Short Model Run

11 May 2007

B. Contor

Short Model Run

- Purpose is **to establish starting heads for scenario**
- Discussed at length in past ESHMC meetings
- New data where available, extract from calibration data otherwise
- Detailed plan outlined in Jan 07 memo

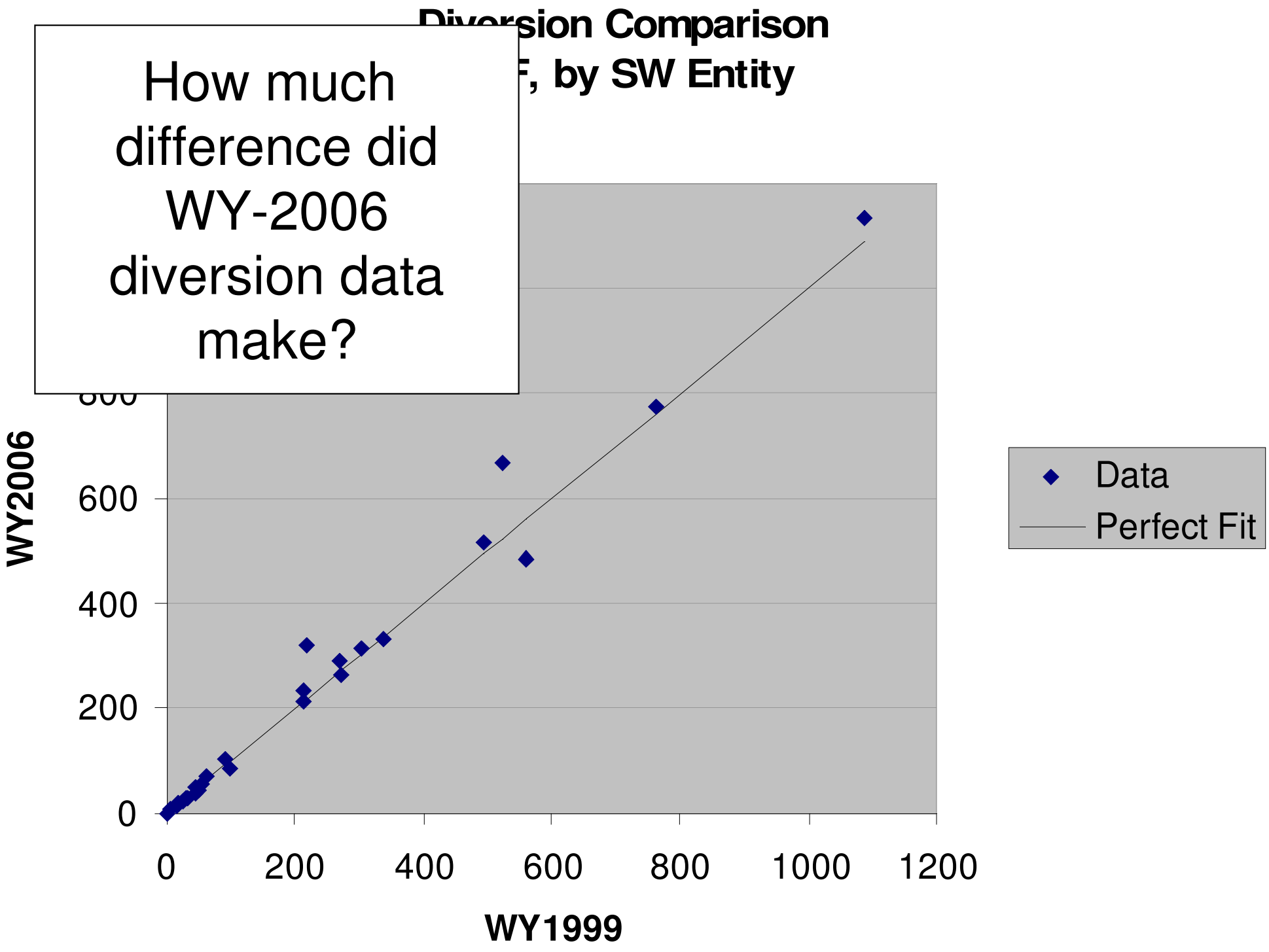
Overview of January ’07 Plan

- Use available actual Snake River and Wood Rivers diversions from electronic IDWR data (2002 - 2005)
- Use actual PRISM precipitation where available (through September 2006)
- For other data, use calibration-period data from model year 2000 as proxy for 2002-2005. Use calibration period from model year 1999 as proxy for 2006

Departures from Plan

- Plan
  - Snake River diversions 2006
    - 1999 calibration data
- Actual
  - Snake diversions 2006
    - Actual data from IDWR expedited processing (all Snake entities but Ft. Hall)

How much difference did WY-2006 diversion data make?



Departures from Plan

- Plan
  - Canal seepage
    - 1999 data
  - Precip Oct 06 – April 07
    - model-year 1999. Note that model-year 1999 used “departures-based” NOAA estimates
- Actual
  - Canal seepage
    - 2001 fractions applied to diversions
  - Precip Oct 06 – Apr 07
    - Preliminary or provisional PRISM through February 07, PRISM corresponding to model-year 1999 for March and April 07.

Departures from Plan

- Plan
  - Return flows
    - calculate from diversions using most-recent return-flow fractions
- Actual
  - Return flows
    - Wood Rivers: Actual data (through ’05)
    - Entities w/ recent return-flow measurements: Use most recent fraction
    - Other entities: Use base fraction from calibration period

Departures from Plan

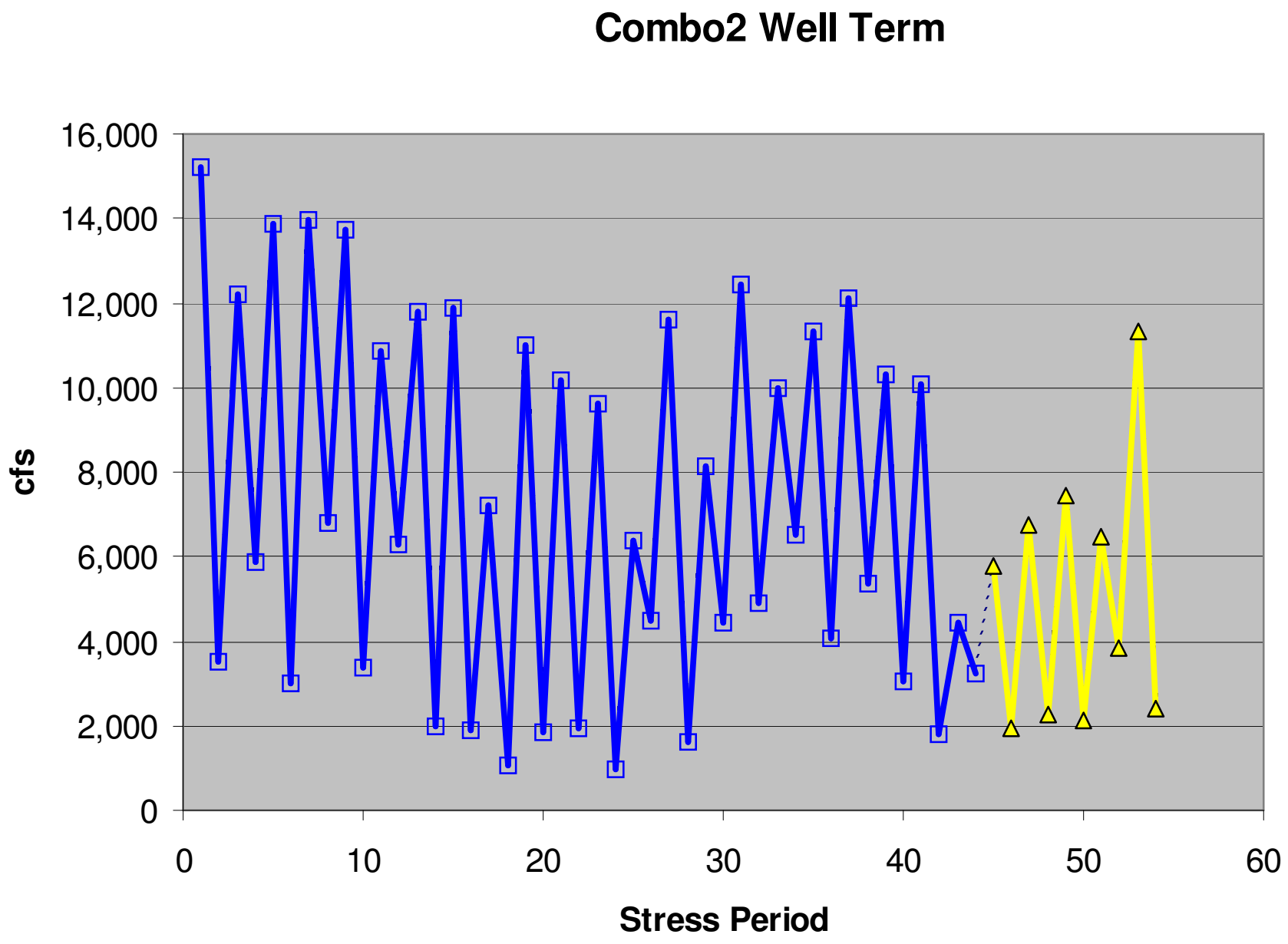
- Plan
  - Sprinkler percentage
    - not mentioned
  - Irrigated lands
    - not mentioned
- Actual
  - Sprinkler percentage
    - most recent calibration data (model year 2001)
  - Irrigated lands
    - null_irr_001 from May training (year-2000 LANDSAT derived)

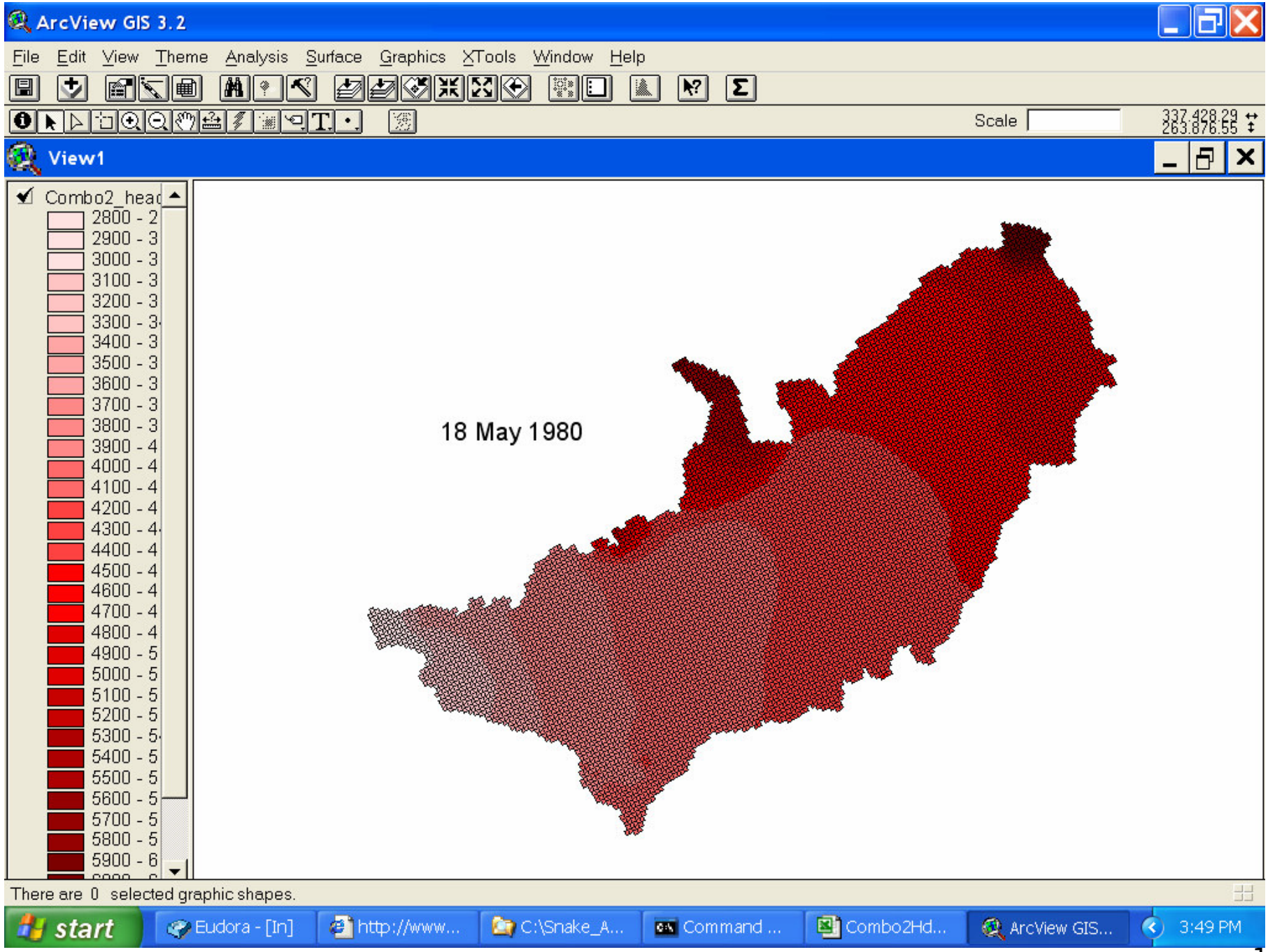
Departures from Plan

- Plan
  - Starting Heads
    - Ending heads from model calibration
- Actual
  - Starting Heads
    - Calibration actually ended 25 April 02. Simulation adjusted *.dis file to account for leap years, tacked extended data onto calibration data, and run from 1 May 1980 through 30 April 2007, with calibration starting heads

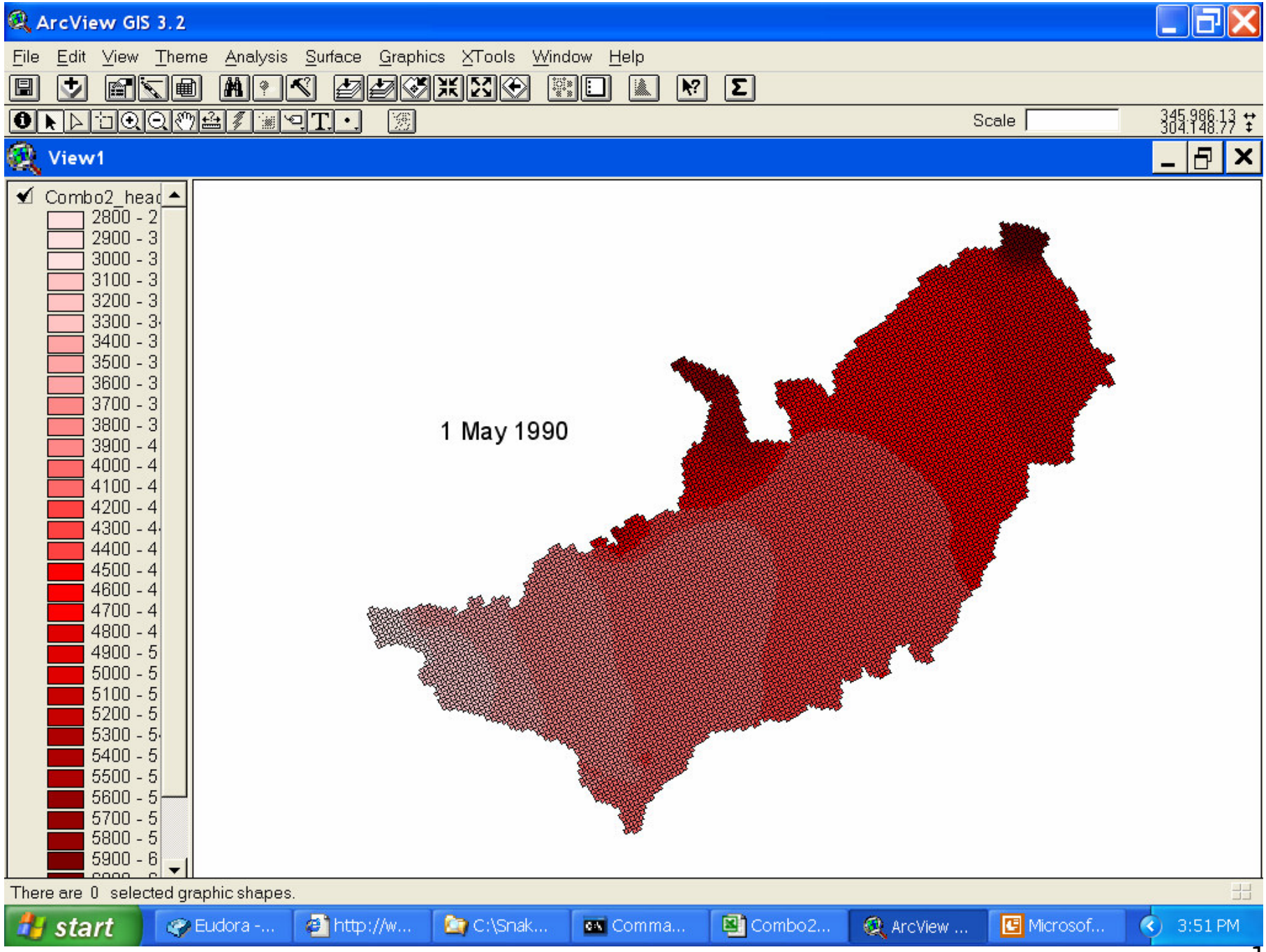
Resulting “Combo2” Run

Note: Combo3 will supercede Combo2 (Aberdeen-Springfield returns issue)

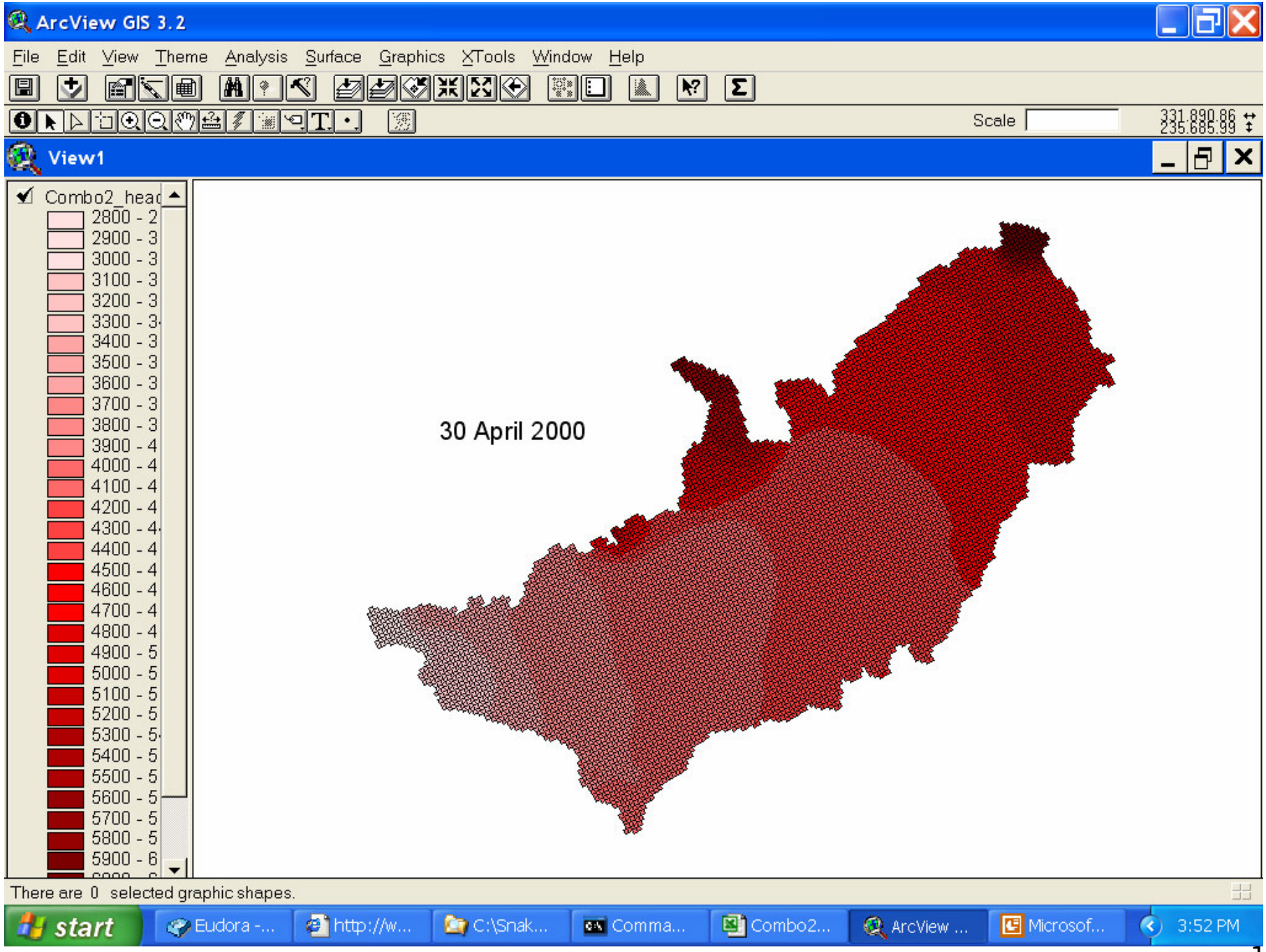

Combo2 Well Term
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
cfs
0
10
20
30
40
50
60
Stress Period



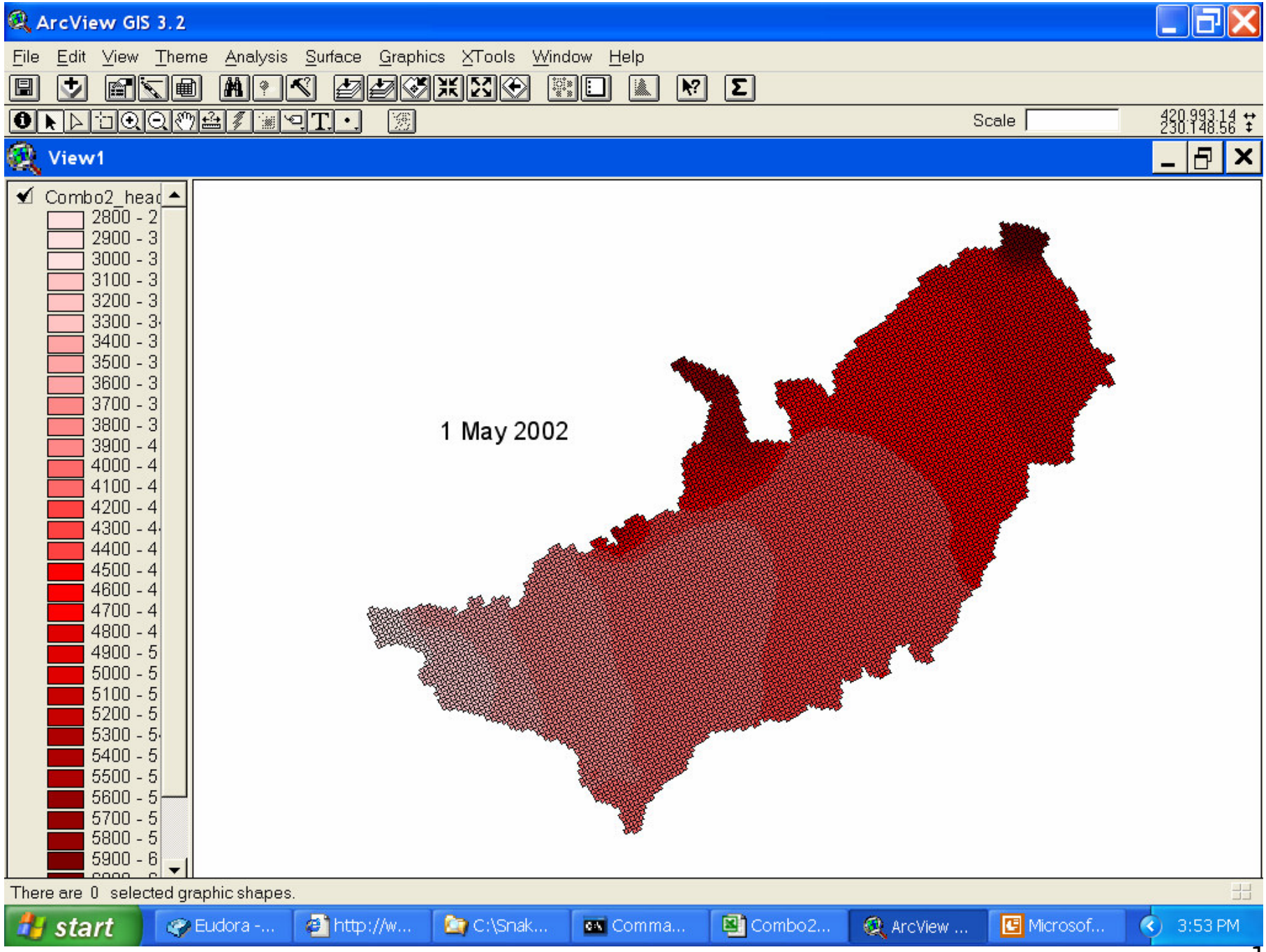
Combo2 starting heads



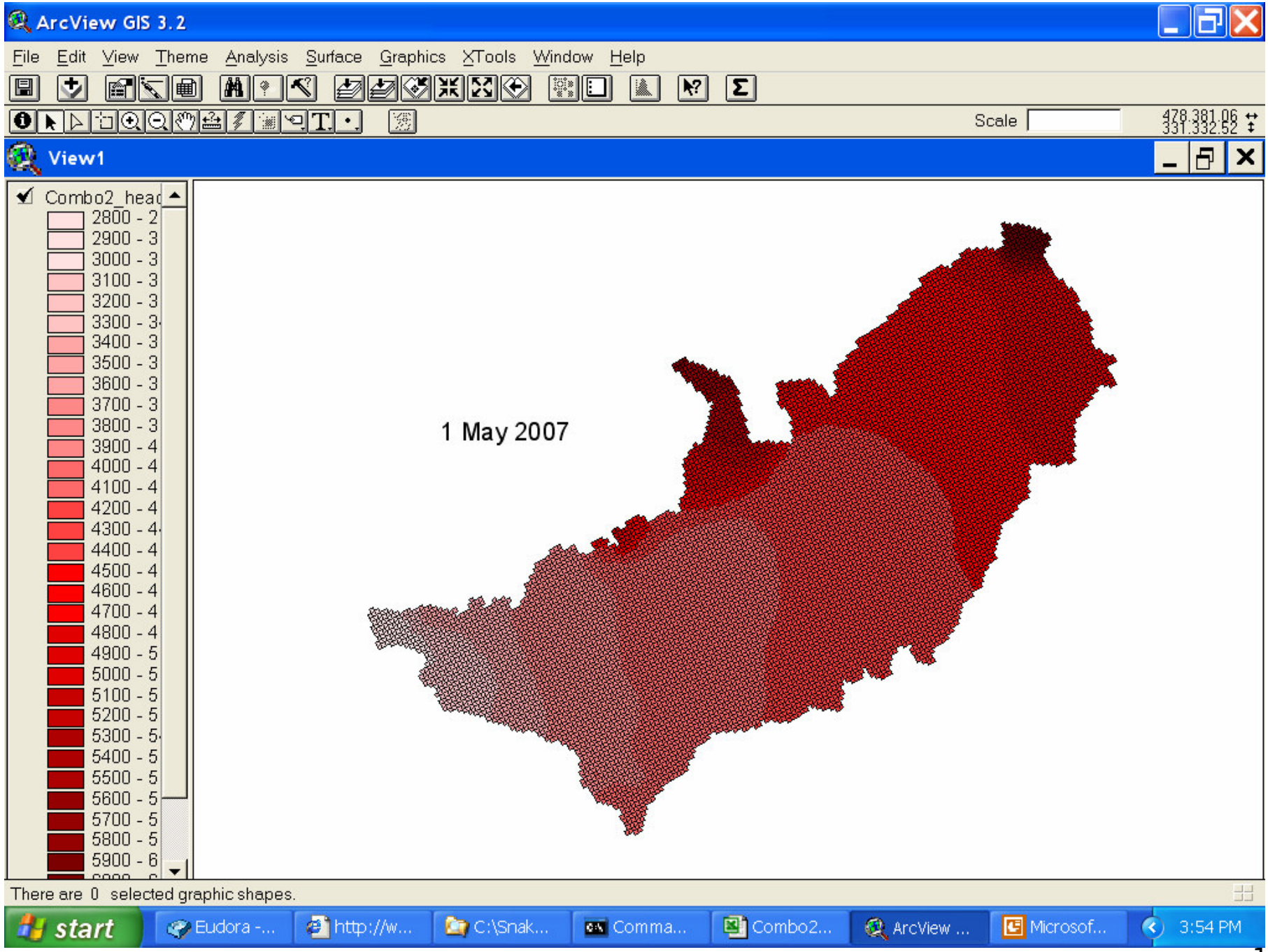
Combo2 intermediate heads



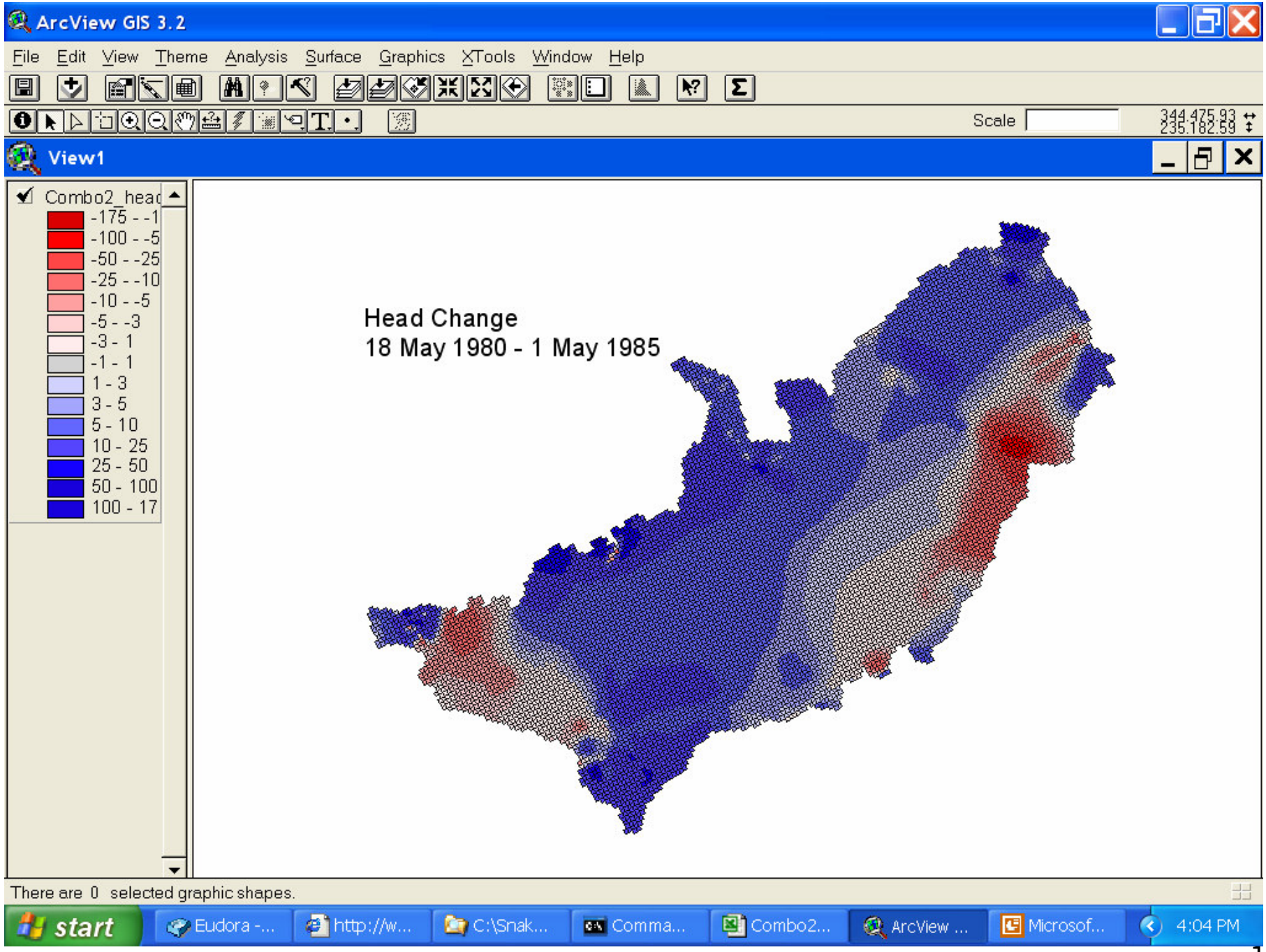
Combo2 intermediate heads

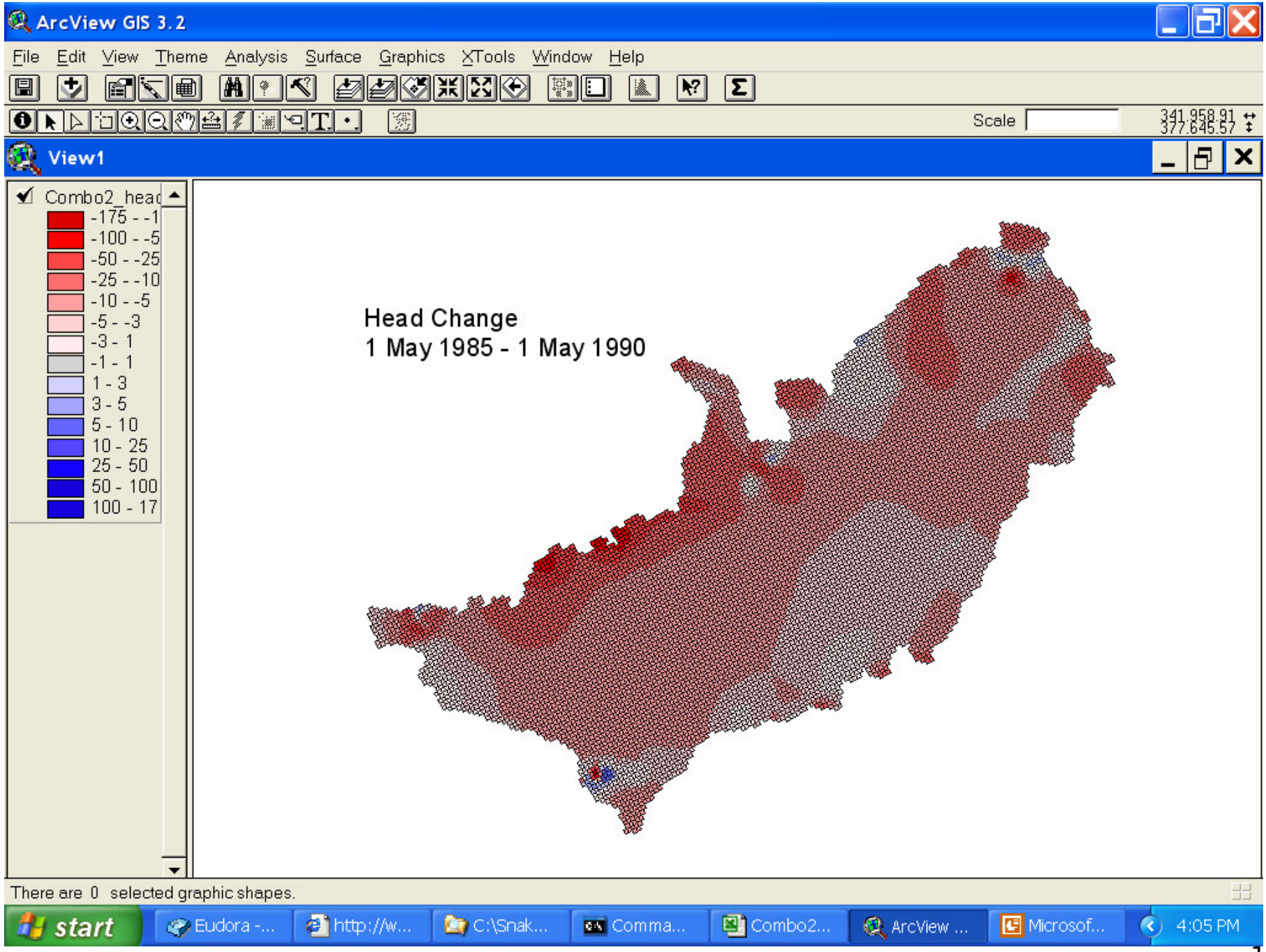


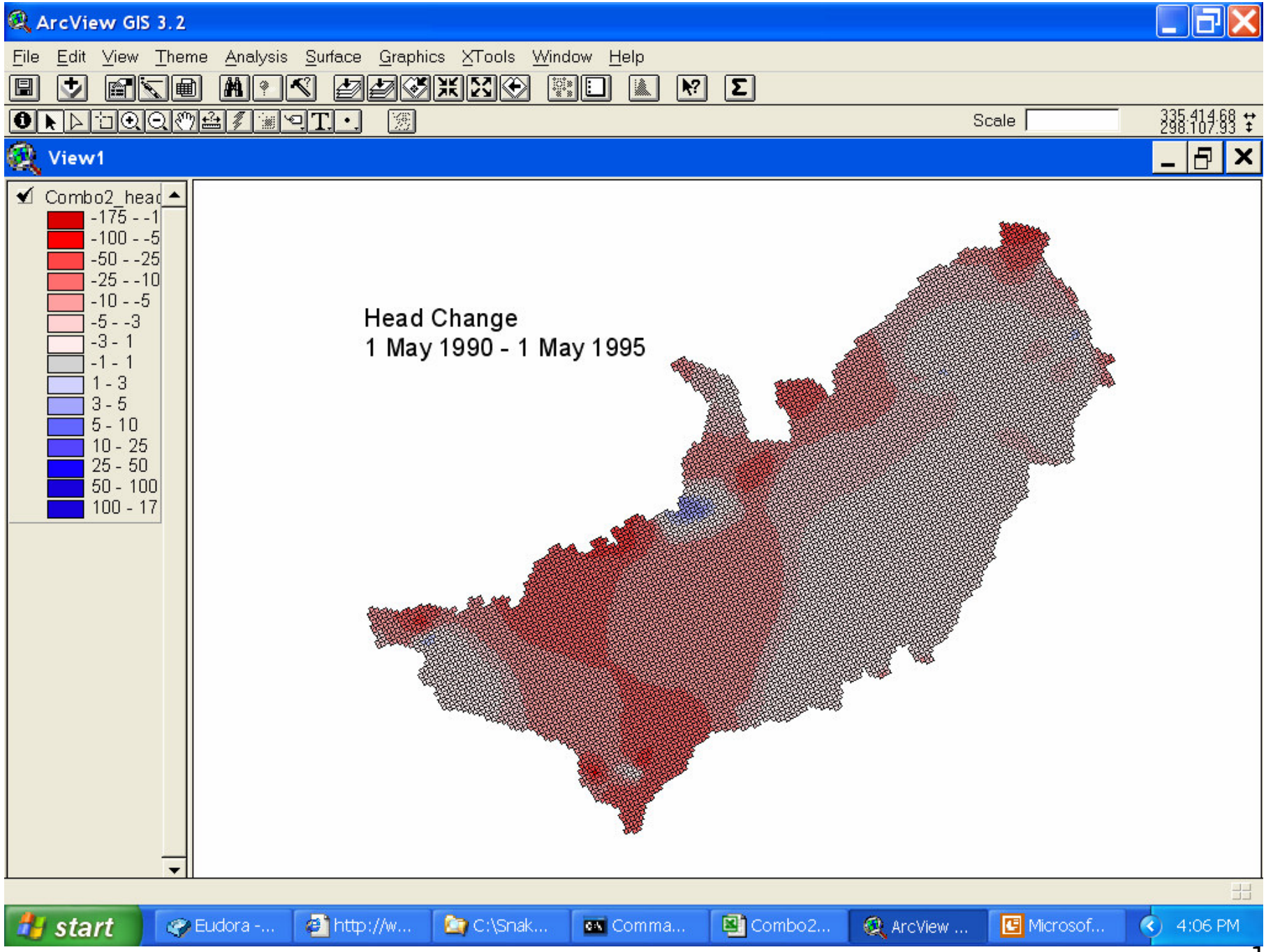
Combo2 intermediate heads

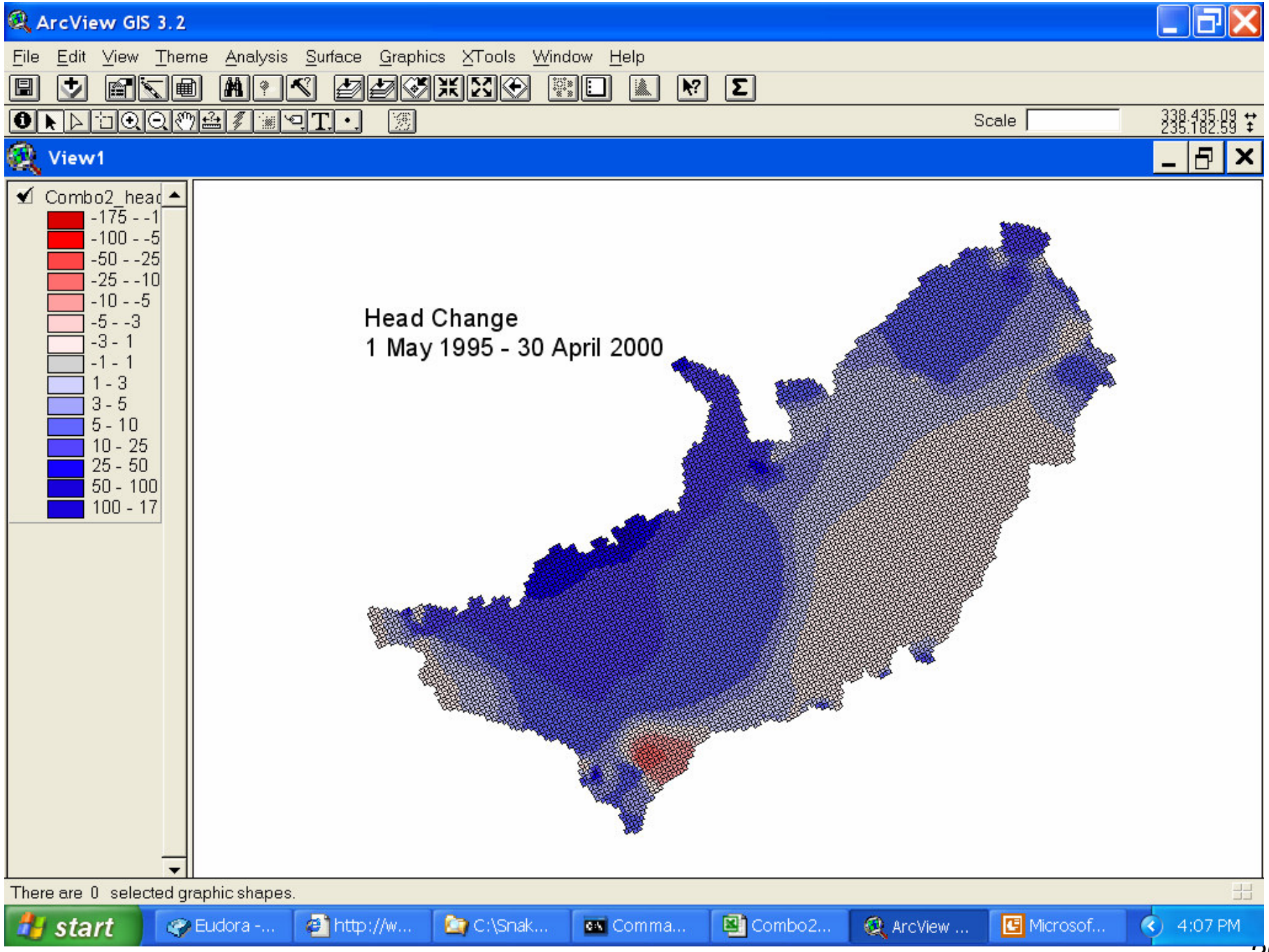


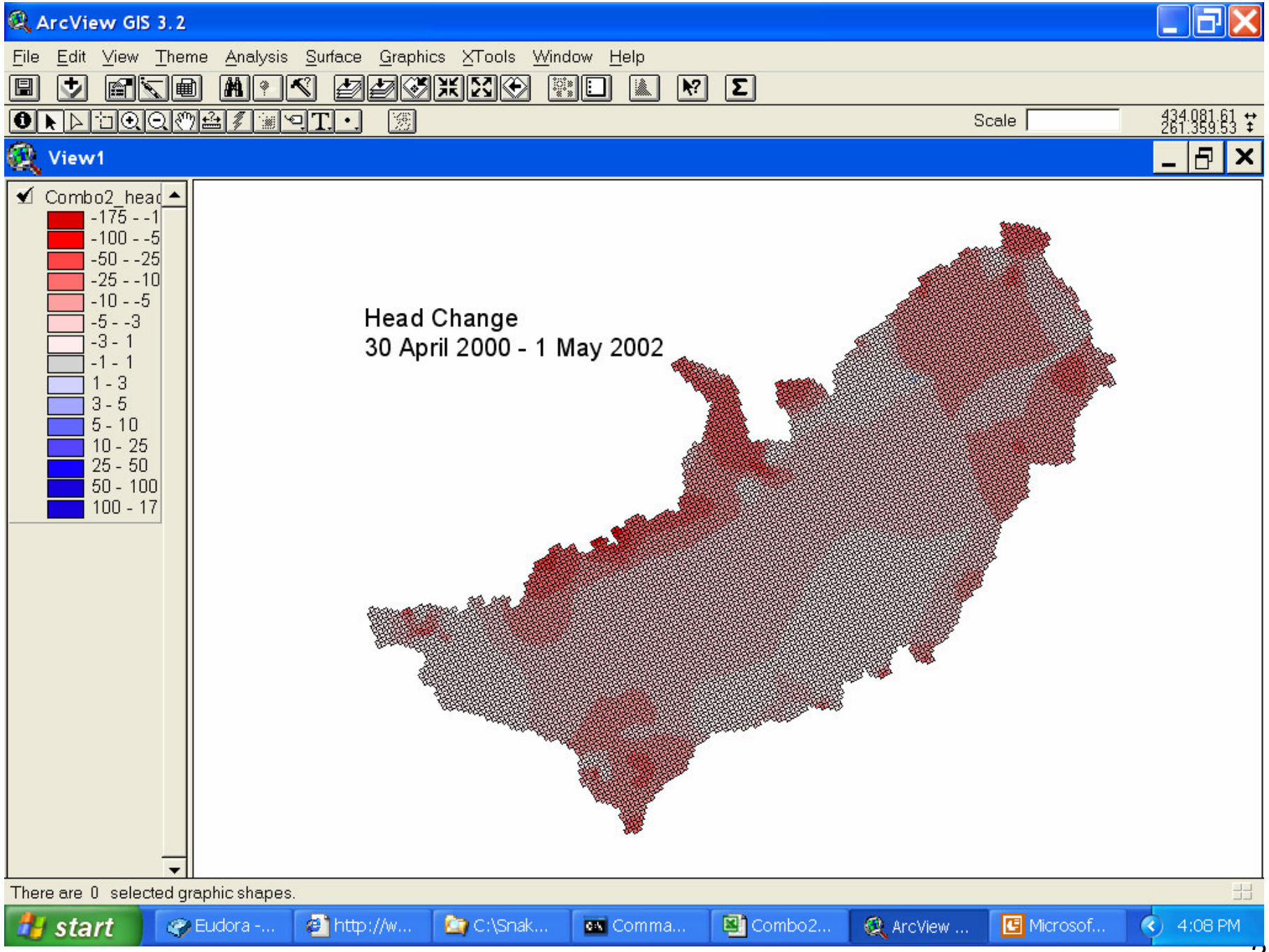
Combo2 ending heads

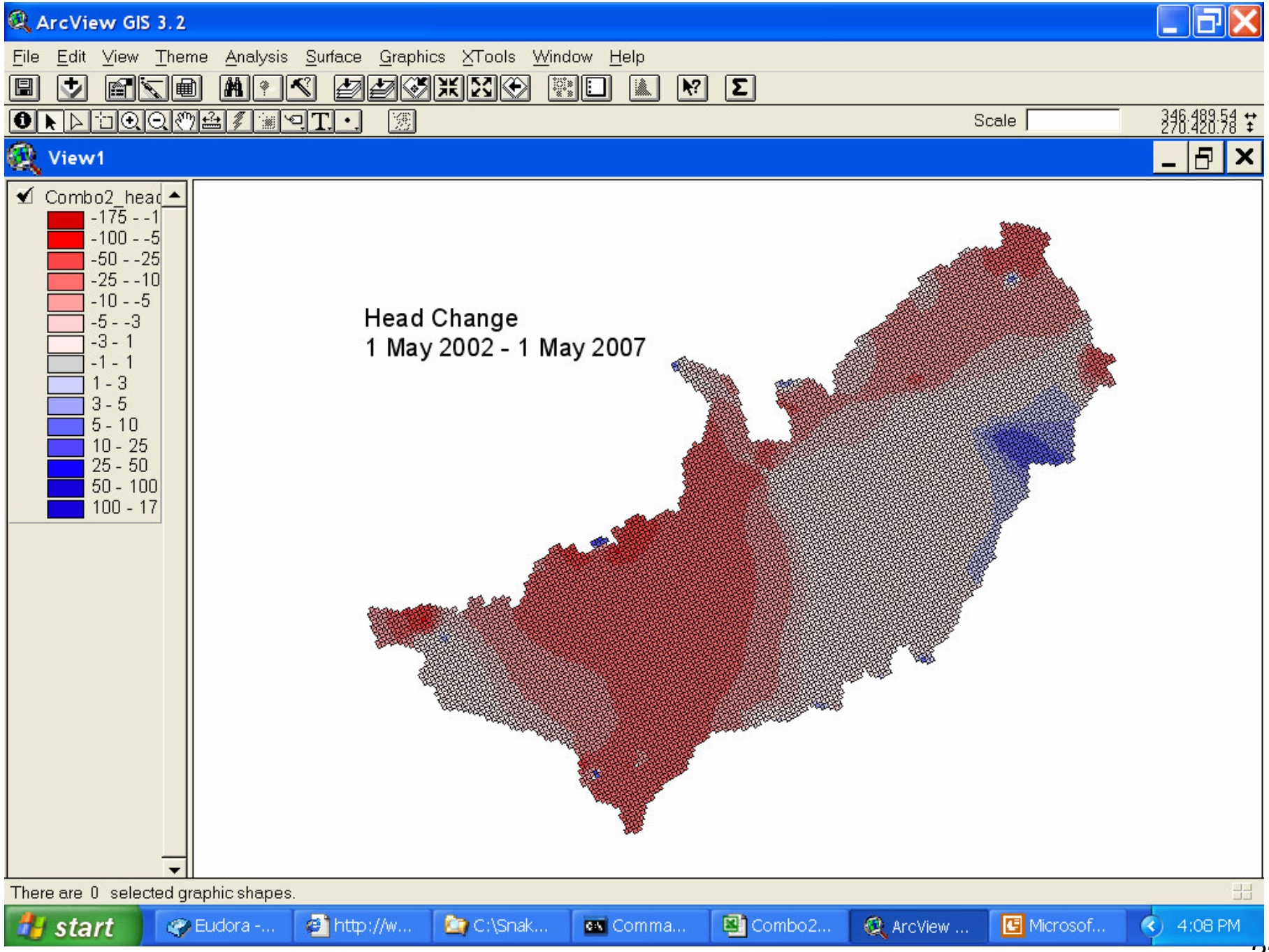

ArcView GIS 3.2
File Edit View Theme Analysis Surface Graphics XTools Window Help
Scale
344,475.93
235,182.59
View1
Combo2_head
-175 - -1
-100 - -5
-50 - -25
-25 - -10
-10 - -5
-5 - -3
-3 - 1
-1 - 1
1 - 3
3 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 17
Head Change
18 May 1980 - 1 May 1985
There are 0 selected graphic shapes.
start
Eudora -...
http://w...
C:\Snak...
Comma...
Combo2...
ArcView ...
Microsof...
4:04 PM


ArcView GIS 3.2
File Edit View Theme Analysis Surface Graphics XTools Window Help
Scale
View1
Combo2_head
-175 - -1
-100 - -5
-50 - -25
-25 - -10
-10 - -5
-5 - -3
-3 - 1
-1 - 1
1 - 3
3 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 17
Head Change
1 May 1985 - 1 May 1990
There are 0 selected graphic shapes.
start
Eudora -...
http://w...
C:\Snak...
Comma...
Combo2...
ArcView ...
Microsof...
4:05 PM


ArcView GIS 3.2
File Edit View Theme Analysis Surface Graphics XTools Window Help
Scale
335,414.68
298,107.93
View1
Combo2_head
-175 - -1
-100 - -5
-50 - -25
-25 - -10
-10 - -5
-5 - -3
-3 - 1
-1 - 1
1 - 3
3 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 17
Head Change
1 May 1990 - 1 May 1995
start
Eudora -...
http://w...
C:\Snak...
Comma...
Combo2...
ArcView ...
Microsof...
4:06 PM


ArcView GIS 3.2
File Edit View Theme Analysis Surface Graphics XTools Window Help
Scale
338,435.09
235,182.59
View1
Combo2_head
-175 - -1
-100 - -5
-50 - -25
-25 - -10
-10 - -5
-5 - -3
-3 - 1
-1 - 1
1 - 3
3 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 17
Head Change
1 May 1995 - 30 April 2000
There are 0 selected graphic shapes.
start
Eudora -...
http://w...
C:\Snak...
Comma...
Combo2...
ArcView ...
Microsof...
4:07 PM


ArcView GIS 3.2
File Edit View Theme Analysis Surface Graphics XTools Window Help
Scale
434,081.61
261,359.53
View1
Combo2_head
-175 - -1
-100 - -5
-50 - -25
-25 - -10
-10 - -5
-5 - -3
-3 - 1
-1 - 1
1 - 3
3 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 17
Head Change
30 April 2000 - 1 May 2002
There are 0 selected graphic shapes.
start
Eudora -...
http://w...
C:\Snak...
Comma...
Combo2...
ArcView ...
Microsof...
4:08 PM

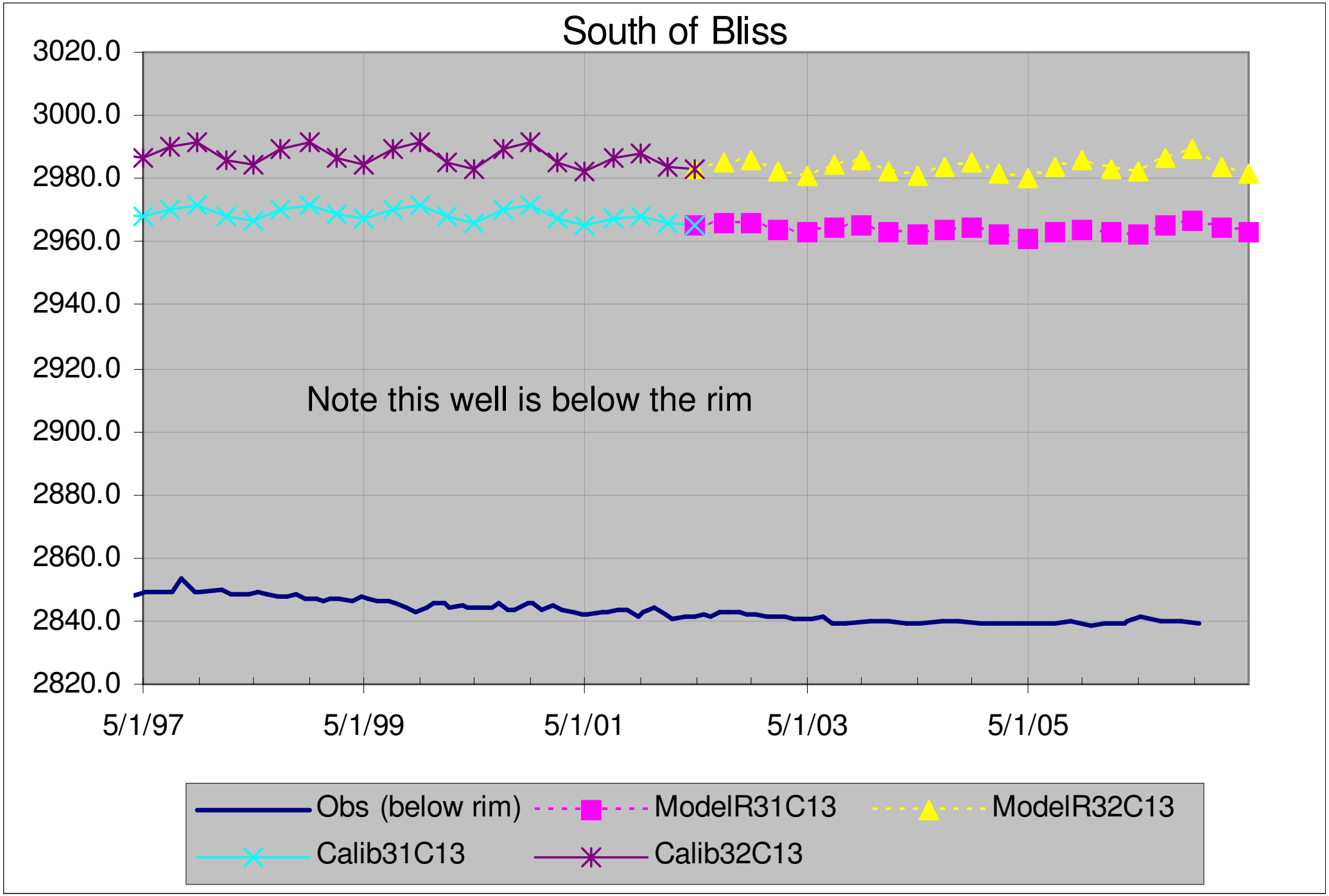

ArcView GIS 3.2
File Edit View Theme Analysis Surface Graphics XTools Window Help
Scale
346,489.54
270,420.78
View1
Combo2_head
-175 - -1
-100 - -5
-50 - -25
-25 - -10
-10 - -5
-5 - -3
-3 - 1
-1 - 1
1 - 3
3 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 17
Head Change
1 May 2002 - 1 May 2007
There are 0 selected graphic shapes.
start
Eudora -...
http://w...
C:\Snak...
Comma...
Combo2...
ArcView ...
Microsof...
4:08 PM

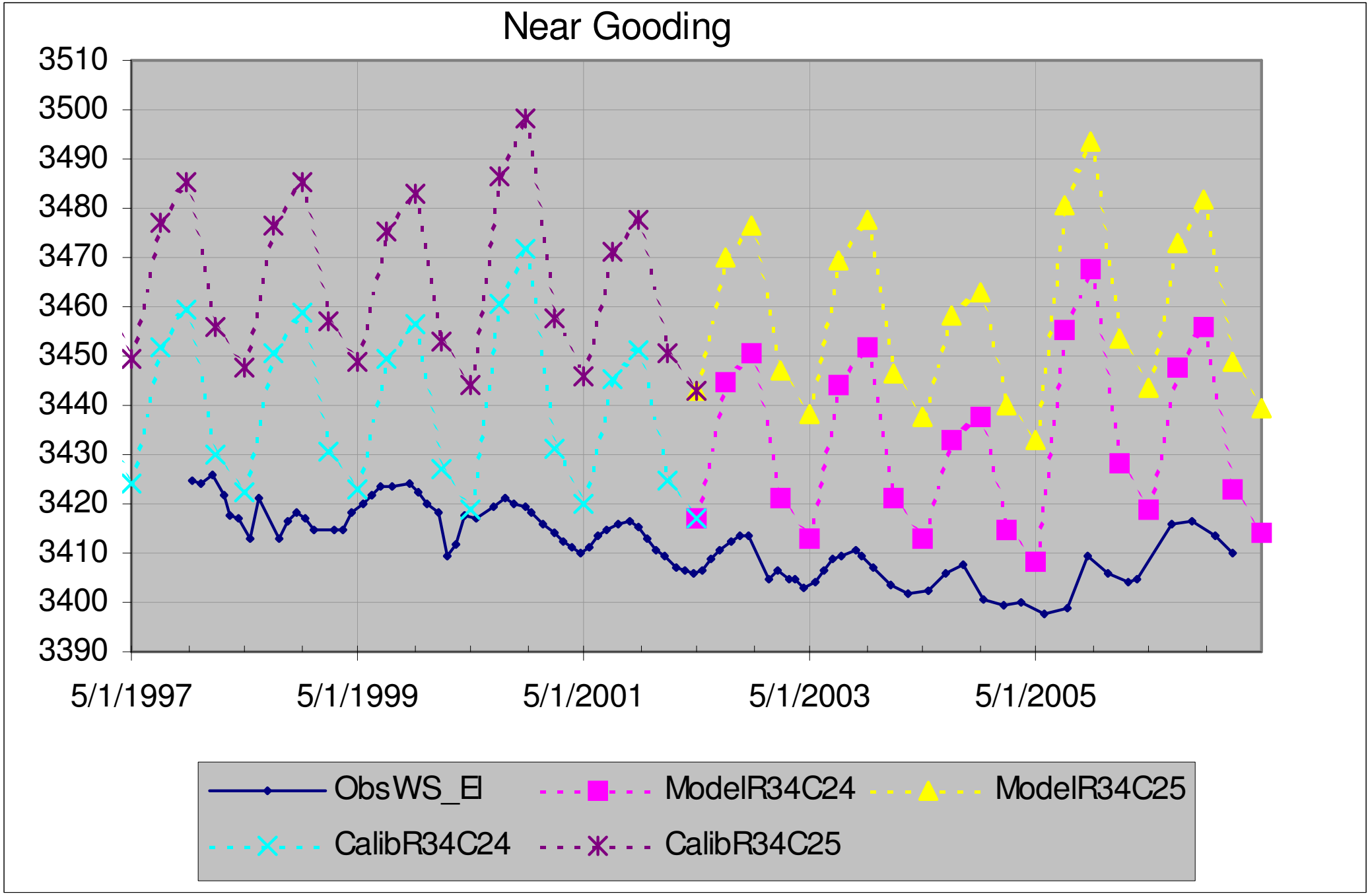
Comparison w/ Calibration & Comparison w/ Observations

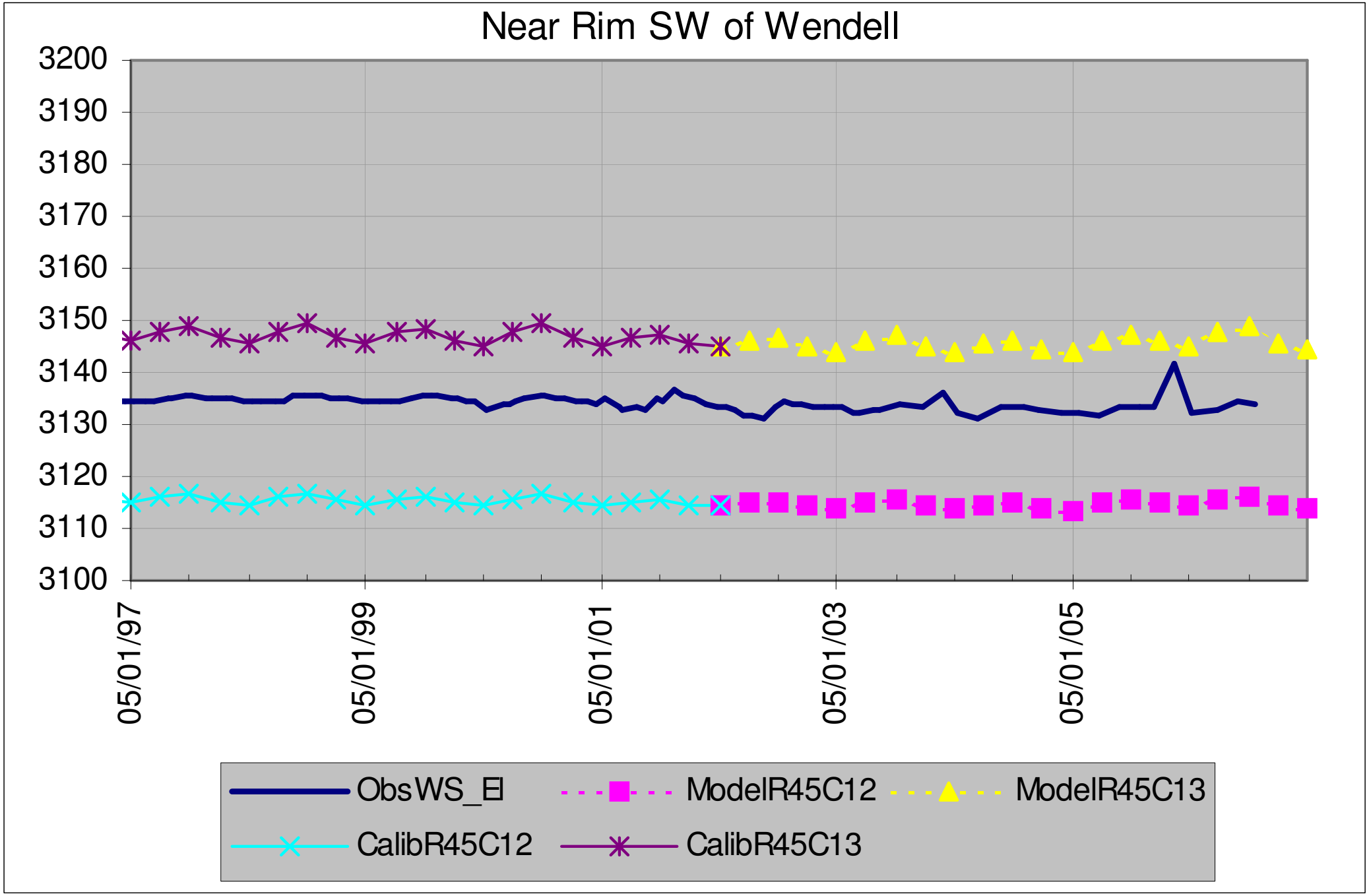
- We are not attempting to *calibrate* the extended data set
- This is a qualitative look for blunders
- Remember the purpose: Get the starting heads about right, so the representation of ***change*** between today & the "long term" Current Practices simulation is about right

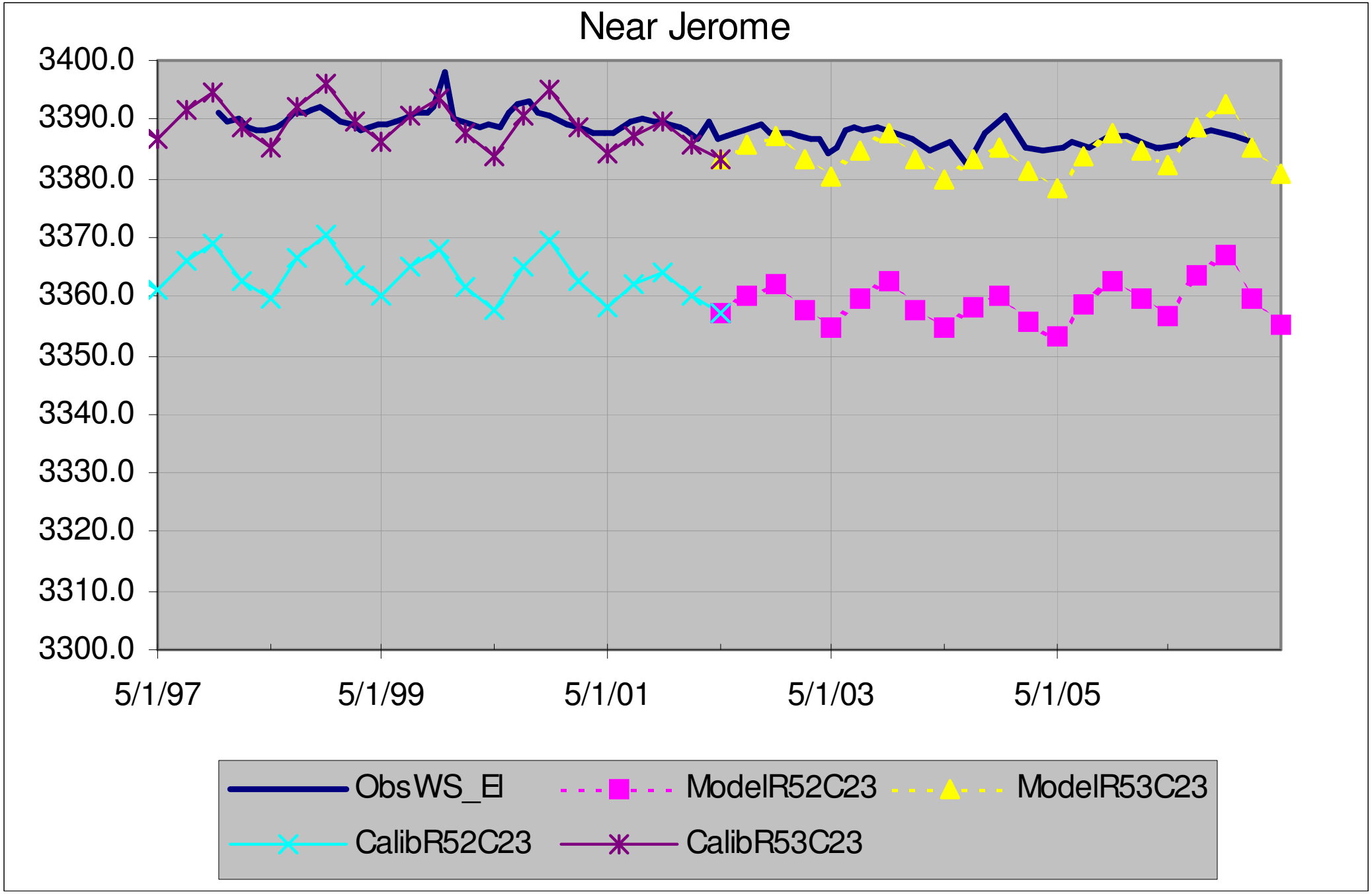
1. Head comparisons

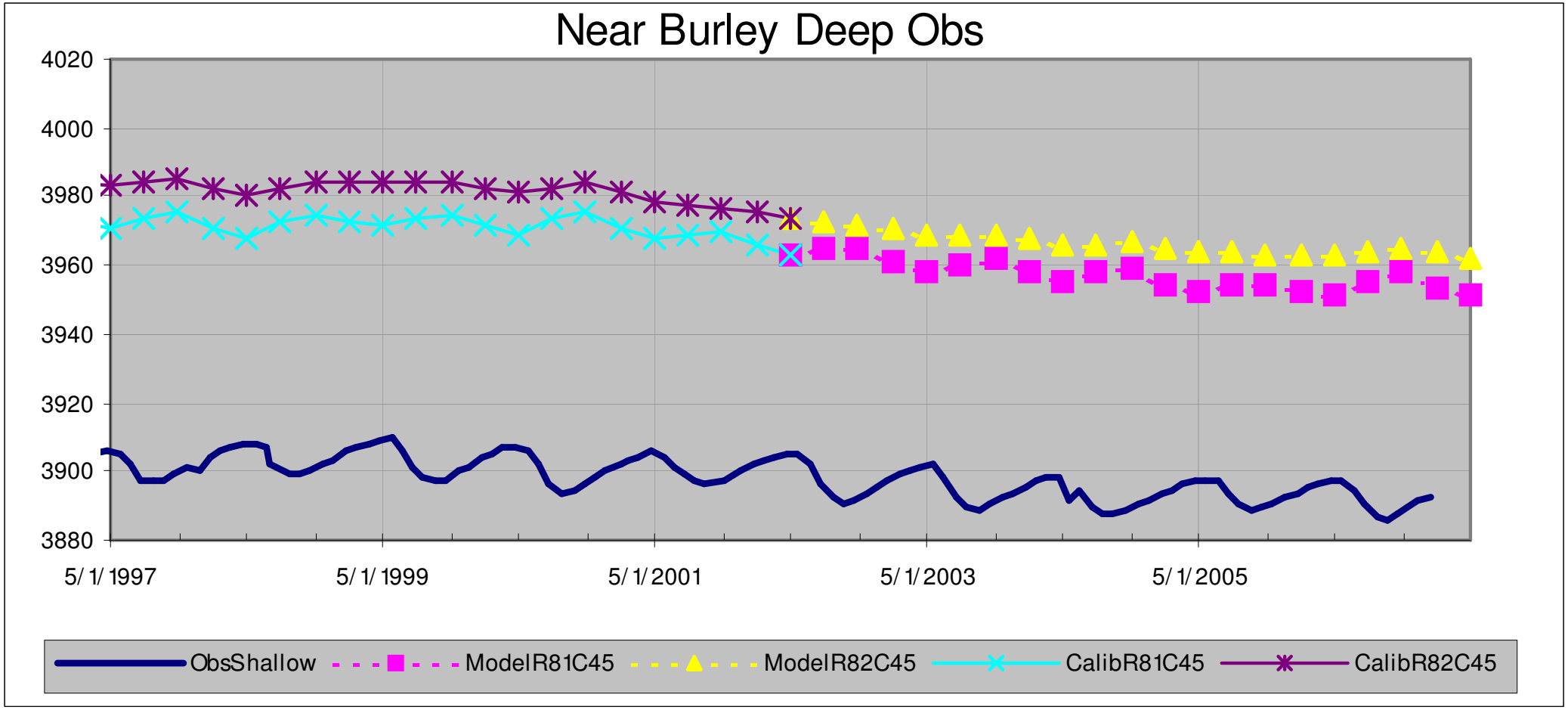
- These locations were selected for two reasons
  - Places that looked funny on the head-change map
  - Effort to get broad spatial distribution
- This isn't a *calibration assessment;* this is an assessment of the *extended data.*
  - Do patterns match calibration patterns?
  - Does the final 3-year trend follow observed trend?
- Note that model heads aren't interpolated; I just took the two closest cells

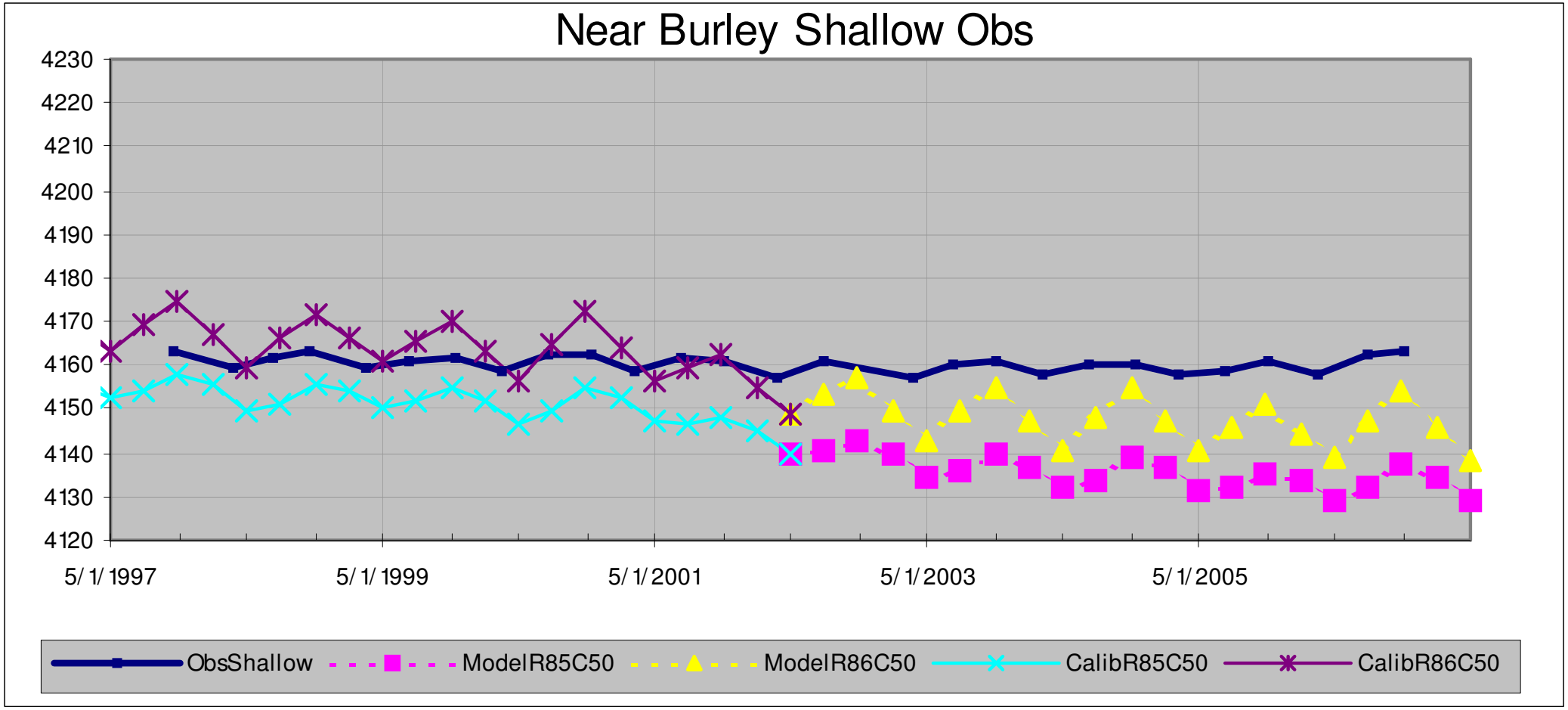

South of Bliss
3020.0
3000.0
2980.0
2960.0
2940.0
2920.0
2900.0
2880.0
2860.0
2840.0
2820.0
Note this well is below the rim
5/1/97
5/1/99
5/1/01
5/1/03
5/1/05
Obs (below rim)
ModelR31C13
ModelR32C13
Calib31C13
Calib32C13

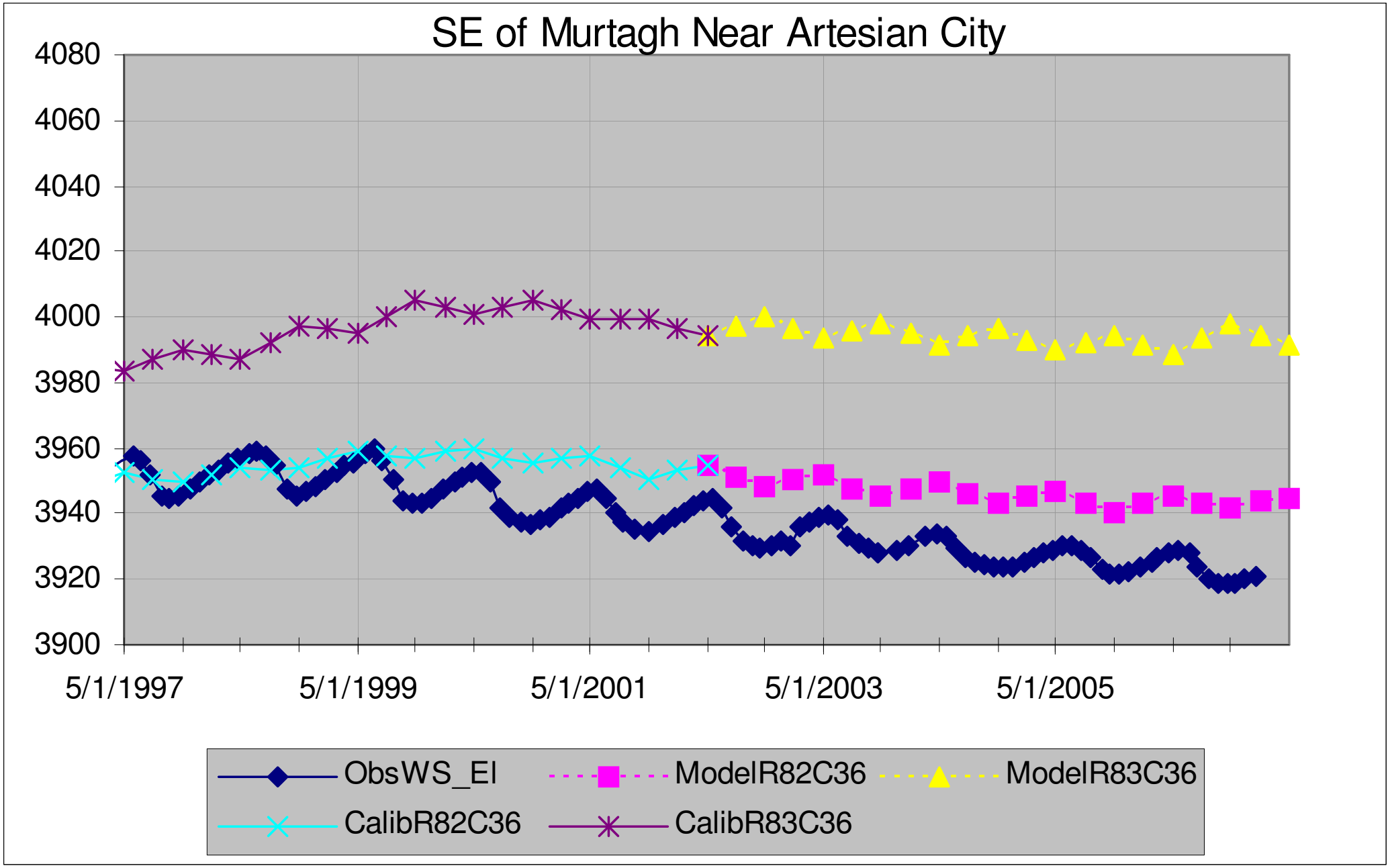

Near Gooding
3510
3500
3490
3480
3470
3460
3450
3440
3430
3420
3410
3400
3390
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR34C24
ModelR34C25
CalibR34C24
CalibR34C25

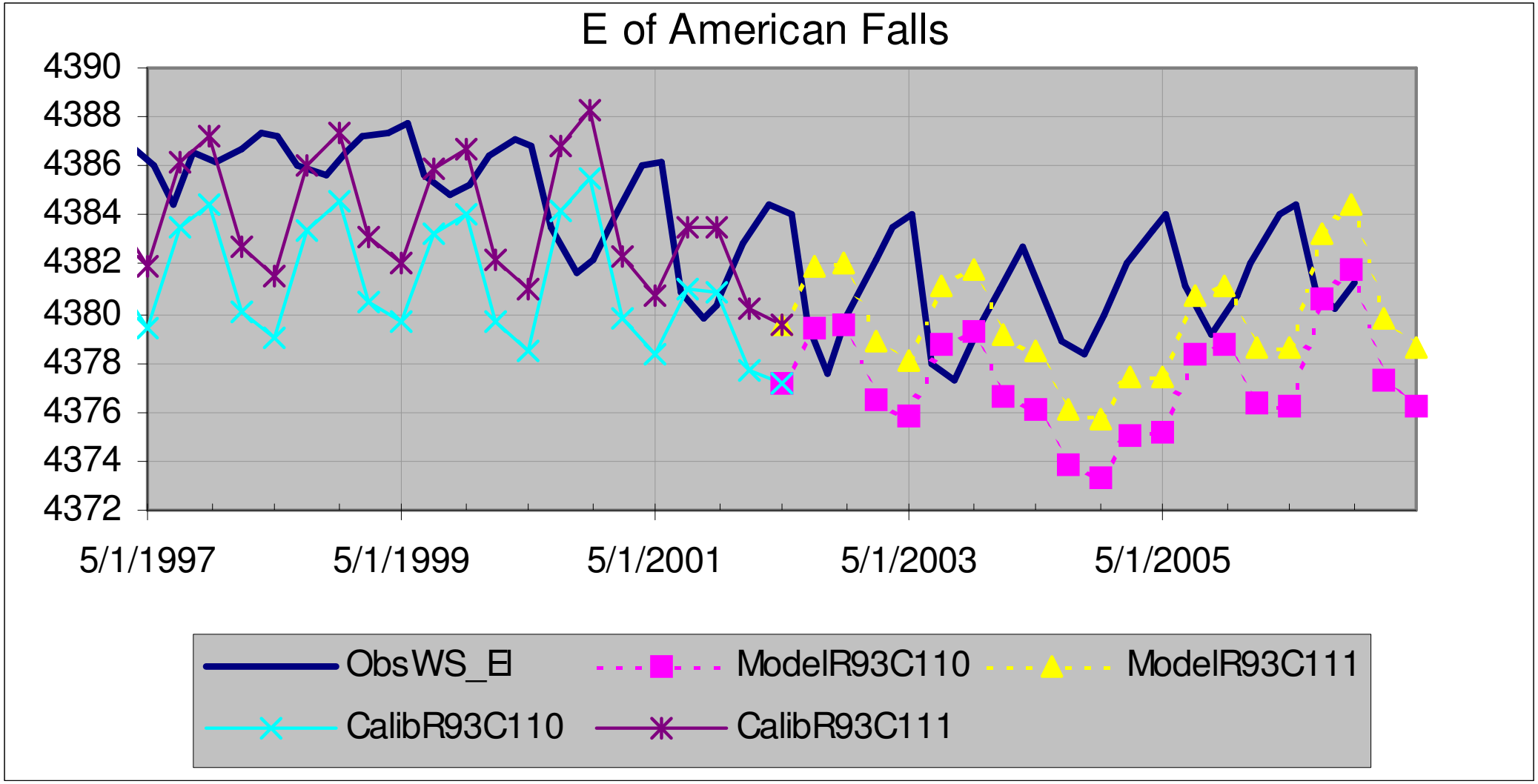

Near Rim SW of Wendell
3200
3190
3180
3170
3160
3150
3140
3130
3120
3110
3100
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
ObsWS_El
ModelR45C12
ModelR45C13
CalibR45C12
CalibR45C13

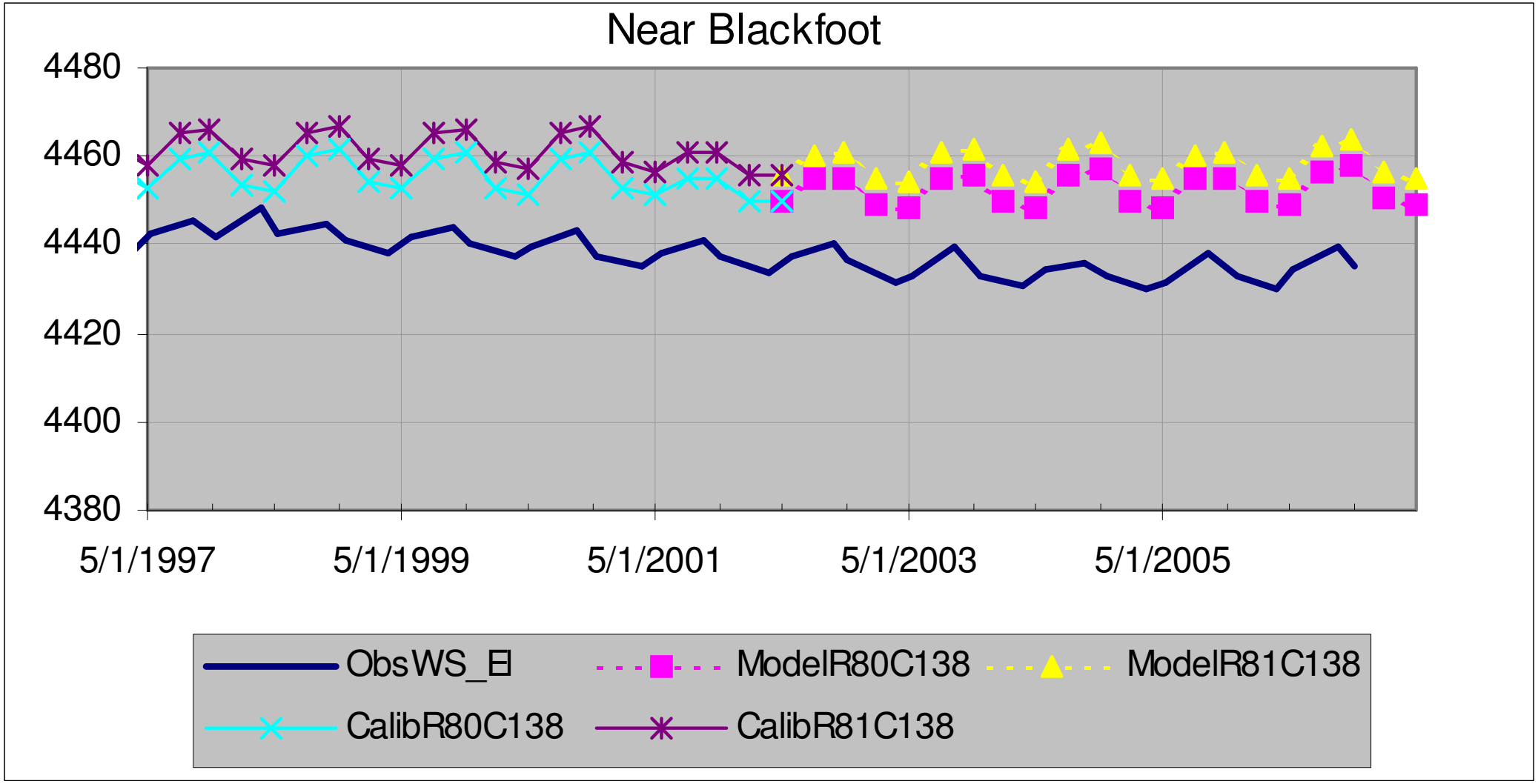

Near Jerome
3400.0
3390.0
3380.0
3370.0
3360.0
3350.0
3340.0
3330.0
3320.0
3310.0
3300.0
5/1/97
5/1/99
5/1/01
5/1/03
5/1/05
ObsWS_El
ModelR52C23
ModelR53C23
CalibR52C23
CalibR53C23

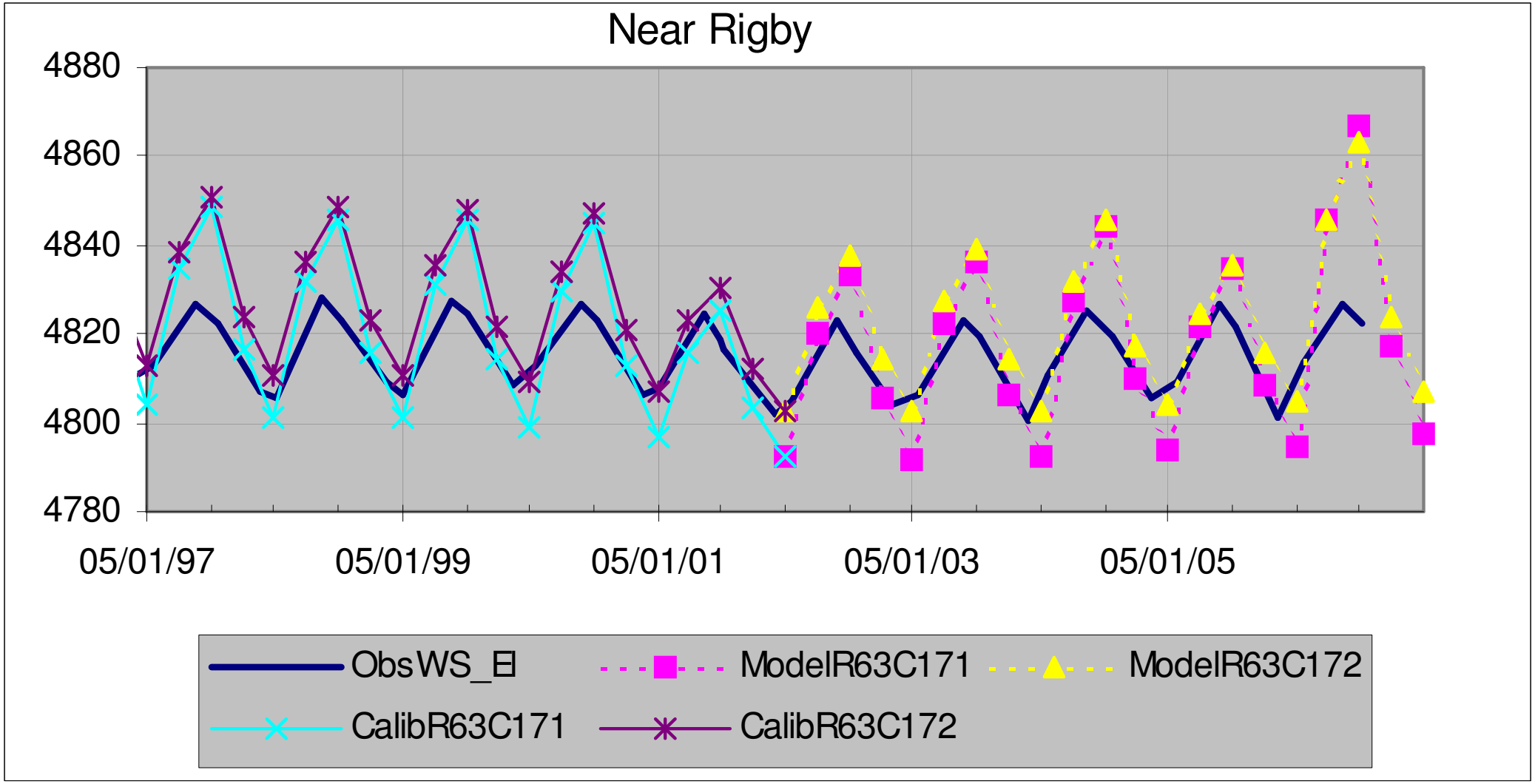

Near Burley Deep Obs
4020
4000
3980
3960
3940
3920
3900
3880
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsShallow
ModelR81C45
ModelR82C45
CalibR81C45
CalibR82C45

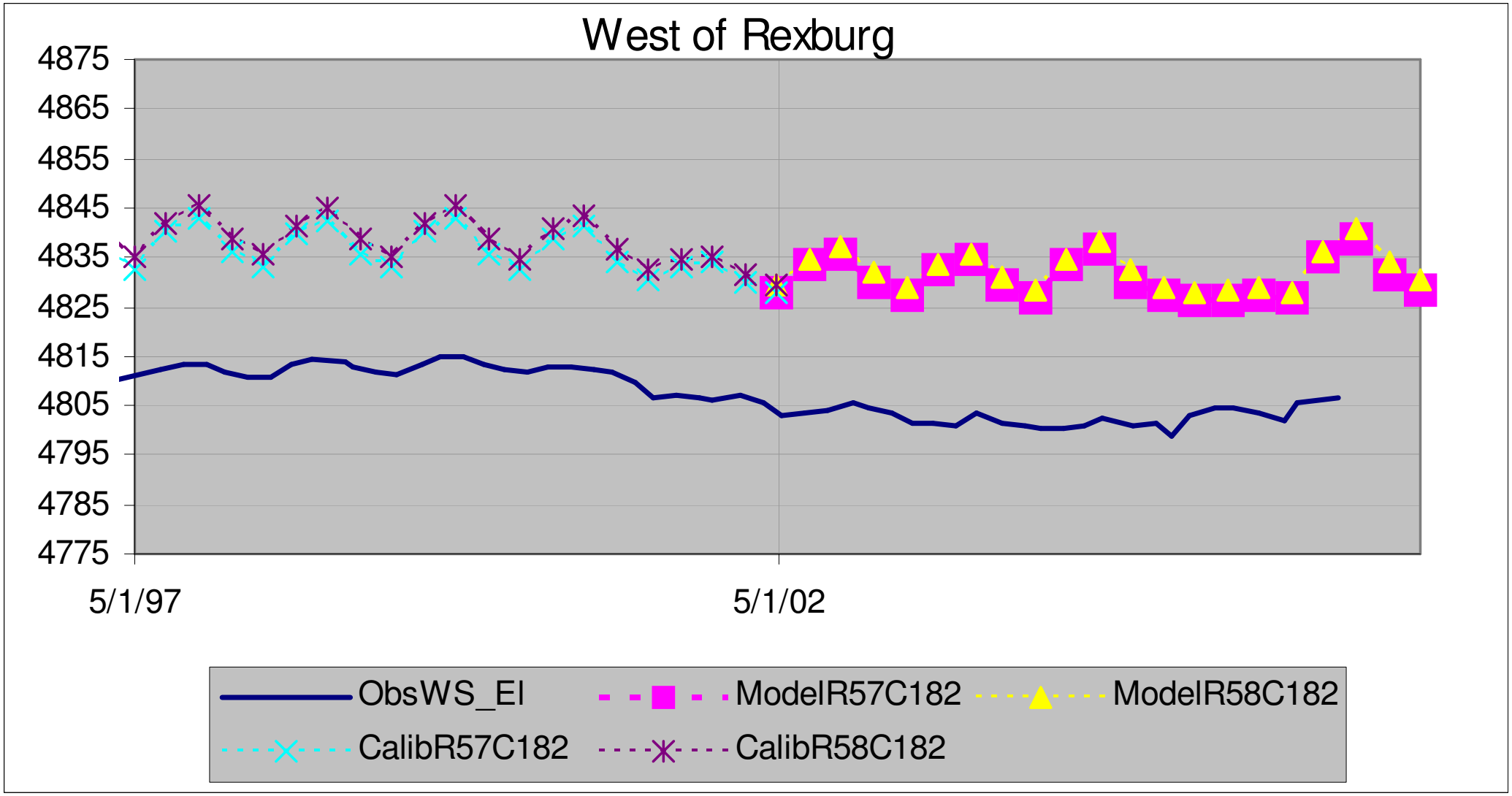

Near Burley Shallow Obs
4230
4220
4210
4200
4190
4180
4170
4160
4150
4140
4130
4120
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsShallow
ModelR85C50
ModelR86C50
CalibR85C50
CalibR86C50

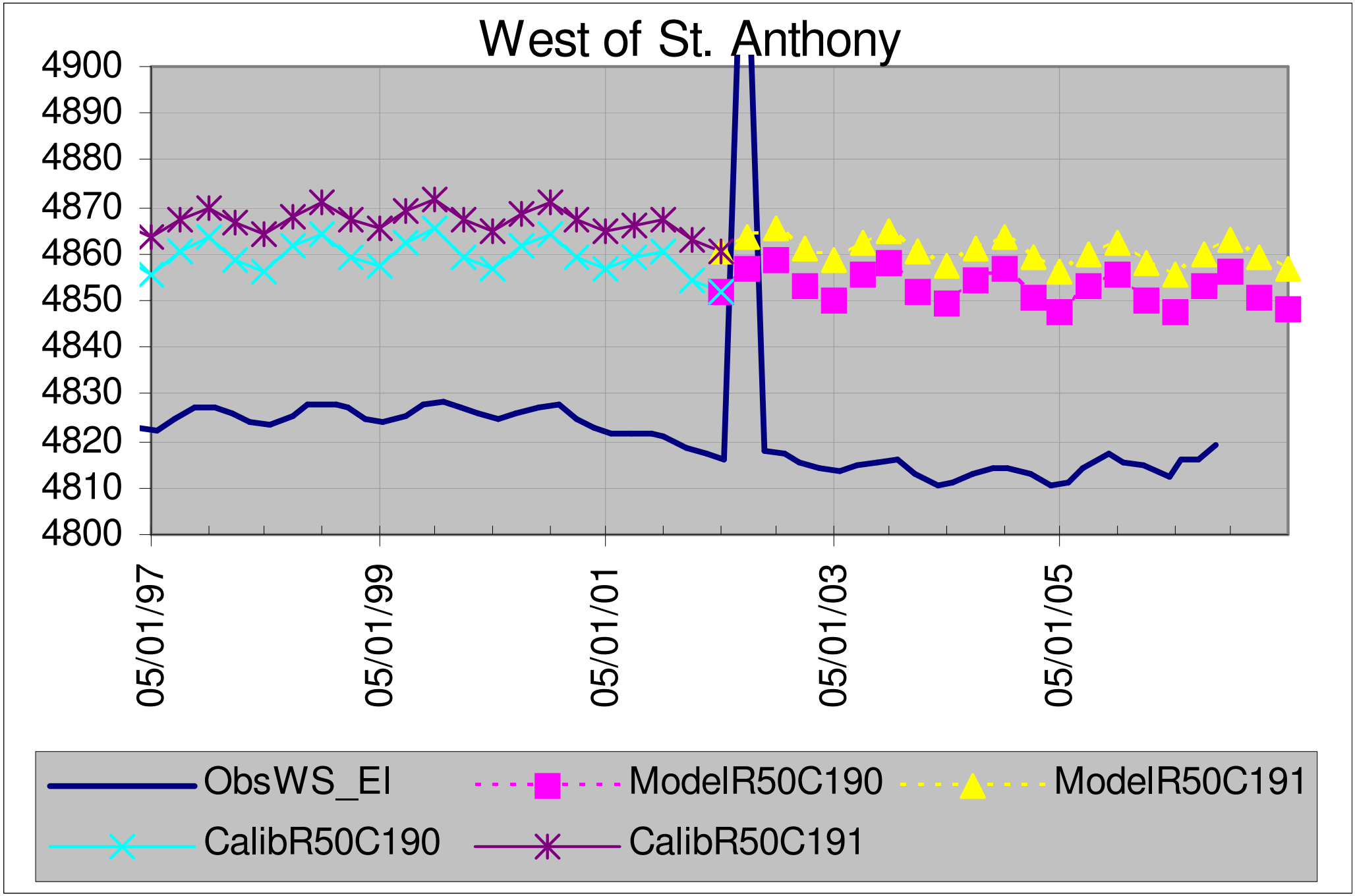

SE of Murtagh Near Artesian City
4080
4060
4040
4020
4000
3980
3960
3940
3920
3900
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR82C36
ModelR83C36
CalibR82C36
CalibR83C36

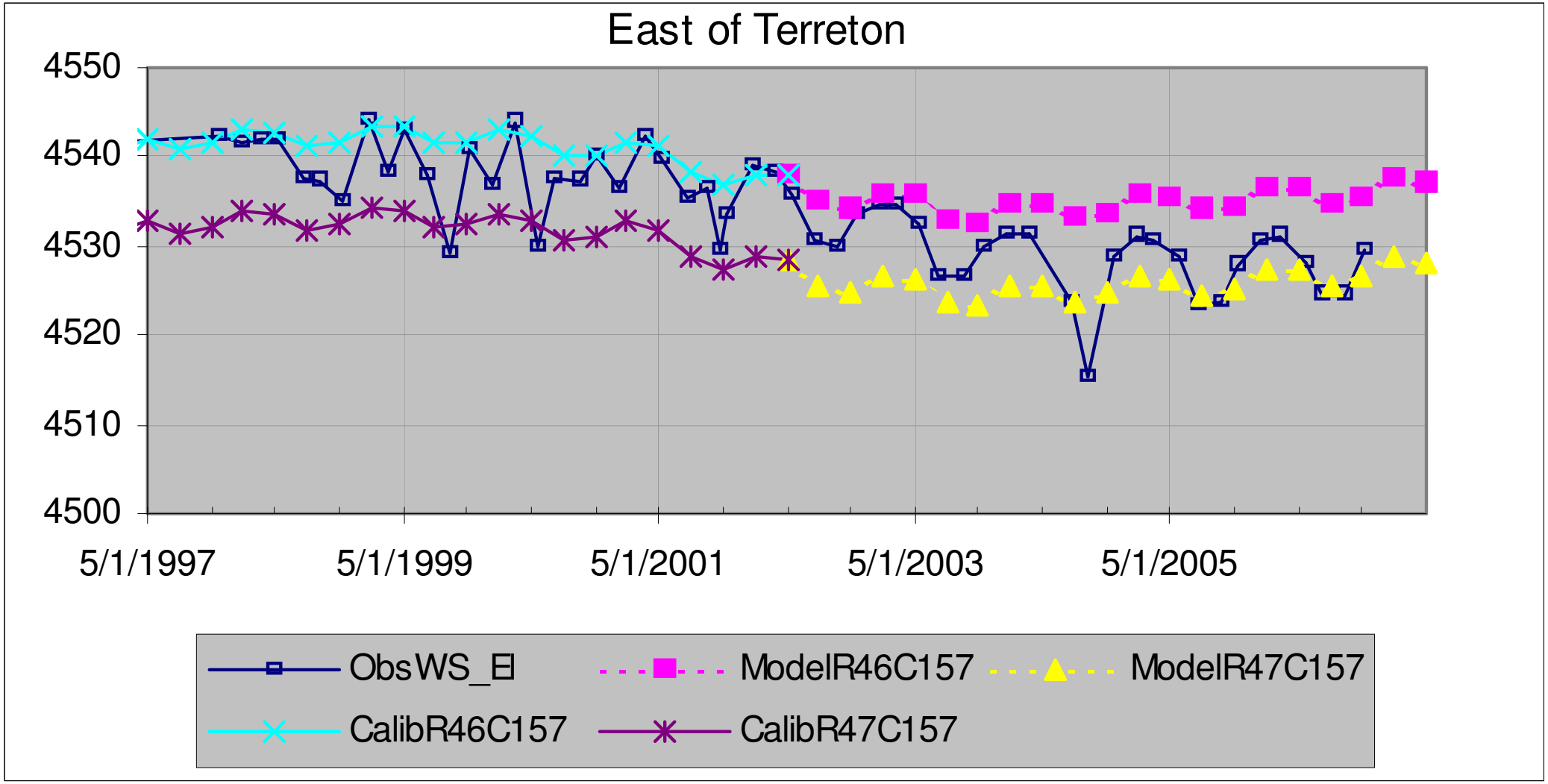

E of American Falls
4390
4388
4386
4384
4382
4380
4378
4376
4374
4372
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR93C110
ModelR93C111
CalibR93C110
CalibR93C111

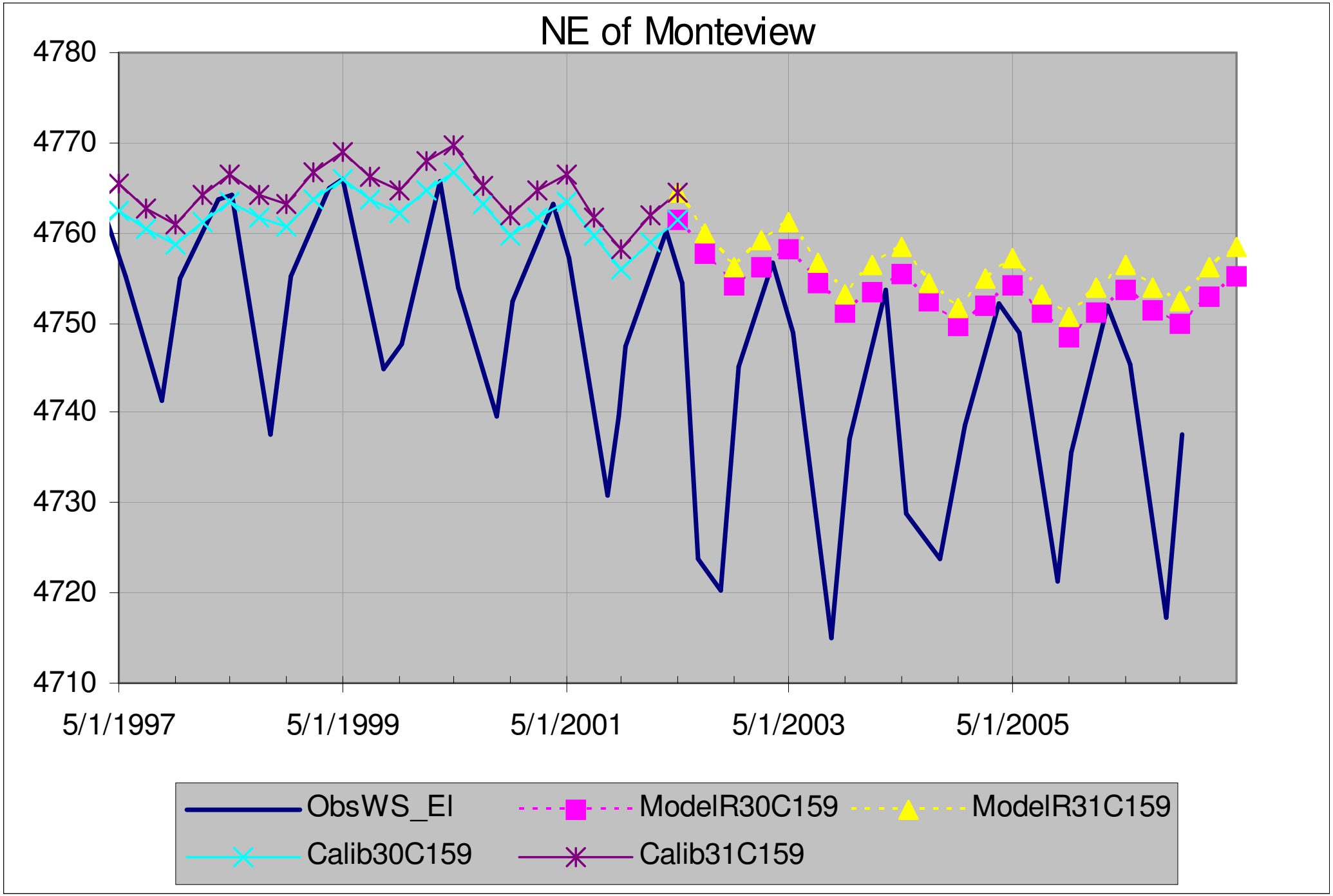

Near Blackfoot
4480
4460
4440
4420
4400
4380
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR80C138
ModelR81C138
CalibR80C138
CalibR81C138

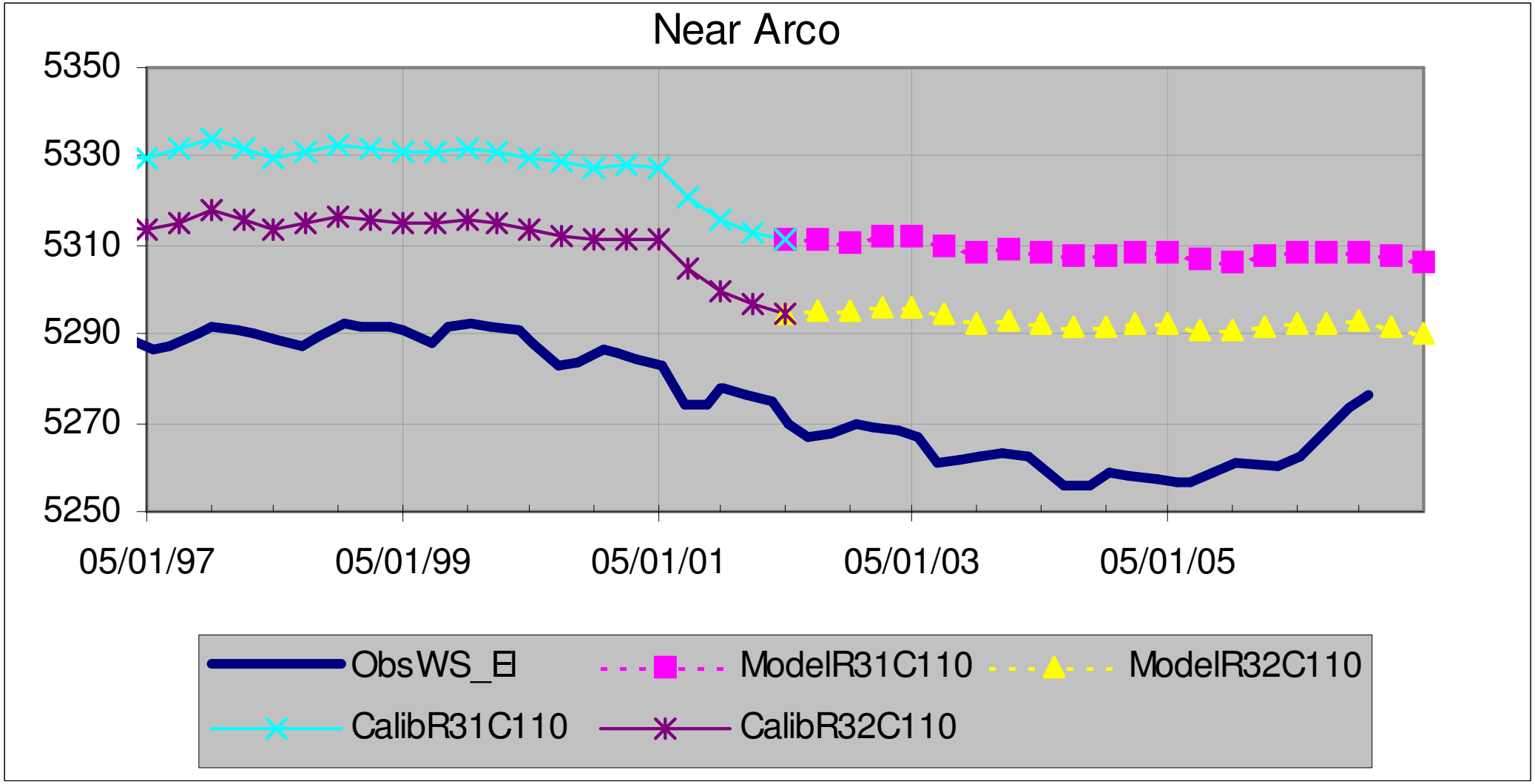

Near Rigby
4880
4860
4840
4820
4800
4780
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
ObsWS_El
ModelR63C171
ModelR63C172
CalibR63C171
CalibR63C172

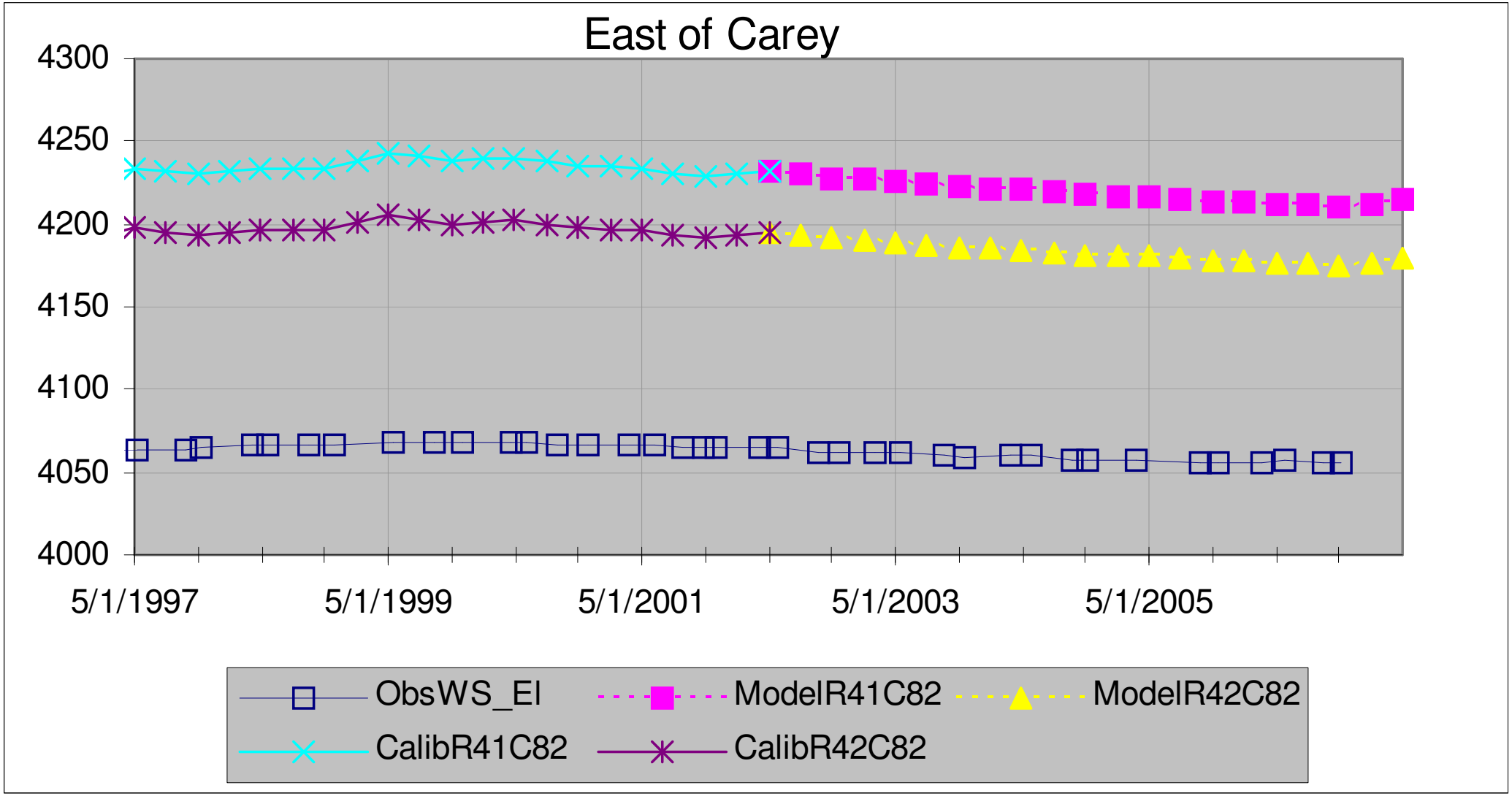

West of Rexburg
4875
4865
4855
4845
4835
4825
4815
4805
4795
4785
4775
5/1/97
5/1/02
ObsWS_El
ModelR57C182
ModelR58C182
CalibR57C182
CalibR58C182

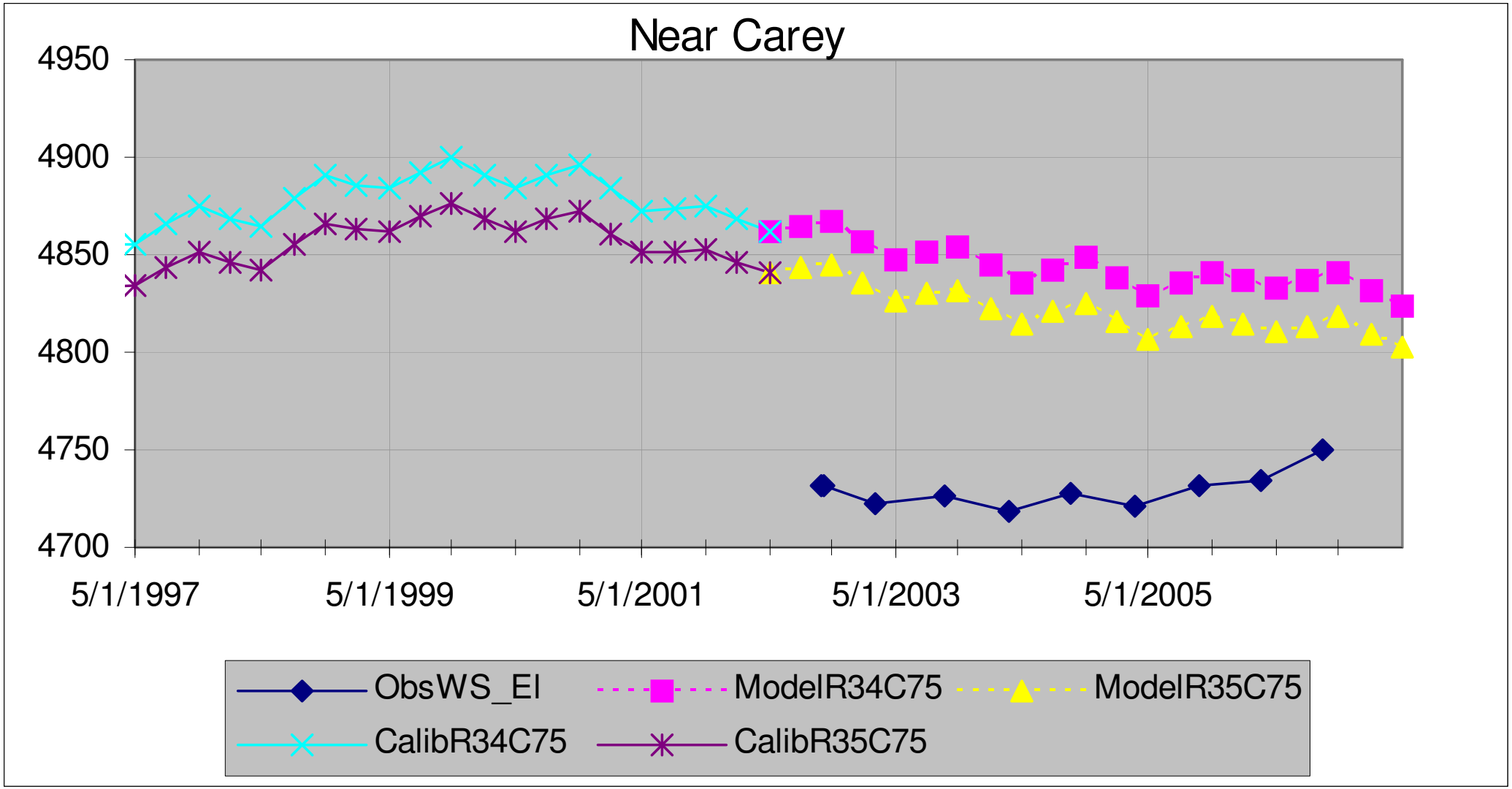

West of St. Anthony
4900
4890
4880
4870
4860
4850
4840
4830
4820
4810
4800
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
ObsWS_El
ModelR50C190
ModelR50C191
CalibR50C190
CalibR50C191

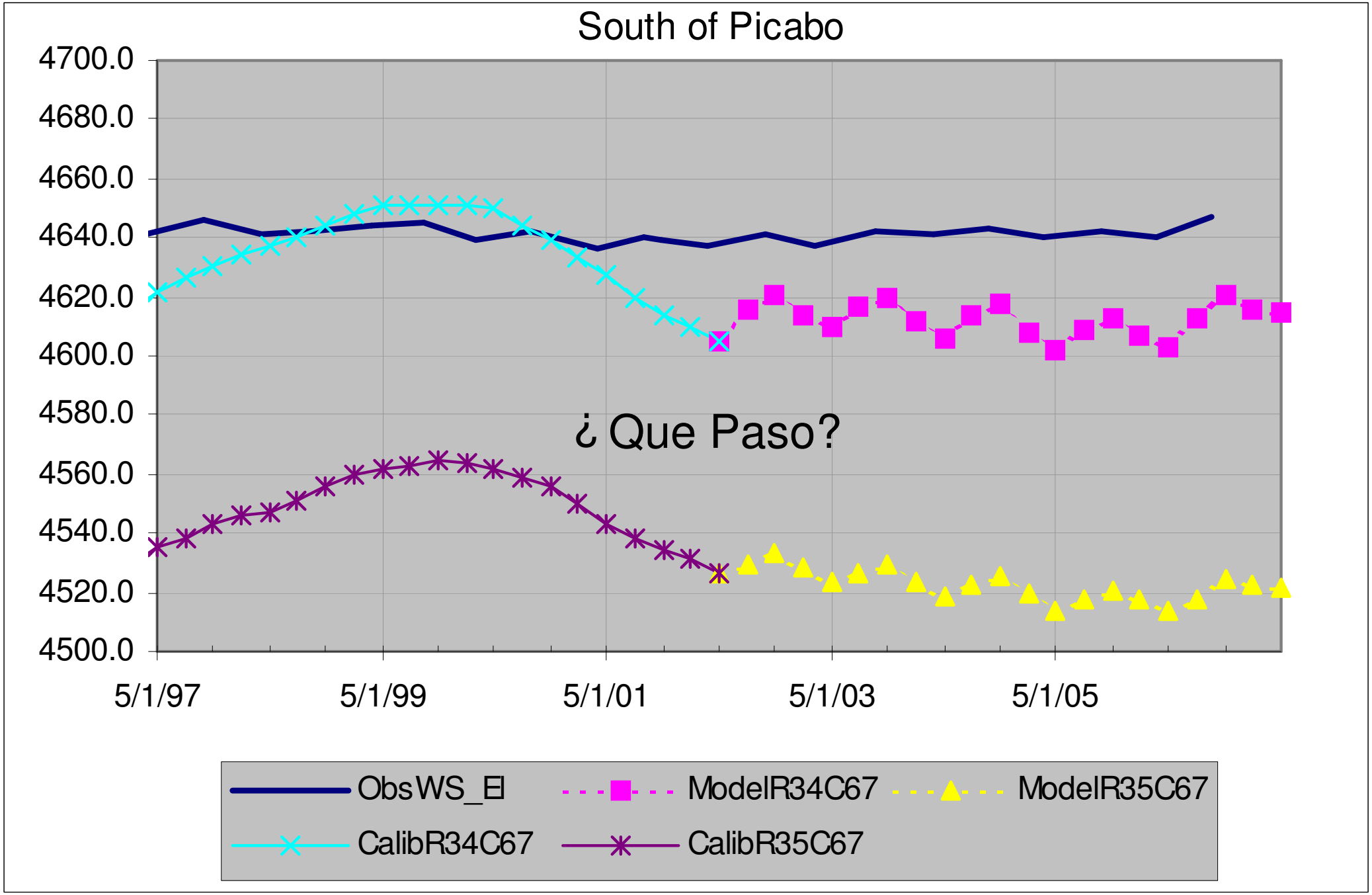

East of Terreton
4550
4540
4530
4520
4510
4500
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR46C157
ModelR47C157
CalibR46C157
CalibR47C157

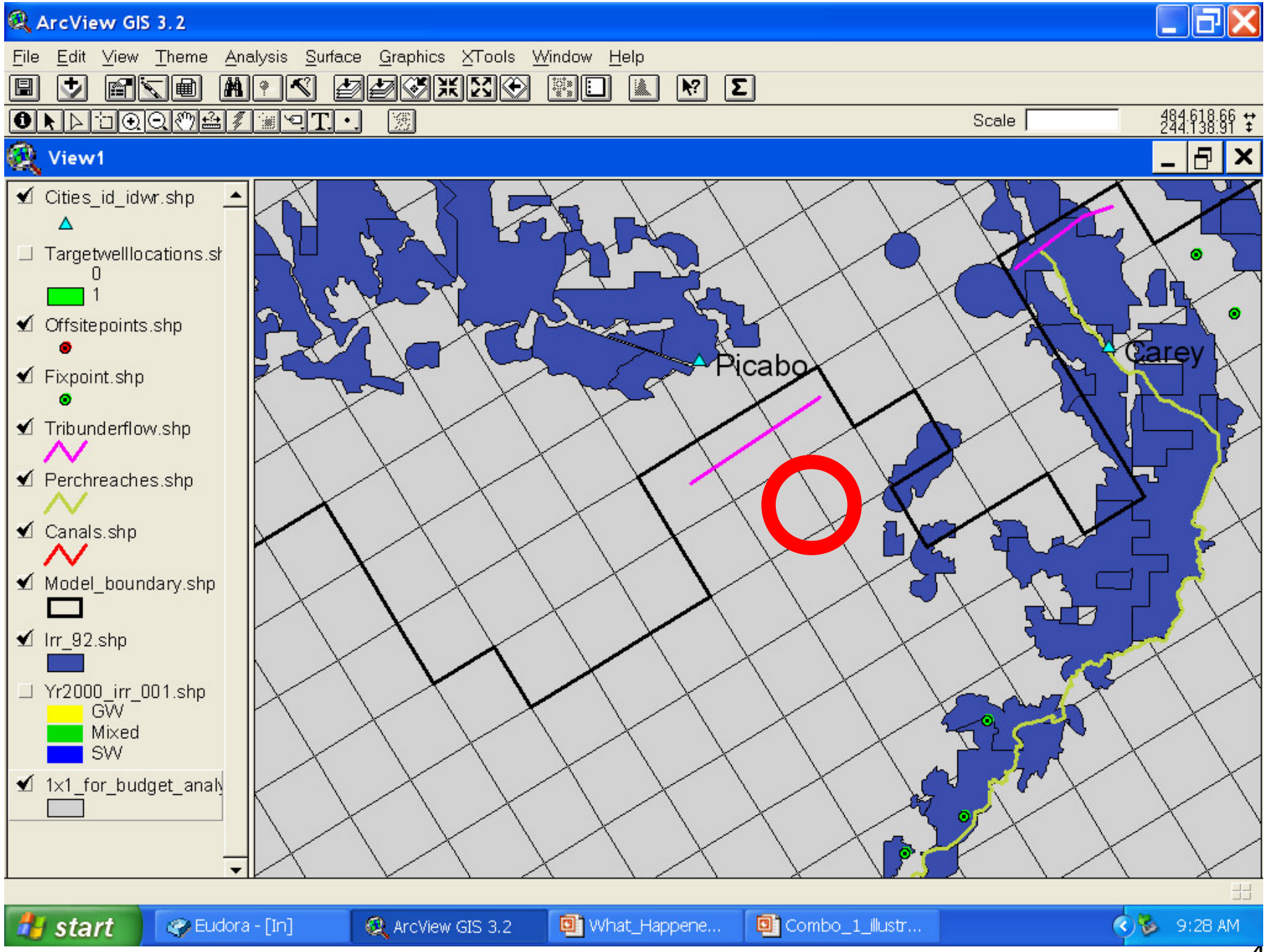

NE of Monteview
4780
4770
4760
4750
4740
4730
4720
4710
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR30C159
ModelR31C159
Calib30C159
Calib31C159


Near Arco
5350
5330
5310
5290
5270
5250
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
ObsWS_El
ModelR31C110
ModelR32C110
CalibR31C110
CalibR32C110

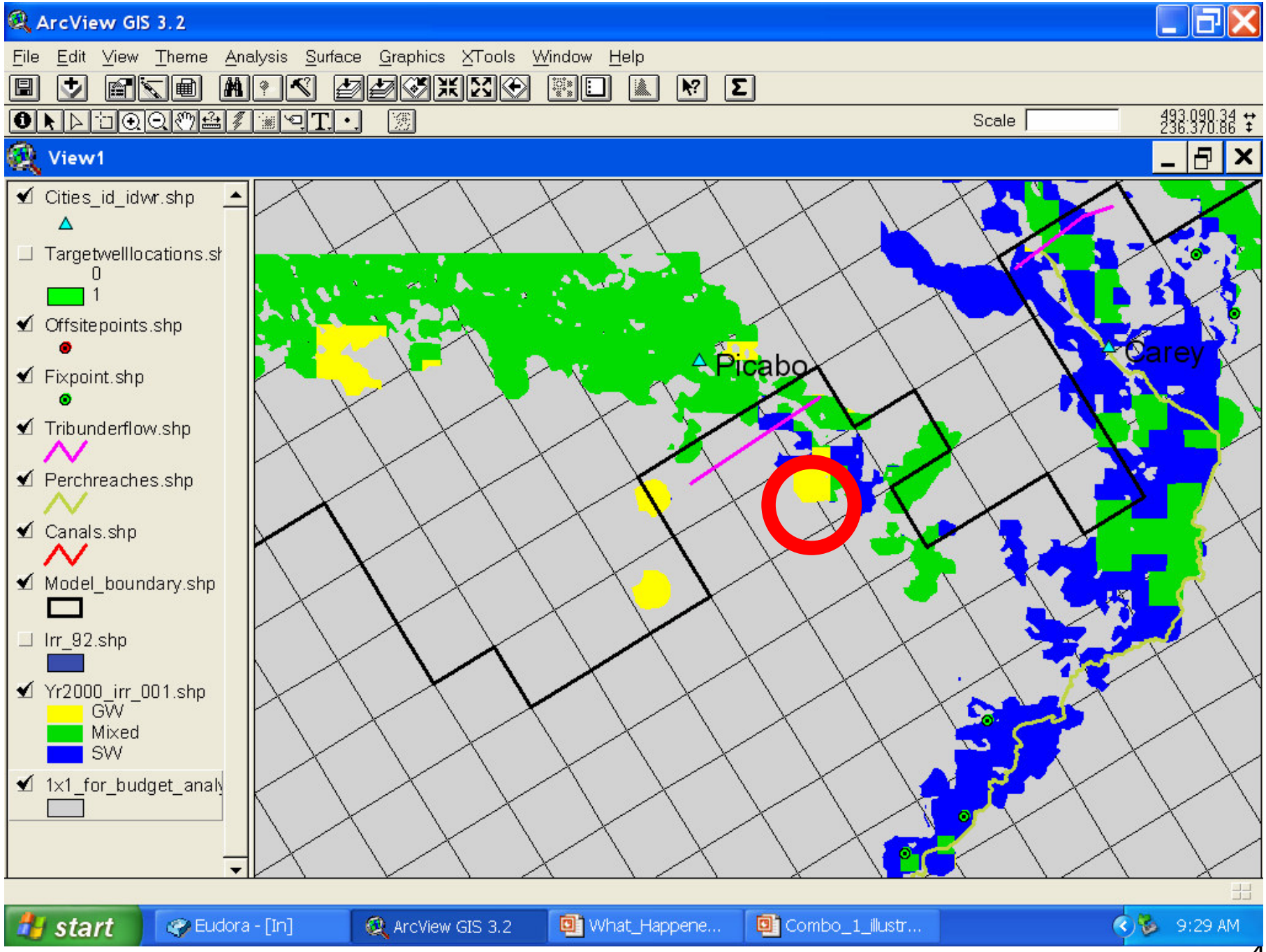

East of Carey
4300
4250
4200
4150
4100
4050
4000
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR41C82
ModelR42C82
CalibR41C82
CalibR42C82


Near Carey
4950
4900
4850
4800
4750
4700
5/1/1997
5/1/1999
5/1/2001
5/1/2003
5/1/2005
ObsWS_El
ModelR34C75
ModelR35C75
CalibR34C75
CalibR35C75


South of Picabo
4700.0
4680.0
4660.0
4640.0
4620.0
4600.0
4580.0
4560.0
4540.0
4520.0
4500.0
5/1/97
5/1/99
5/1/01
5/1/03
5/1/05
¿ Que Paso?
ObsWS_El
ModelR34C67
ModelR35C67
CalibR34C67
CalibR35C67



Calibration-Period Irrigated Lands (circa 1992)



Extended-Period Irrigated Lands (year 2000)

Final Head Trend Scorecard

Simulation Too Low:	Simulation OK:	Simulation Too High:
St. Anthony	Monteview	Artesian City
Near Carey	Bliss	Rigby
Arco	Rexburg	
Burley Shallow	East of Carey	
	Picabo	
	Blackfoot	
	Gooding	
	Terreton	
	American Falls	
	Wendell	
	Jerome	
	Burley Deep	

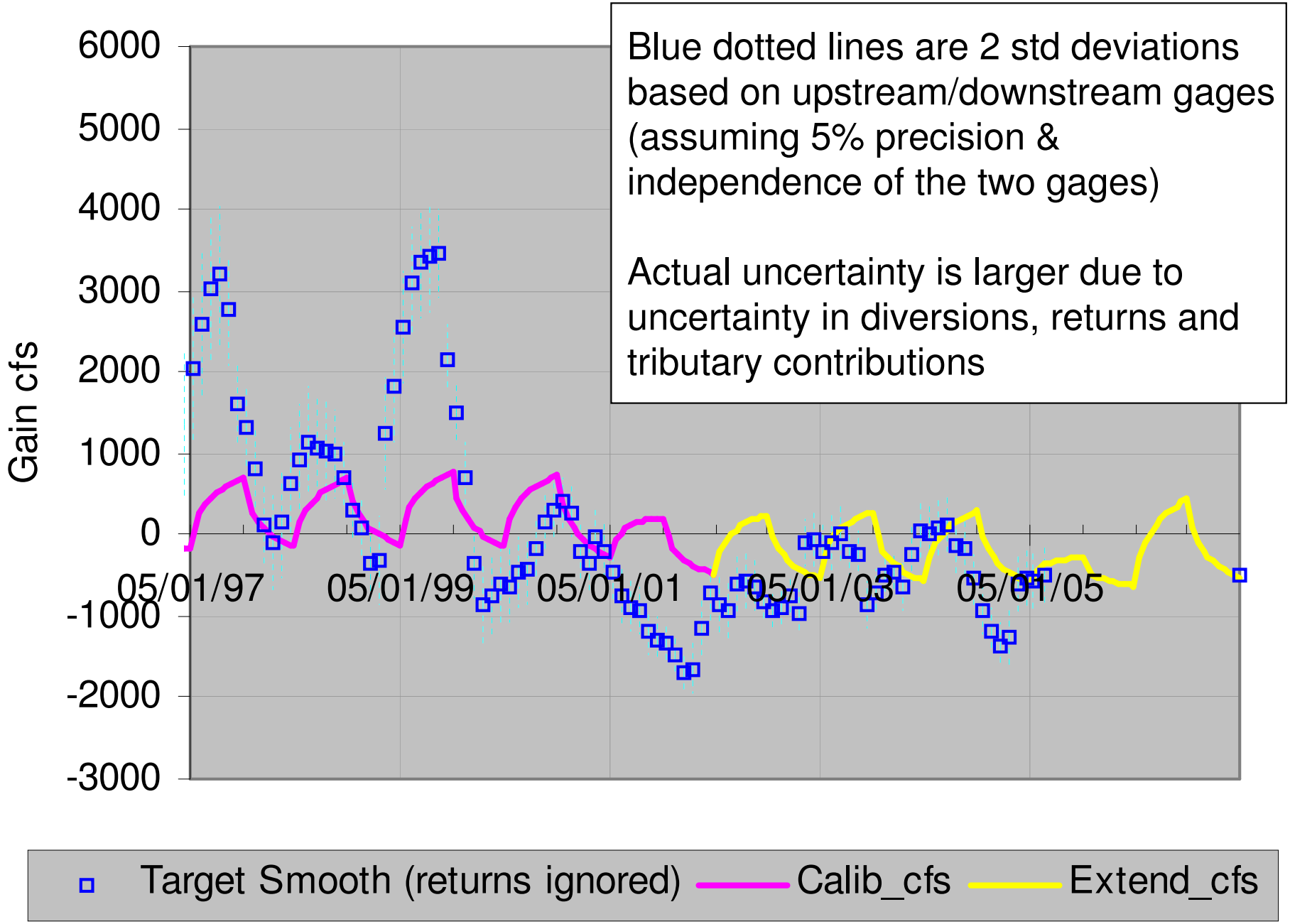
2. River Gains/Losses

- Targets ***don't consider returns***
- Model results ***do*** consider returns

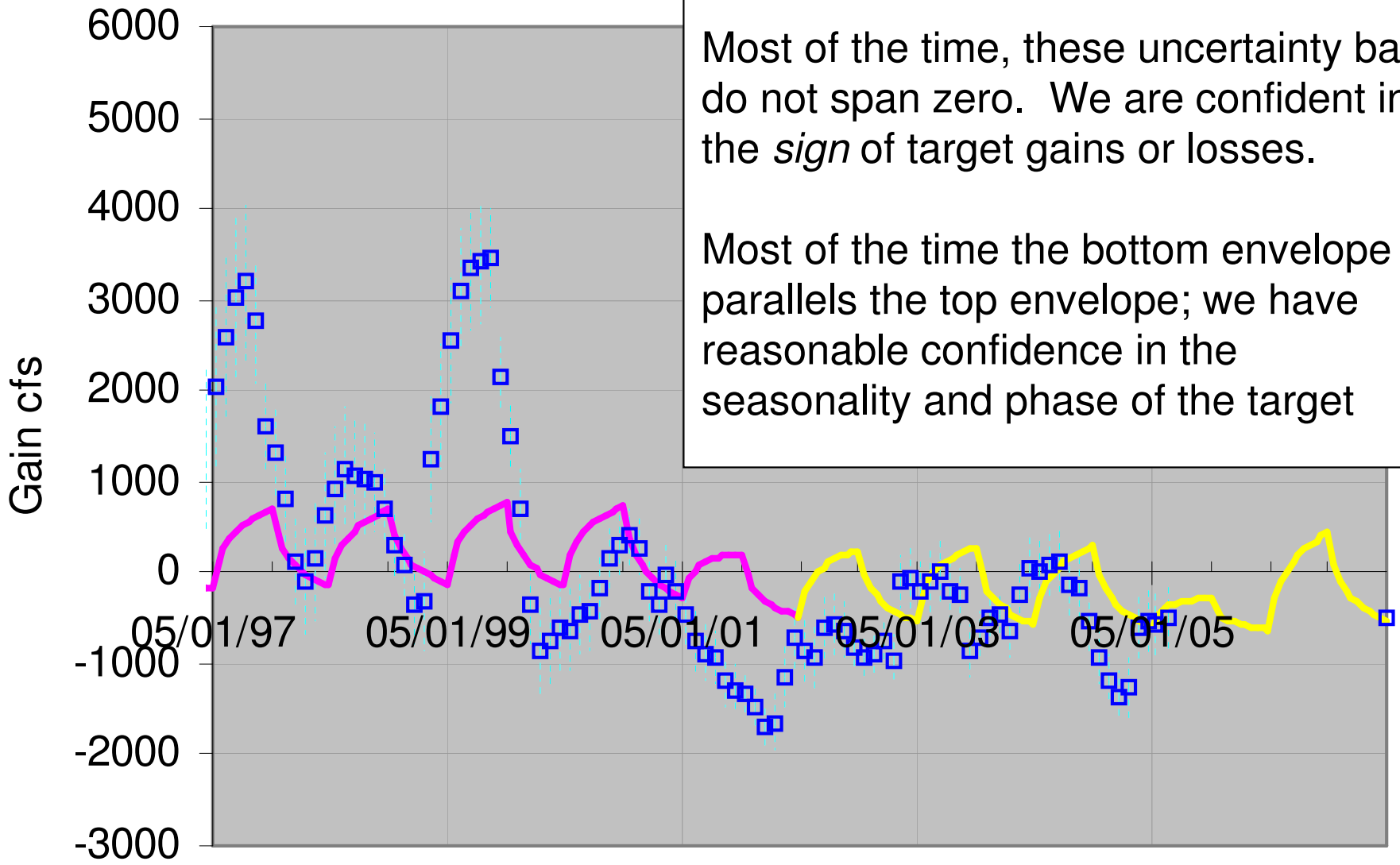
- **MAGNITUDES AREN'T COMPARABLE -** look at patterns

- We hope synthetic data will:
  - be consistent with calibration data
  - not be inconsistent w/ observed *patterns*

ASH_REX


Blue dotted lines are 2 std deviations based on upstream/downstream gages (assuming 5% precision & independence of the two gages)
Actual uncertainty is larger due to uncertainty in diversions, returns and tributary contributions
Gain cfs
6000
5000
4000
3000
2000
1000
0
-1000
-2000
-3000
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
Target Smooth (returns ignored)
Calib_cfs
Extend_cfs

ASH_REX



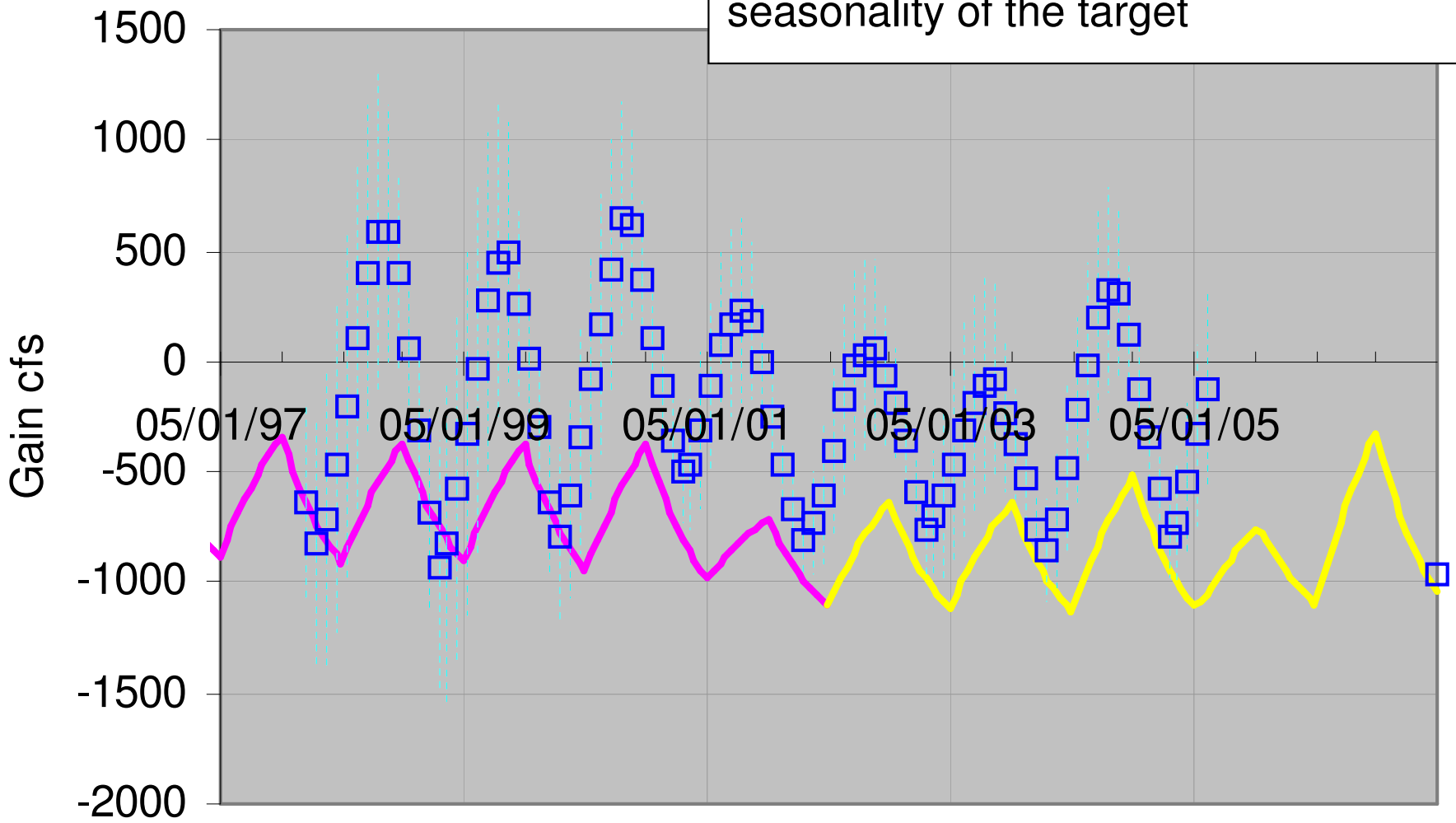
Most of the time, these uncertainty bars do not span zero. We are confident in the *sign* of target gains or losses.

Most of the time the bottom envelope parallels the top envelope; we have reasonable confidence in the seasonality and phase of the target

Target Smooth (returns ignored) — Calib_cfs — Extend_cfs

HEI_SHE

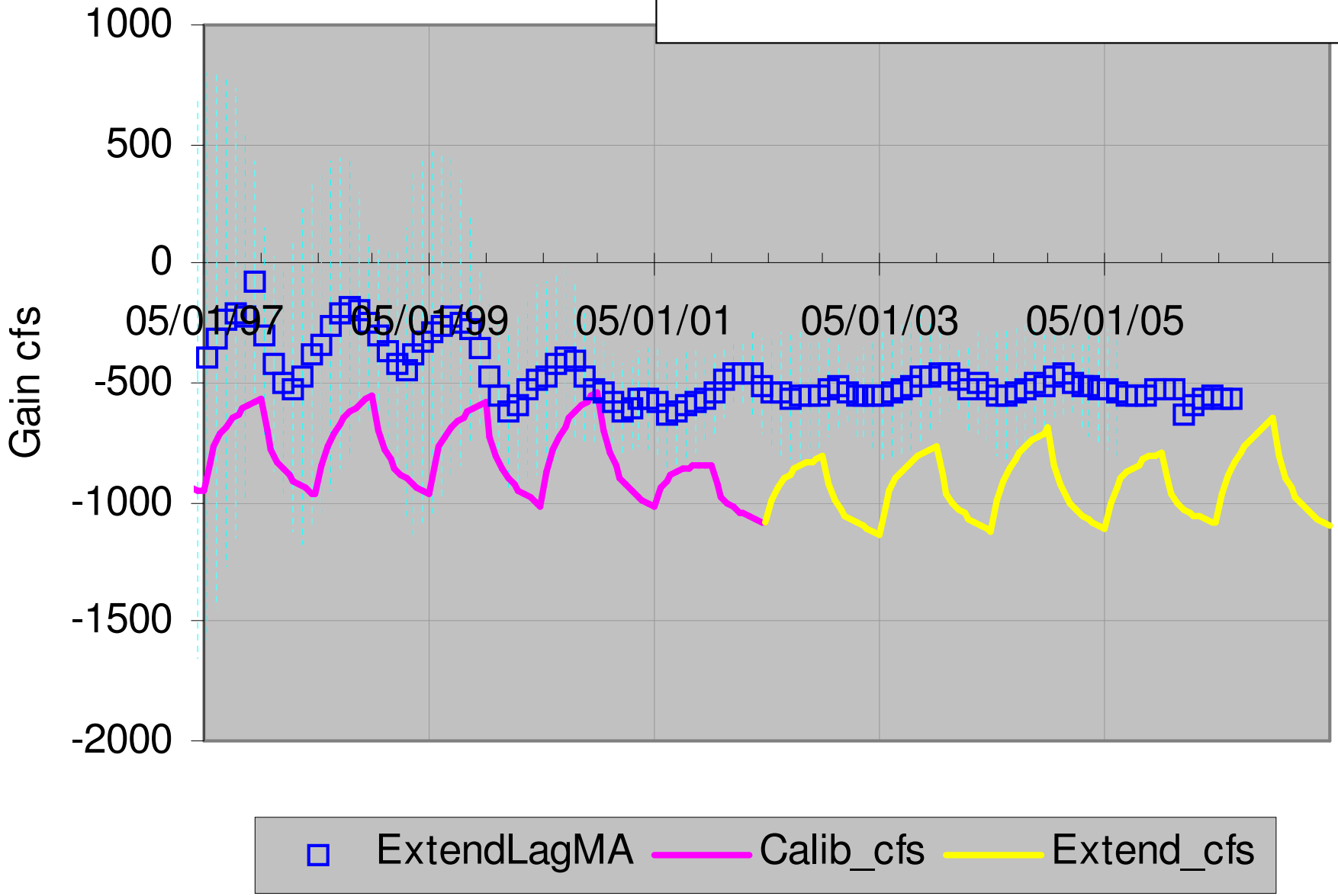
We are confident in the sign and seasonality of the target



Calib_cfs Extend_cfs Target Smooth (returns ignored)

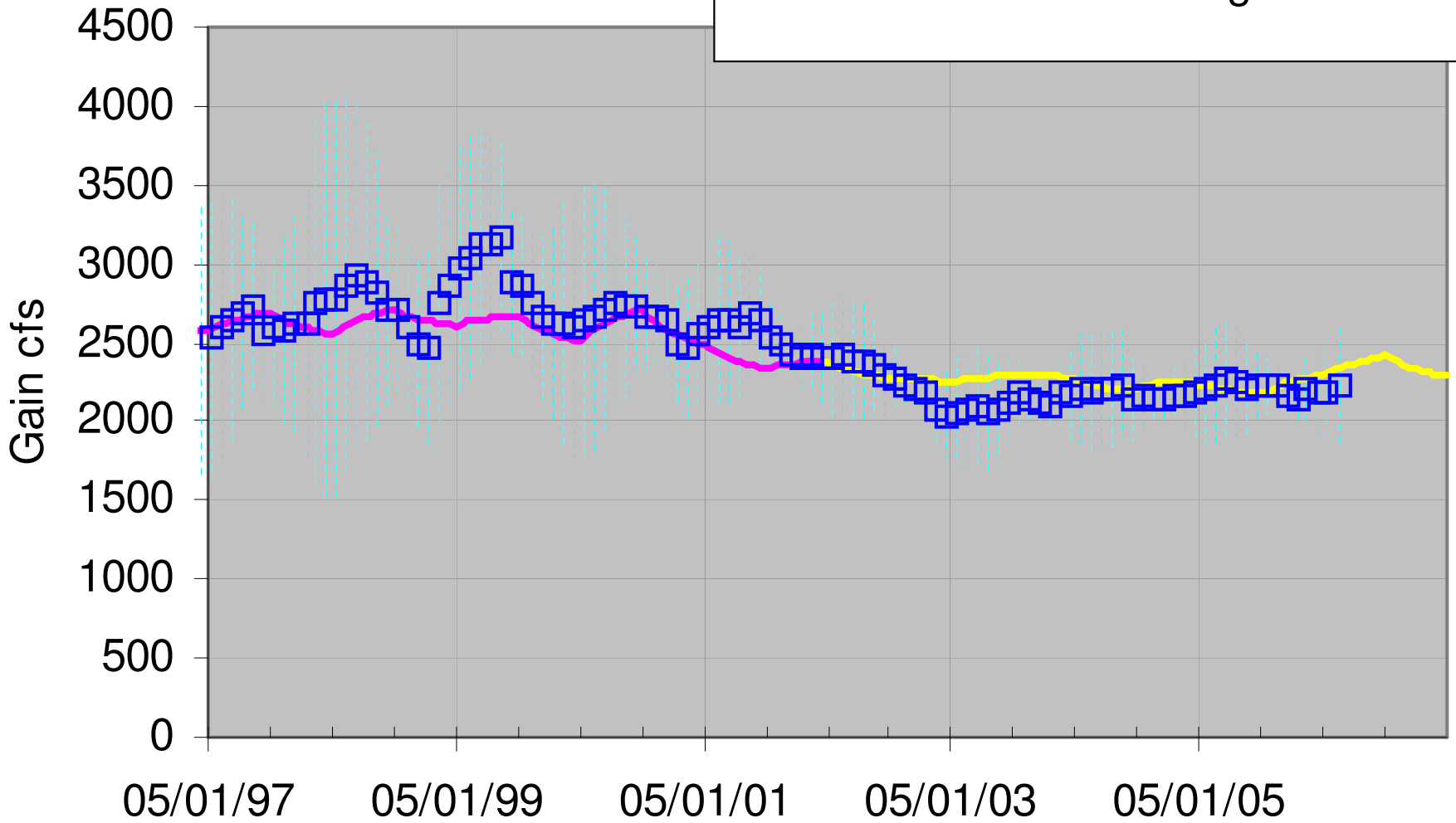
SHE_NRB

We are confident in the sign of the target



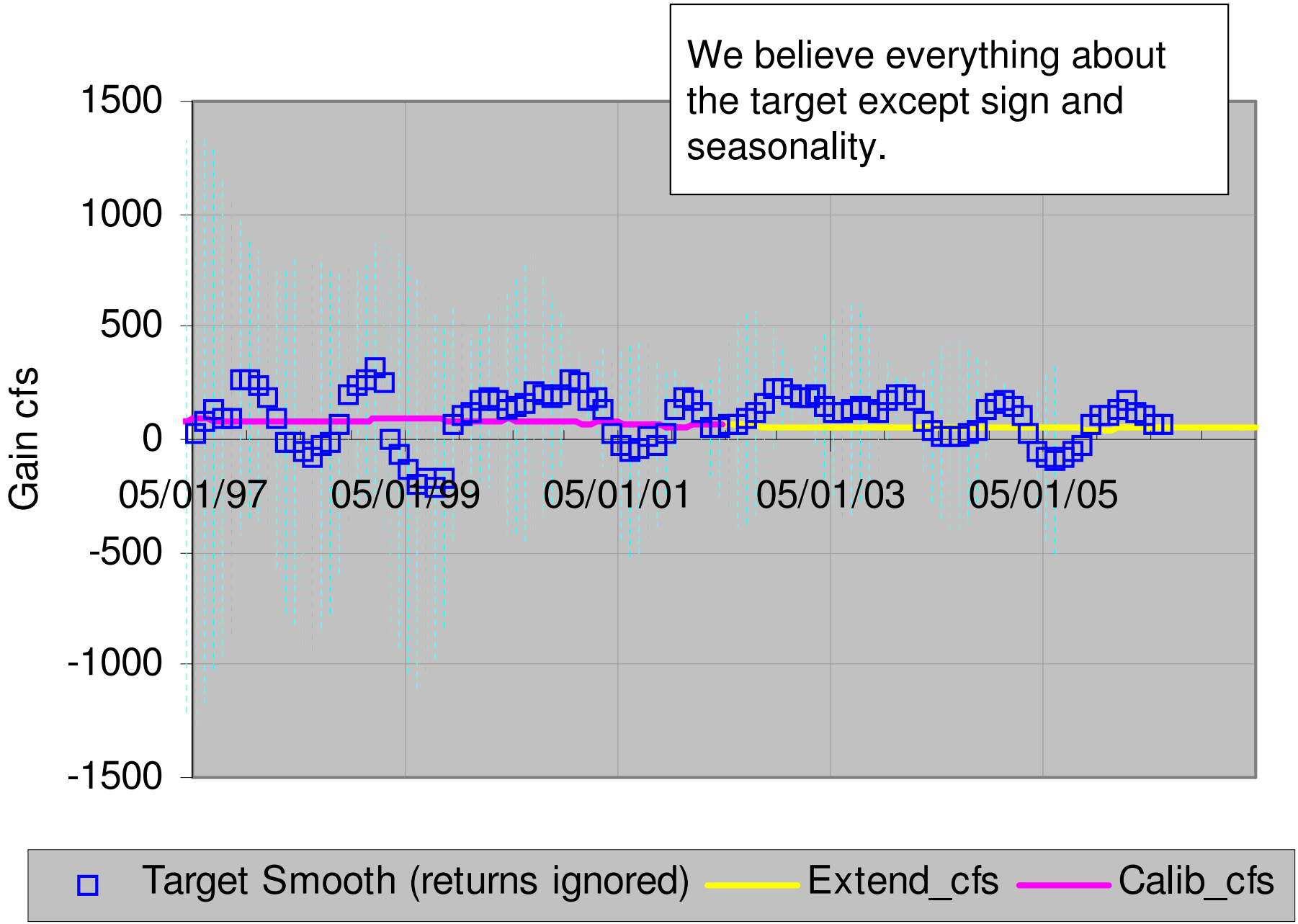
NRB_NEE

We are confident in the sign of the target



Target Smooth (returns ignored) — Calib_cfs — Extend_cfs

NEE_MIN


We believe everything about the target except sign and seasonality.
1500
1000
500
0
-500
-1000
-1500
Gain cfs
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
Target Smooth (returns ignored)
Extend_cfs
Calib_cfs

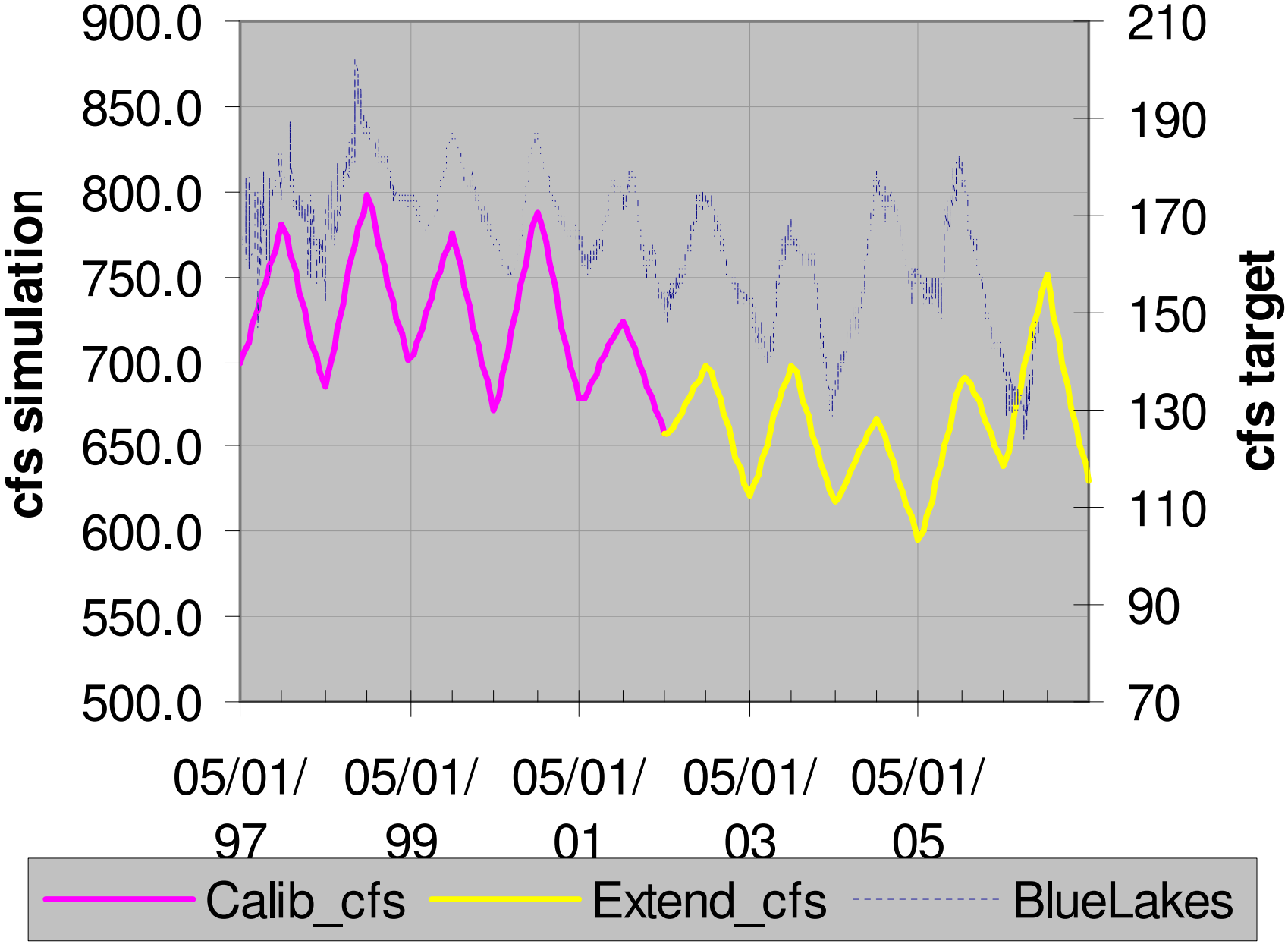
3. Spring Discharges

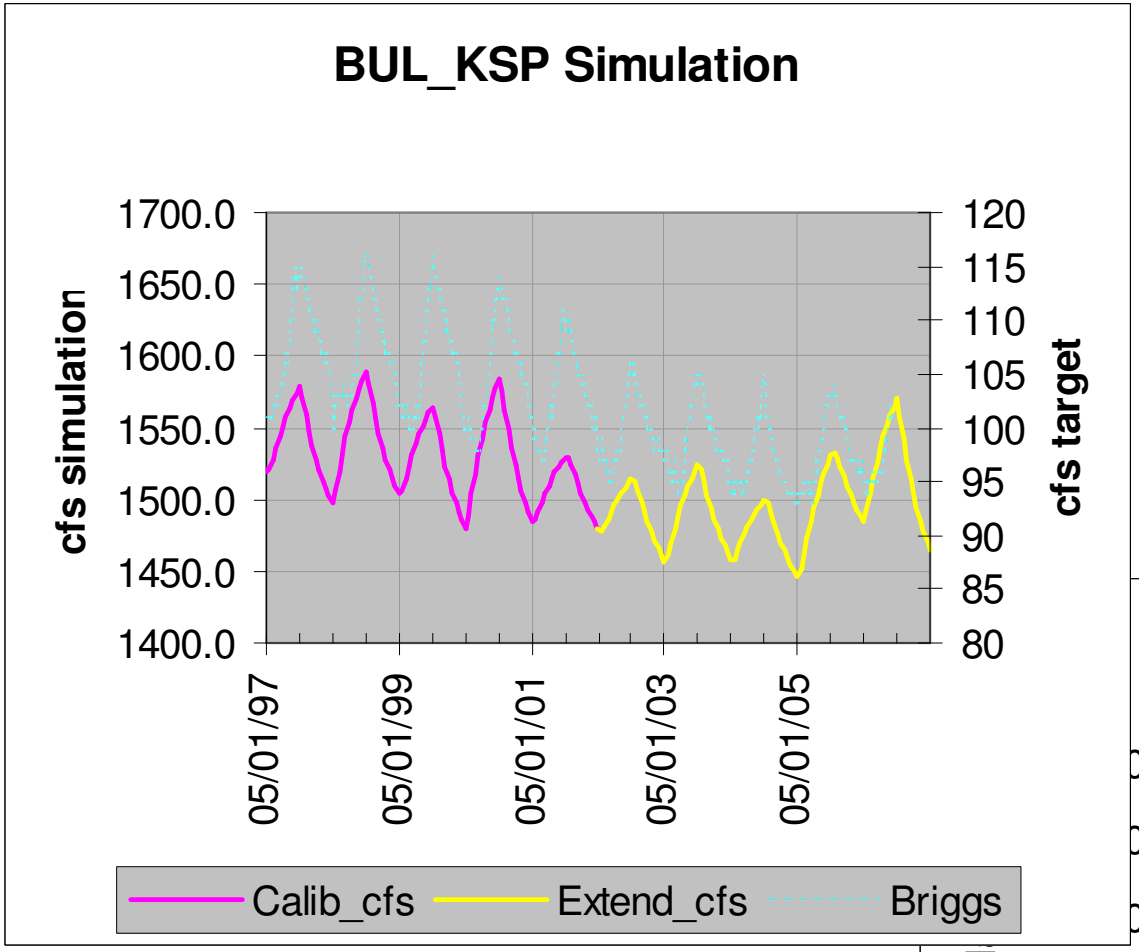
- Targets ***don't include the whole reach***

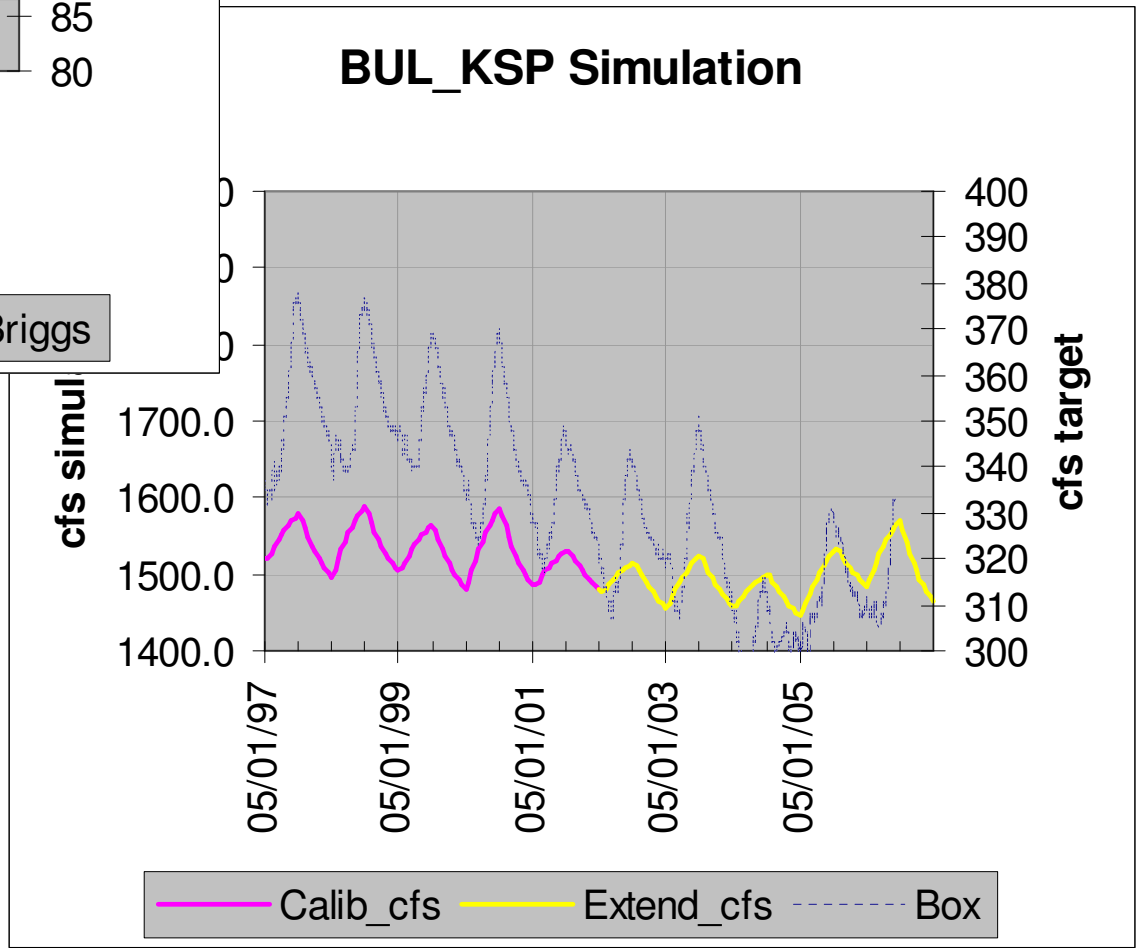
- **MAGNITUDES AREN'T COMPARABLE**

- We hope synthetic data will:
  - be consistent with calibration data
  - not be inconsistent w/ observed *patterns*

DWB_BUL Simulation

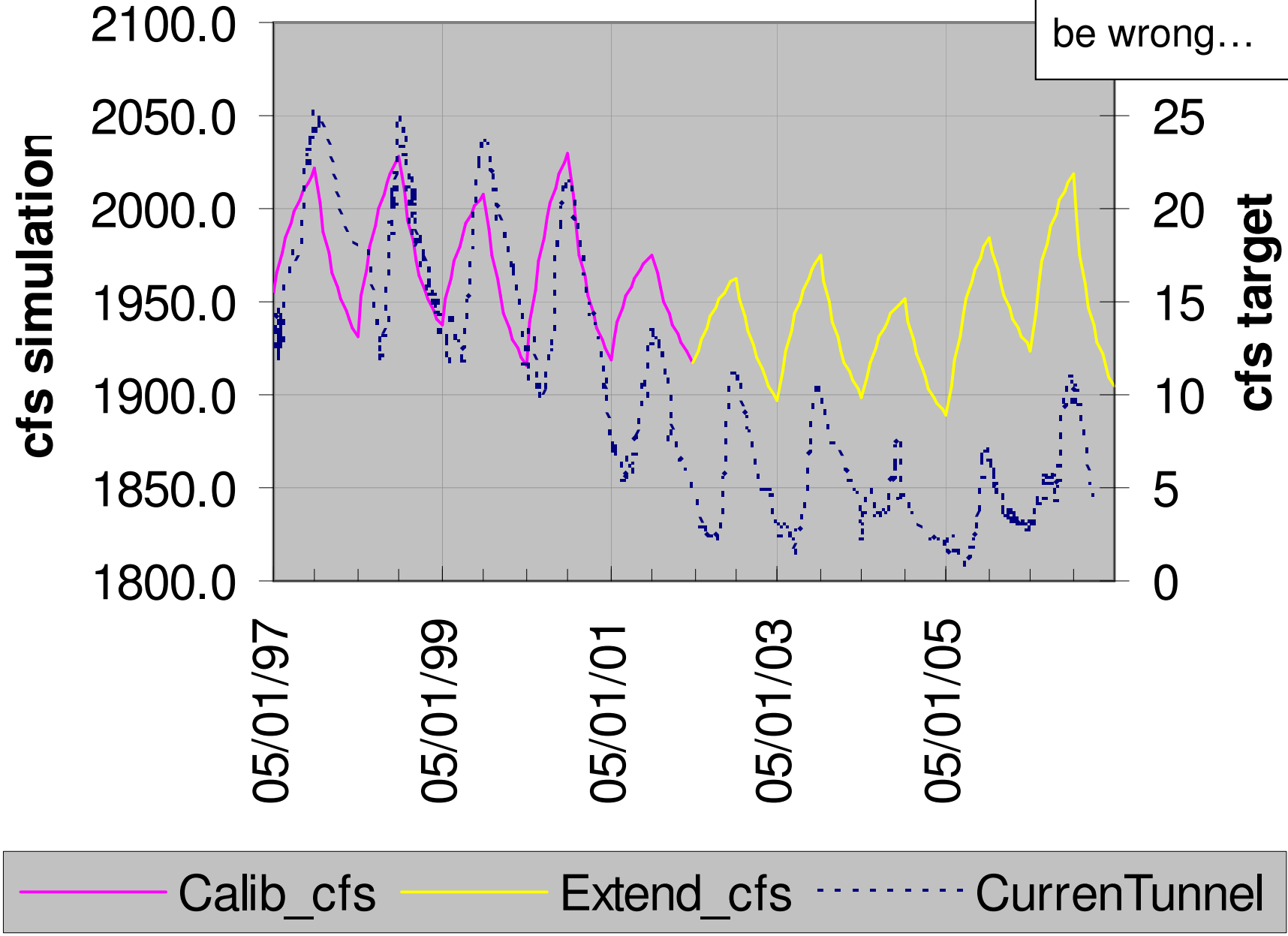



BUL_KSP Simulation
cfs simulation
cfs target
1700.0
1650.0
1600.0
1550.0
1500.0
1450.0
1400.0
120
115
110
105
100
95
90
85
80
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
Calib_cfs
Extend_cfs
Briggs

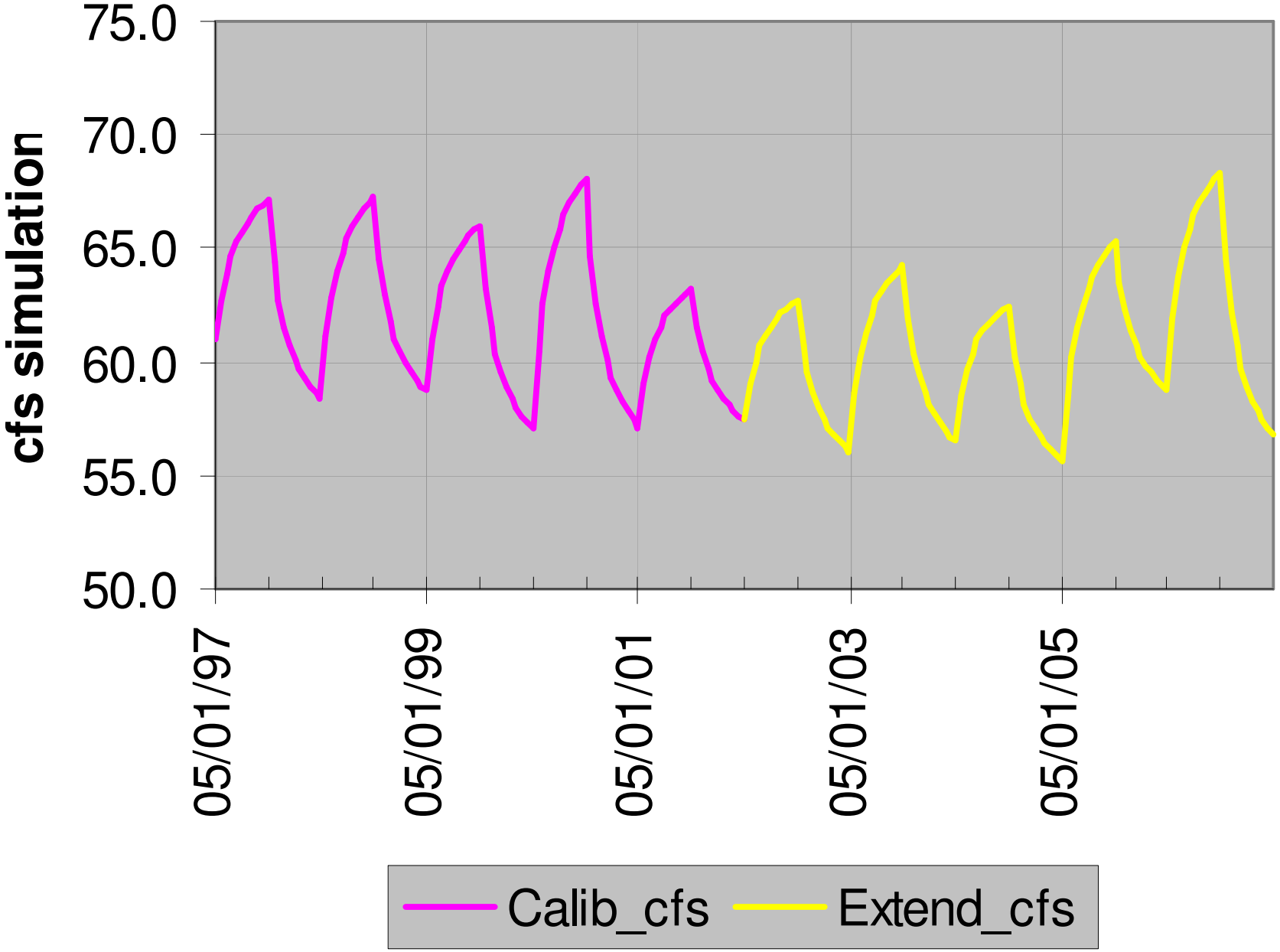

BUL_KSP Simulation
cfs target
1700.0
1600.0
1500.0
1400.0
400
390
380
370
360
350
340
330
320
310
300
05/01/97
05/01/99
05/01/01
05/01/03
05/01/05
Calib_cfs
Extend_cfs
Box

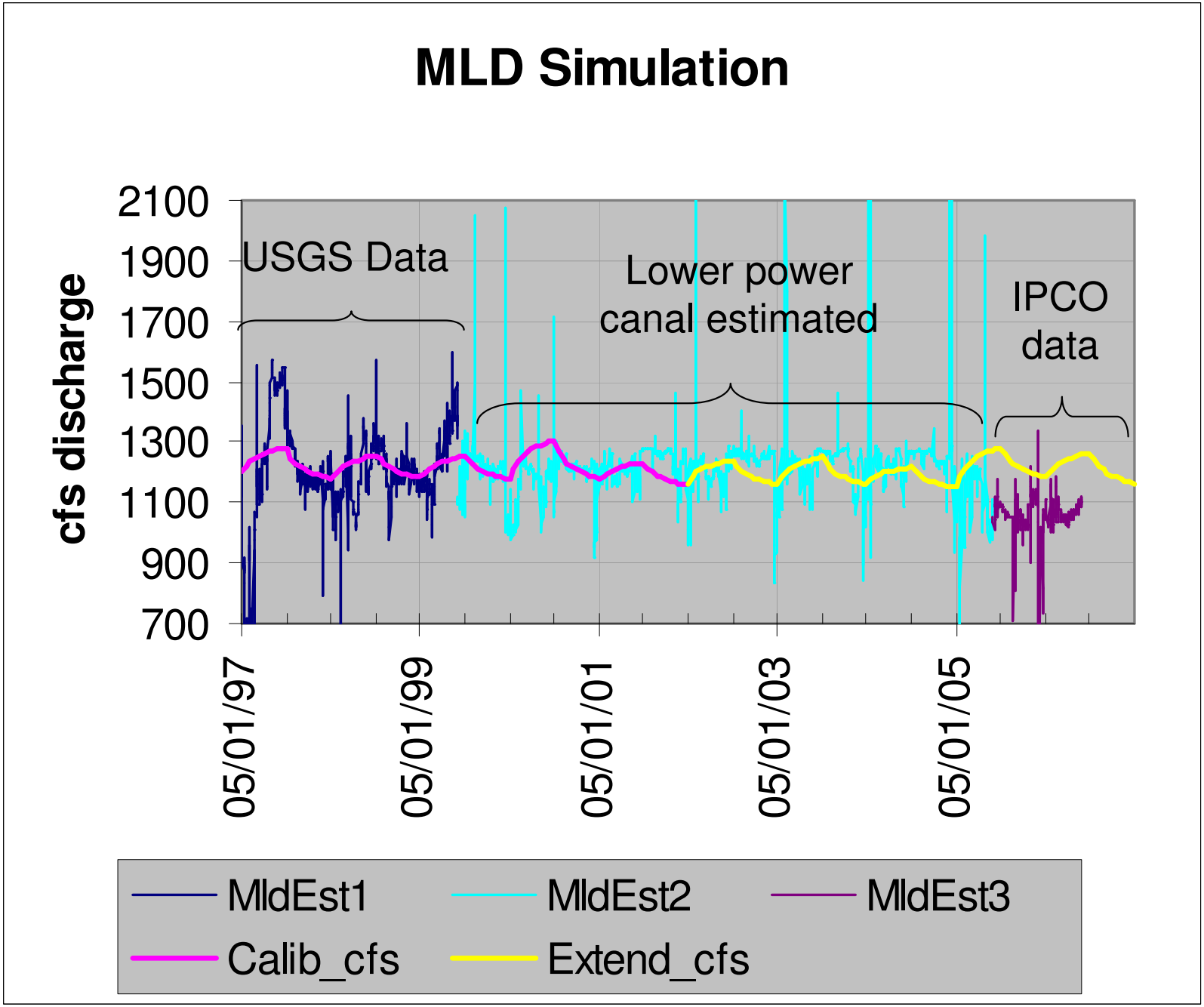
KSP Simulation

My map puts Curren in the K-springs reach but I might be wrong…



KSP_MLD Simulation





Estimate:

Discharge =

(Gooding gage of Malad river)

minus

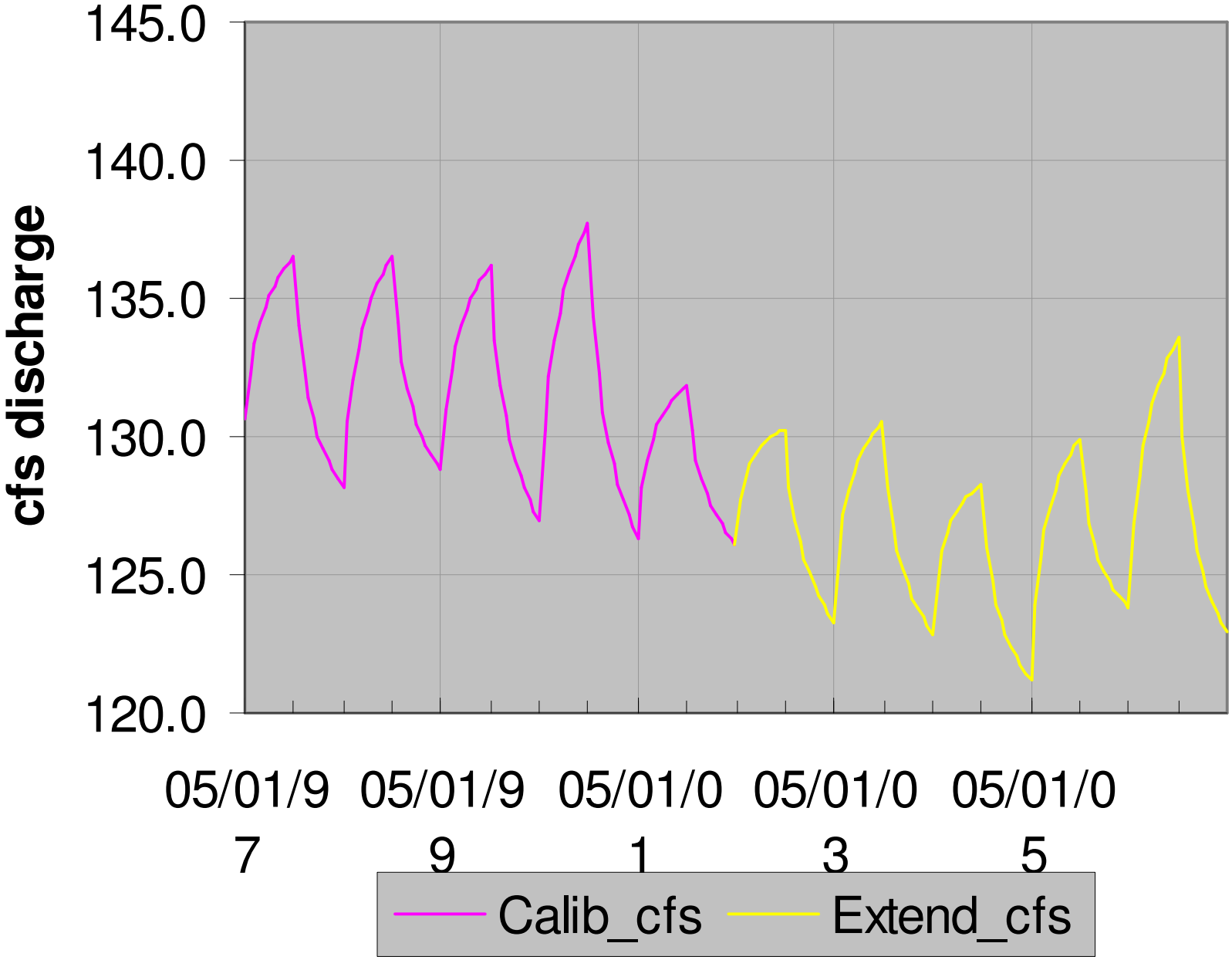
(lower power canal

plus

Bliss gage of Malad river)

Note: No adjustment for diversions or returns between Gooding and Malad River gage at Bliss

MLD_BAN Simulation



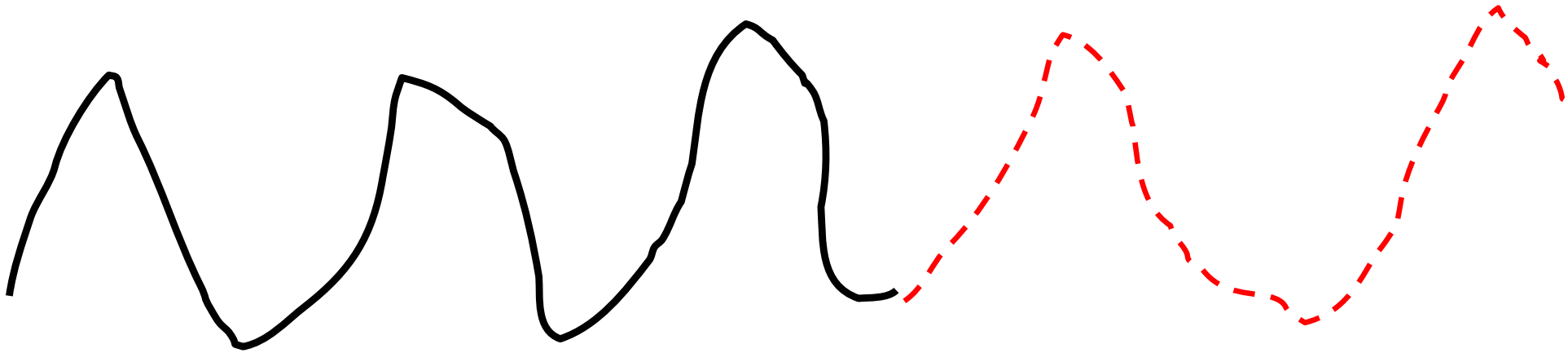
4. Conclusion

We have successfully
synthesized data
by stitching together bits
from various sources.

5. However…

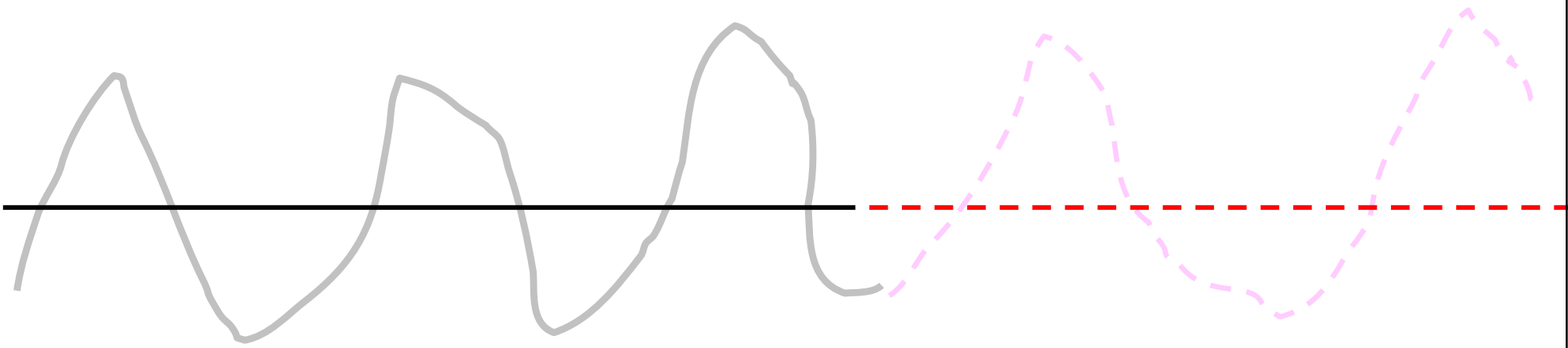
- Remember our purpose: Get starting heads about right so that the representation of ***change*** is realistic
- Put on our thinking caps…
  - The scenario will use annual **average** stress
  - Calibration used **seasonal** stress
  - In order to perform the previous comparisons, The extended data were run using **seasonal** stress.

Hypothetical time series



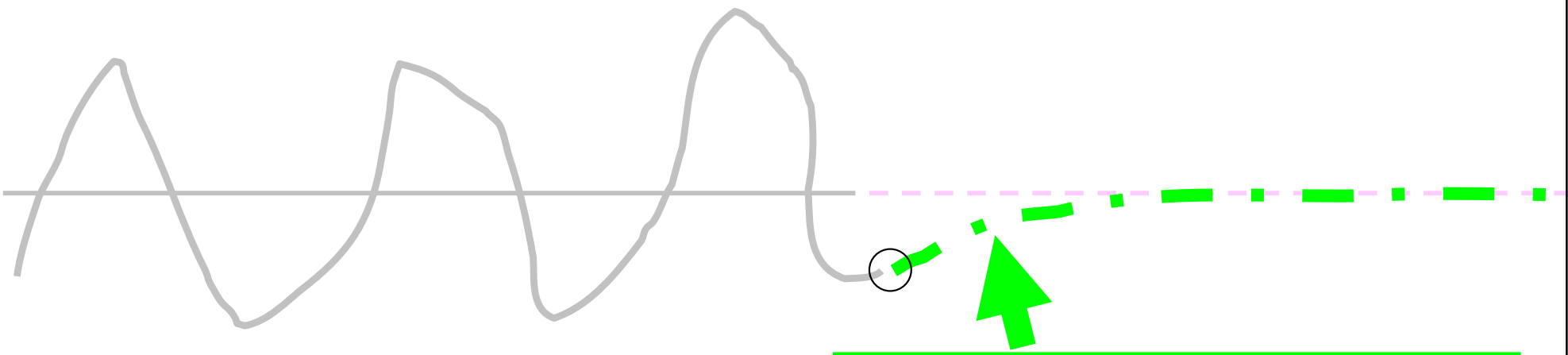
Hypothetical time series

Expected future behavior



Hypothetical *trend*

Expected future *trend*



What we would get if we used starting heads based on a *seasonal* stress

OUR SIMULATION WOULD FALSELY SUGGEST AN EXPECTATION OF INCREASING TREND

6. Proposal for Scenario

- Start scenario run on 1 May 200**2**
  - starting heads = 1 May 2002 heads from "combo3 run" (essentially calibration ending heads advanced 5 days)
  - First five years stress = extended data set 2002-2006 averaged to **annual values**
  - Additional 300 years (starting 1 May 200**7**) using average scenario stress (to be discussed)

→ *Is five years enough?*

END