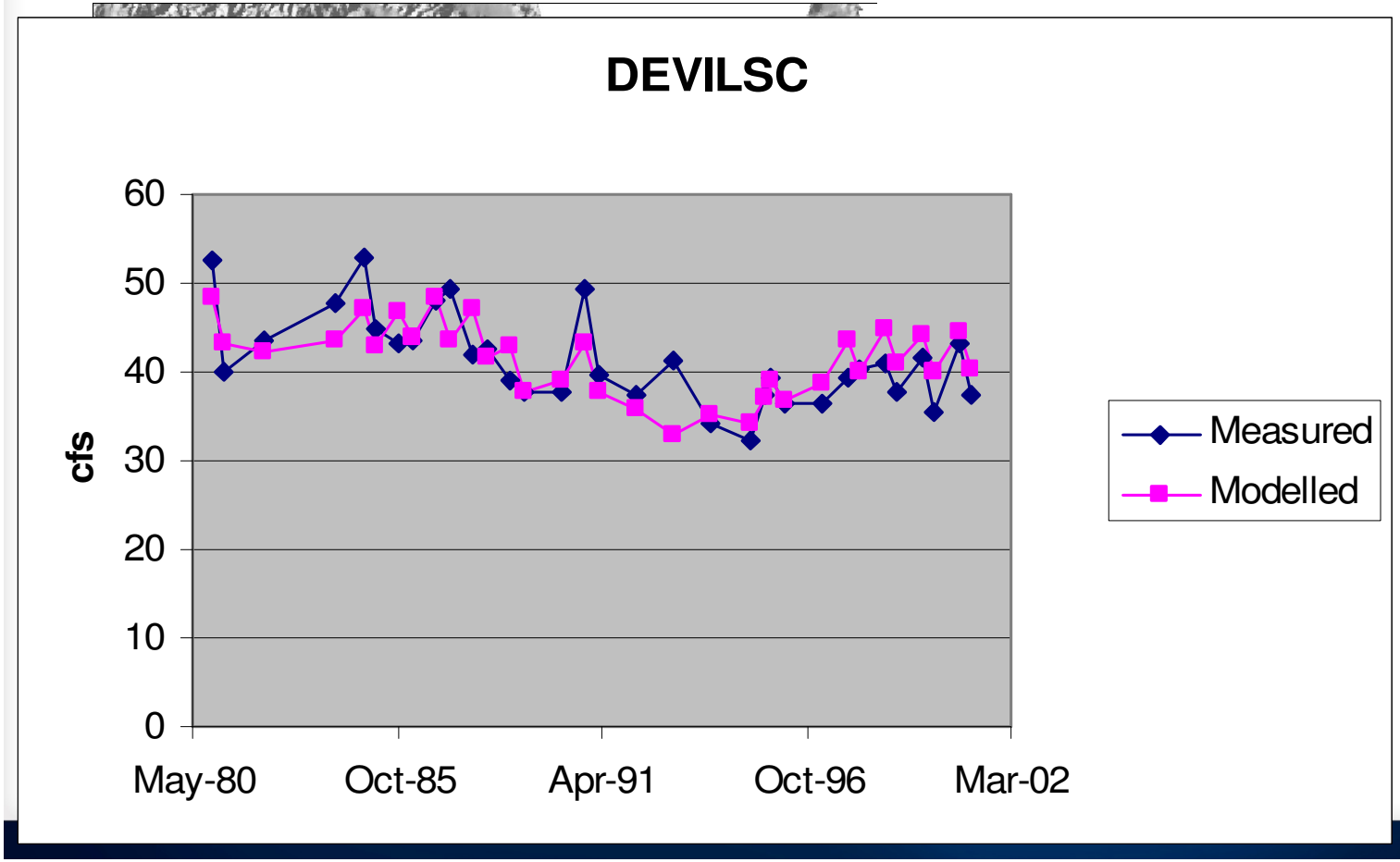
owl

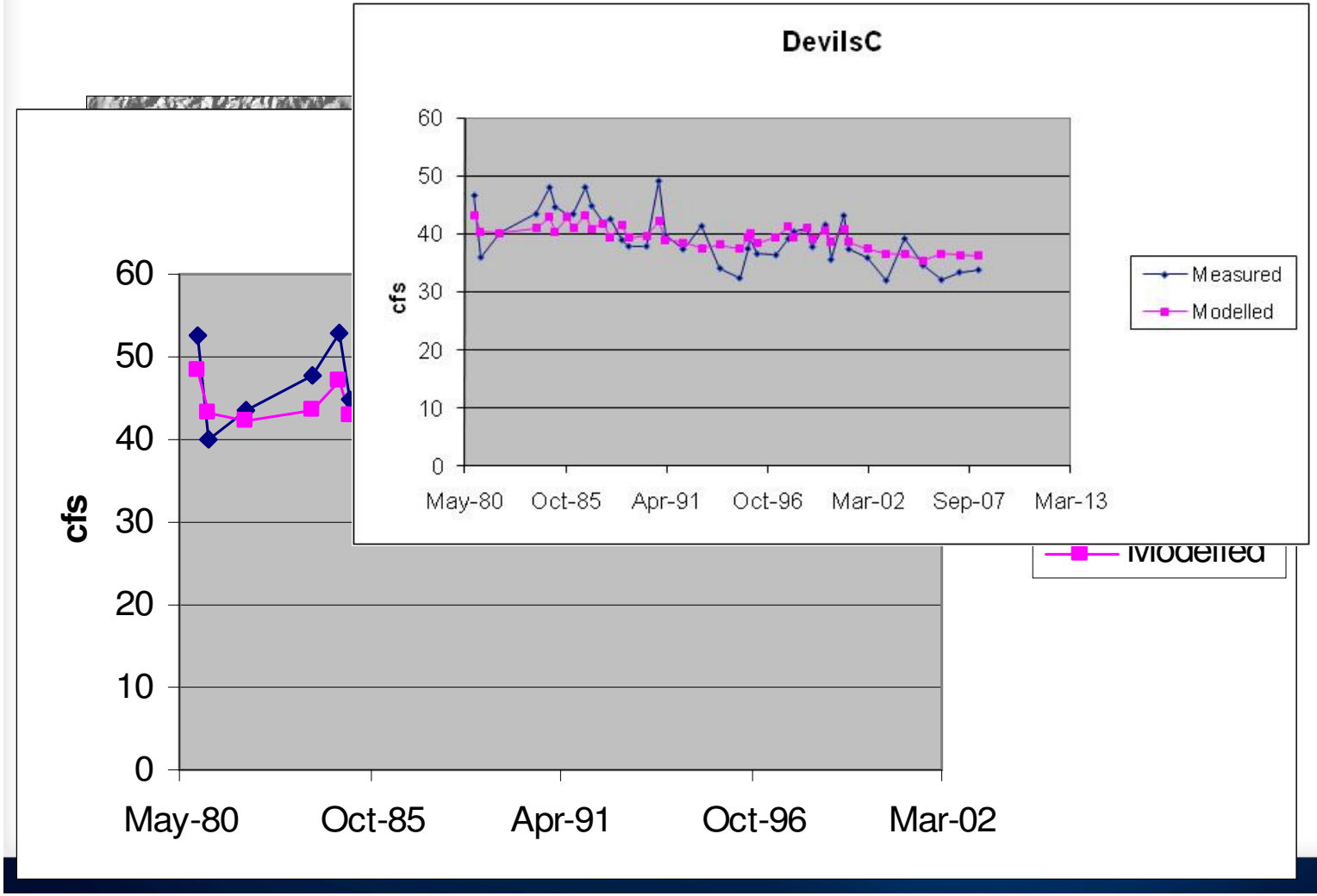

DevilsWb
cfs
20
18
16
14
12
10
8
6
4
2
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled
cfs
20
18
16
14
12
10
8
6
4
2
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Modelled

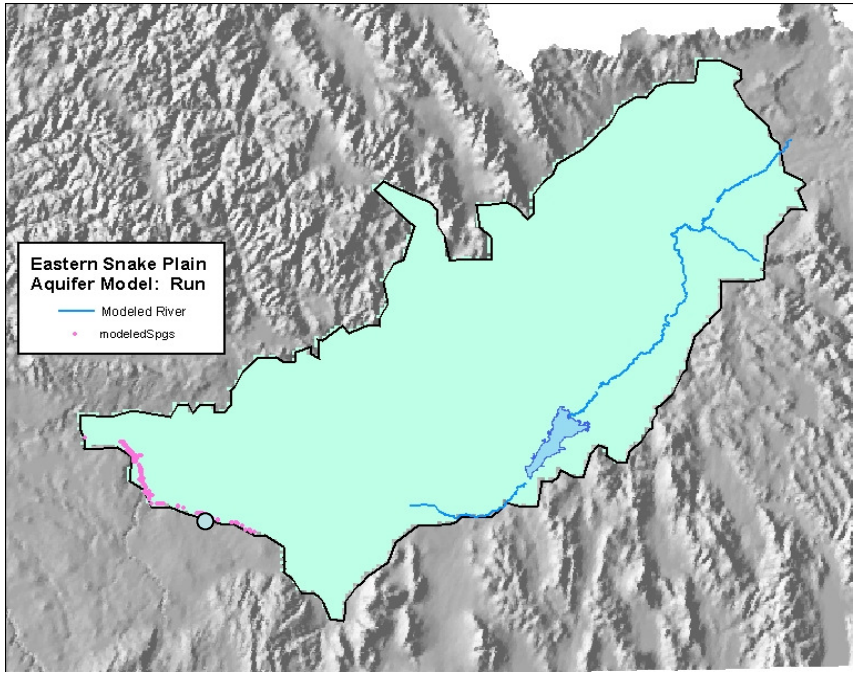


- Devils Corral

- Devils Corral

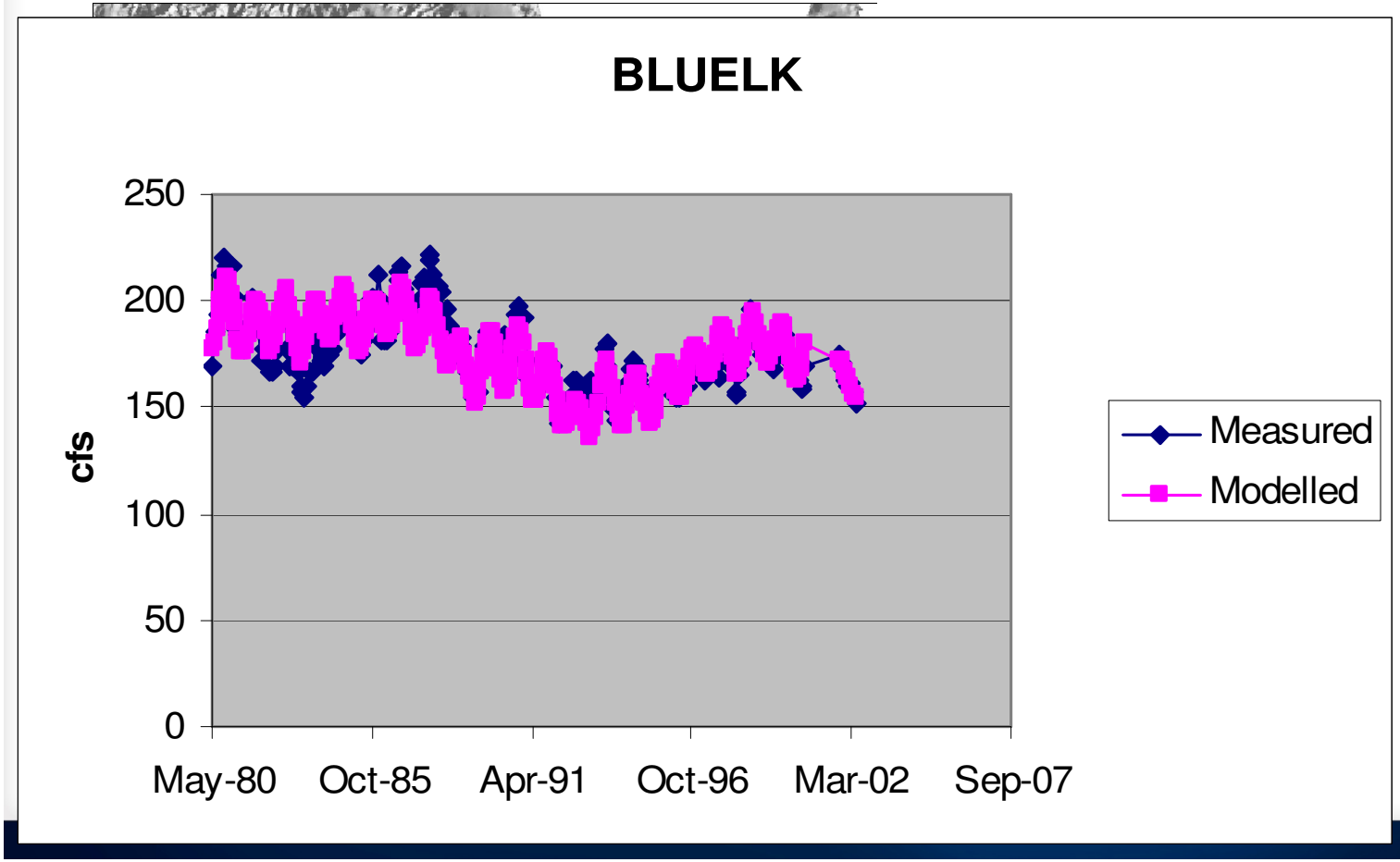


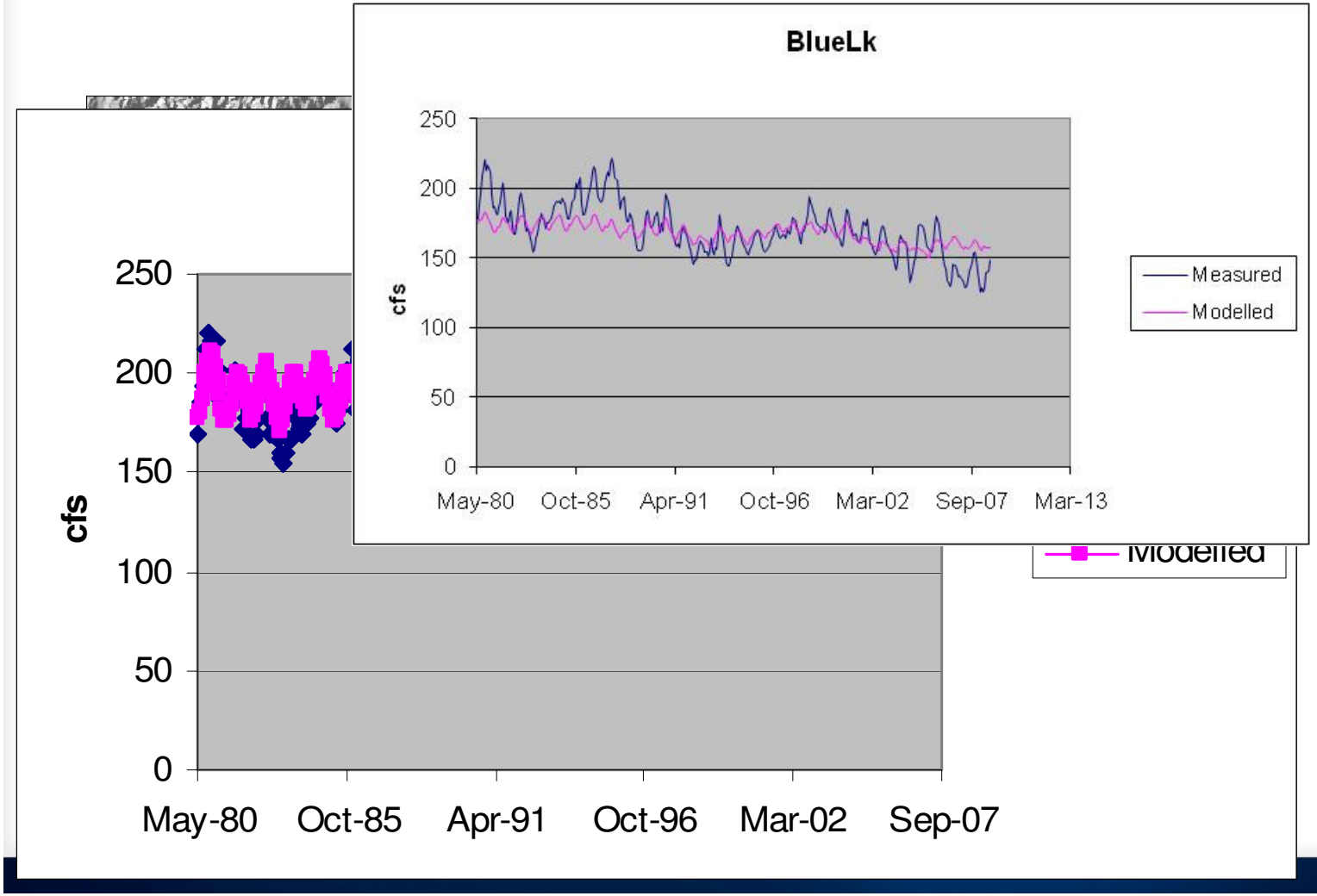

DevilsC
cfs
60
50
40
30
20
10
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Blue Lakes

- Blue Lakes


BLUELK
250
200
150
100
50
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled


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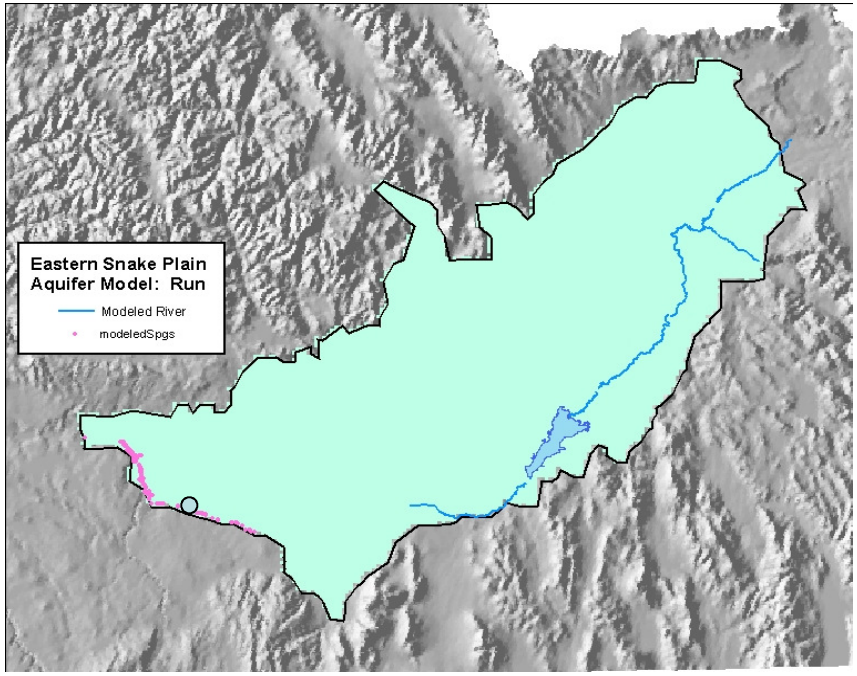
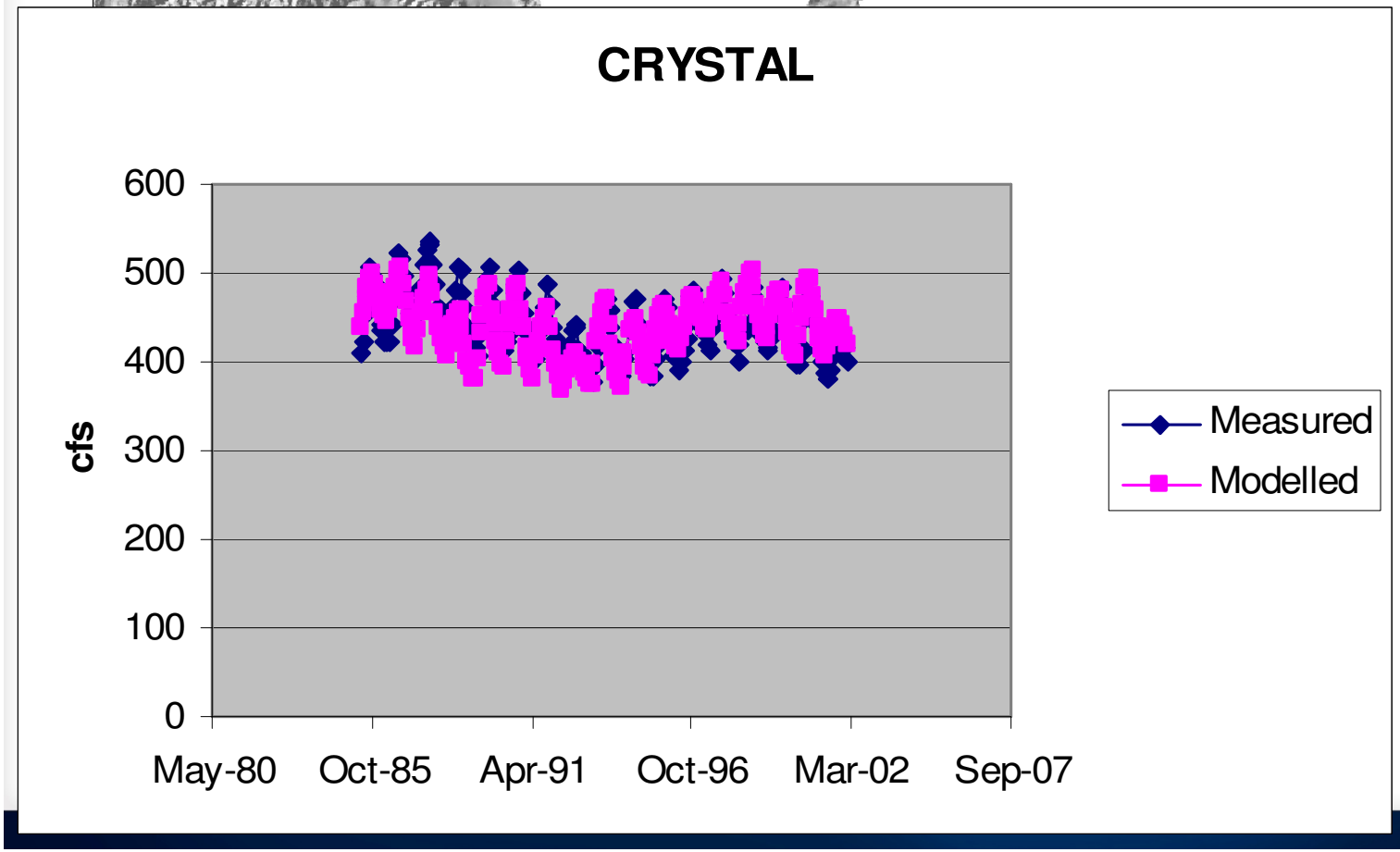
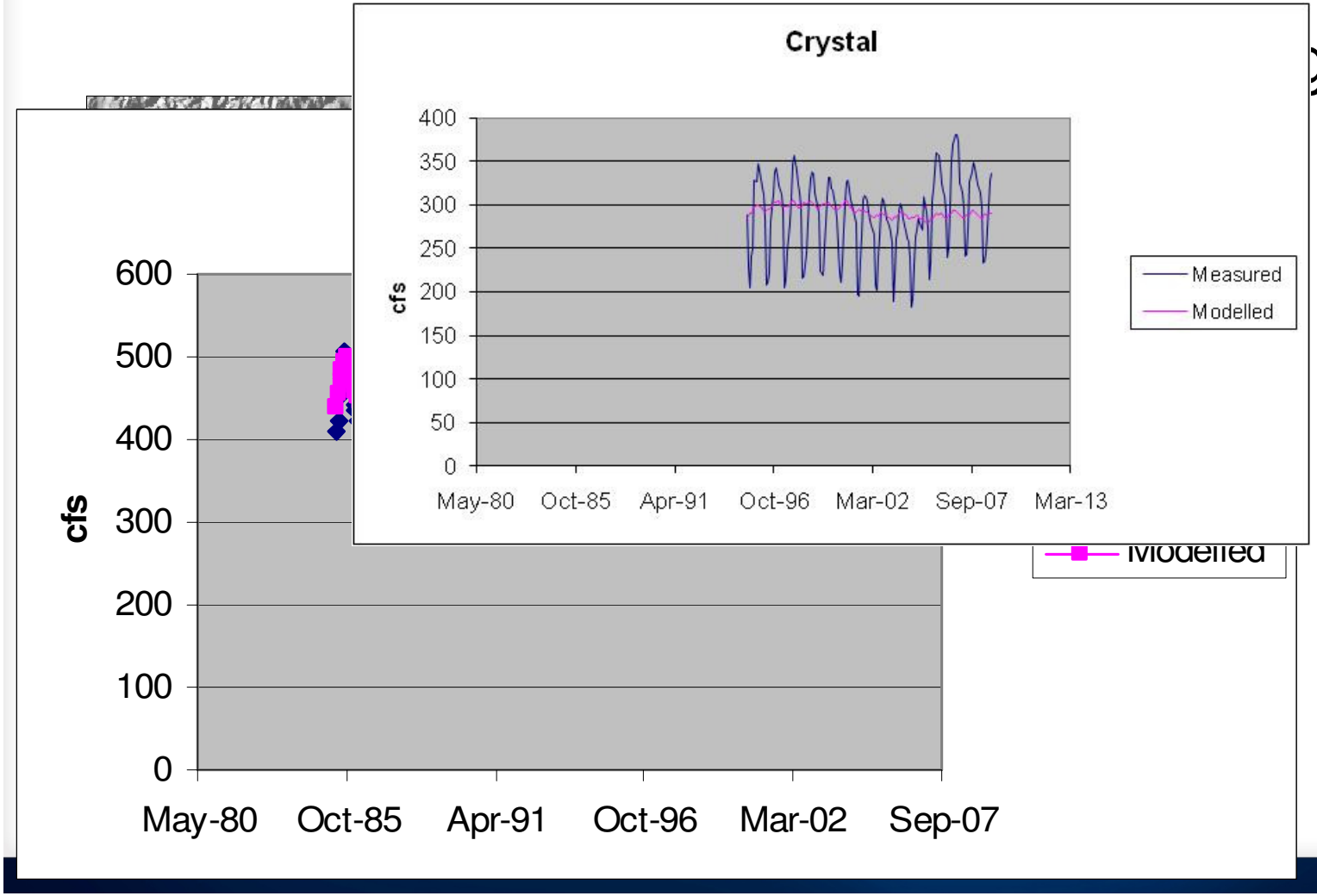
100
50
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Modelled

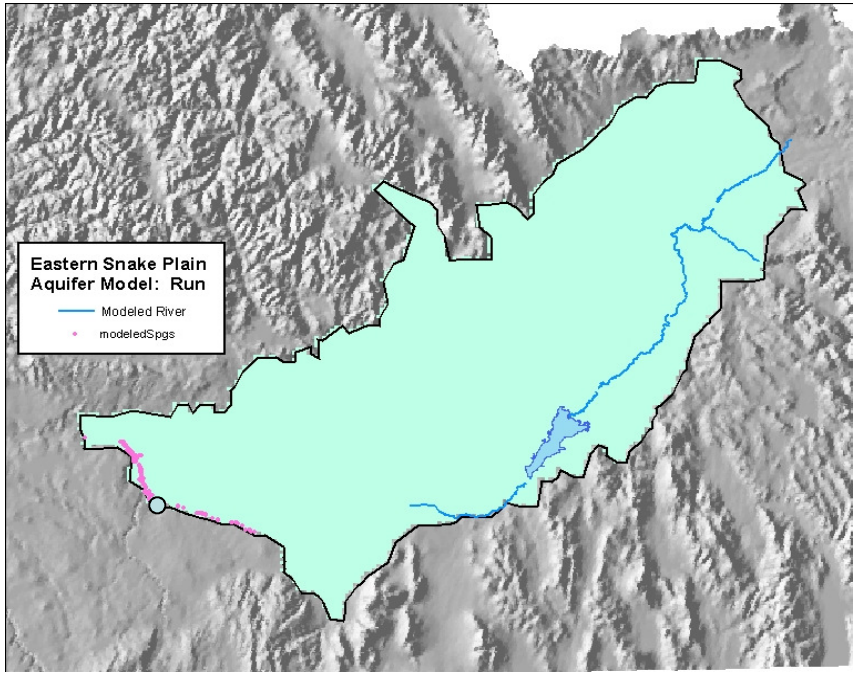


- Crystal Springs

- Crystal Springs

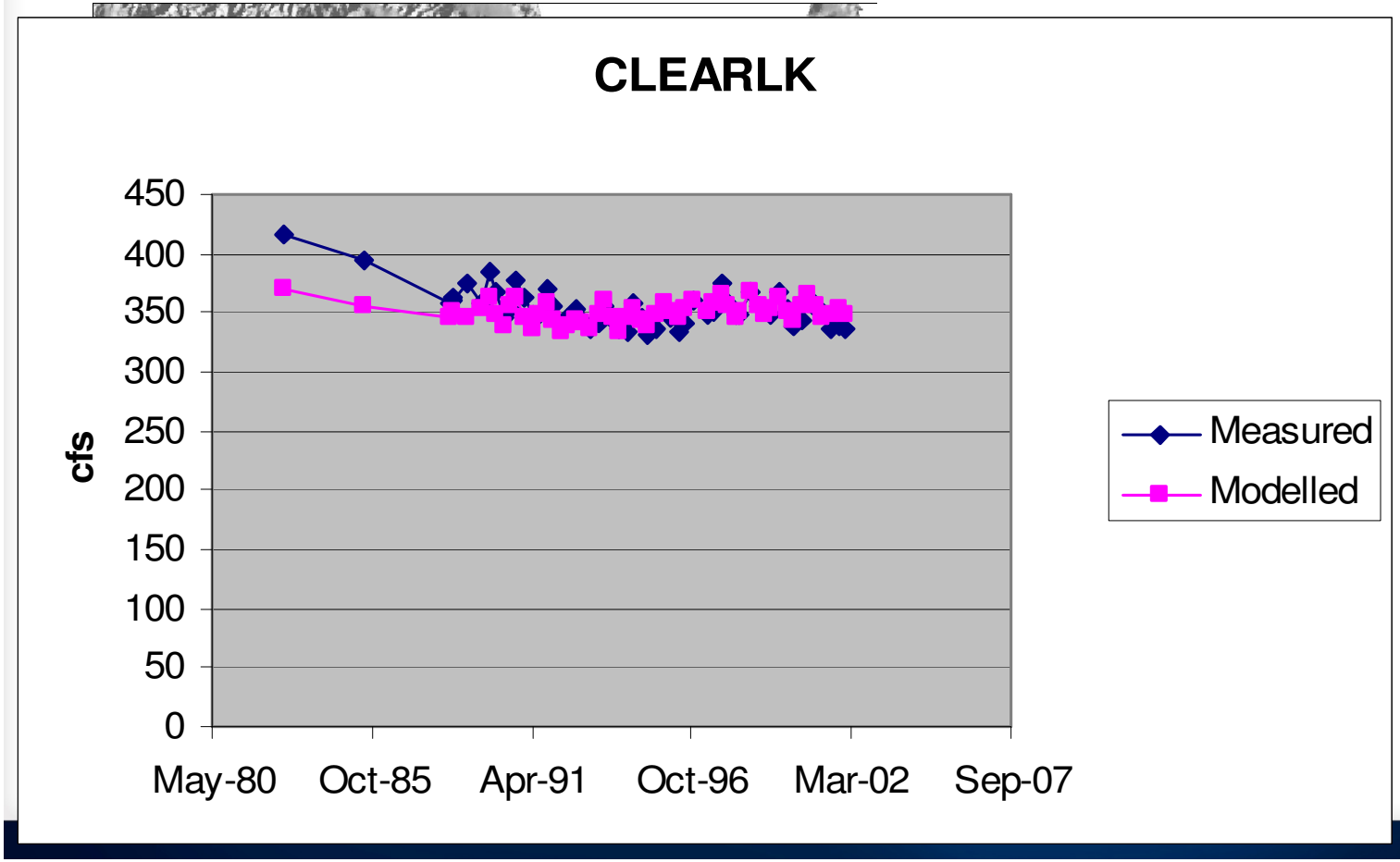


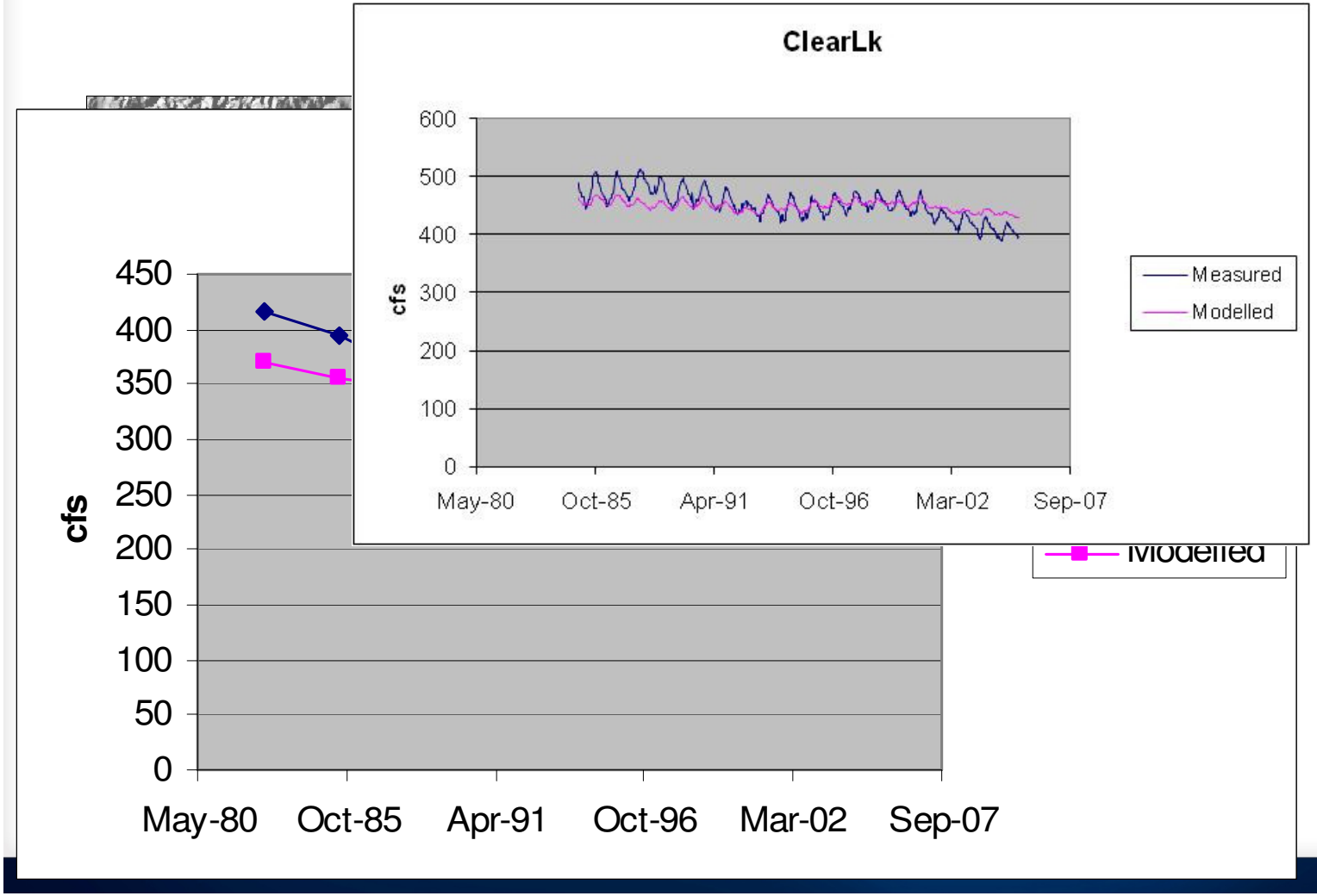

Crystal
400
350
300
250
200
150
100
50
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled
600
500
400
300
200
100
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Modelled

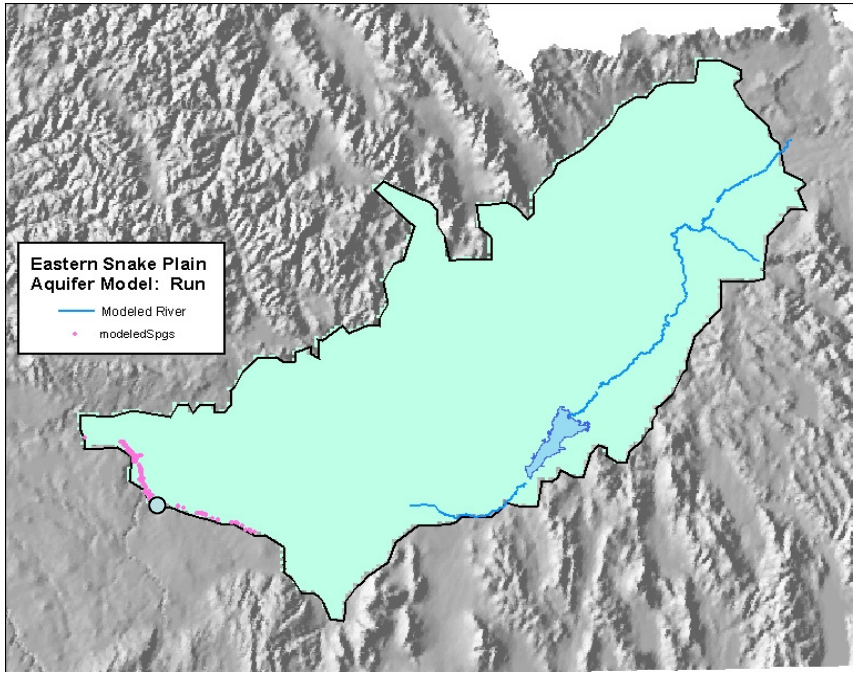

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Clear Lakes

- Clear Lakes

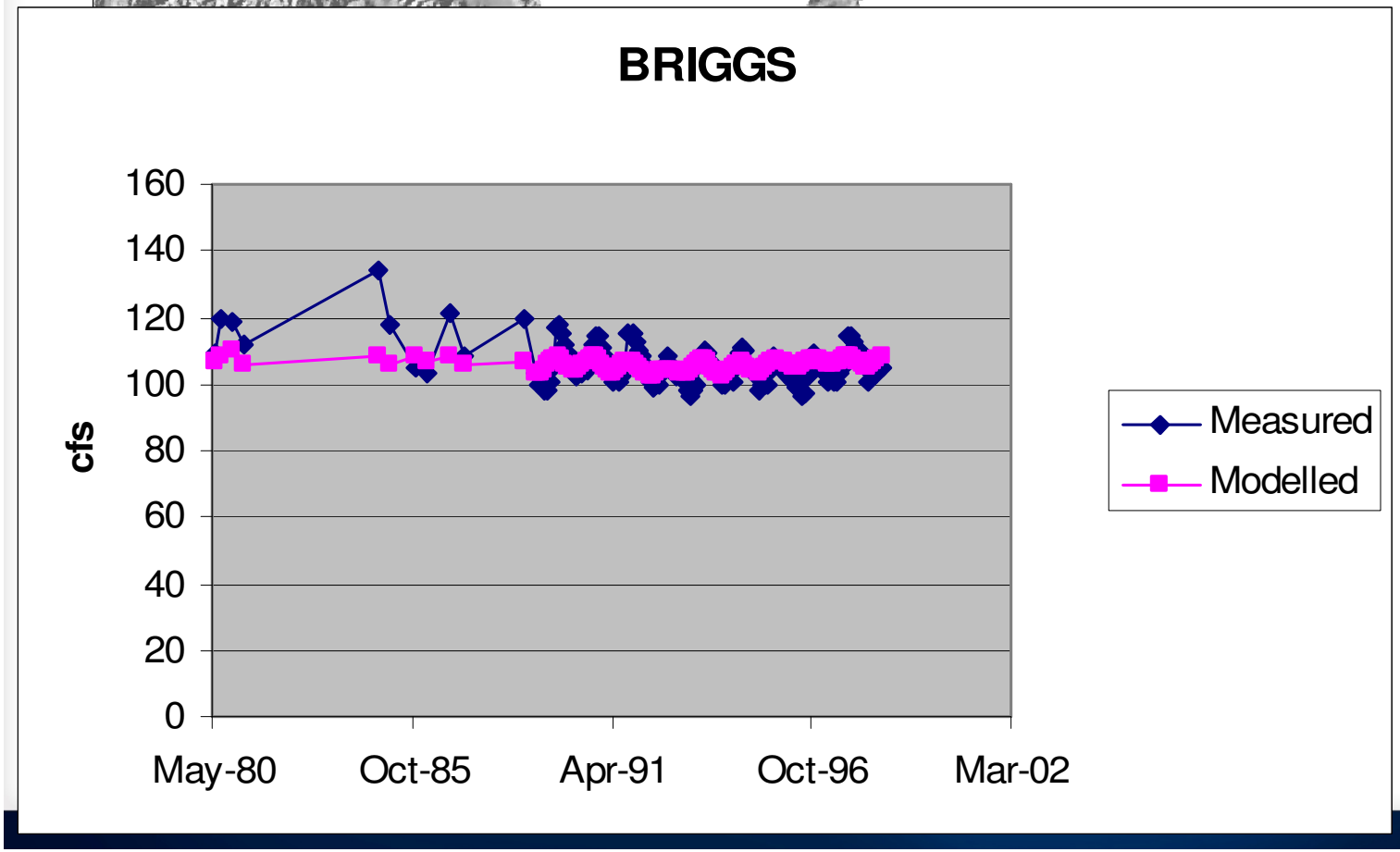

CLEARLK
cfs
450
400
350
300
250
200
150
100
50
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled

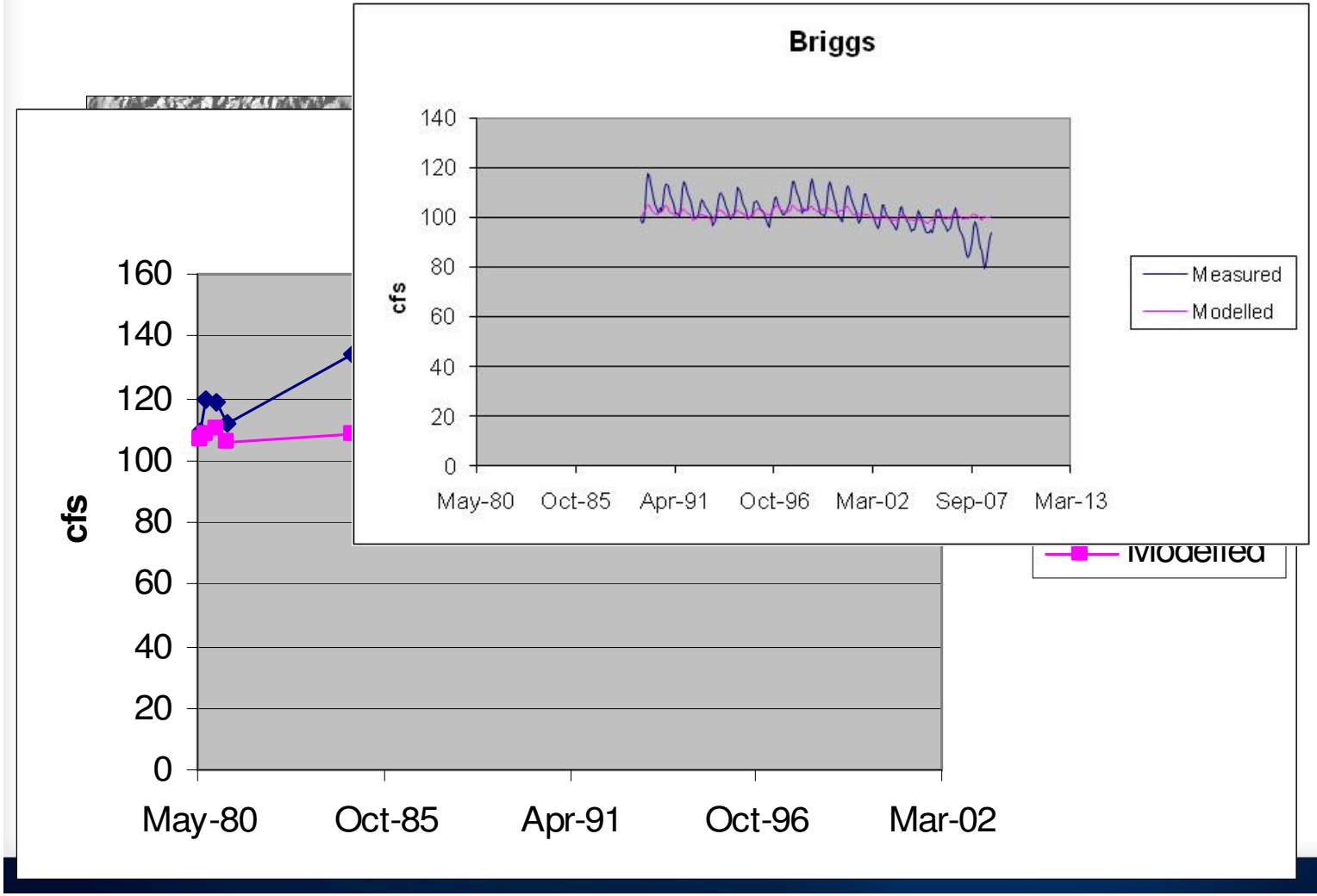

ClearLk
600
500
400
300
200
100
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled
450
400
350
300
250
200
150
100
50
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Modelled

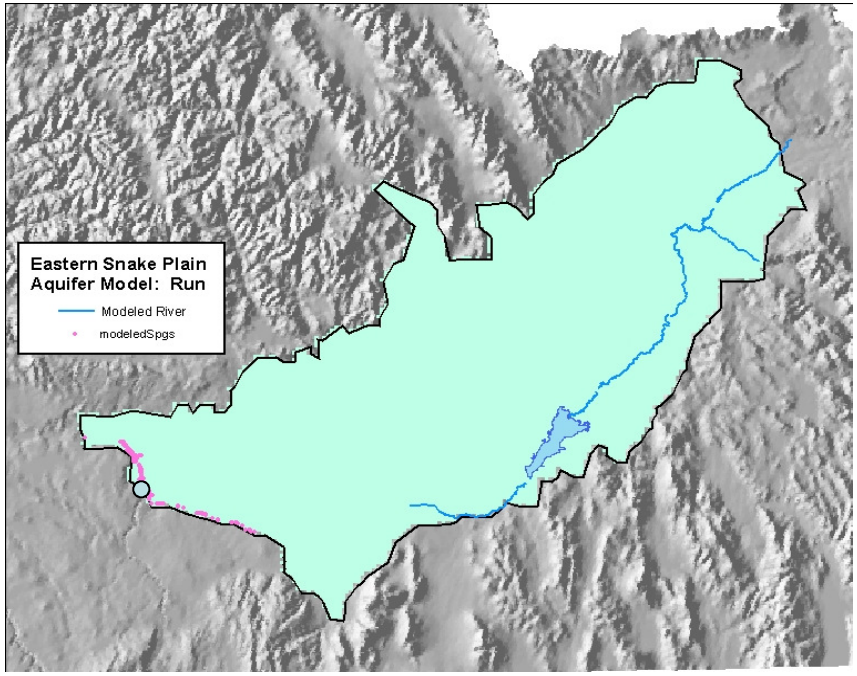


- Briggs Spring

- Briggs Spring

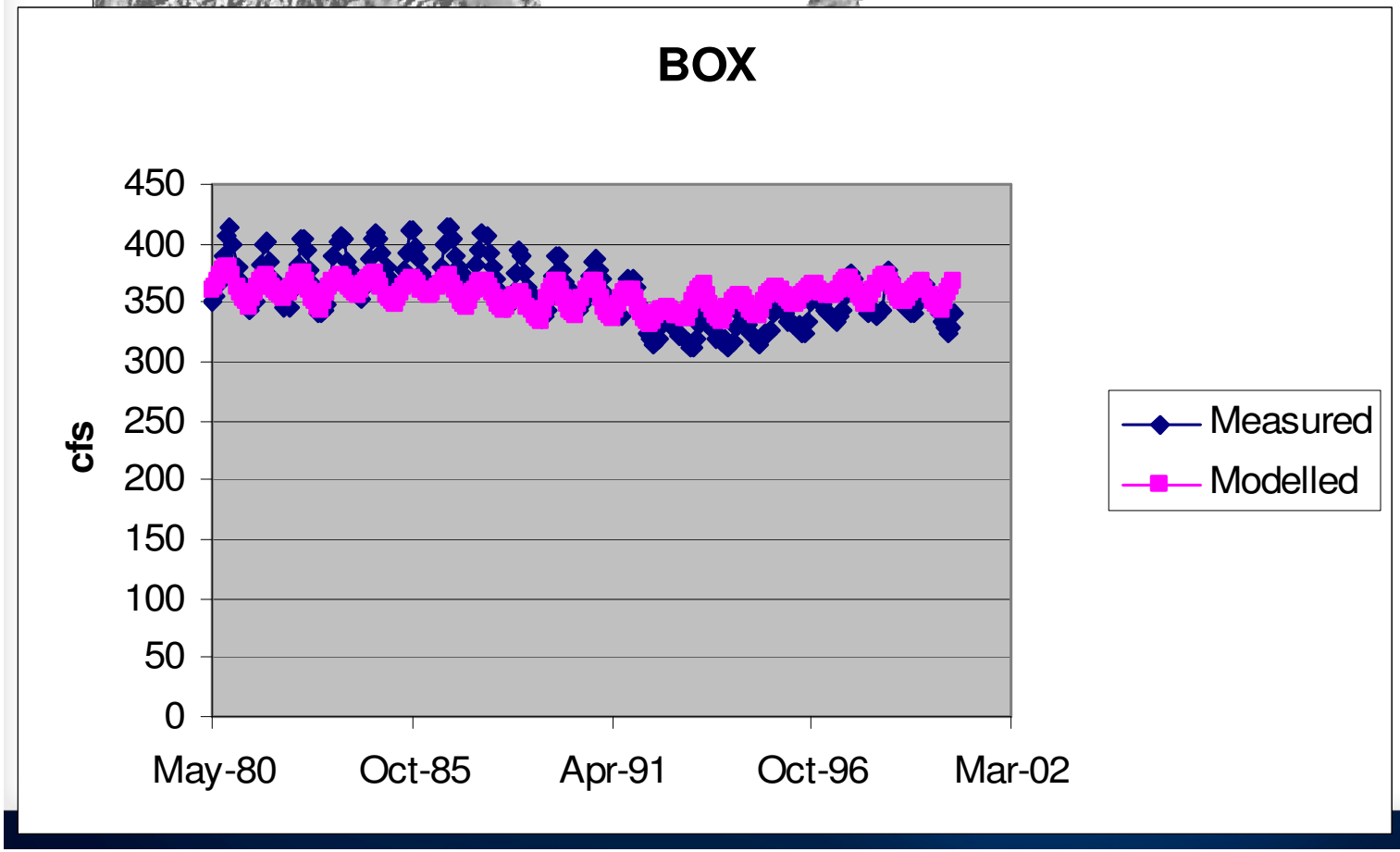



Briggs
cfs
140
120
100
80
60
40
20
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled
cfs
160
140
120
100
80
60
40
20
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Modelled

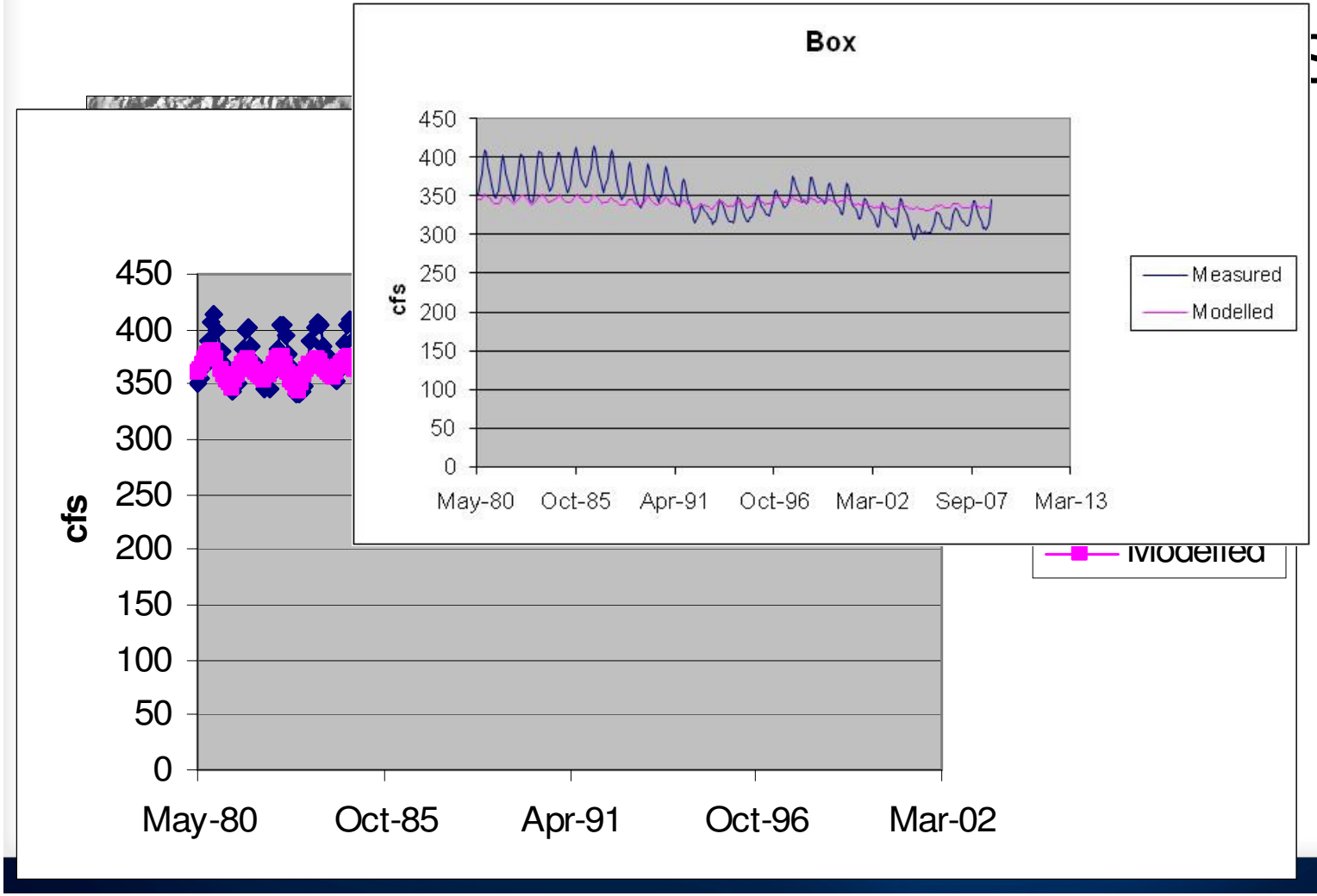


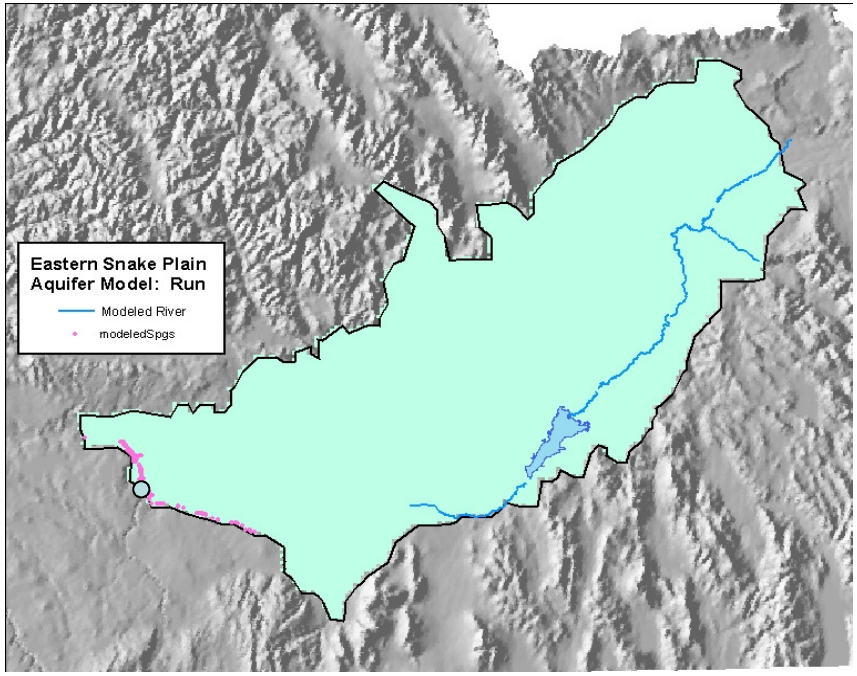
- Box Canyon Spring

- Box Canyon Spring



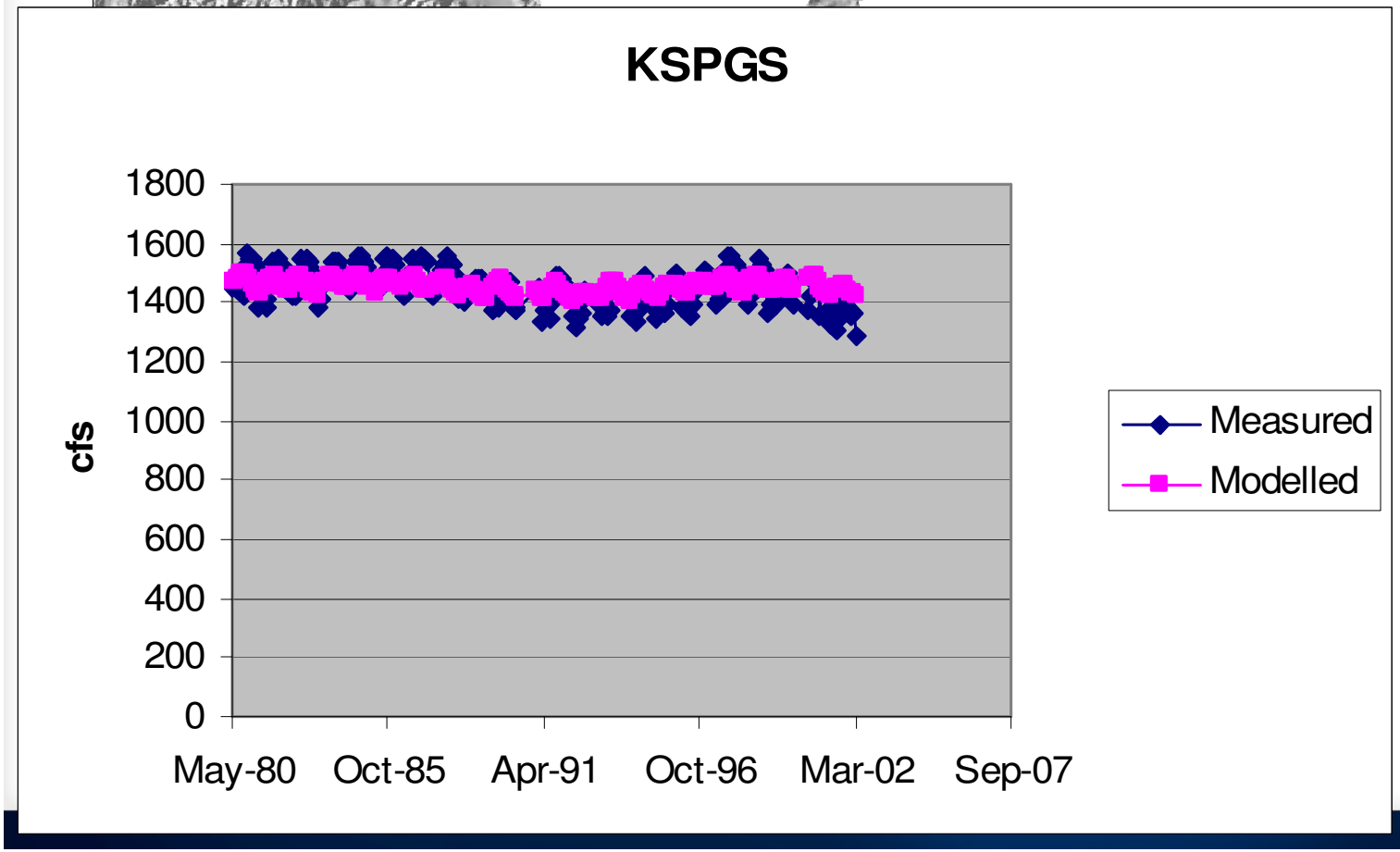
Spring


Box
450
400
350
300
250
200
150
100
50
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled
Modelled

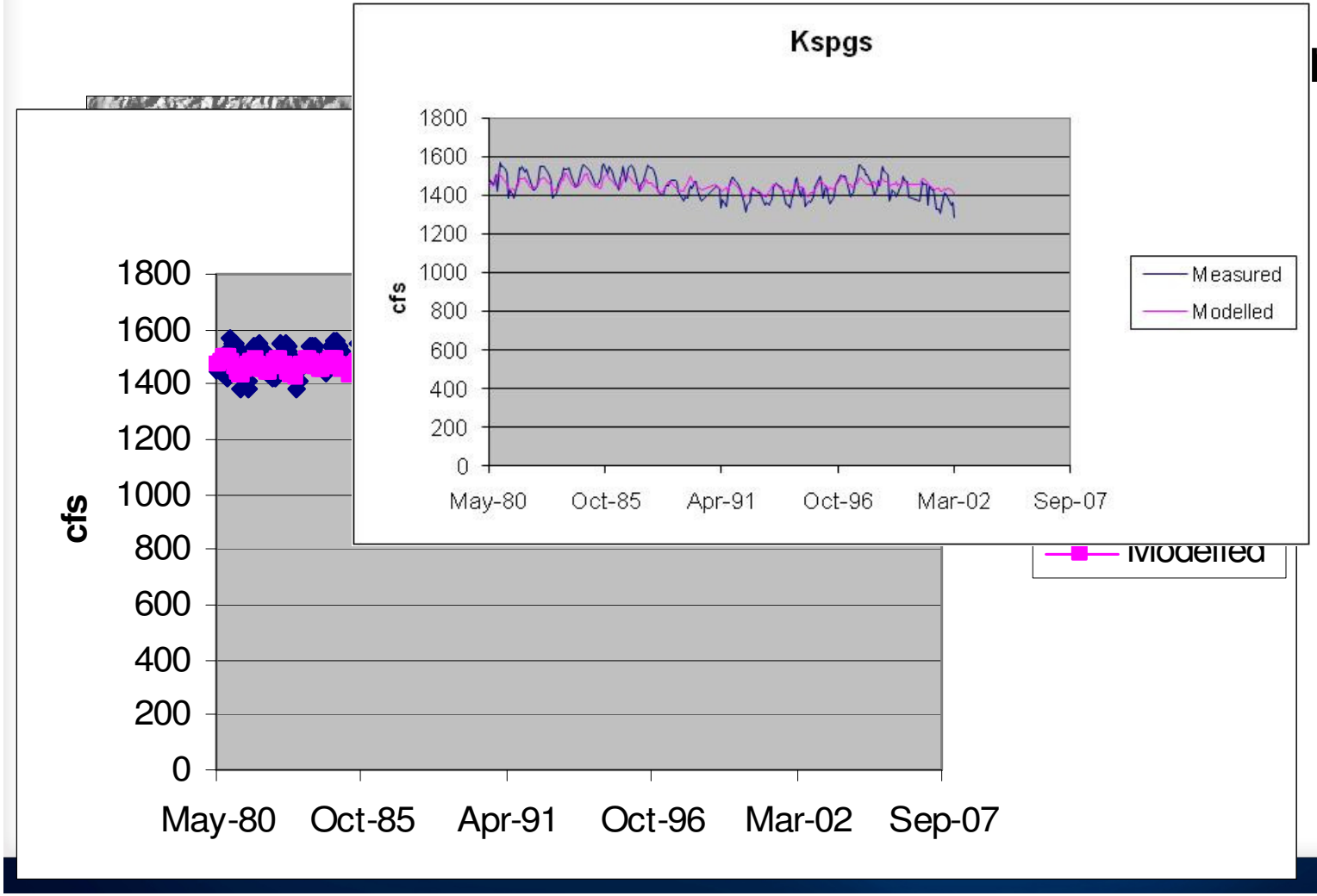


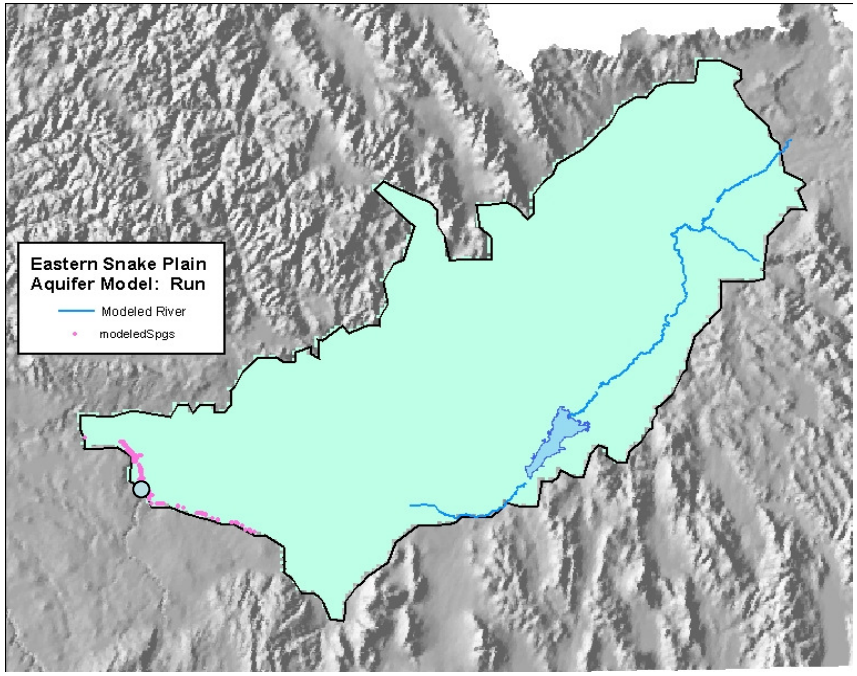
- Thousand Springs

- Thousand Springs

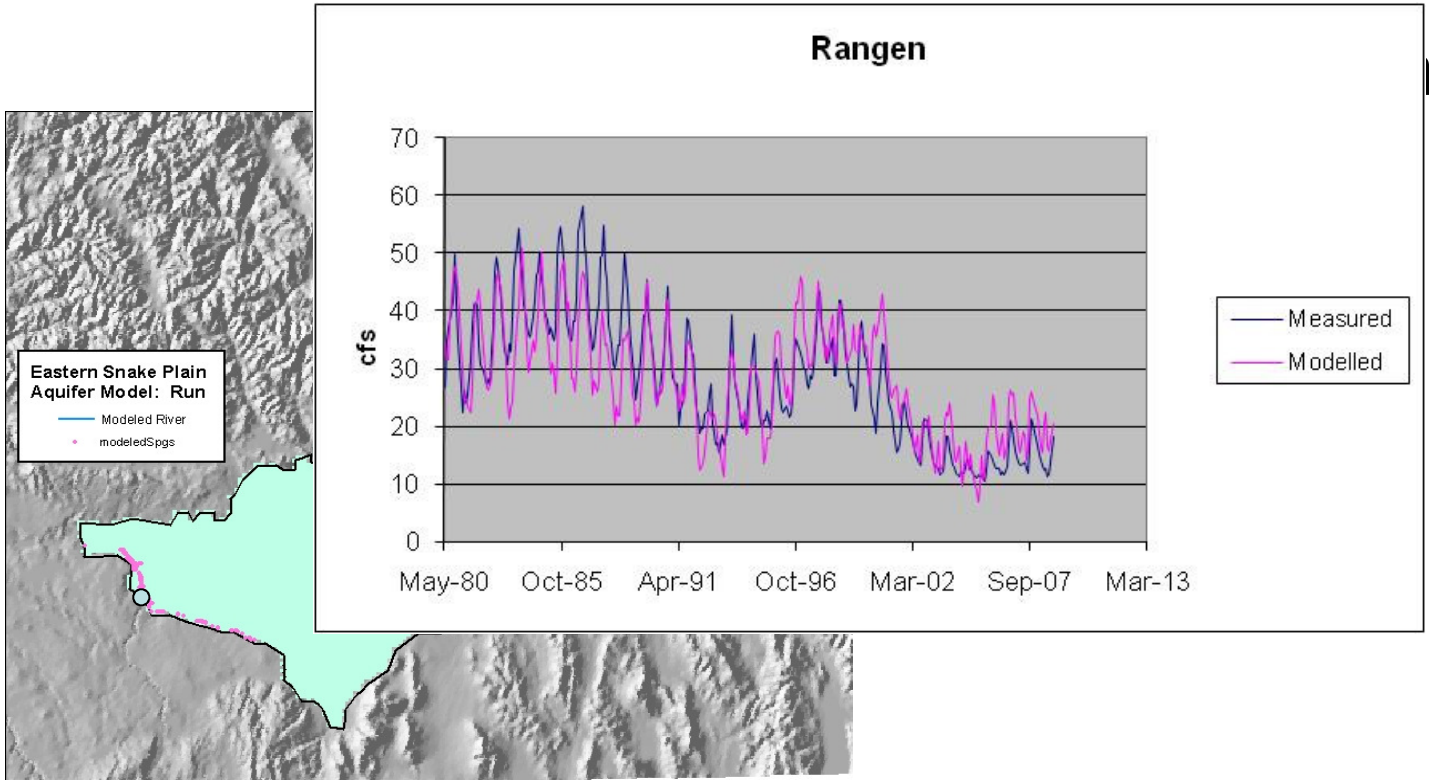


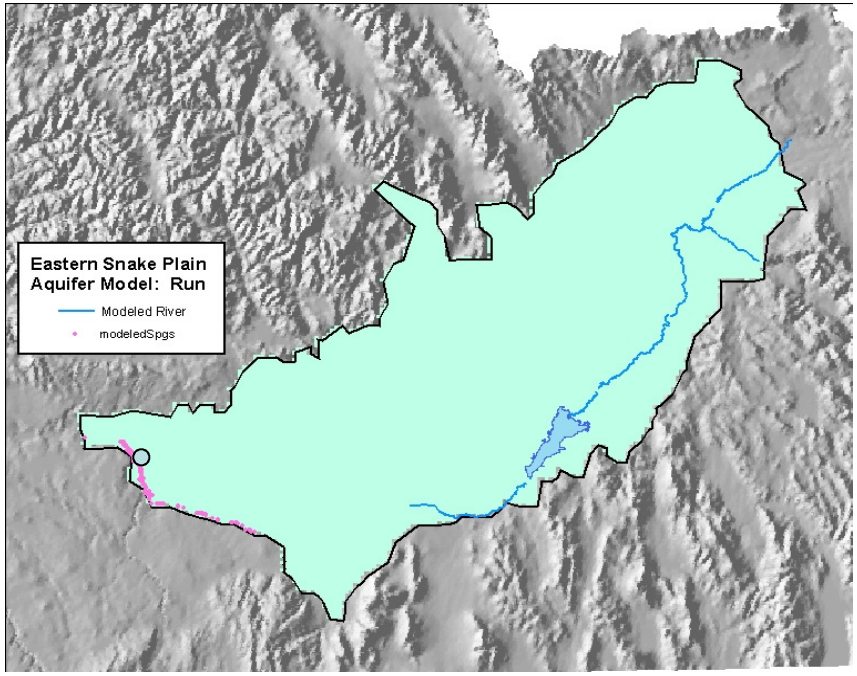
rings


Kspgs
cfs
1800
1600
1400
1200
1000
800
600
400
200
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled
Modelled



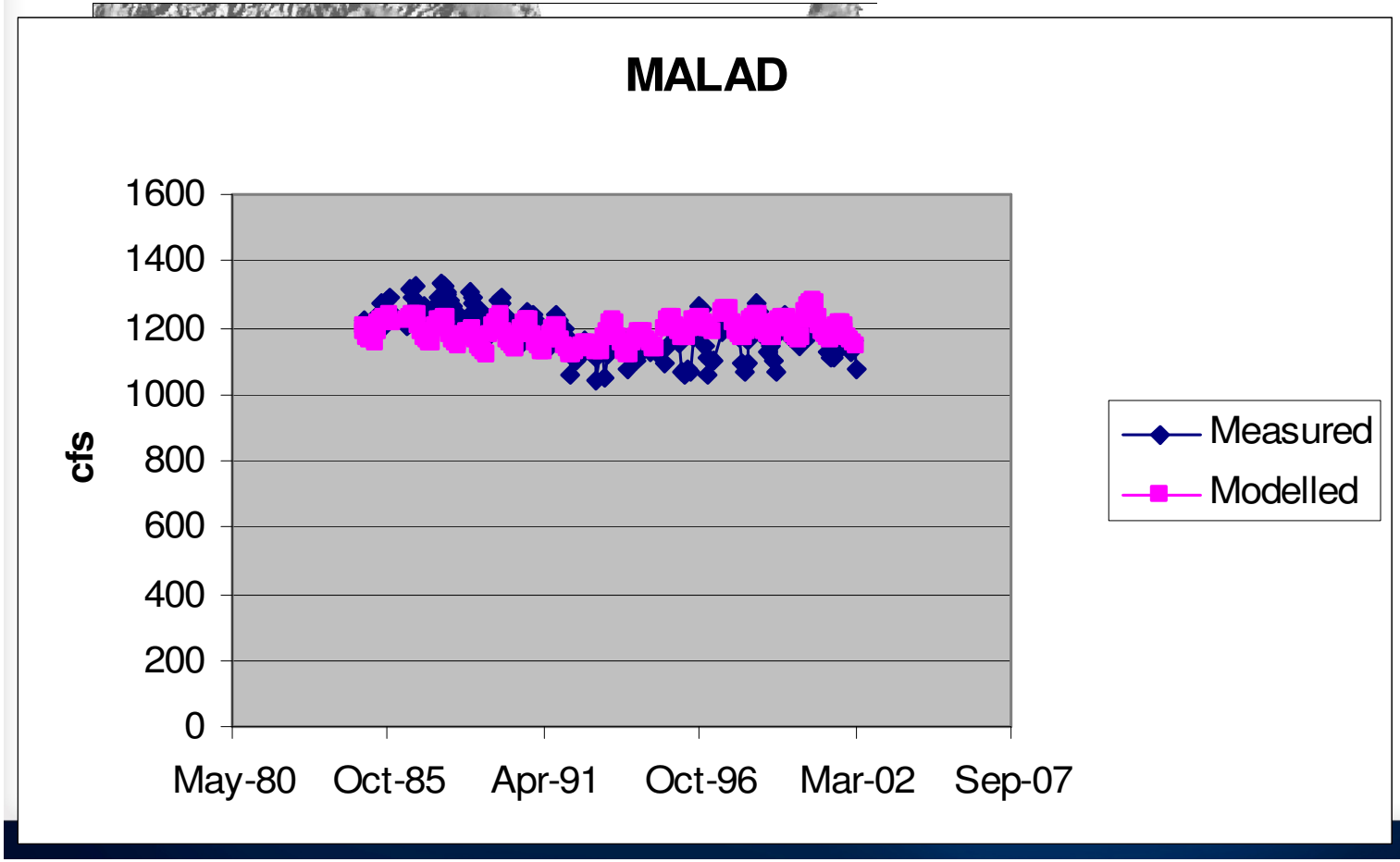
- Rangen Spring

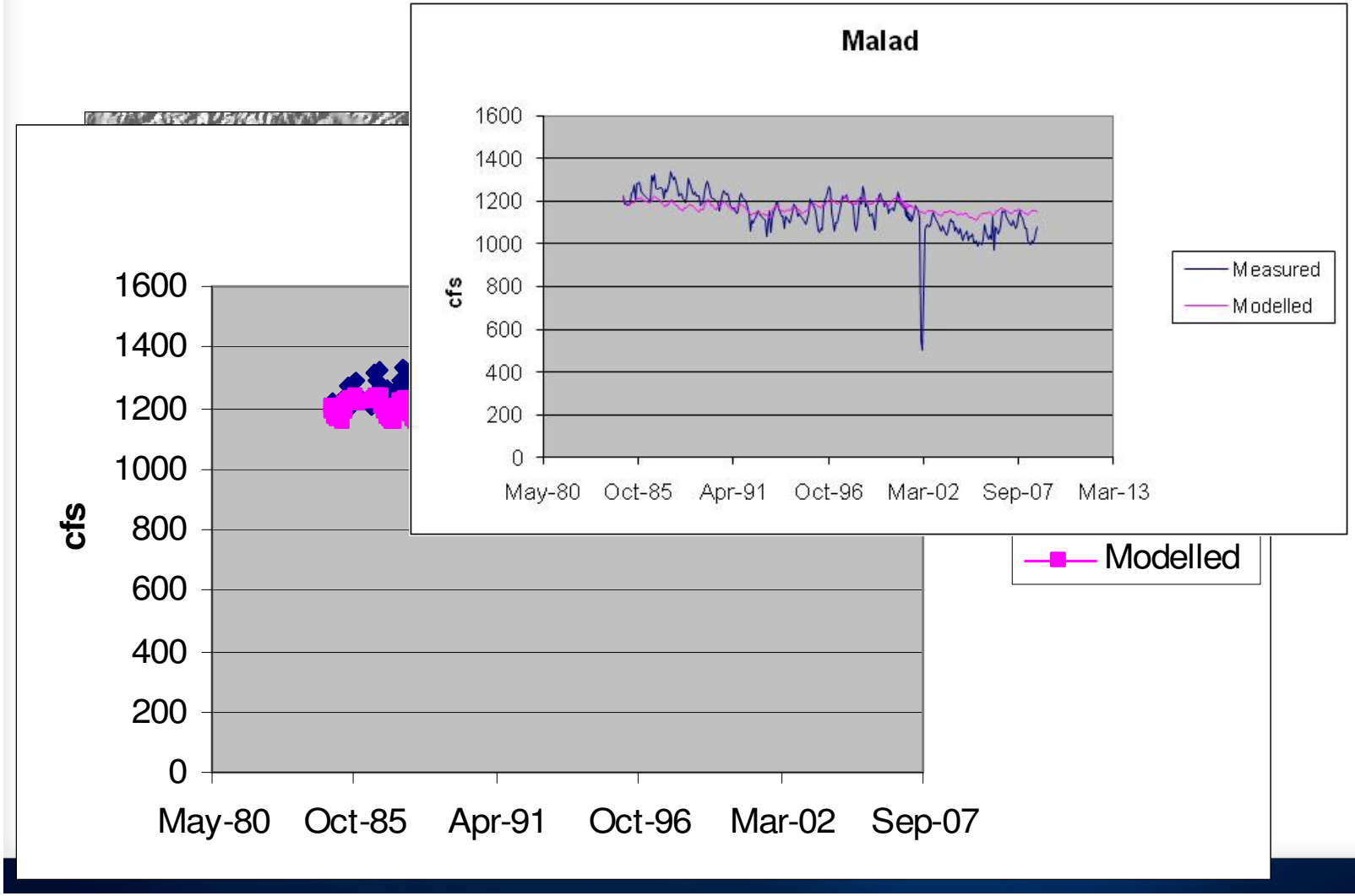

Rangen
70
60
50
40
30
20
10
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled
Eastern Snake Plain Aquifer Model: Run
Modeled River
modeledSpgs

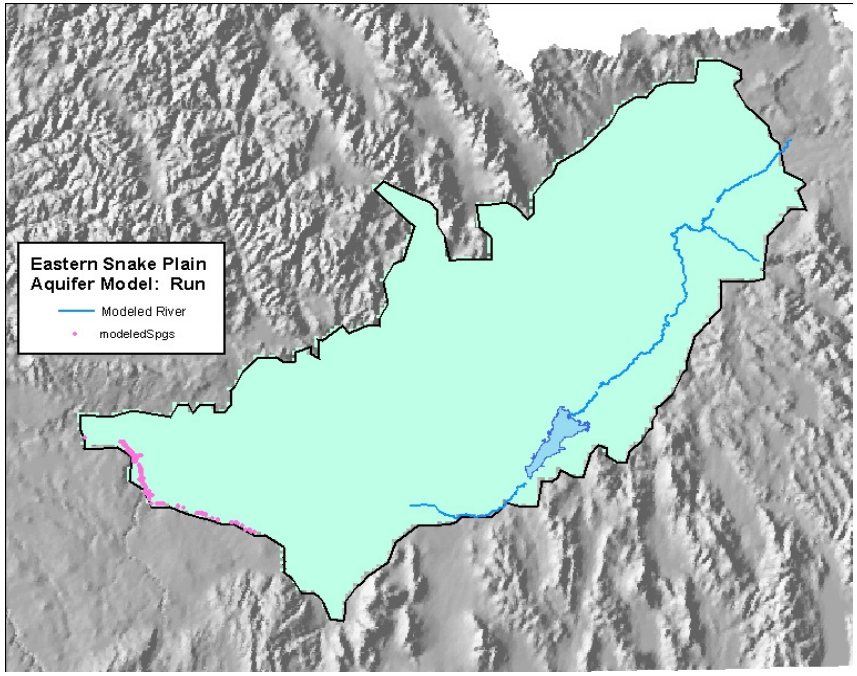

Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs

- Malad

- Malad

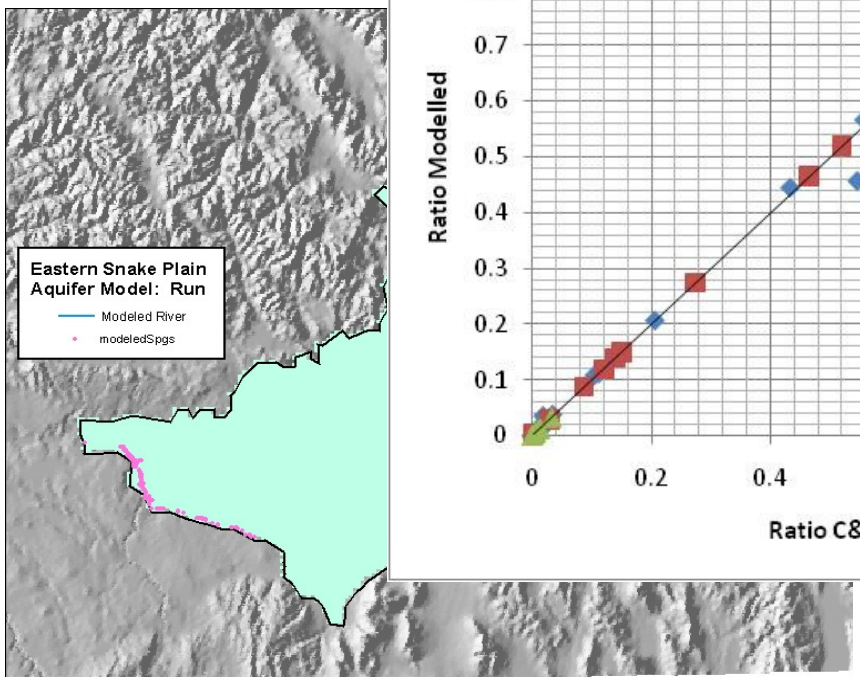

MALAD
cfs
1600
1400
1200
1000
800
600
400
200
0
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Measured
Modelled

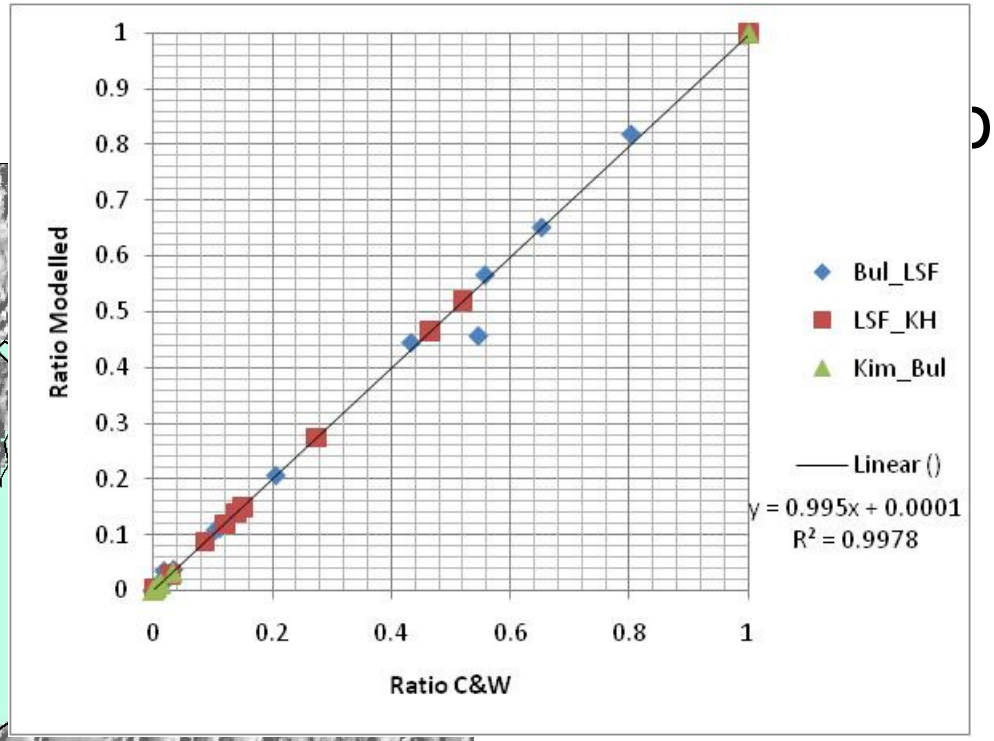

Malad
1600
1400
1200
1000
800
600
400
200
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Mar-13
Measured
Modelled
1600
1400
1200
1000
800
600
400
200
0
cfs
May-80
Oct-85
Apr-91
Oct-96
Mar-02
Sep-07
Modelled



- Group C Springs

prings


Eastern Snake Plain
Aquifer Model: Run
Modeled River
modeledSpgs


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
0
0.2
0.4
0.6
0.8
1
Bul_LSF
LSF_KH
Kim_Bul
Linear ()
y = 0.995x + 0.0001
R² = 0.9978

END