

STAKEHOLDER  
ADVISORY FORUM  
MEETING  
MAY 9, 2003

# STAGES IN MODELING PROCESS

- Conceptual model
- Model construction
- Calibration
  - steady-state
  - transient
- Verification
- Prediction

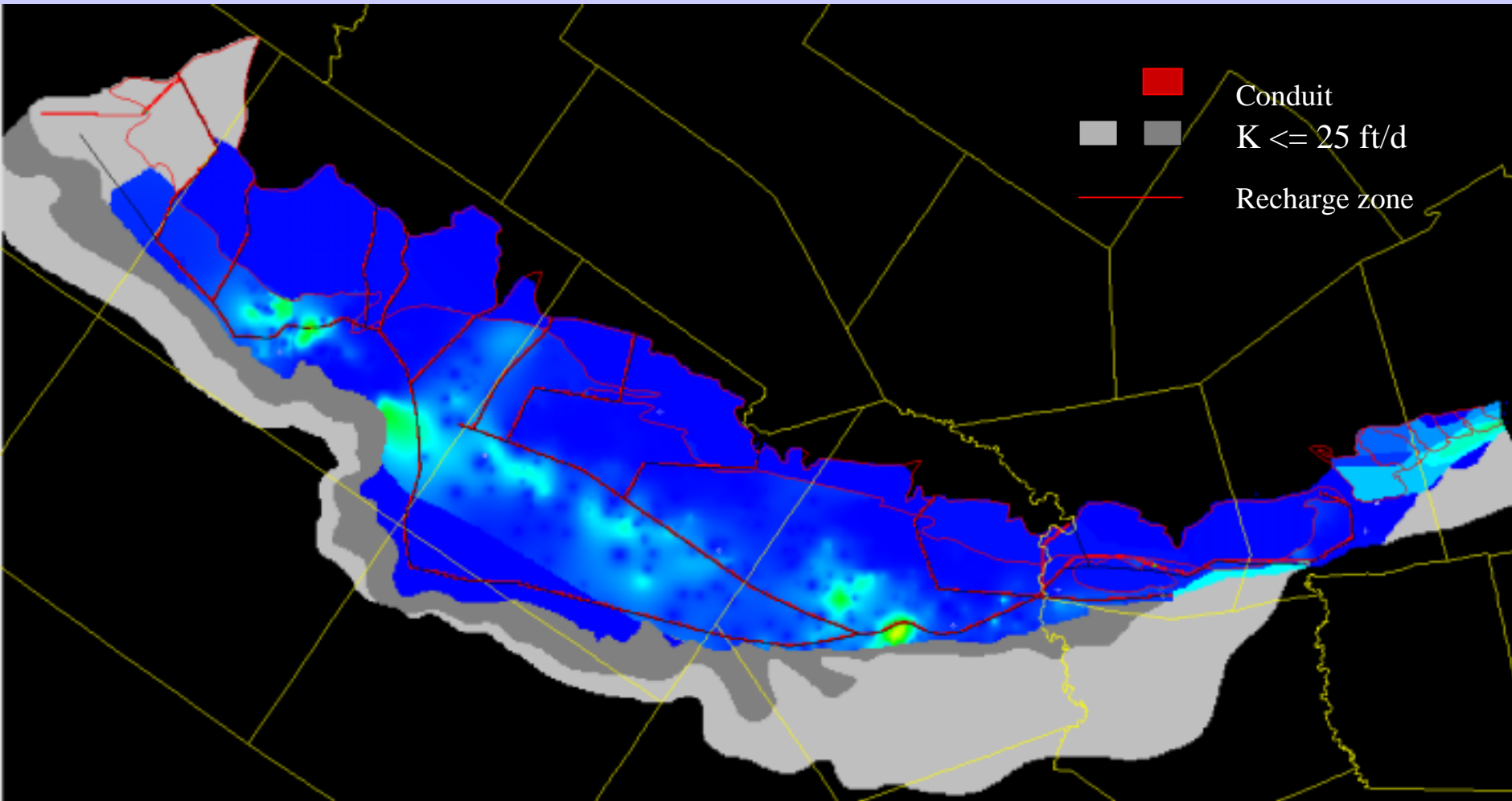
# PRESENTATION

- TRANSIENT SIMULATION
  - Hydraulic Properties
  - Boundary Conditions
  - Stresses -- monthly stress periods
- TRANSIENT CALIBRATION
  - Calibration targets
  - Calibration results

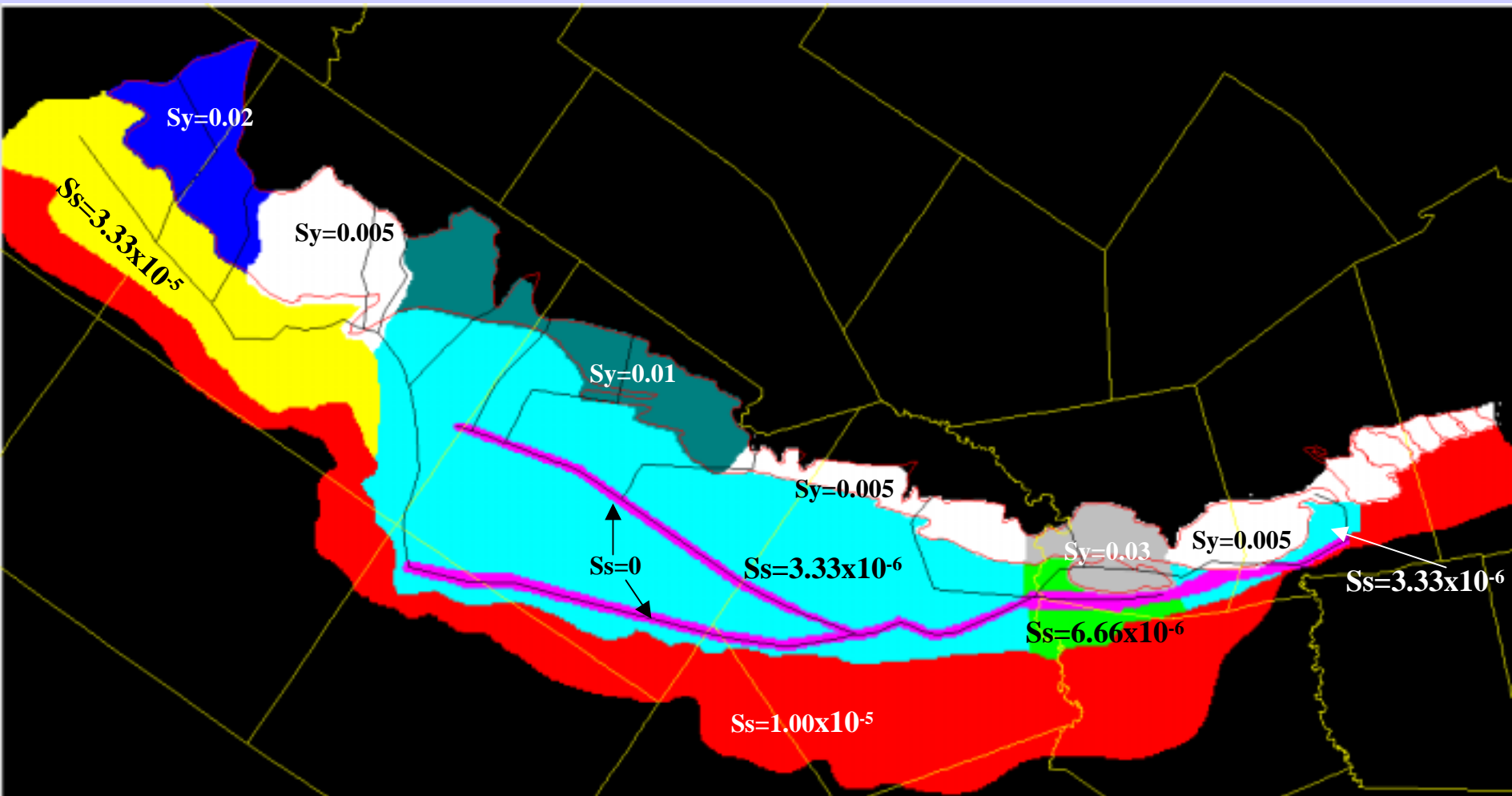
# HYDRAULIC PROPERTIES

# HYDRAULIC CONDUCTIVITY

## SWRI + CONDUITS



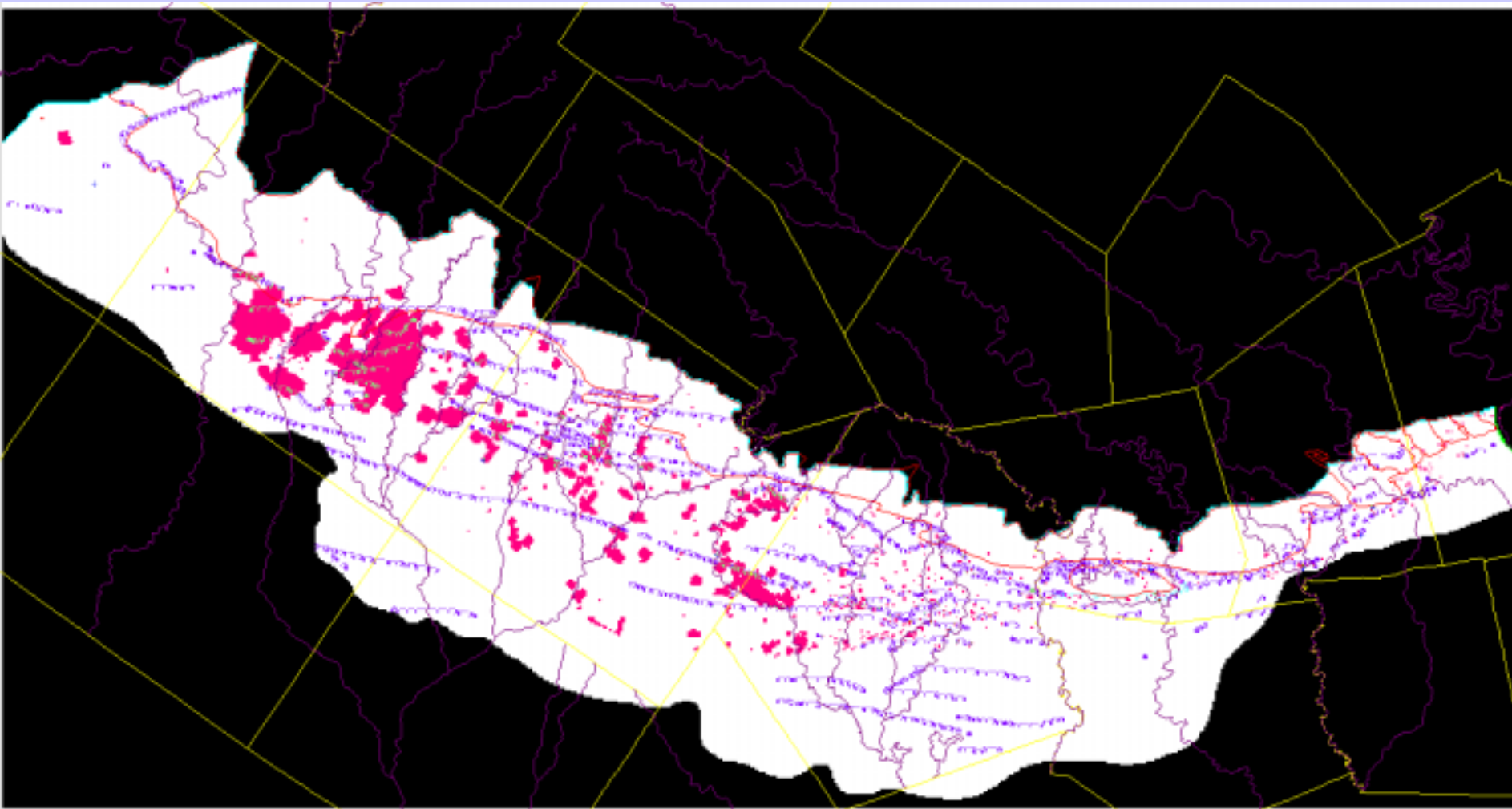
# STORATIVITY ZONES



# BOUNDARY CONDITIONS

# BOUNDARY CONDITIONS

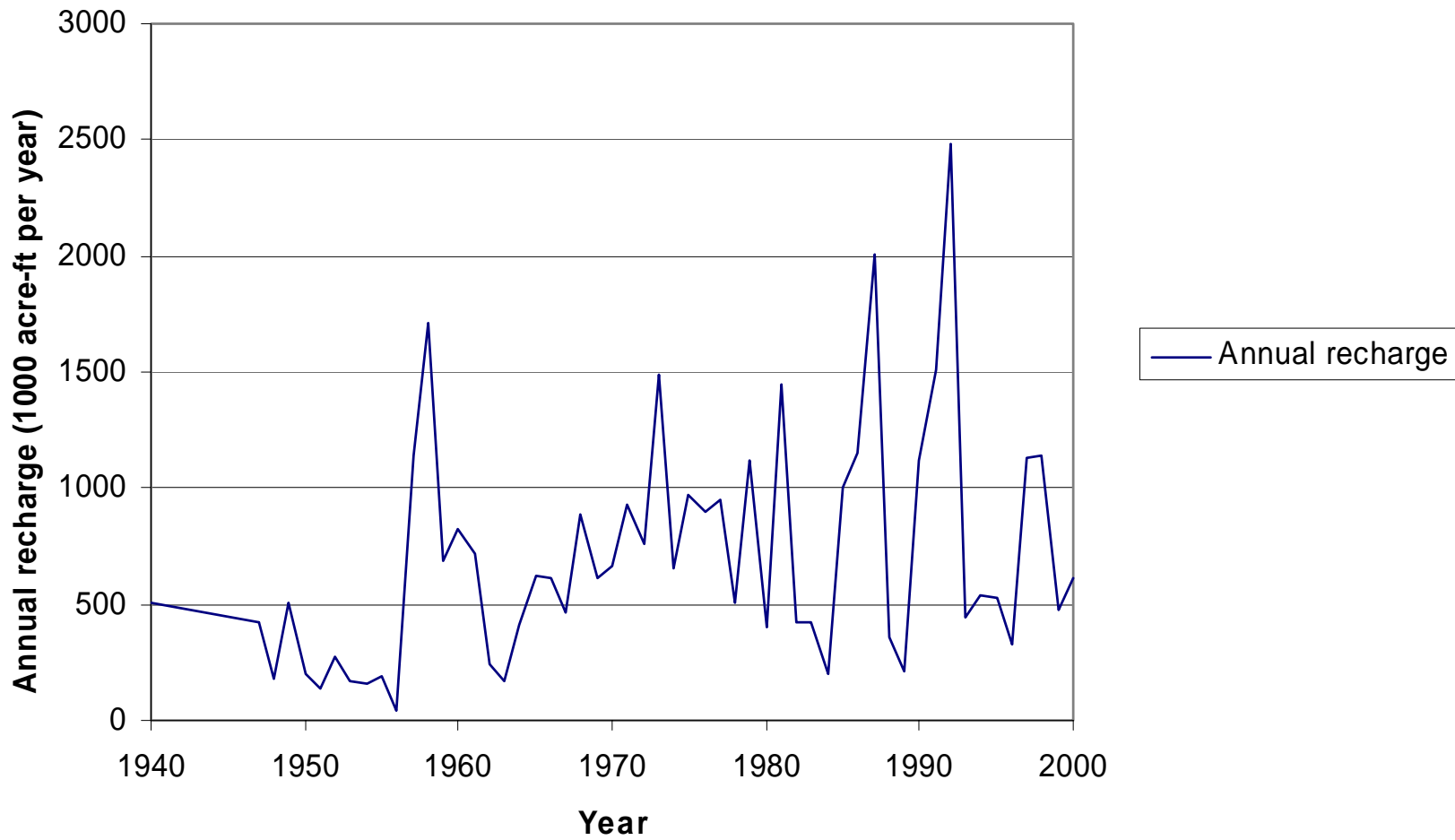
Northern boundary: General-Head (SS) > Constant-Flux (Transient)



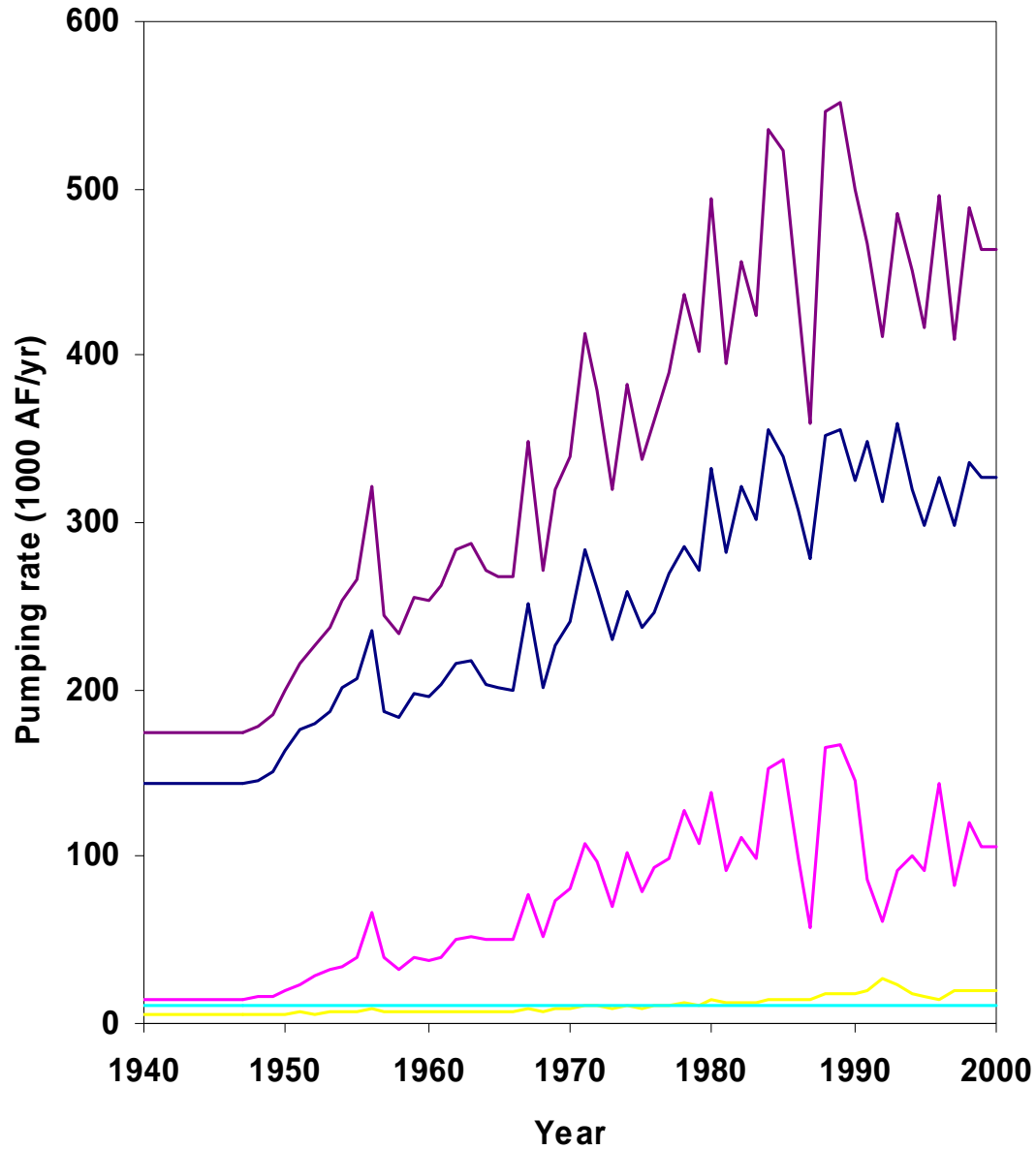


**STRESSES**

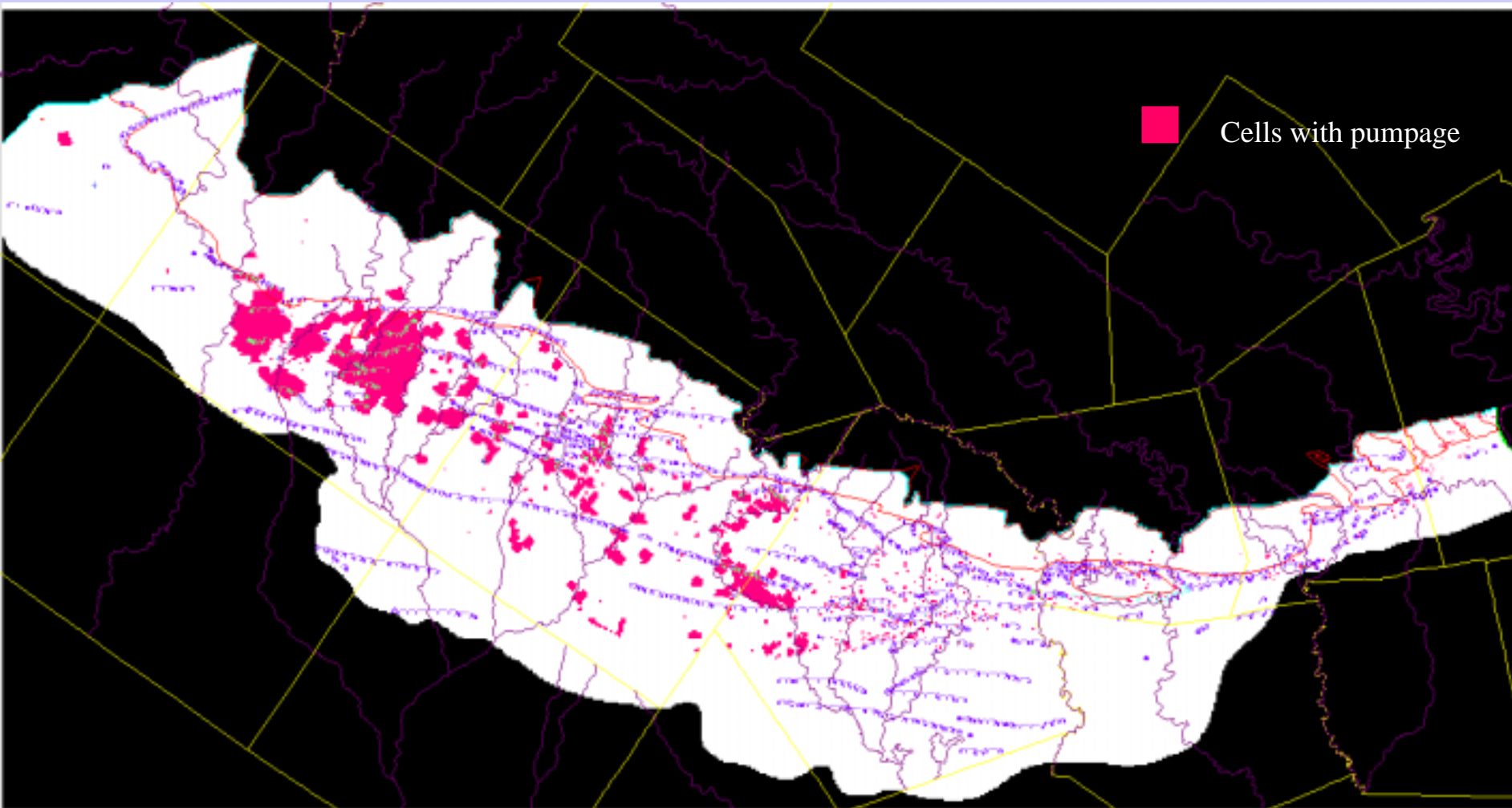
# Annual recharge



# Annual Pumping



# PUMPAGE



TRANSIENT  
CALIBRATION  
TARGETS

# TRANSIENT CALIBRATION TARGETS

## HYDRAULIC HEADS

- Calibration targets
  - (1) Hydraulic heads - long-term record wells
    - County Index wells
    - match hydrographs
  - (2) Hydraulic heads - selected time periods
    - periods of above- and below-normal precipitation
    - match hydraulic heads for a set of wells

# TRANSIENT CALIBRATION TARGETS HYDRAULIC HEADS

- Selected time periods
  - (1) Below-normal precipitation
    - (a) 1952-57
      - May thru November 1956
      - 175 wells
    - (2) Above-normal precipitation
      - (a) 1973-77
        - November 1974 thru July 1975
        - 172 wells

# TRANSIENT CALIBRATION TARGETS SPRINGFLOW

- 5 springs simulated:

San Marcos	compiled
Comal	compiled
Leona	compiled
San Pedro	compiled*
San Antonio	compiled*

\*Based on relation with index well J-17



TRANSIENT  
CALIBRATION  
PROCESS

# TRANSIENT CALIBRATION REVISIONS

- Recharge adjusted
  - Cibolo Creek basin reduced by 50 percent
  - High recharge years ( $>1,400,000$  acre-ft)  
reduced by 20 percent (1958, 1973, 1981, 1987)
- Storativity zones and values adjusted
- Hydraulic conductivity and placement of conduits adjusted
- Drain (spring) elevation and conductance adjusted

TRANSIENT  
CALIBRATION  
RESULTS

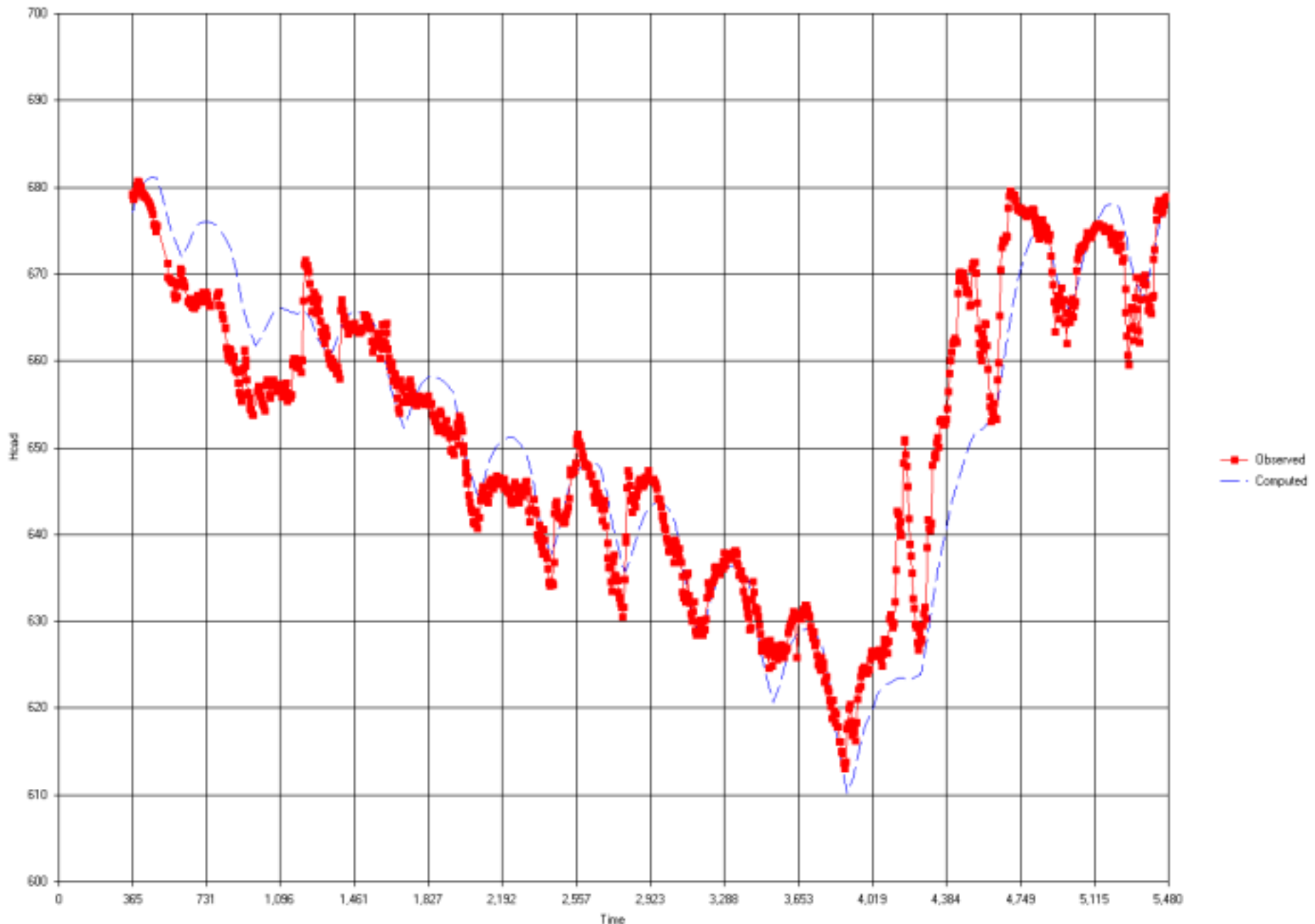
# TRANSIENT CALIBRATION PERIODS

- To make size of data sets and simulation run times more manageable
  - (1) 1947-60
    - includes drought period
  - (2) 1961-75
    - includes period of high water levels
  - (3) 1976-90

TRANSIENT  
PERIOD 1947-60

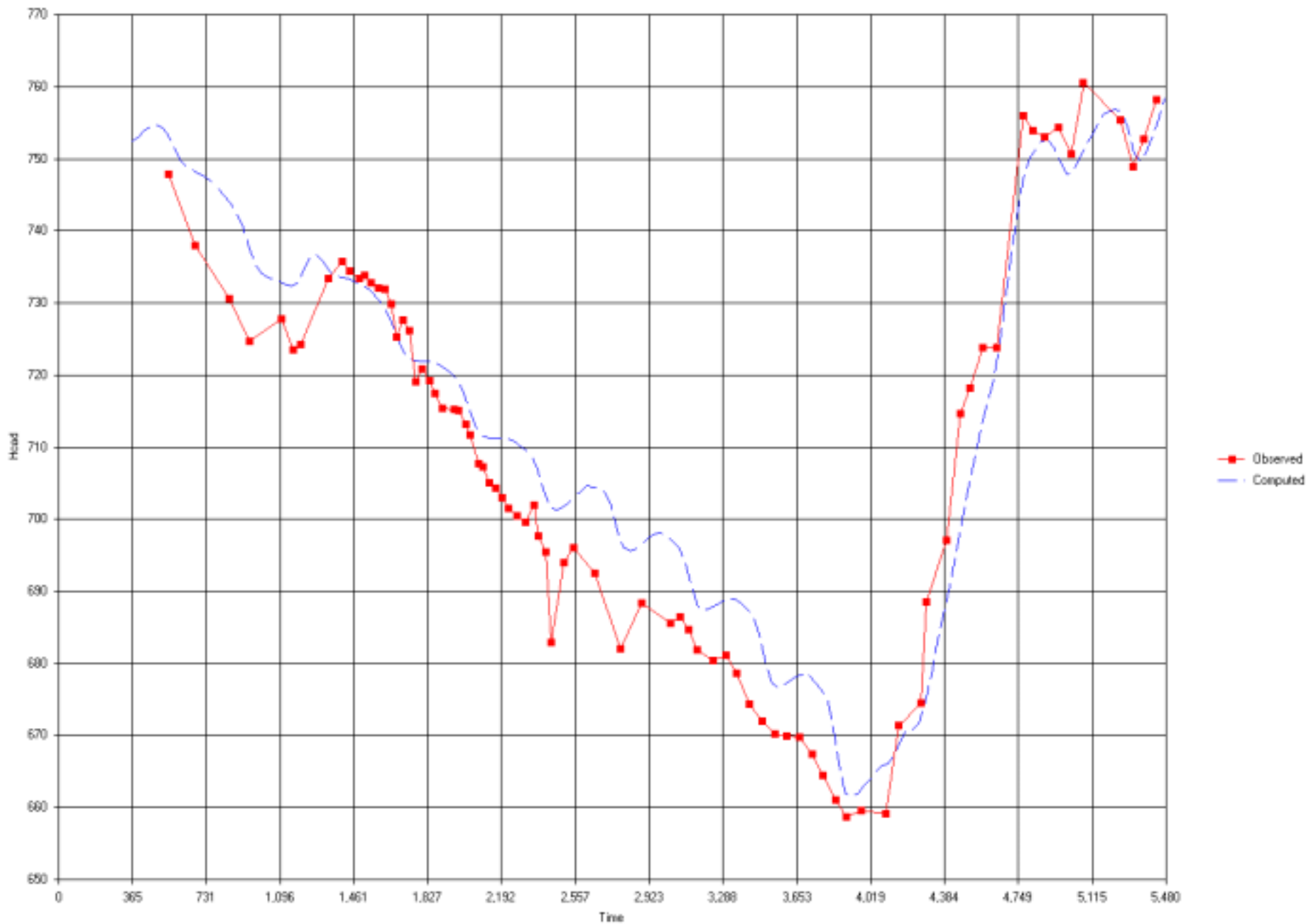
# Central Bexar County

Bexar\_index



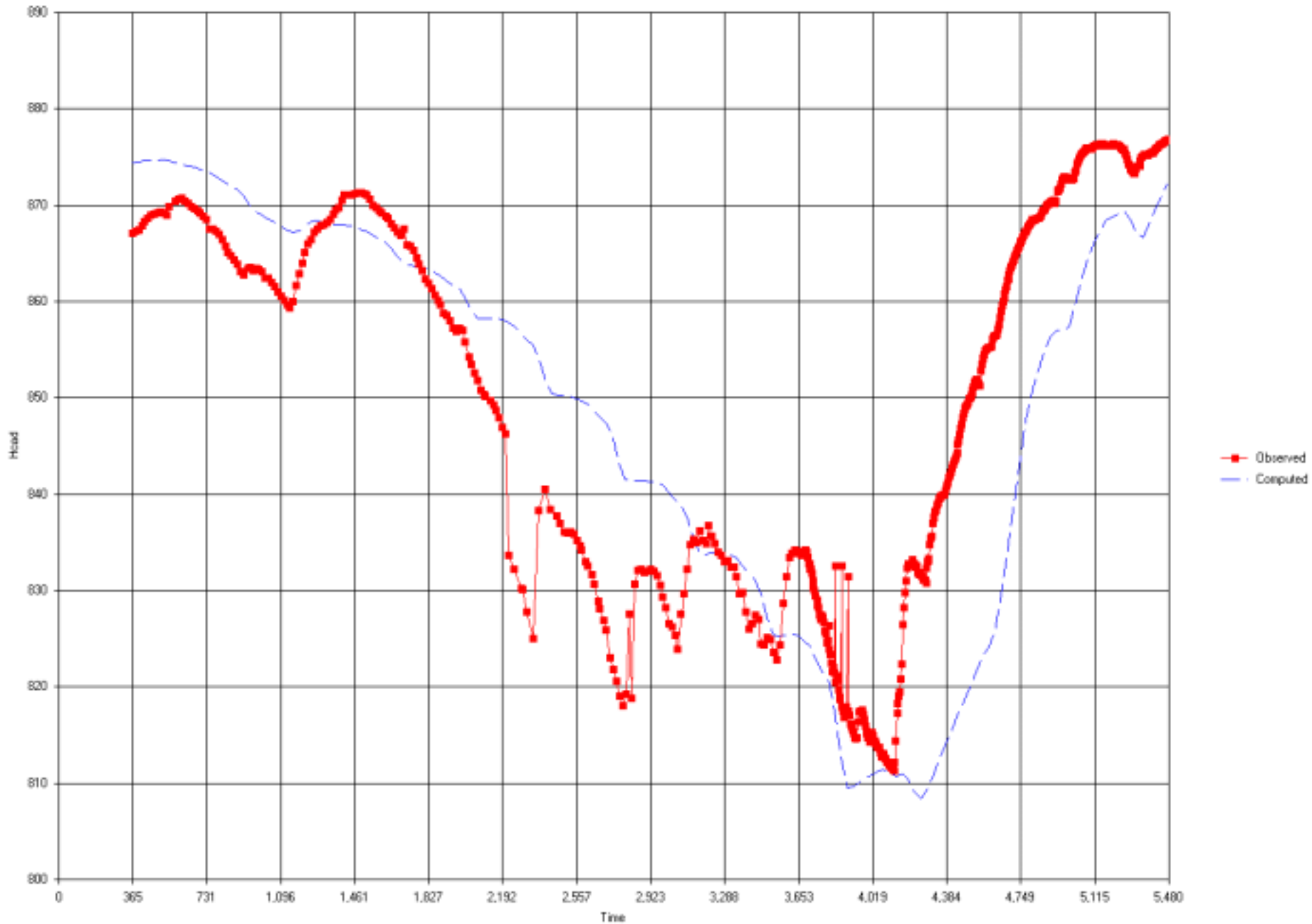
# Southwest Medina County

Medina\_6946701



# South-central Uvalde County

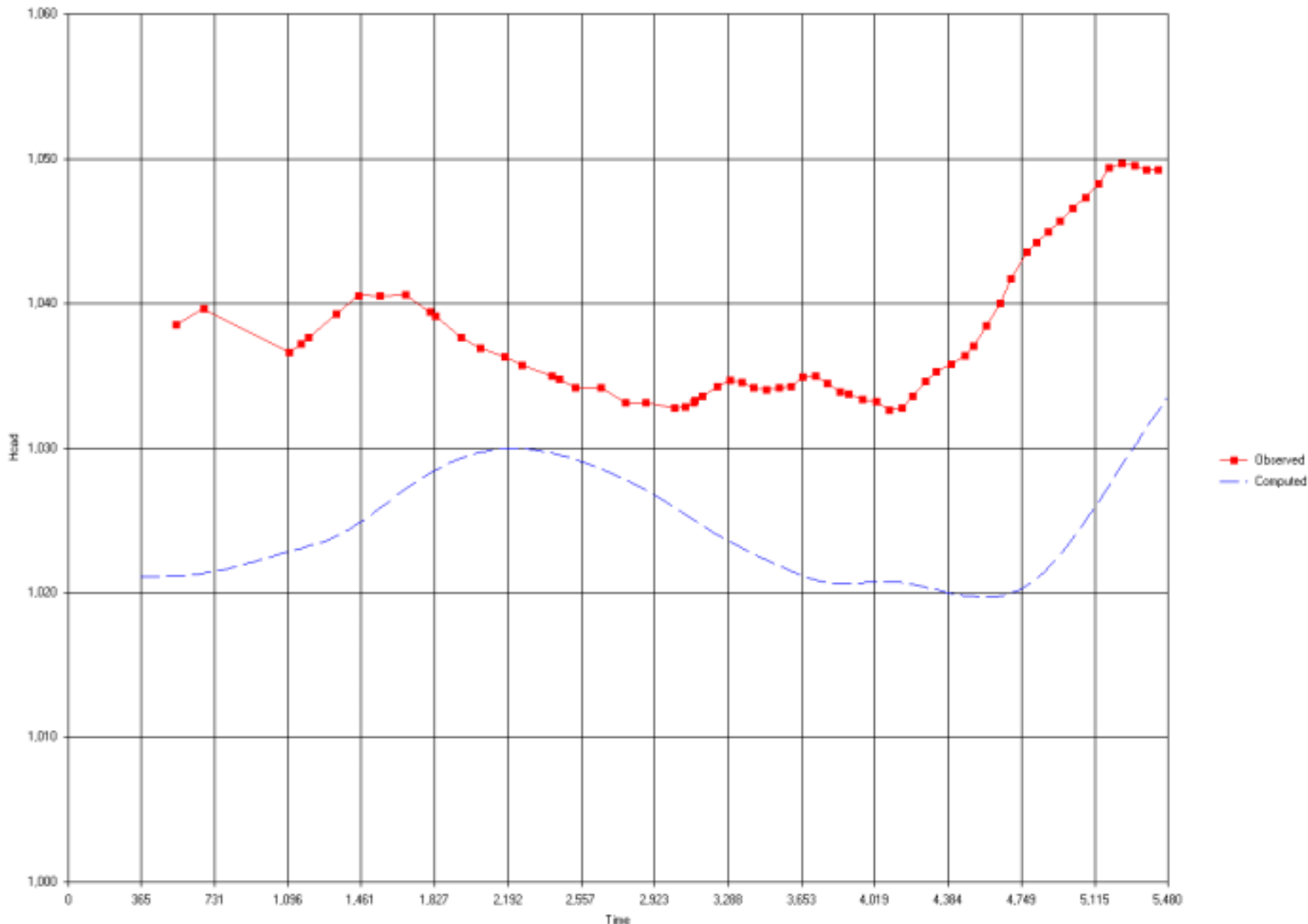
Uvalde\_index





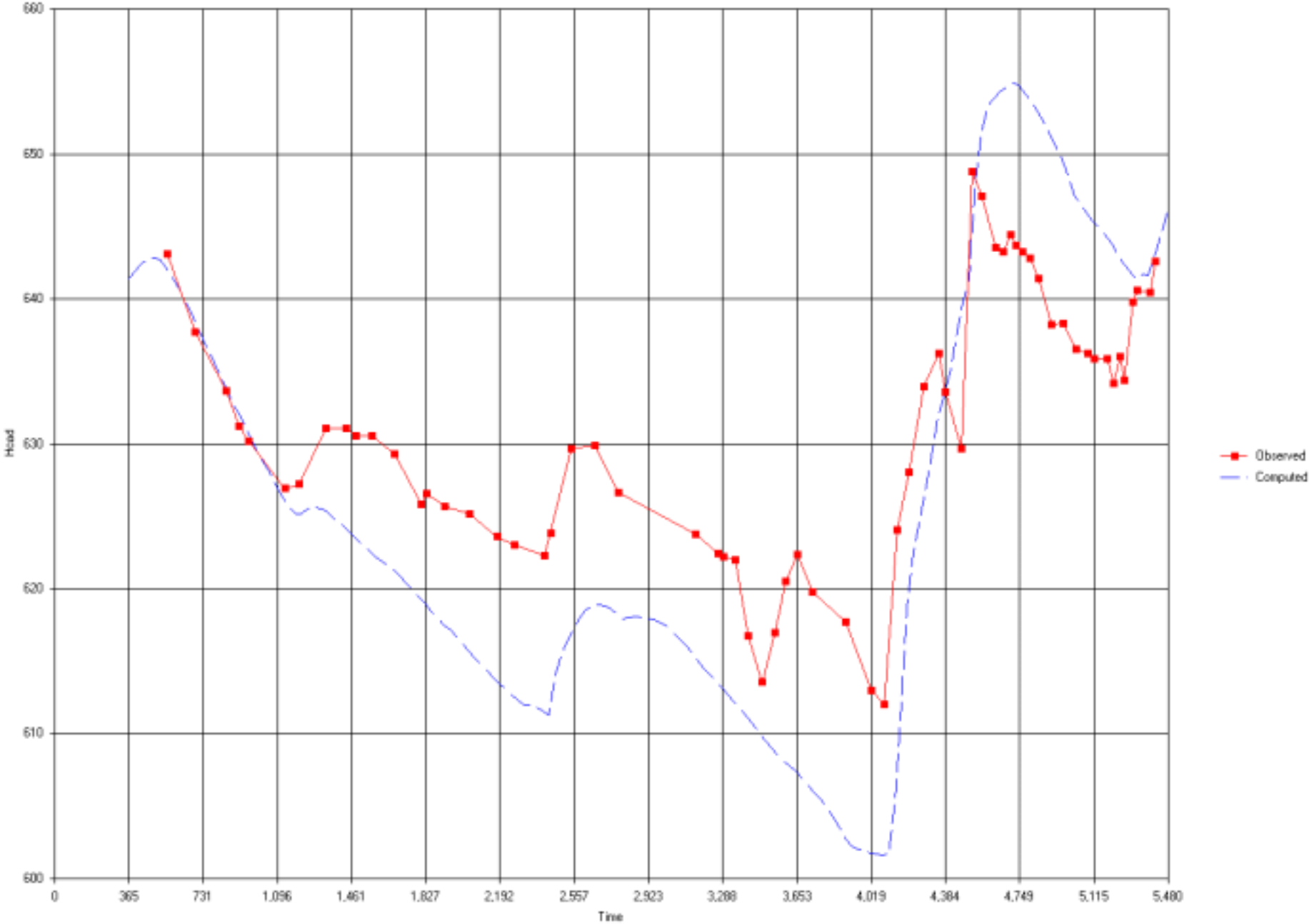
# Central Kinney County

Kinney\_7046901



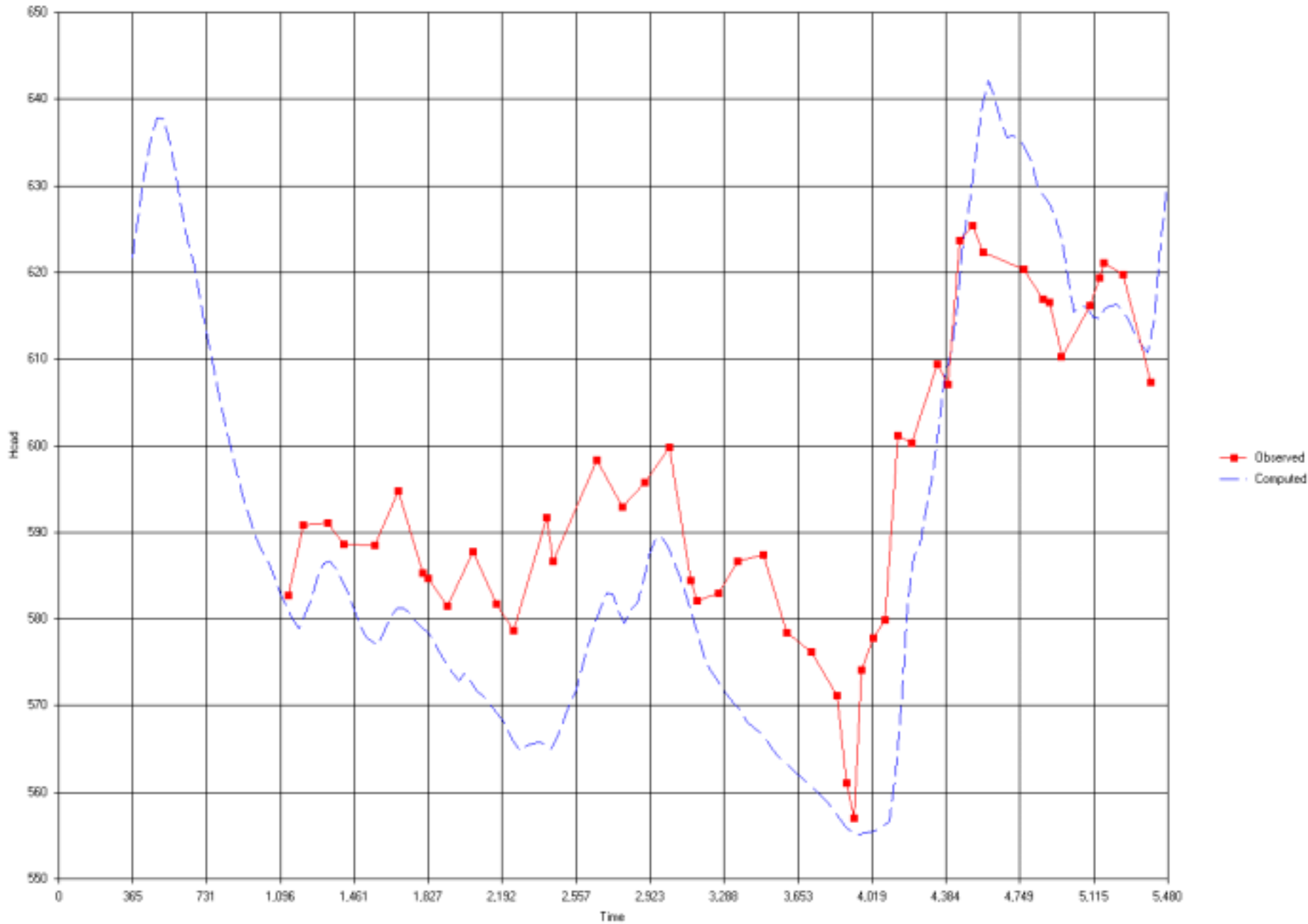
North-central Comal County

Comal\_6823212



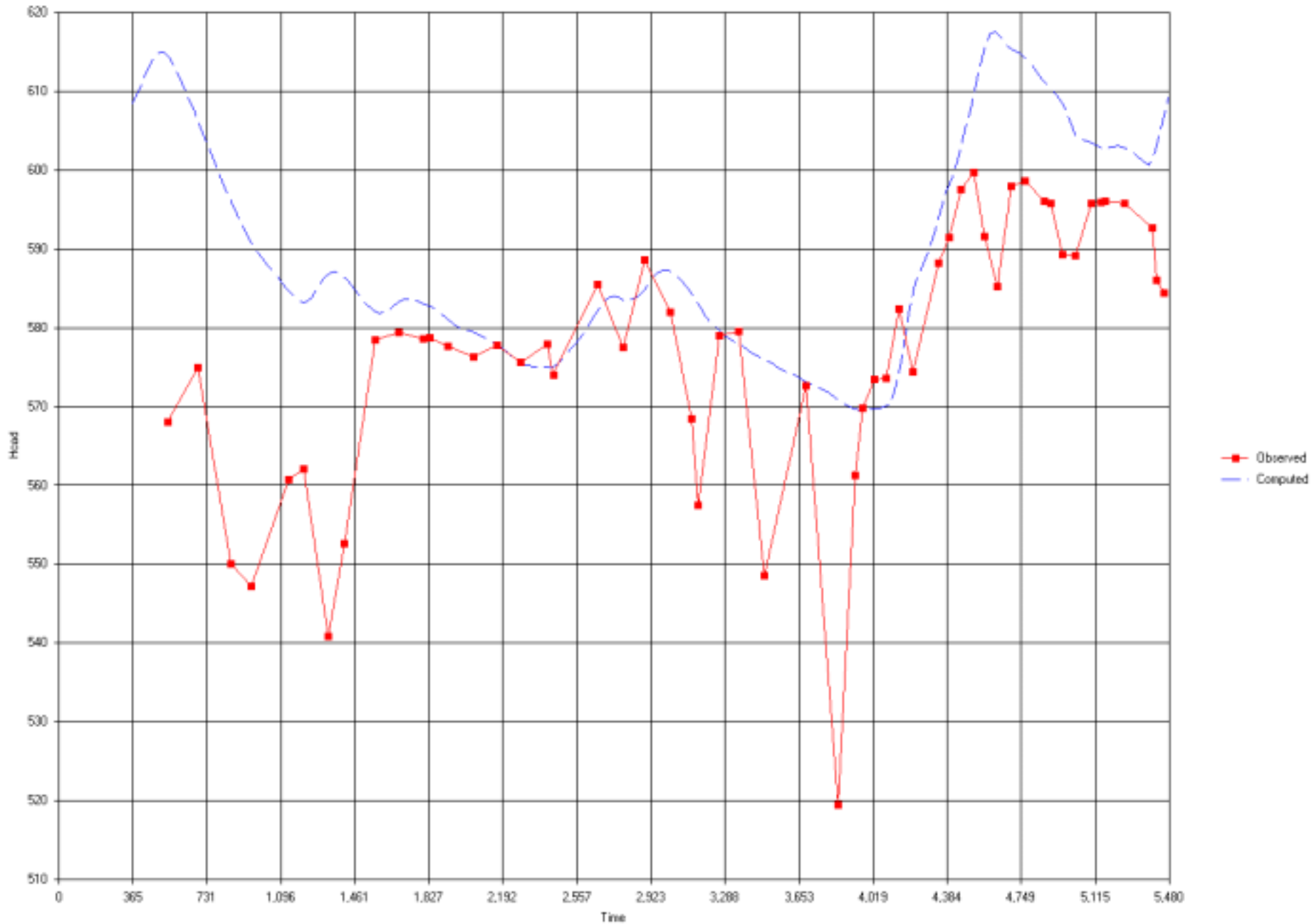
# Eastern Hays County

Hays\_5857903



# Central Hays County

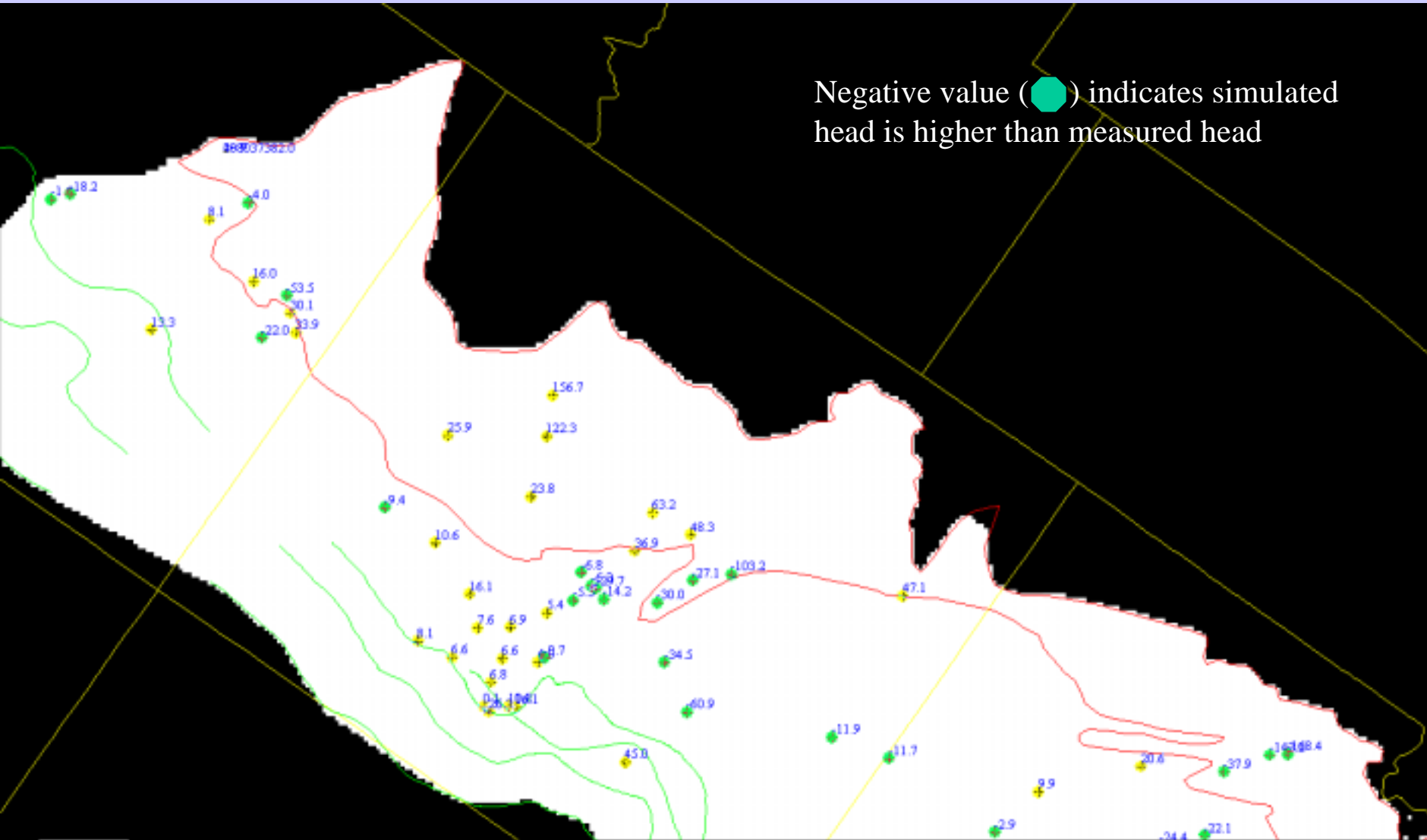
Hays\_6702103



# HYDRAULIC HEAD RESIDUALS

(For August 1956)

Negative value (●) indicates simulated head is higher than measured head

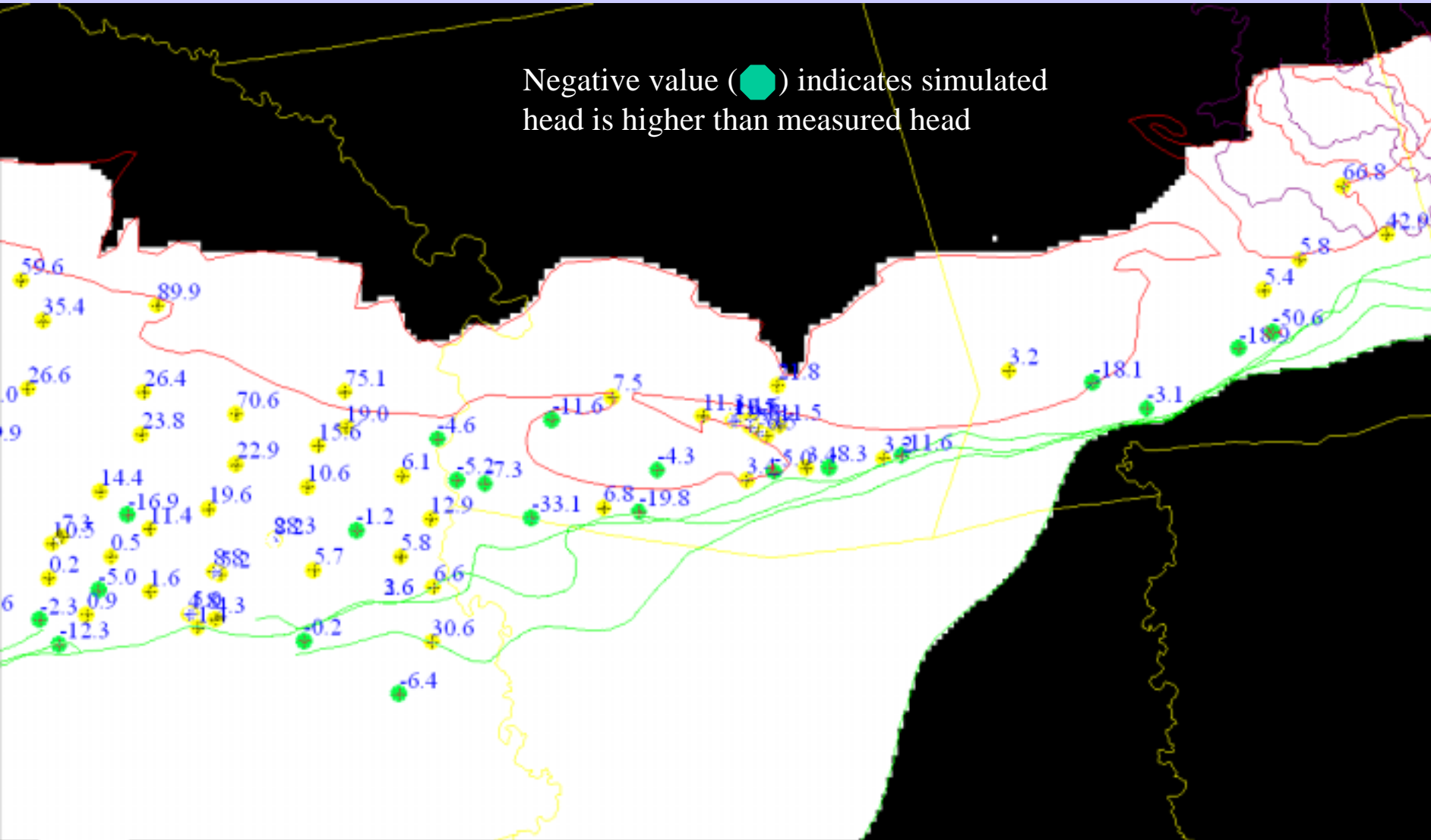




# HYDRAULIC HEAD RESIDUALS

(For August 1956)

Negative value (●) indicates simulated head is higher than measured head

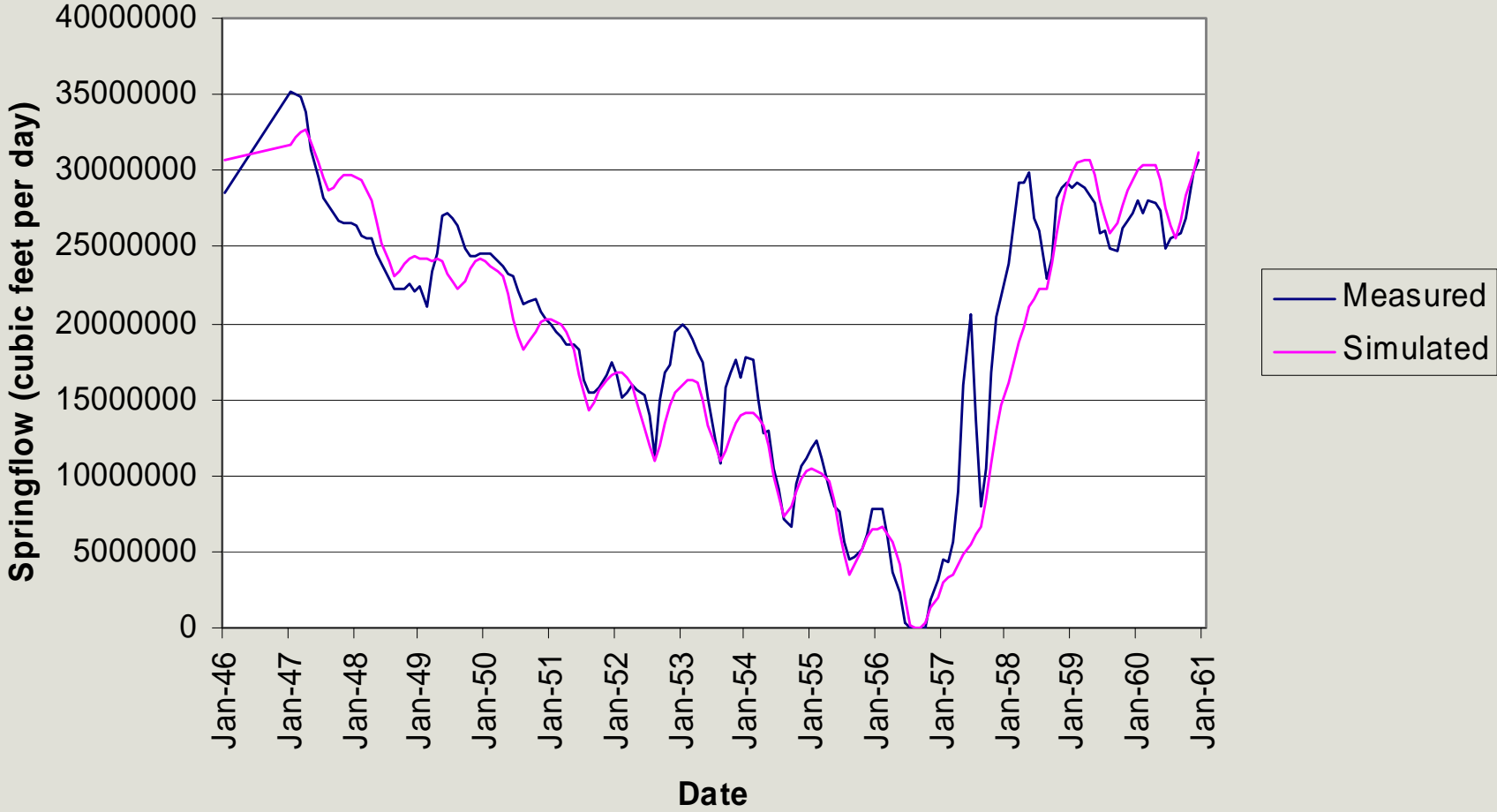




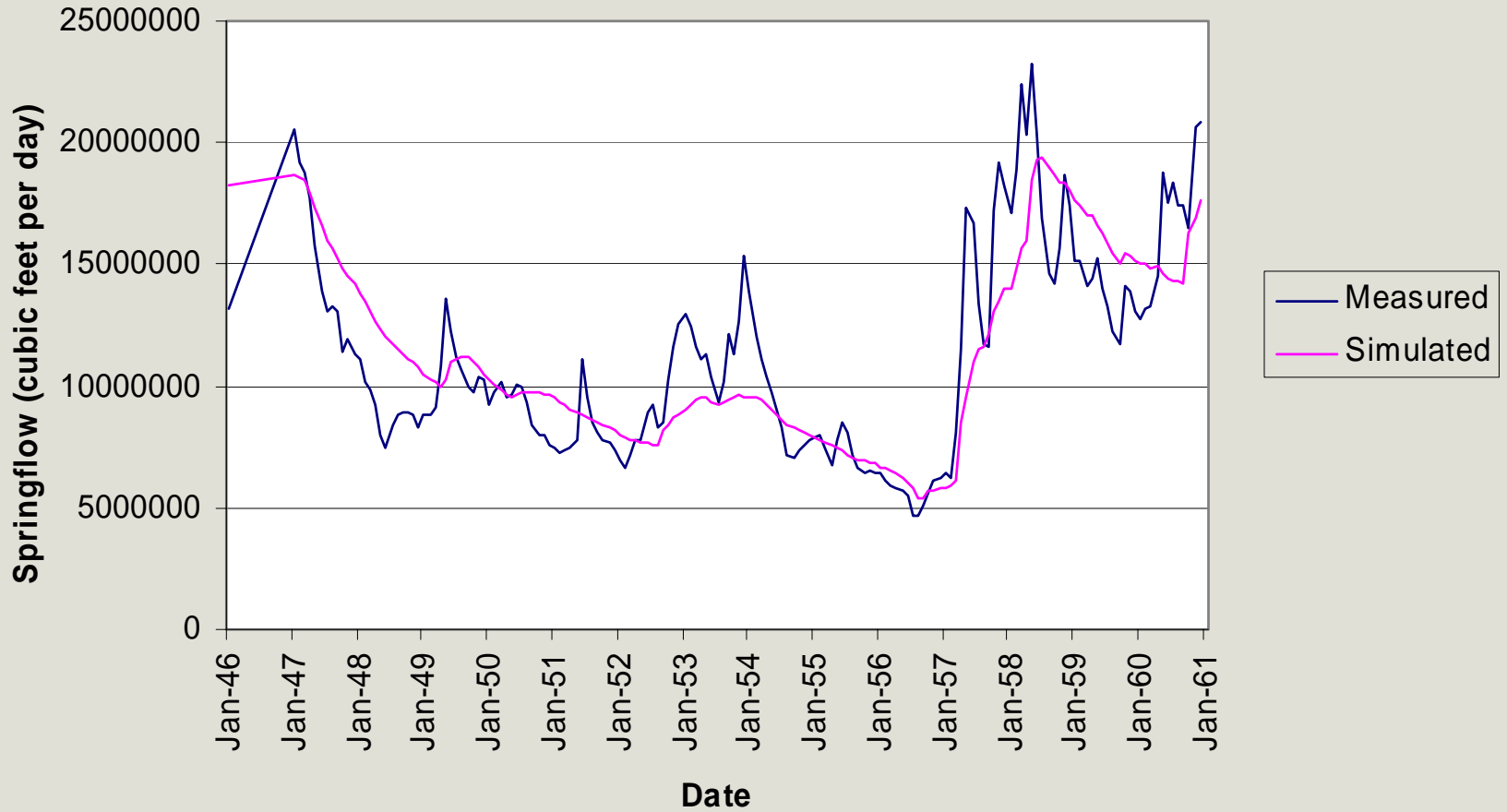




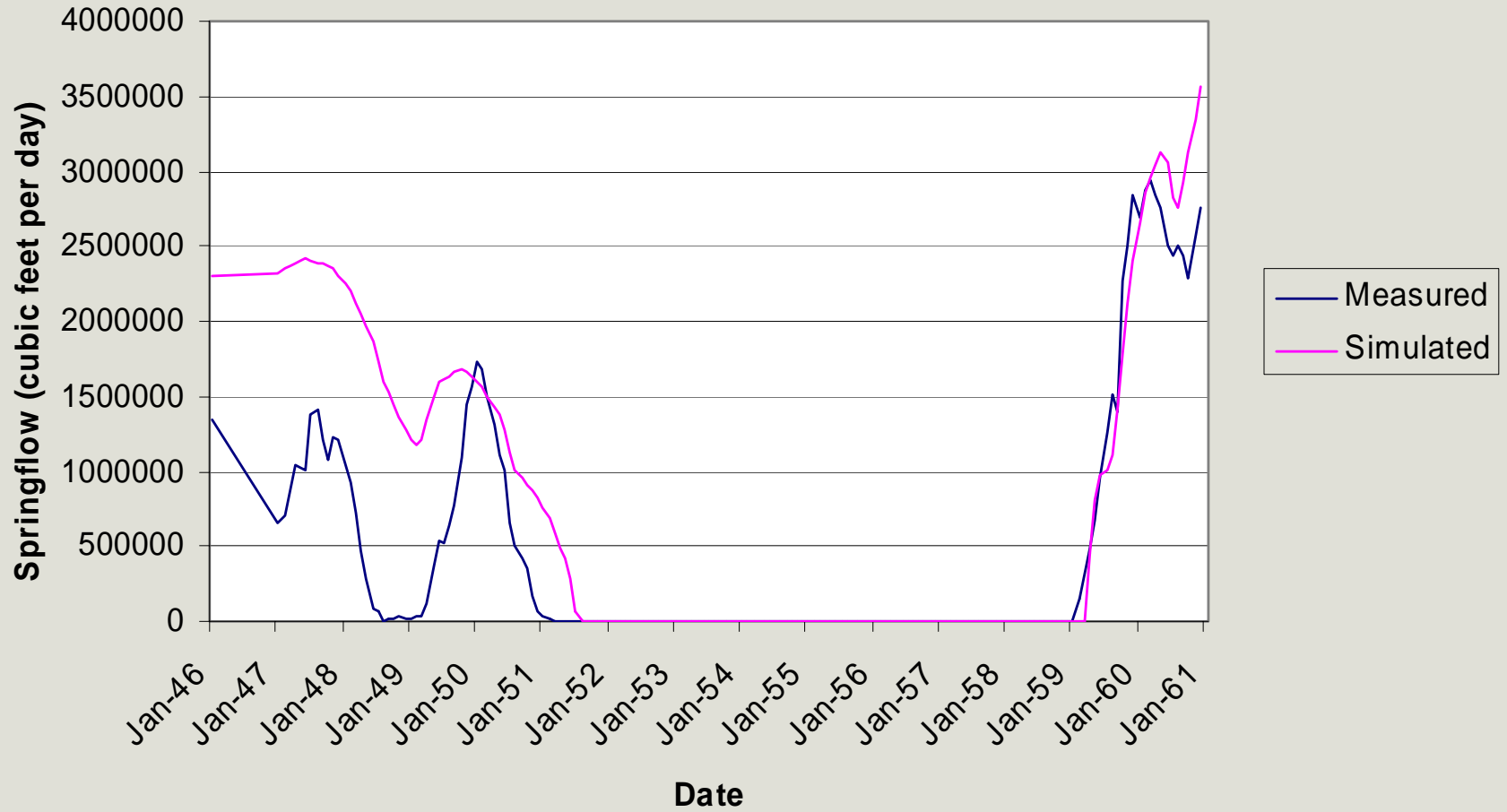
# Comal Springs -- 1947-60



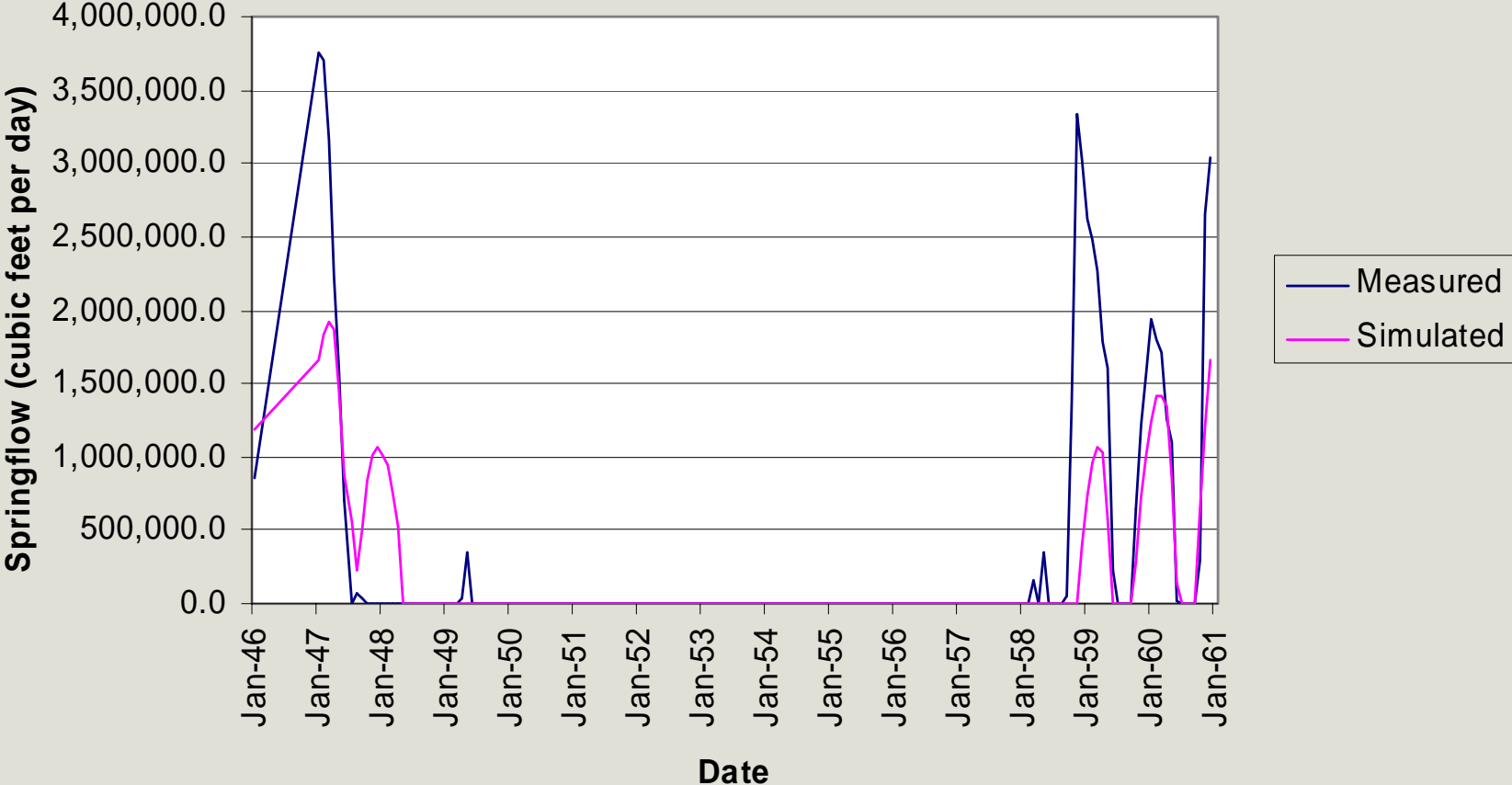
### San Marcos Springs -- 1947-60



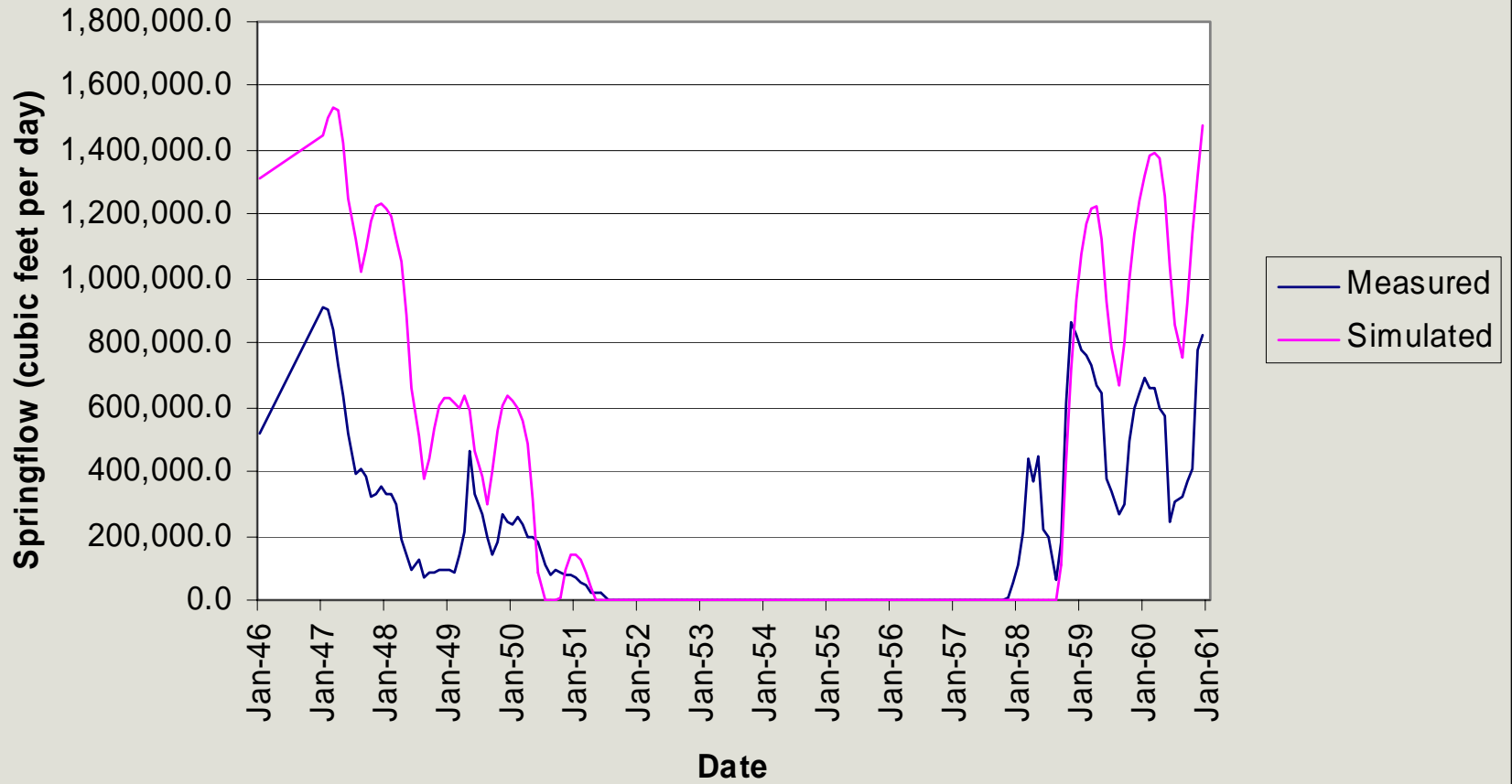
# Leona Springs -- 1947-60



# San Antonio Springs -- 1947-60



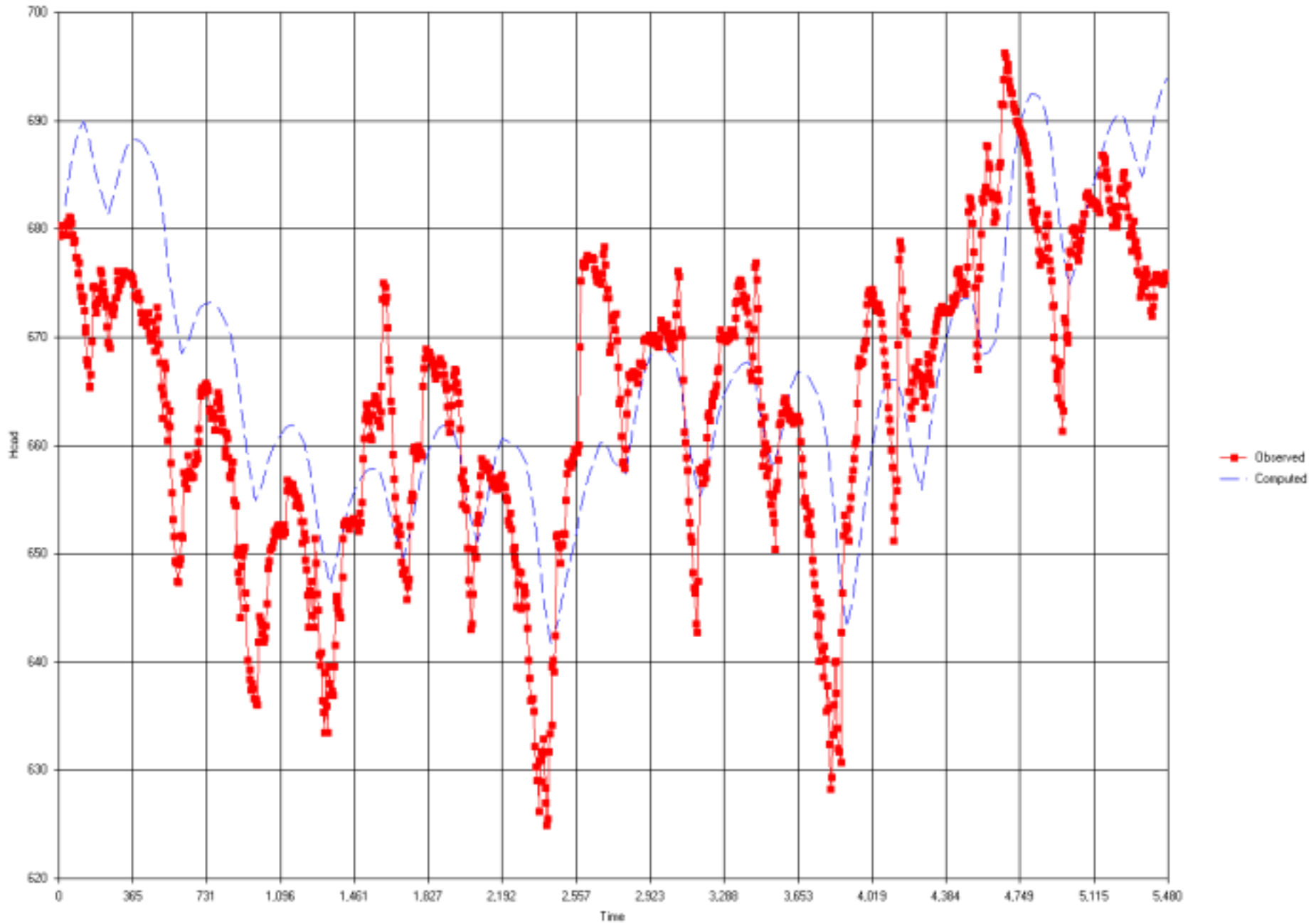
### San Pedro Springs -- 1947-60



TRANSIENT  
PERIOD 1961-75

# Central Bexar County

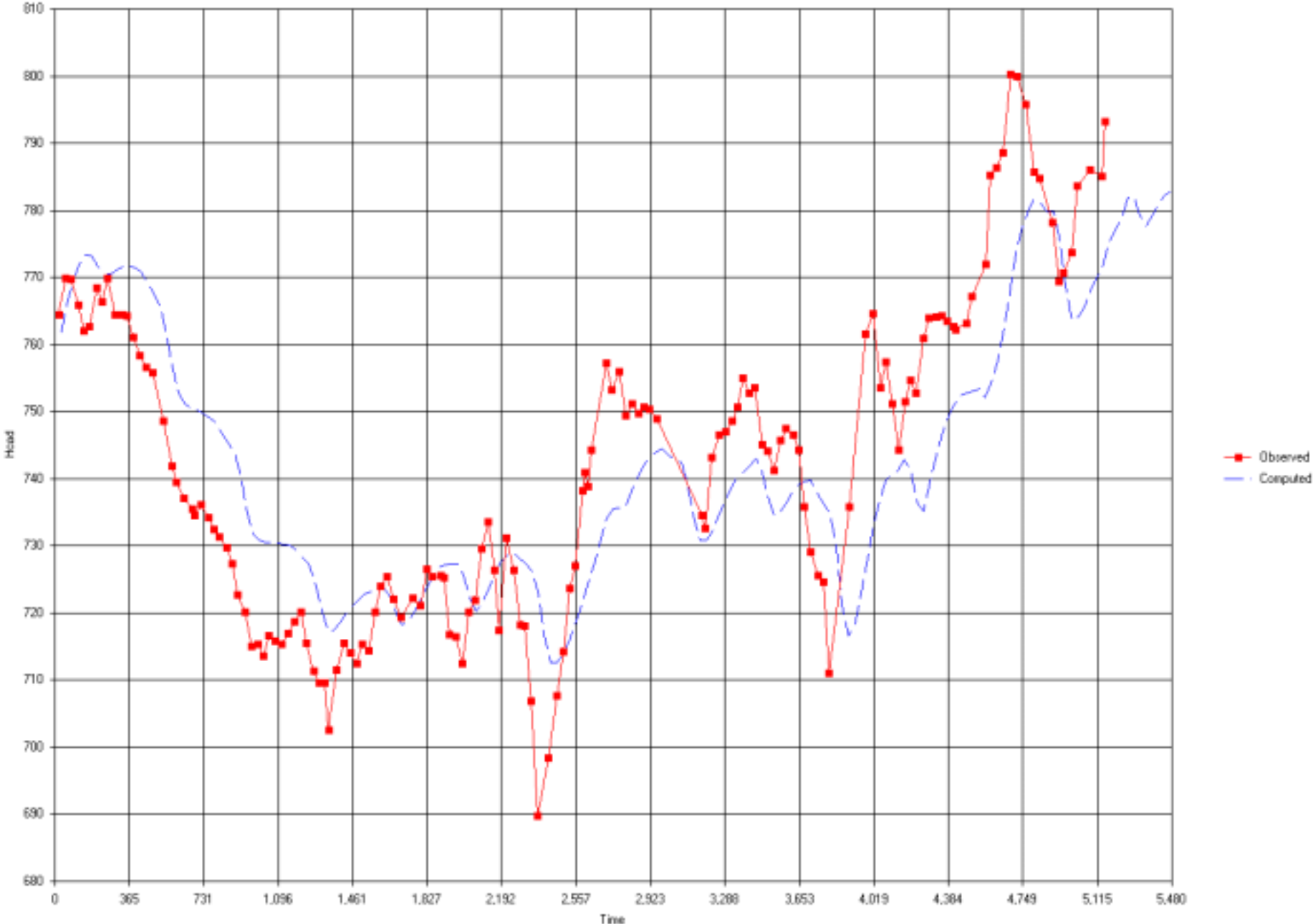
Bexar\_index





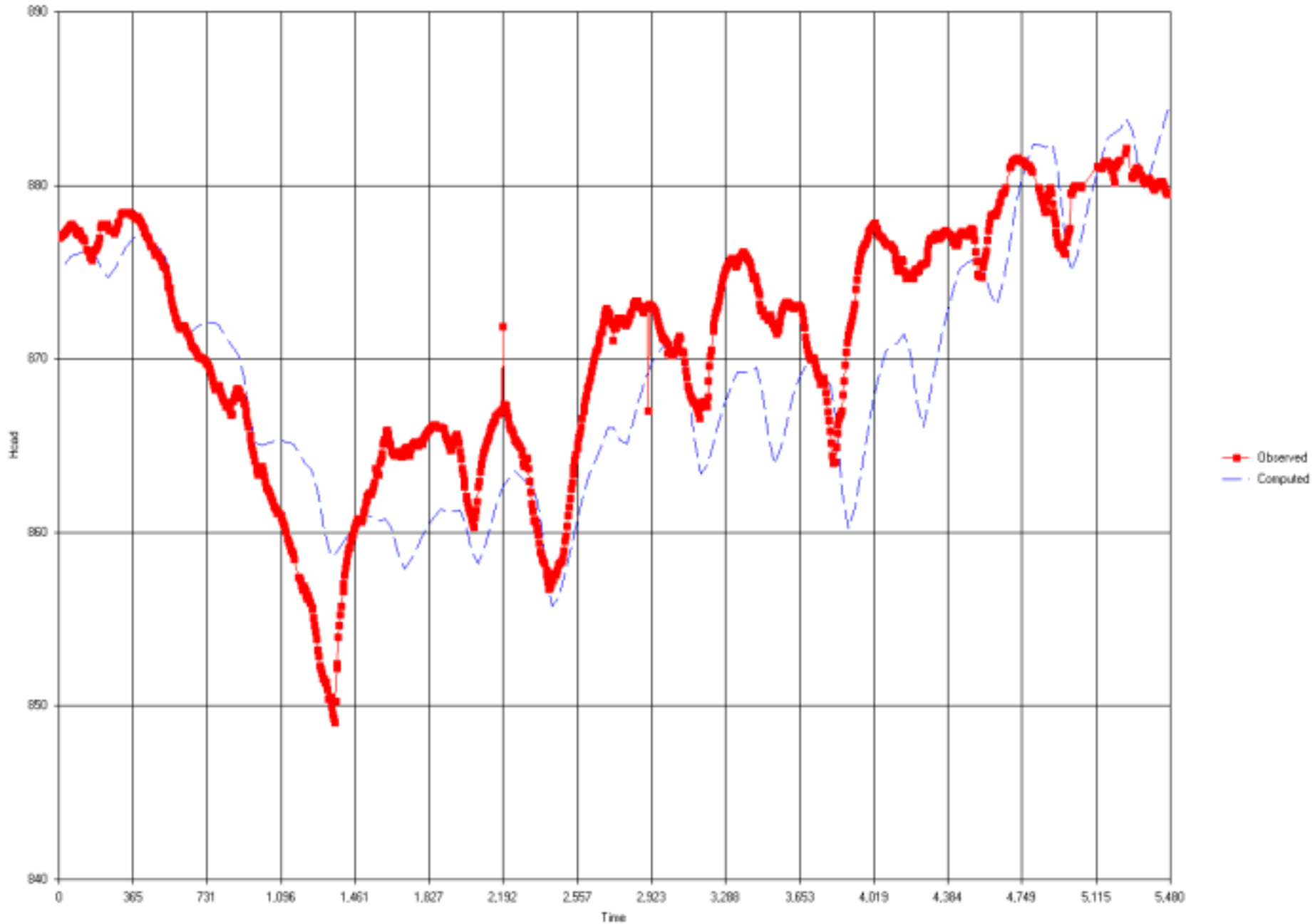
# Southwest Medina County

Medina\_6946701



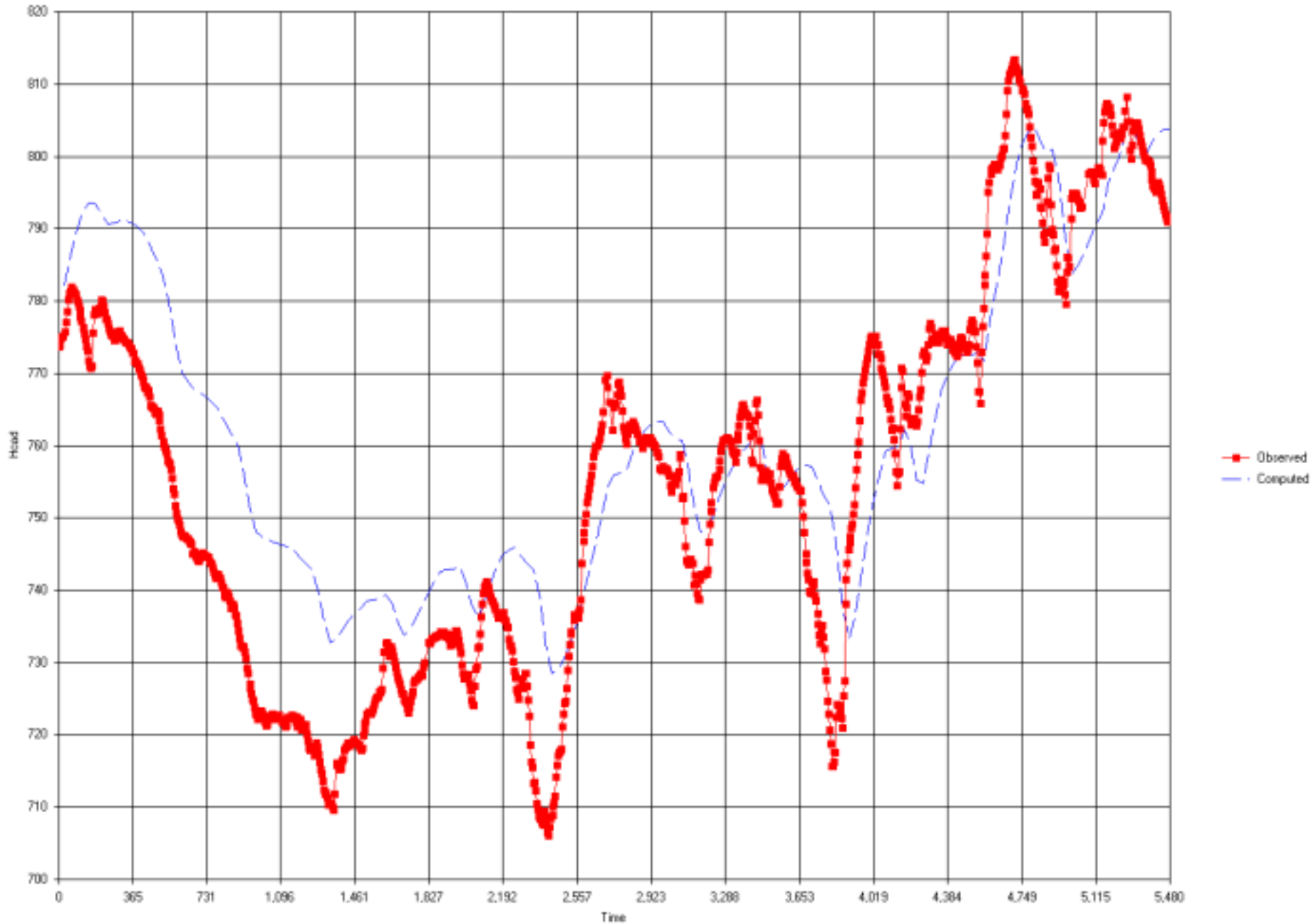
# South-central Uvalde County

Uvalde\_index



# East-central Uvalde County

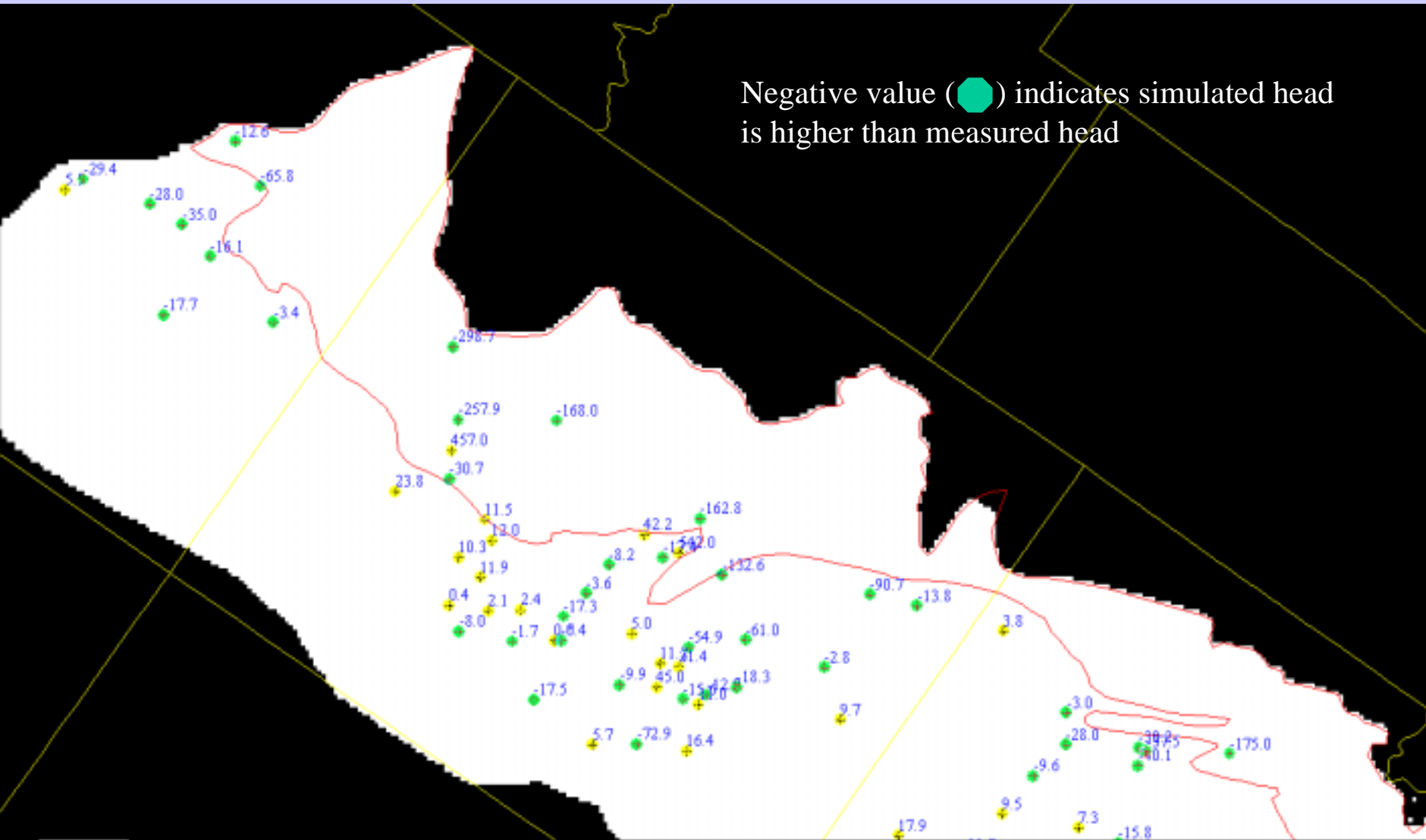
Uvalde\_6945401



# HYDRAULIC HEAD RESIDUALS

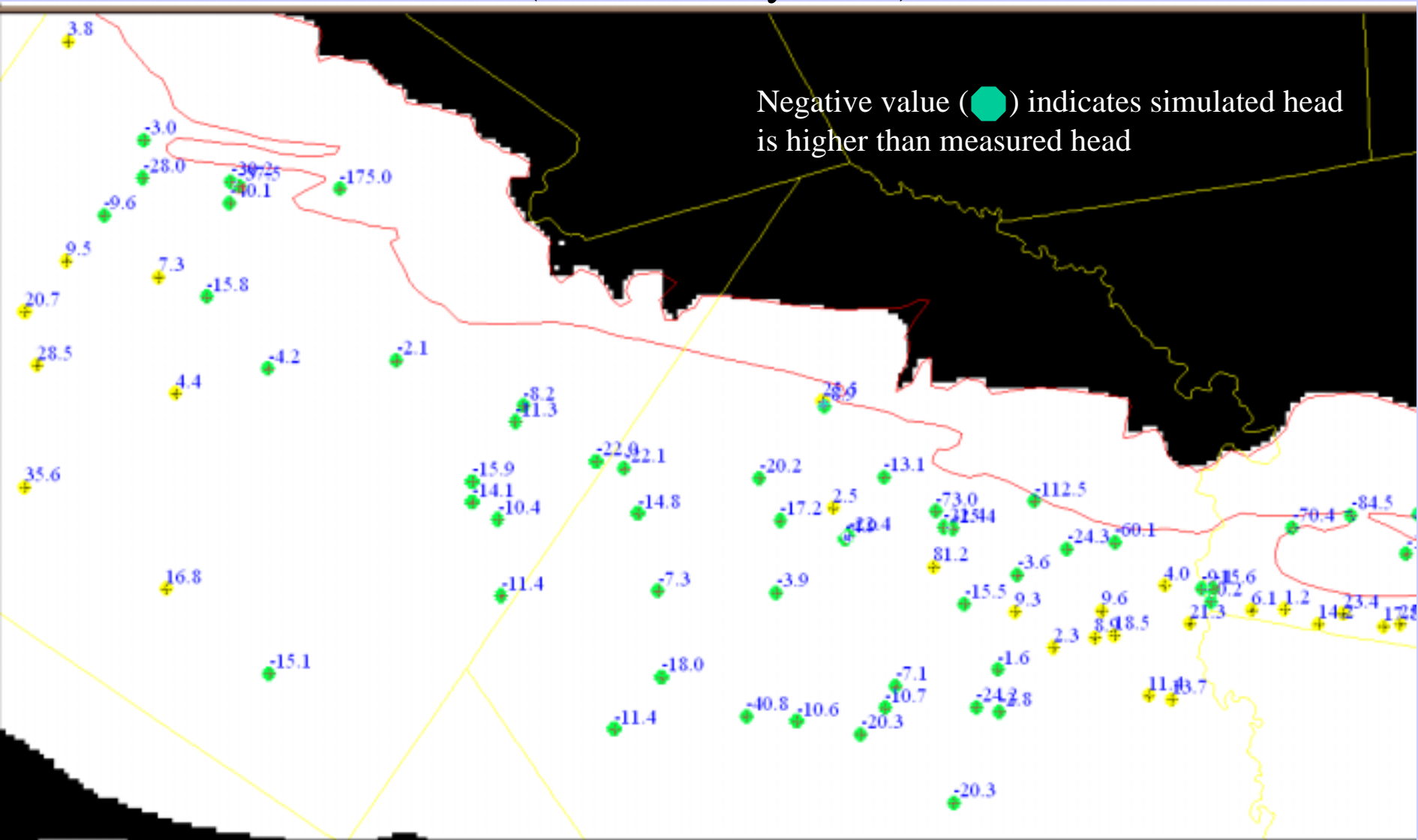
(For February 1975)

Negative value (●) indicates simulated head is higher than measured head



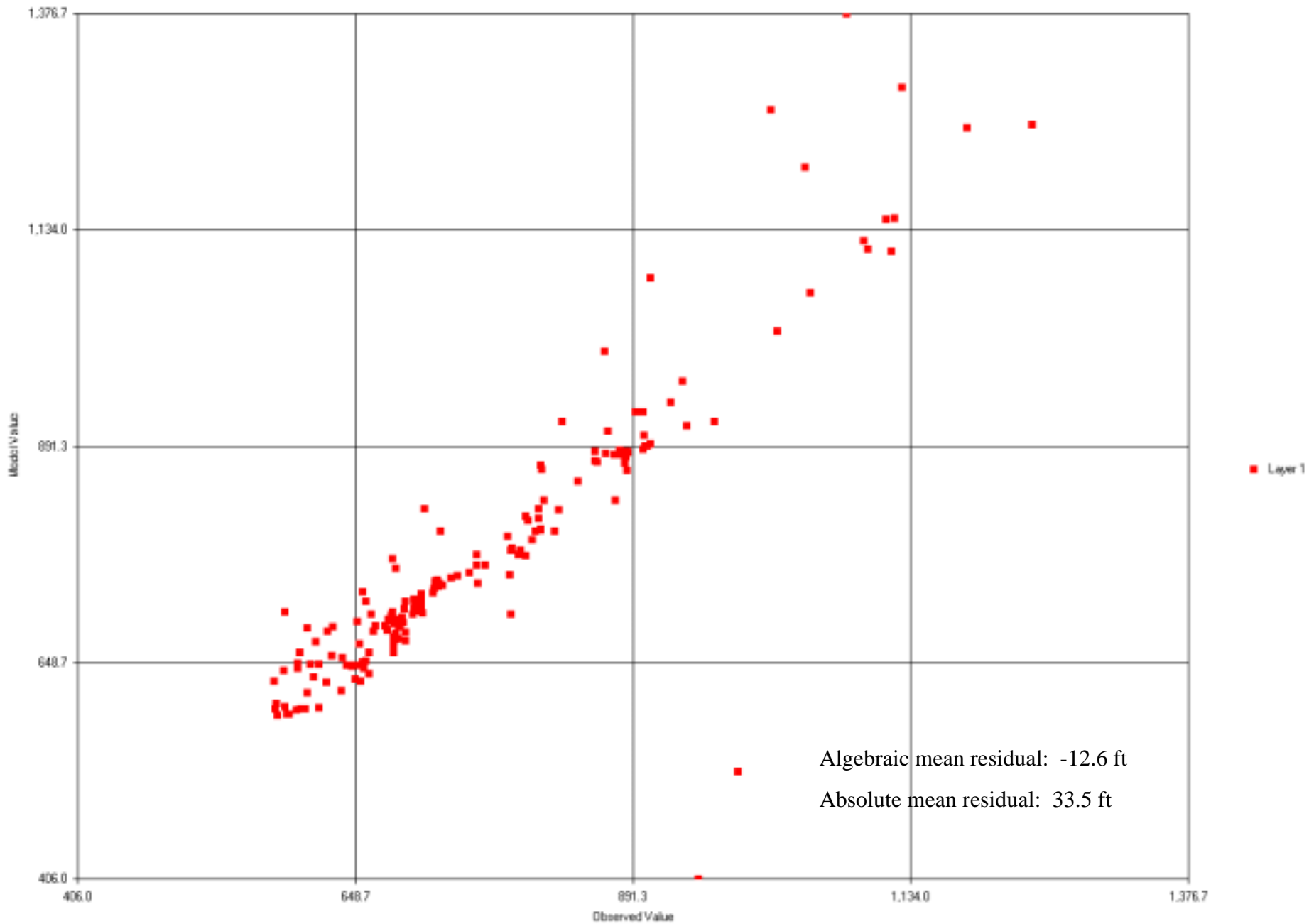
# HYDRAULIC HEAD RESIDUALS

(For February 1975)

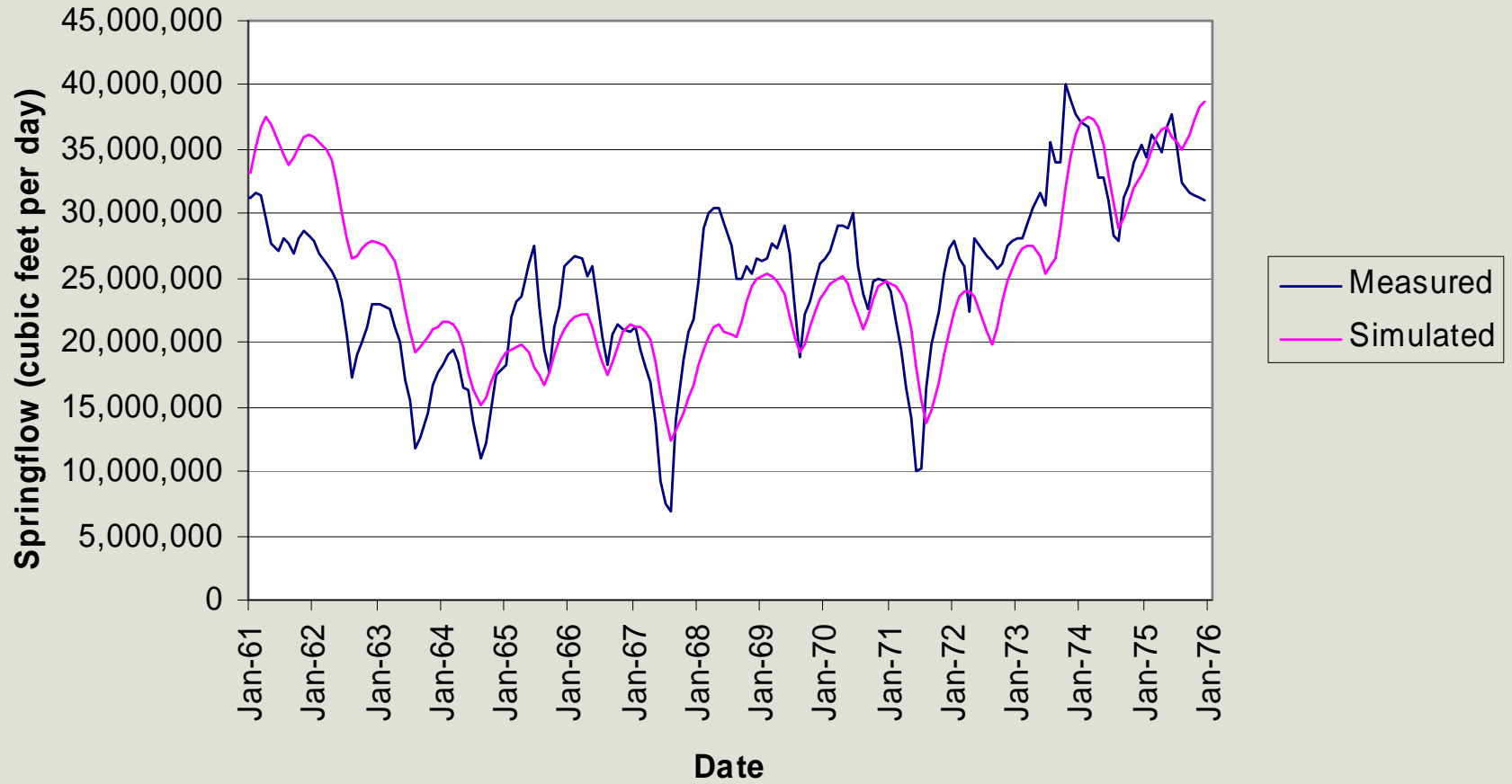




Observed vs. Computed Target Values

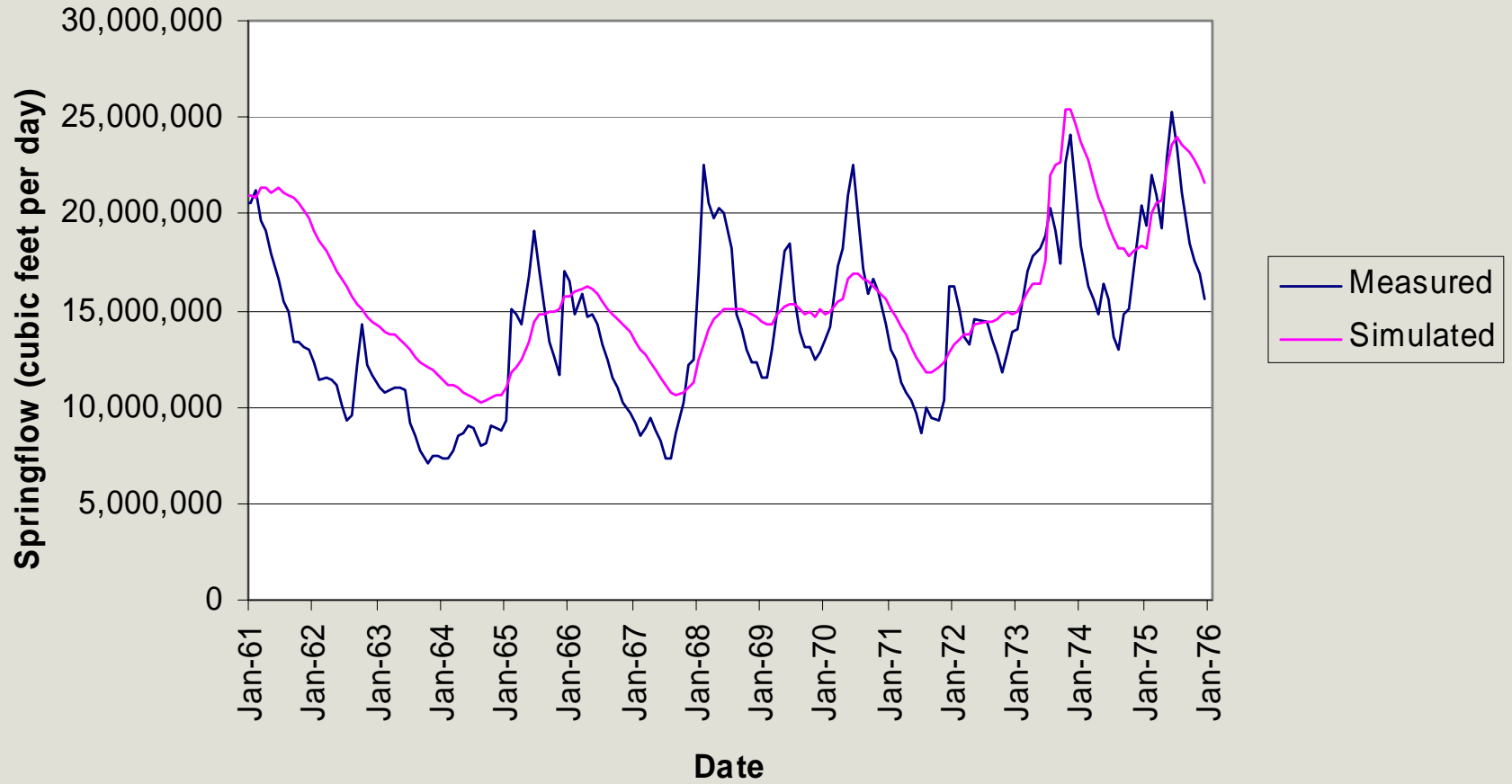


# Comal Springs -- 1961-75

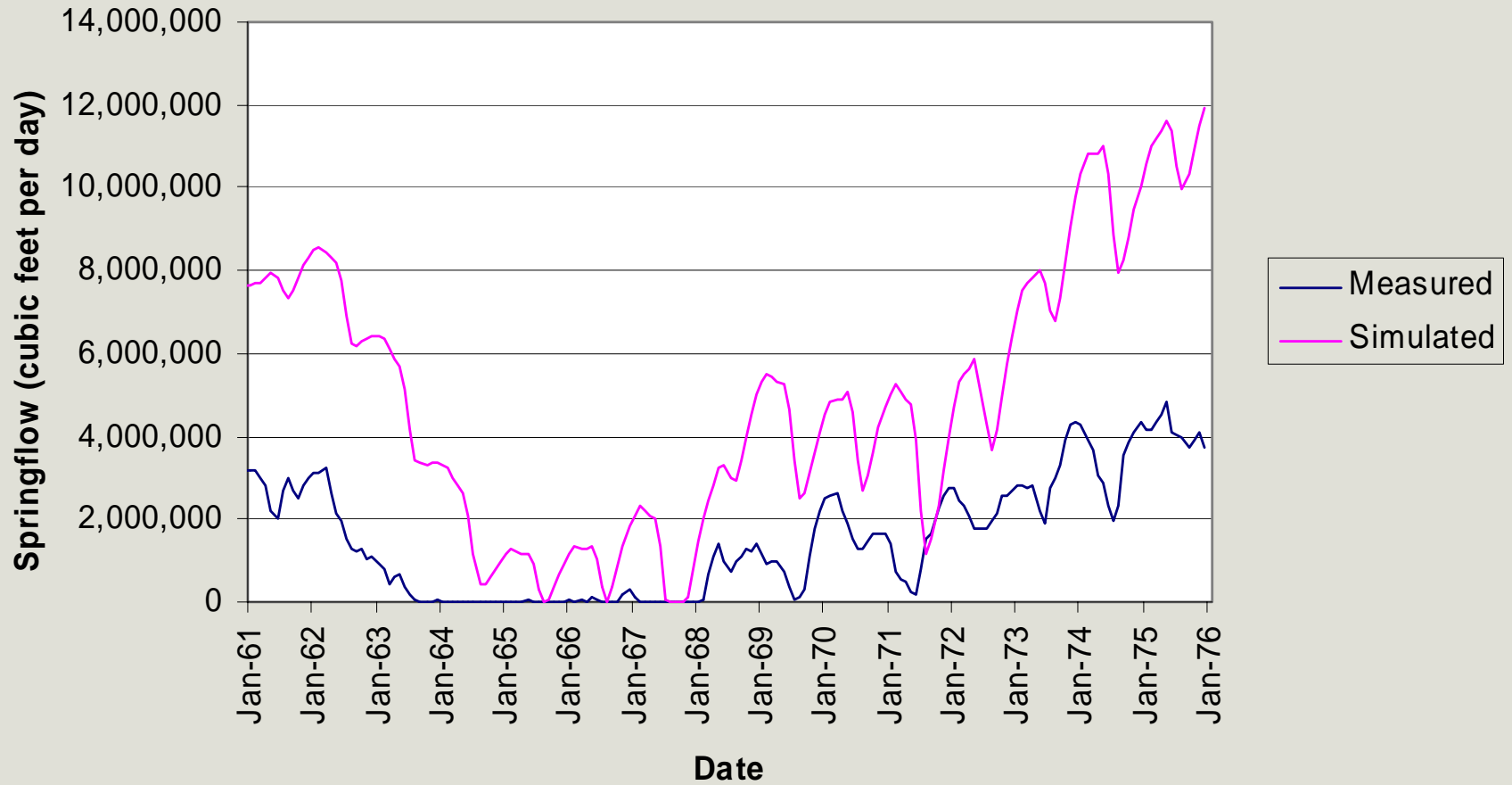




### San Marcos Springs -- 1961-75



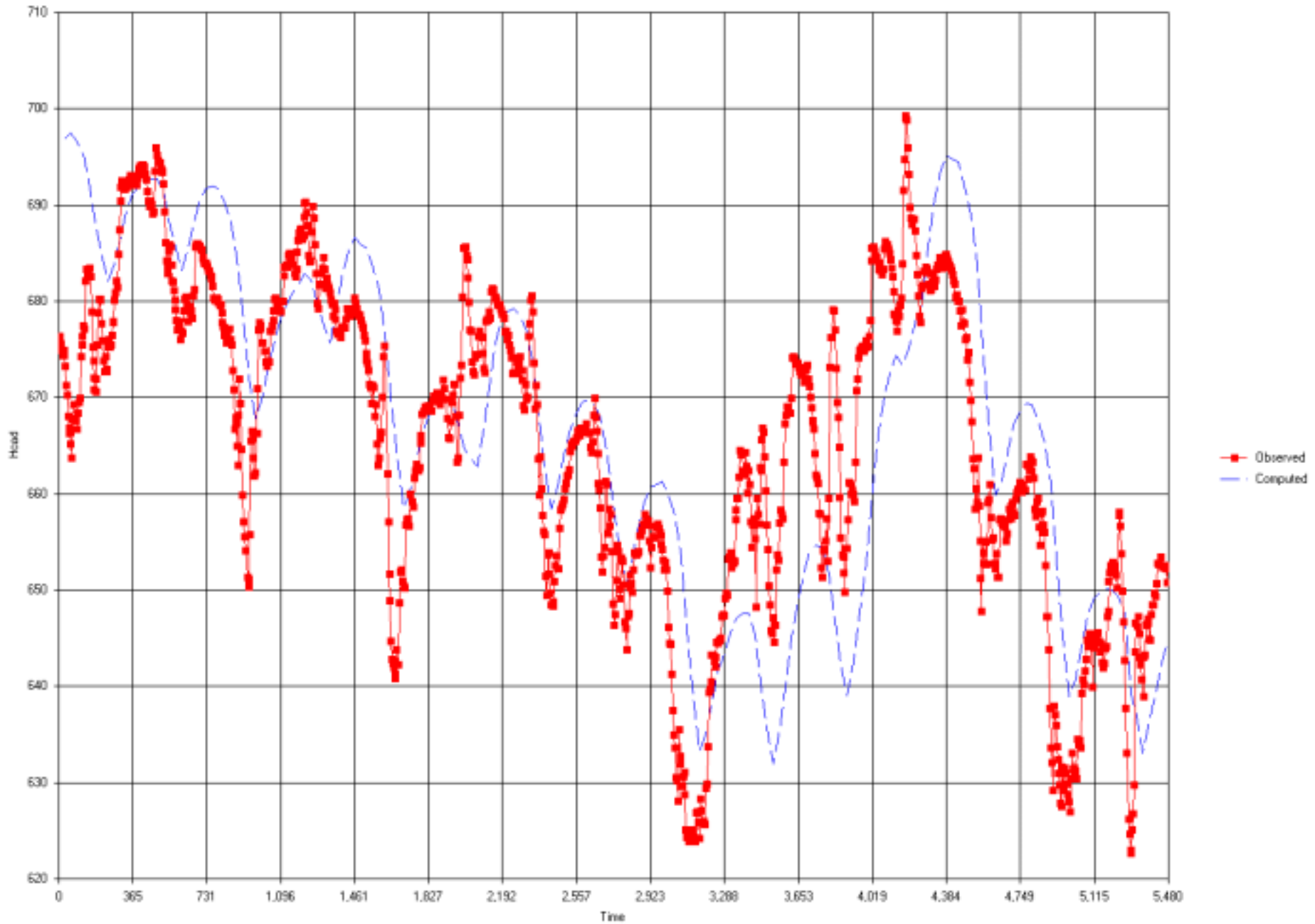
# Leona Springs -- 1961-75



TRANSIENT  
PERIOD 1976-90

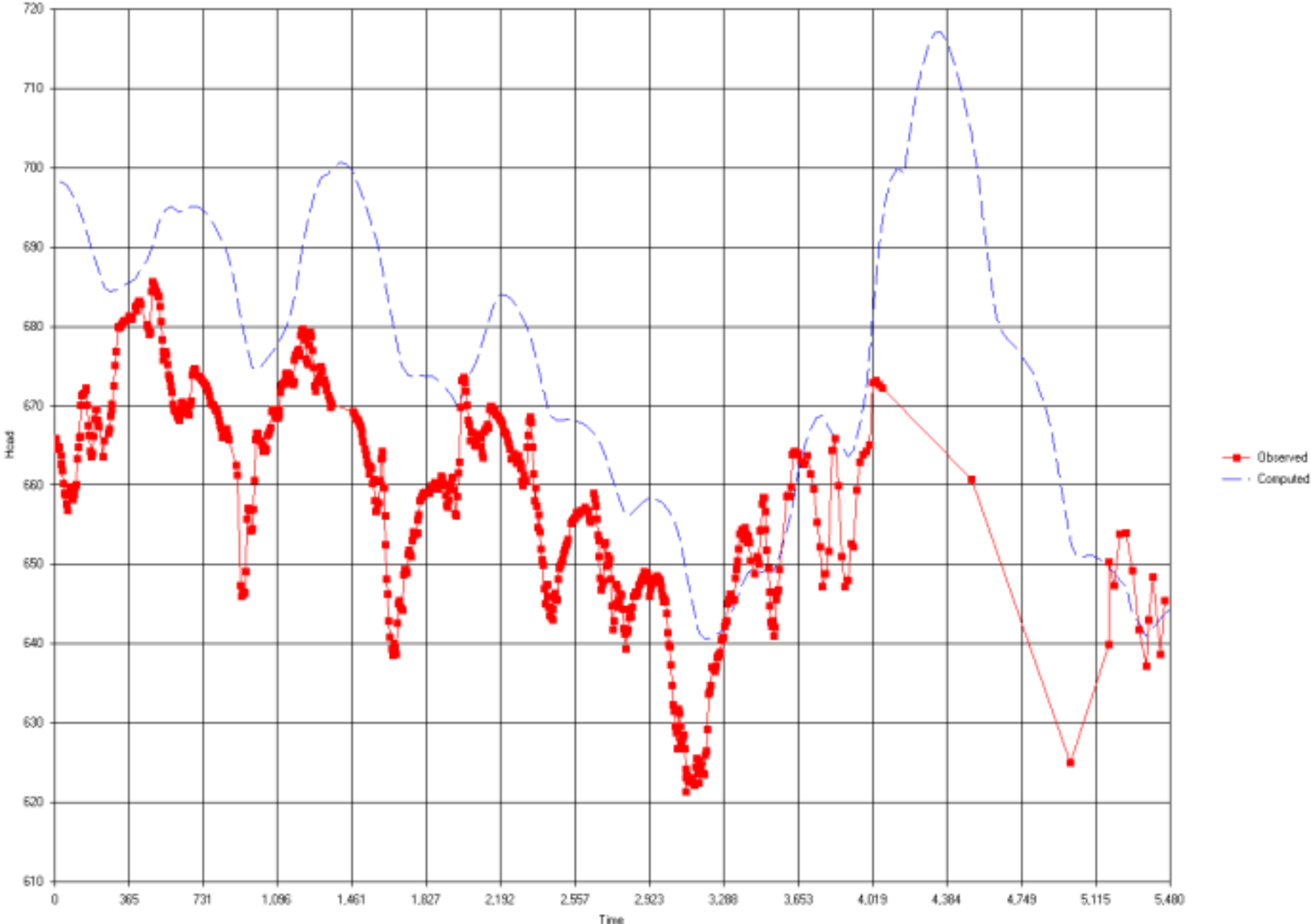
# Central Bexar County

Bexar\_index



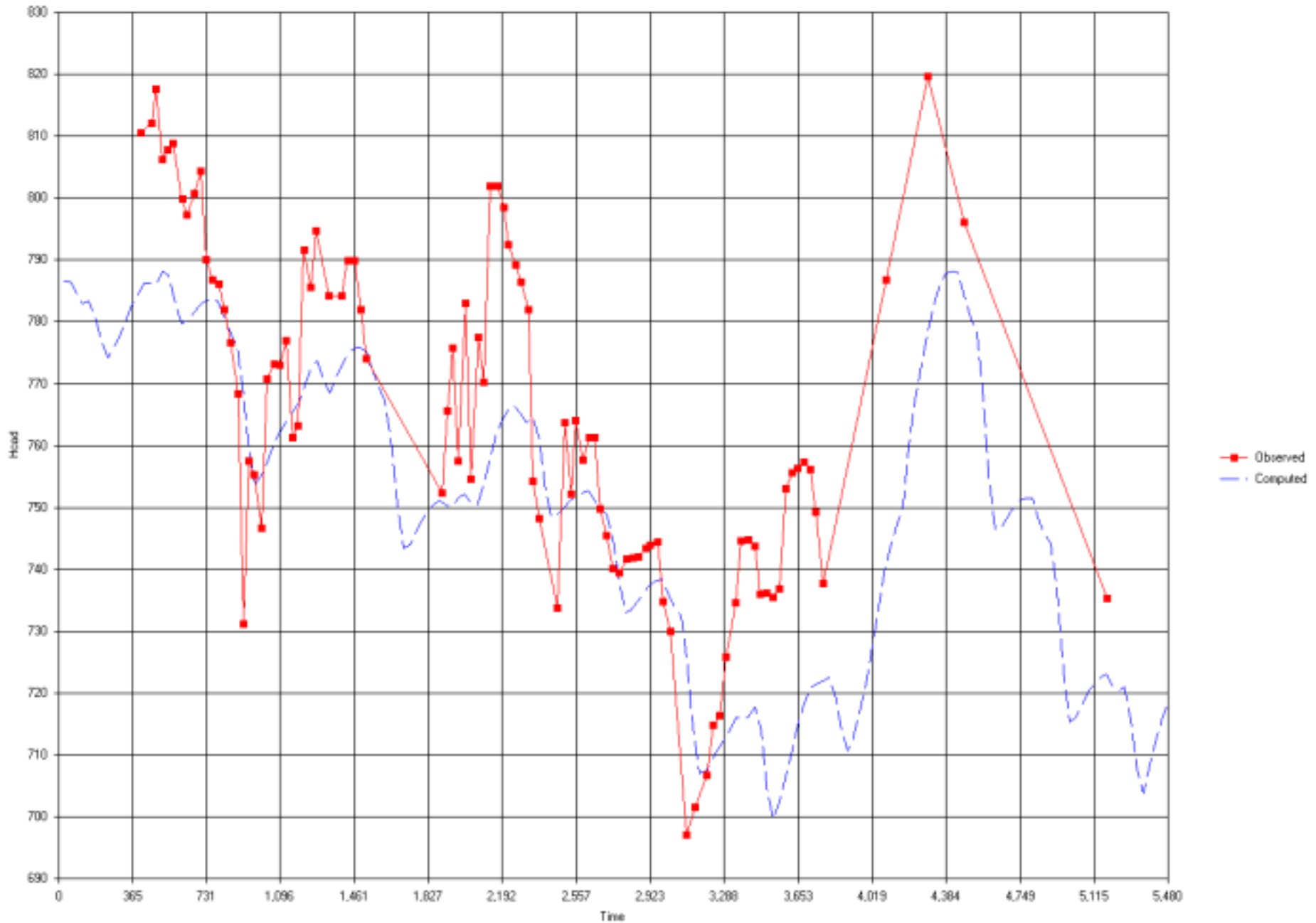
# Northeast Bexar County

Bexar\_6830211



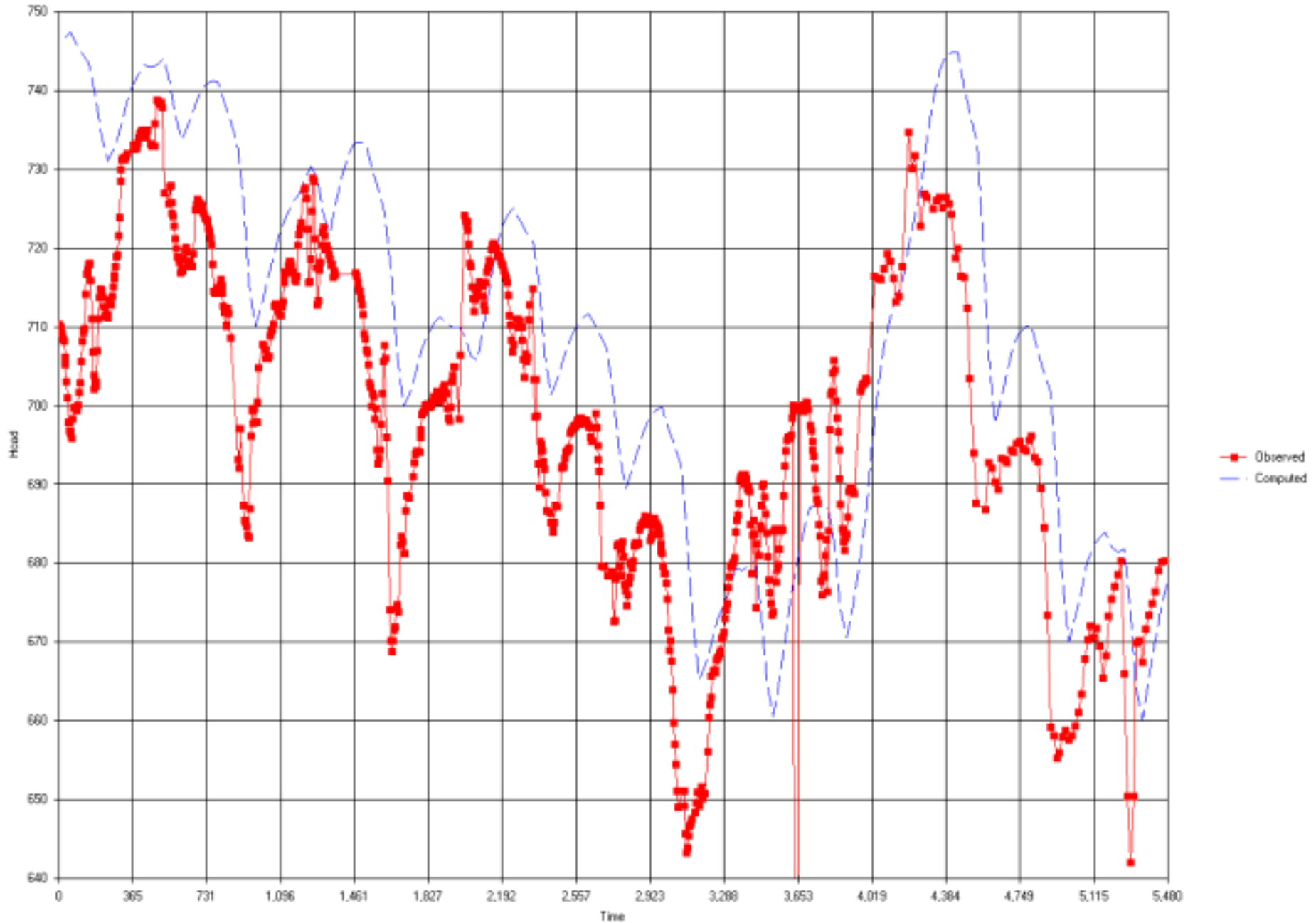
# Southwest Medina County

Medina\_6946701

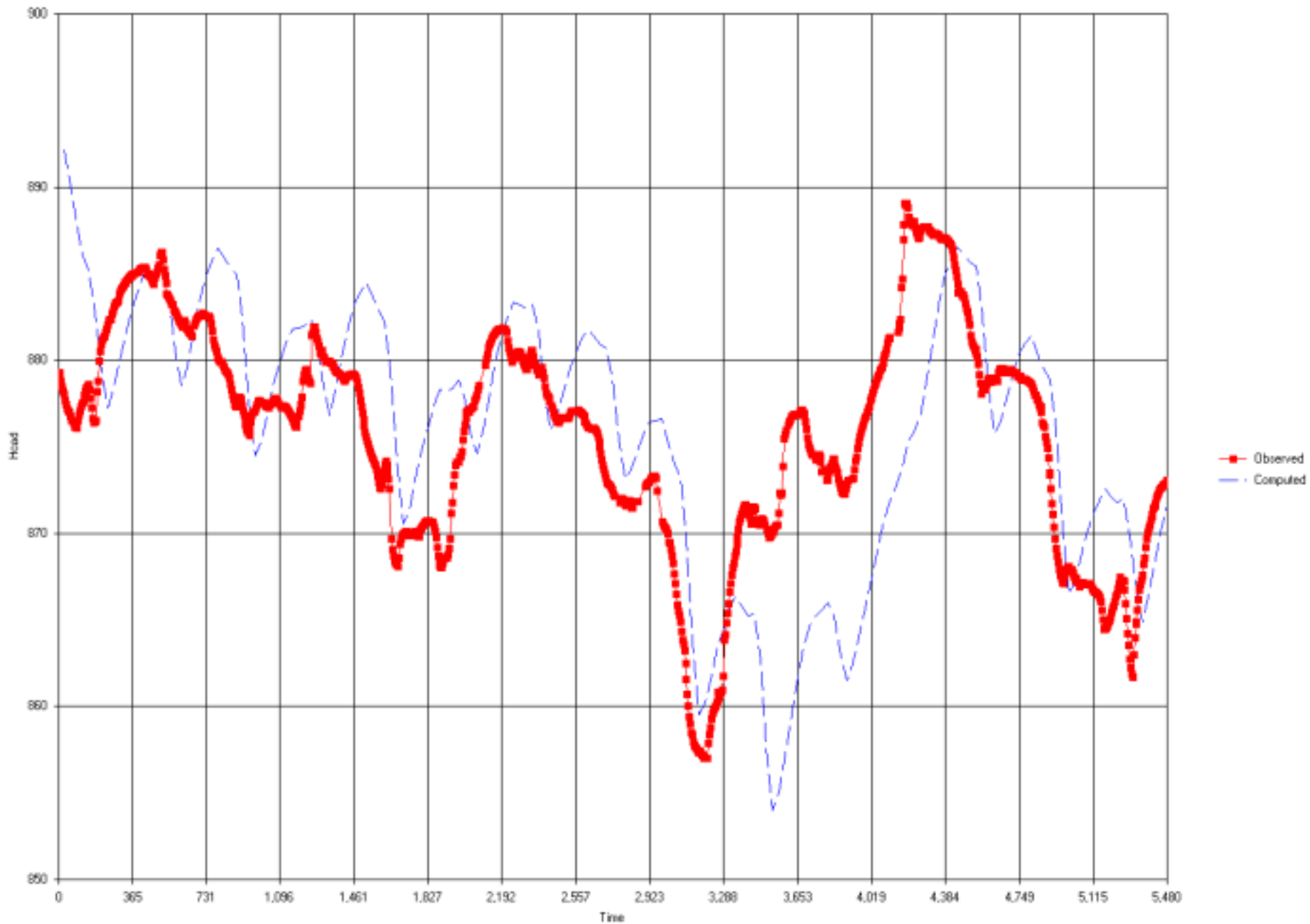


# East-central Medina County

Medina\_6841301



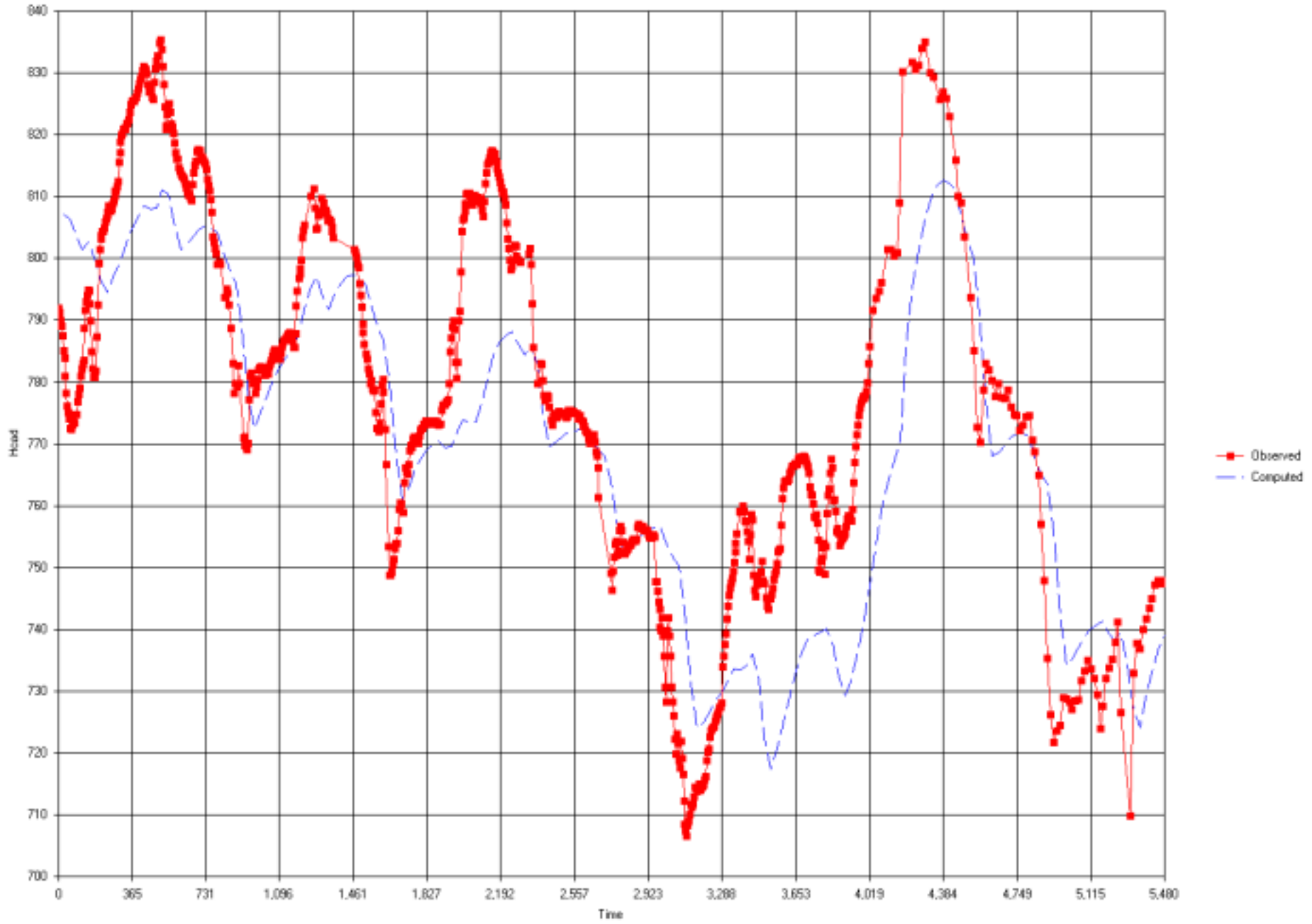
# South-central Uvalde County



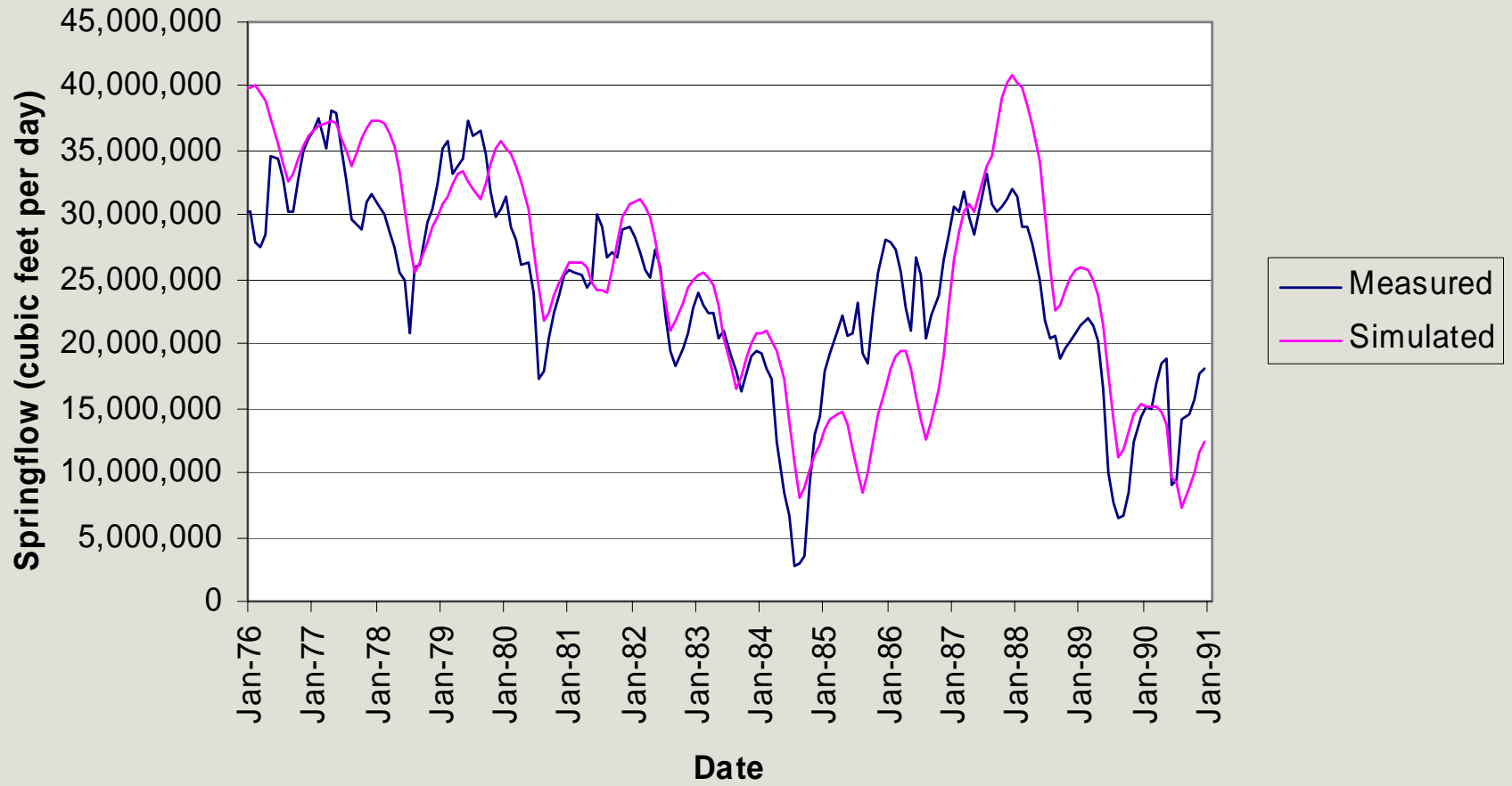


# East-central Uvalde County

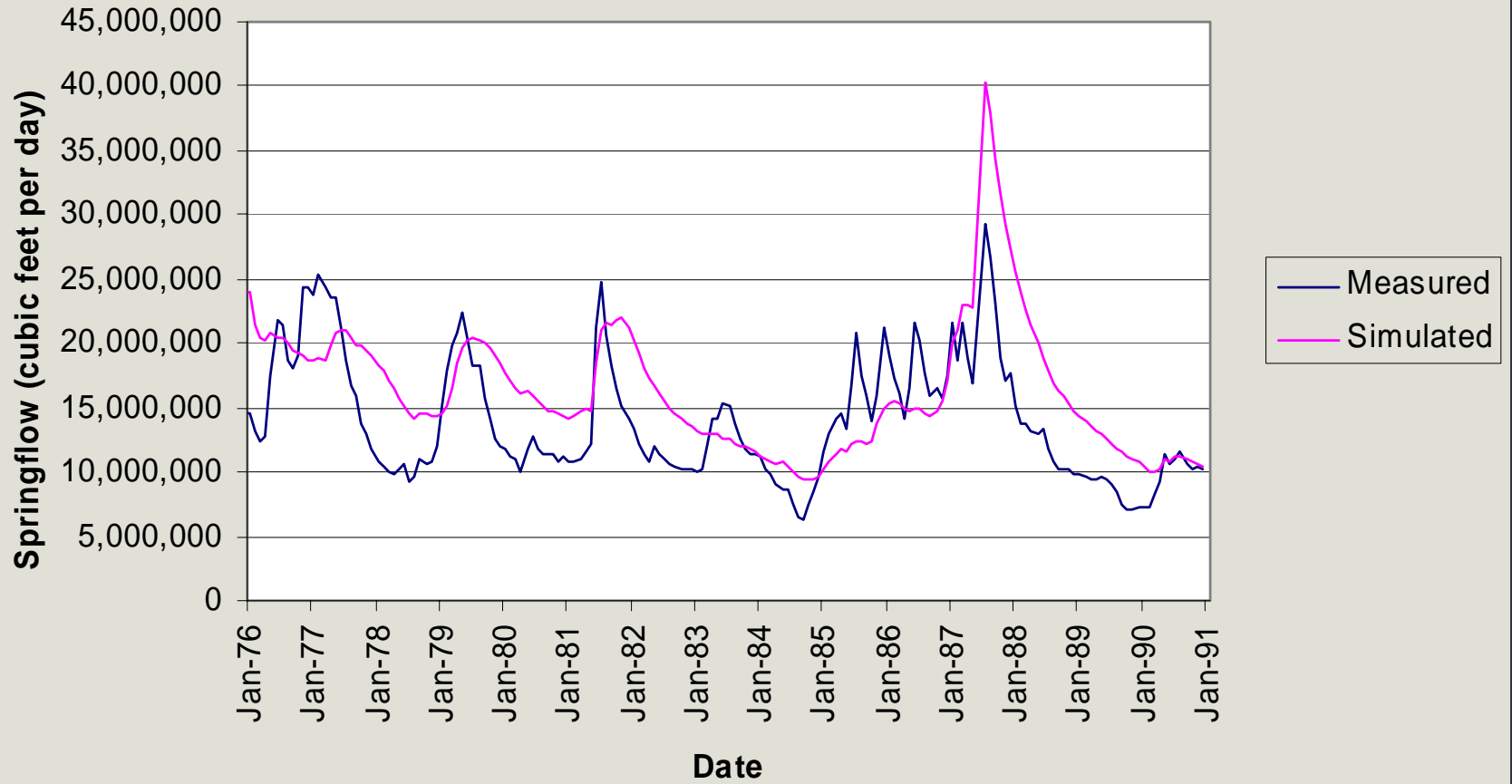
Uvalde\_6945401



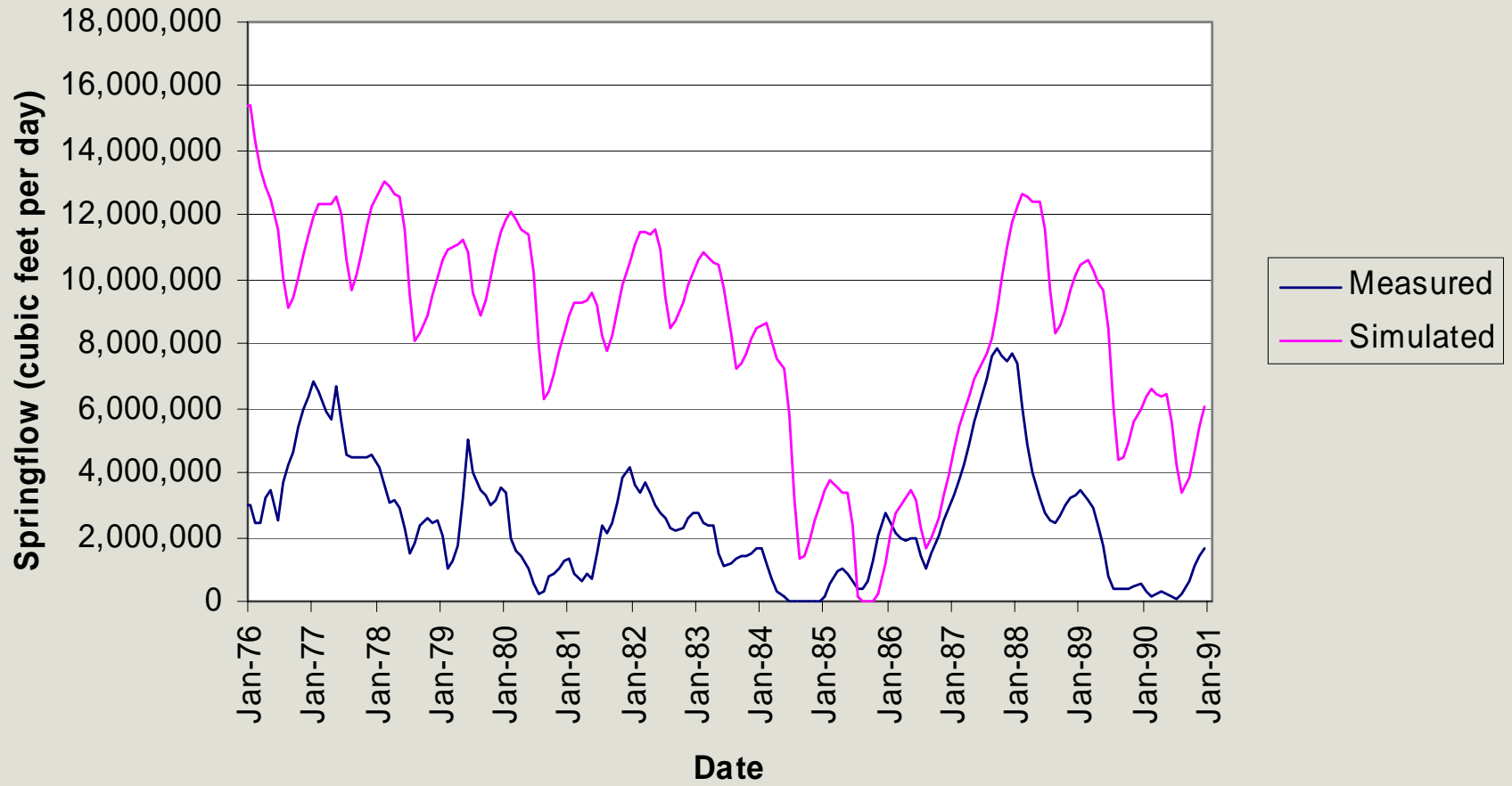
### Comal Springs -- 1976-90



# San Marcos Springs -- 1976-90



# Leona Springs -- 1976-90



LEFT TO DO

# TASKS TO BE COMPLETED

- Complete 1991-2000 verification simulation
- Complete sensitivity analysis
- Local calibration
- Complete reports
  - (1) Edwards Aquifer Model User's Manual
  - (2) Interpretive report (WRIR)
  - (3) Fact Sheet