Kiamichi Watershed Agent-based Model: Progress to Date on Assessing Impacts of Future Climate and Water Exports

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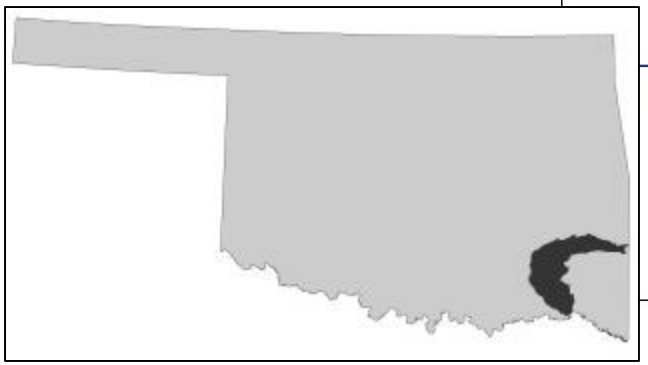
Kiamichi model

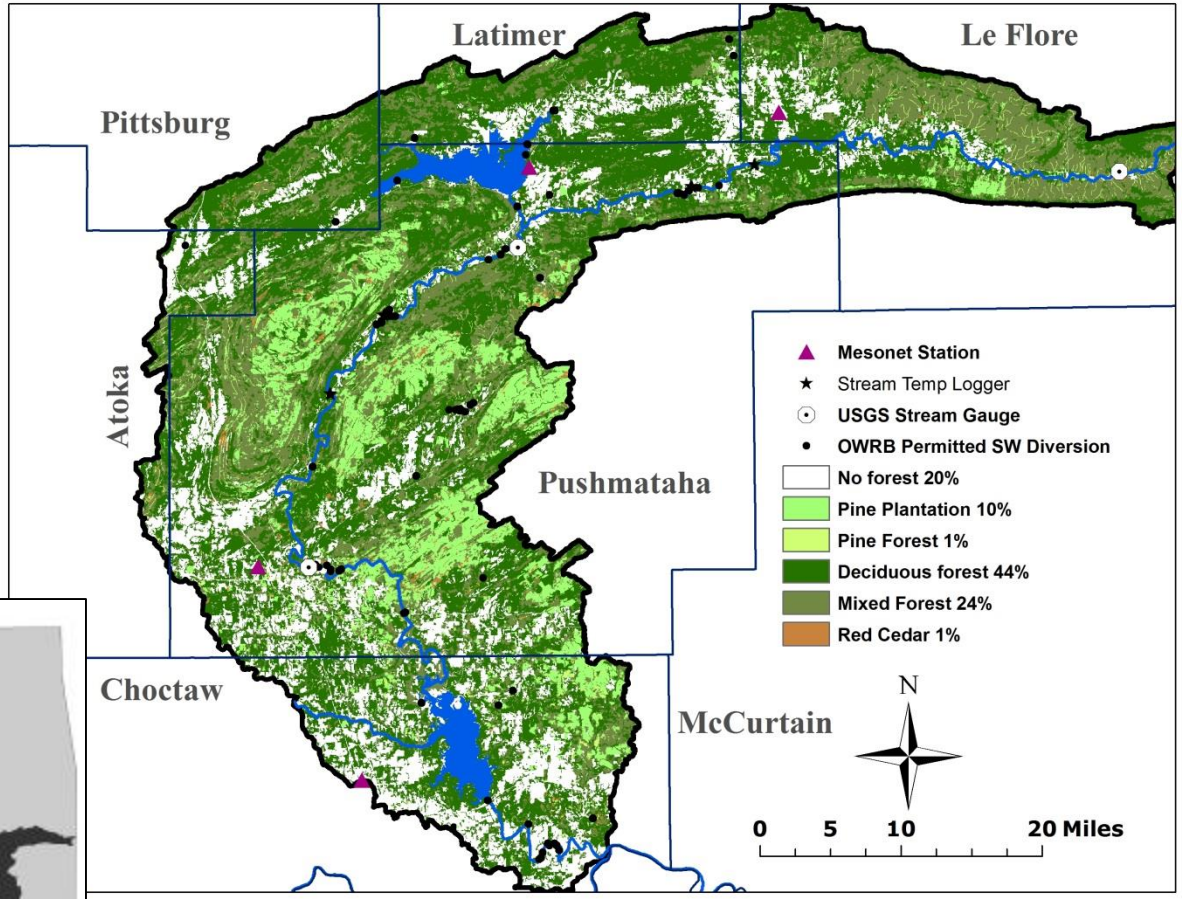
- Decision support needed when
  - Stakeholder interests conflict
  - Decisions create ‘feedback’
  - Conditions differ from ‘normal’
  - Management will involve ‘tradeoffs’
- Designed to help stakeholders answer

“What will happen to the things I care about?”

Kiamichi model components

- Landcover
- Hydrology
  - Kiamichi River
  - Sardis Lake





Kiamichi stakeholders

- OKC

STATE OF OKLAHOMA, CHOCTAW NATION OF OKLAHOMA,

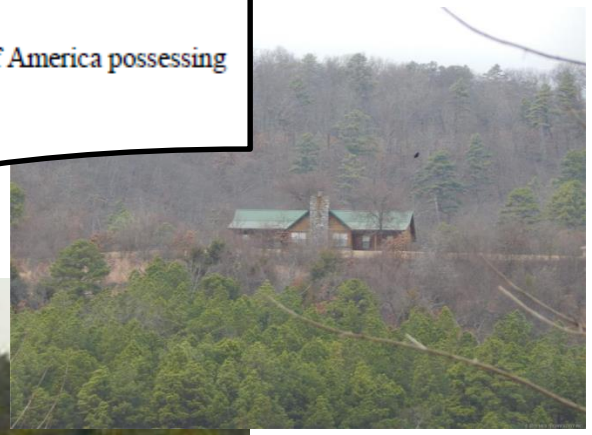
CHICKASAW NATION, CITY OF OKLAHOMA CITY WATER SETTLEMENT

AUGUST 2016

PREAMBLE

WHEREAS, the State of Oklahoma is a state of the United States of America possessing the sovereign powers and rights of a state;

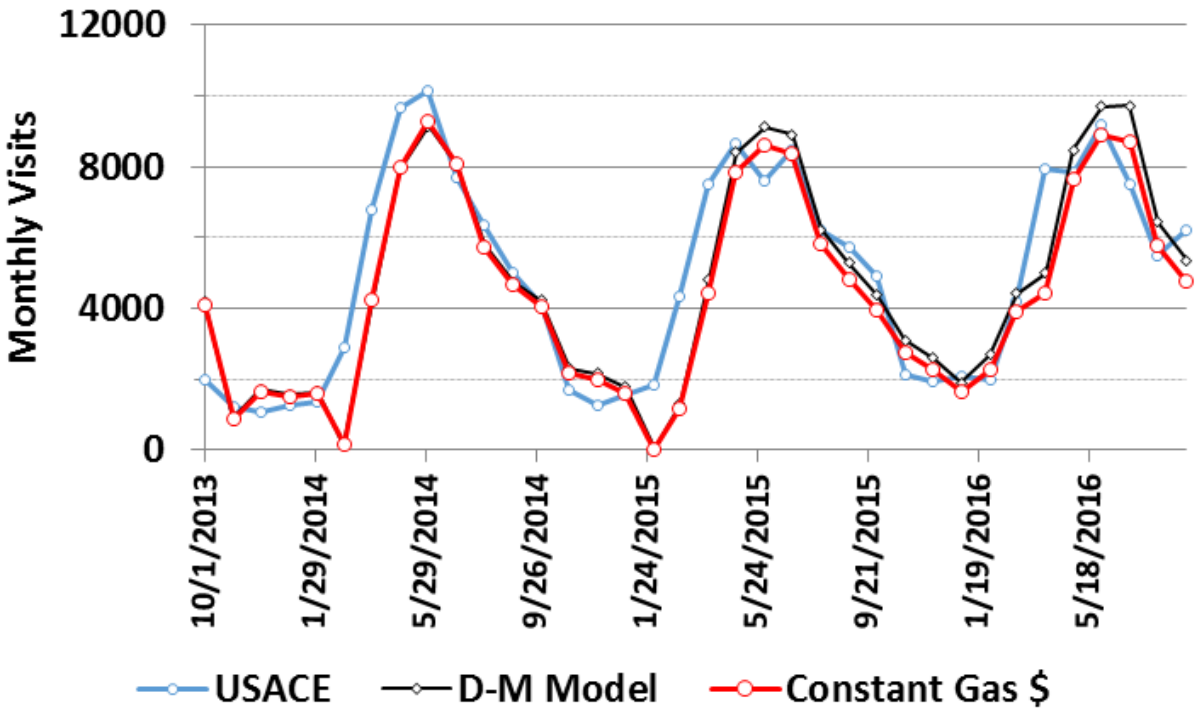
WHEREAS, the Chickasaw Nation is a federally recog



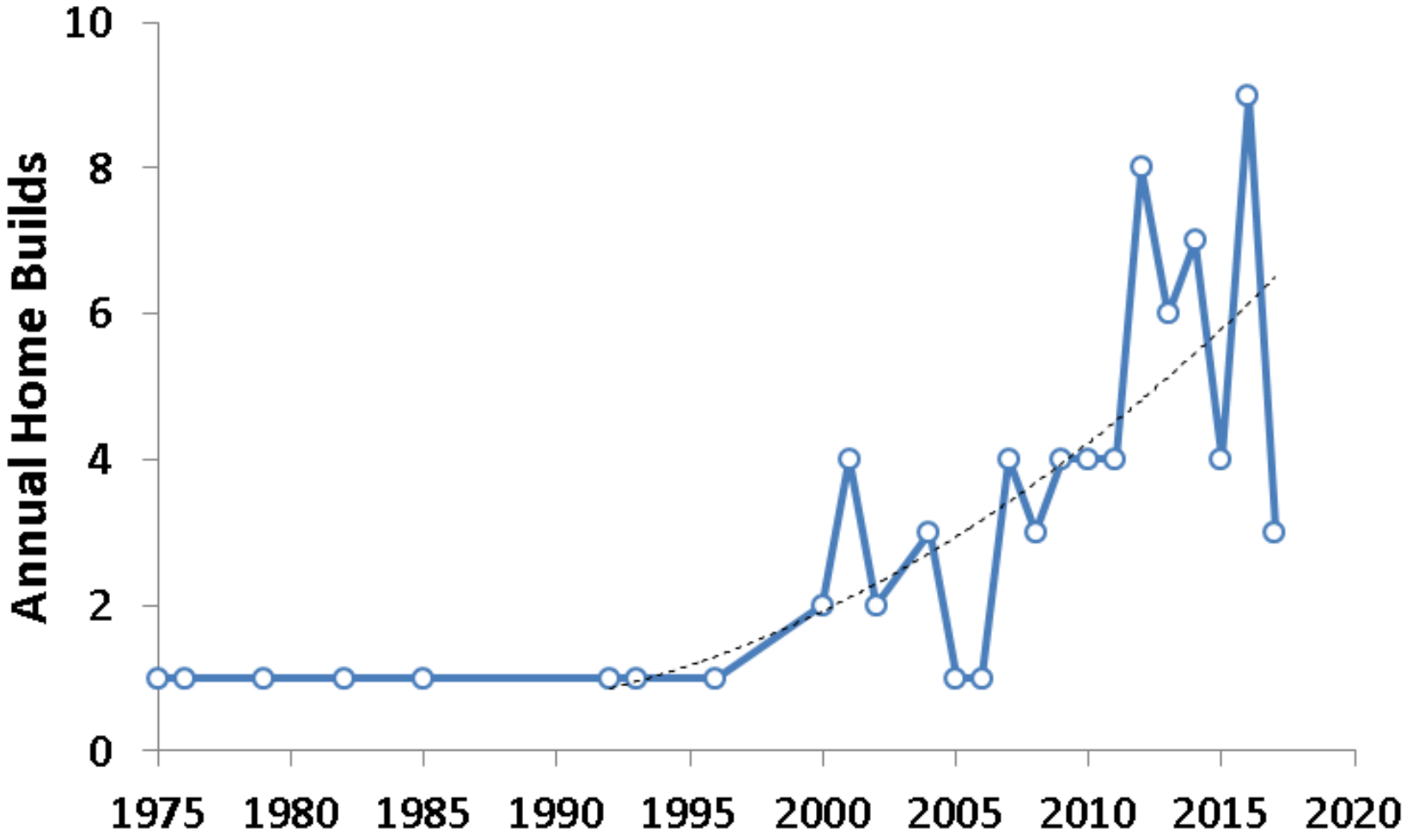
- Local interests
  - Development
  - Tourism

Reservoir visits

- Model by Daniels and Melstrom (2017)
- Exponential model
  - Precipitation
  - Temperature
  - Lake levels
  - Gas $
  - Year, Month, Park
- Adapted for ‘future’ by:
  - Constant Gas $
  - Constant ‘Year’

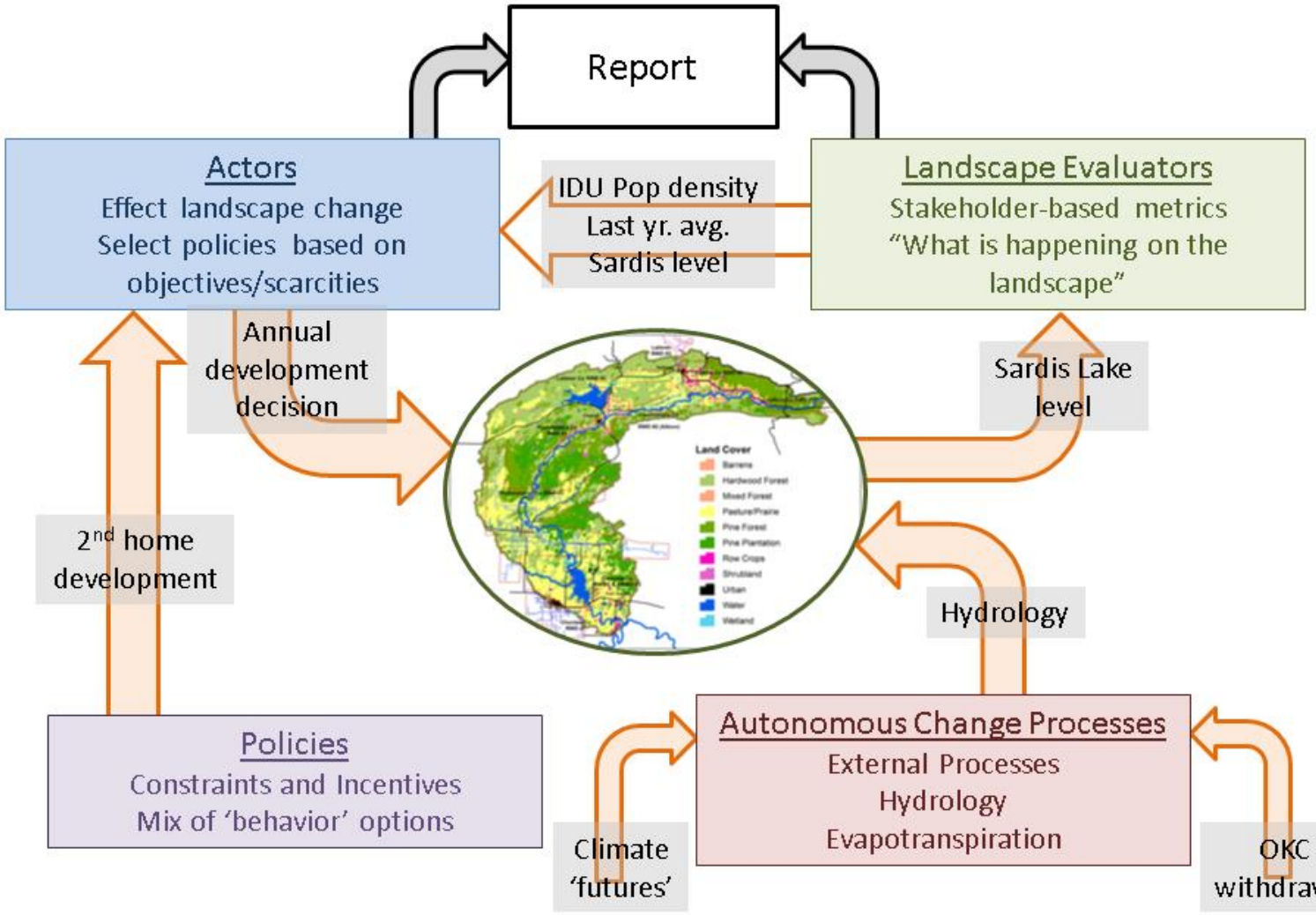


Rural Subdivision 2nd Homes

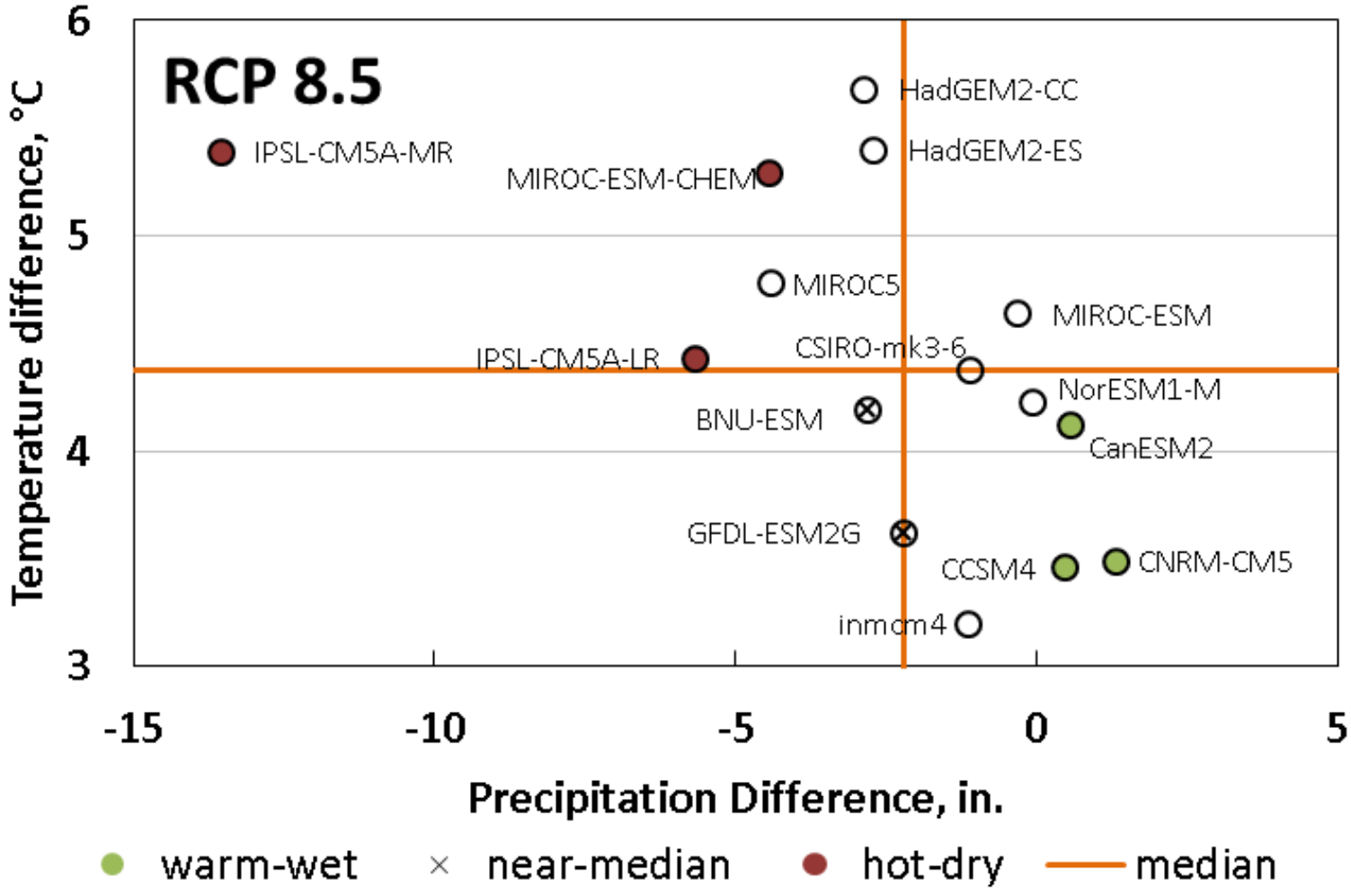


Data from the OK EPSCoR 'PVPLUS' property value database

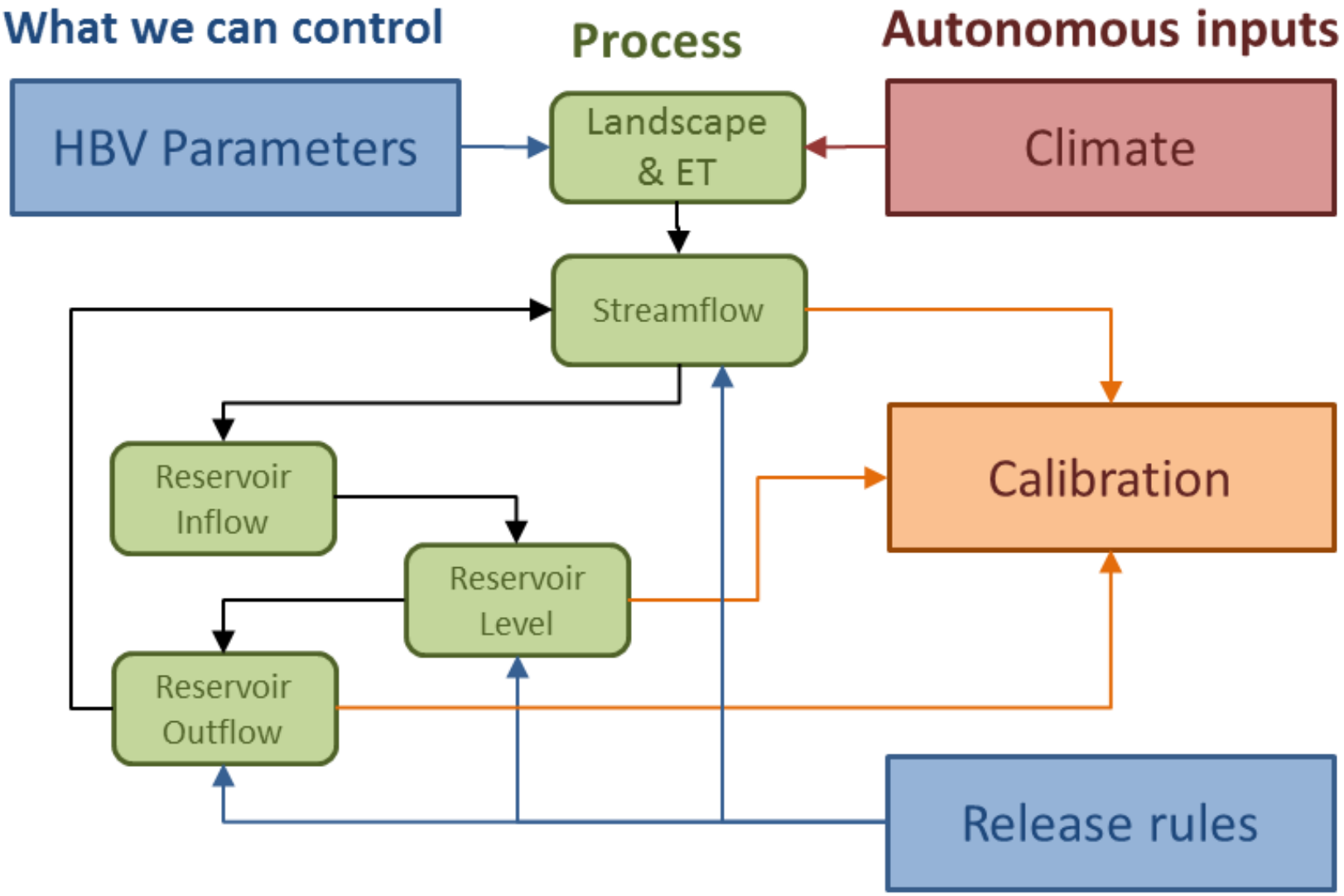
Landscape interactions



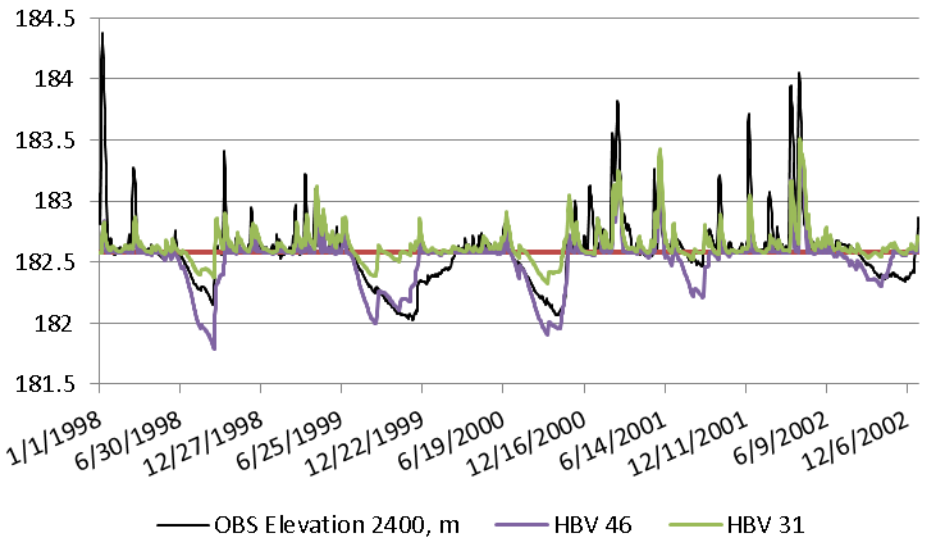
Climate components



HBV Parameters ↔ Streamflow ↔ Release Rules



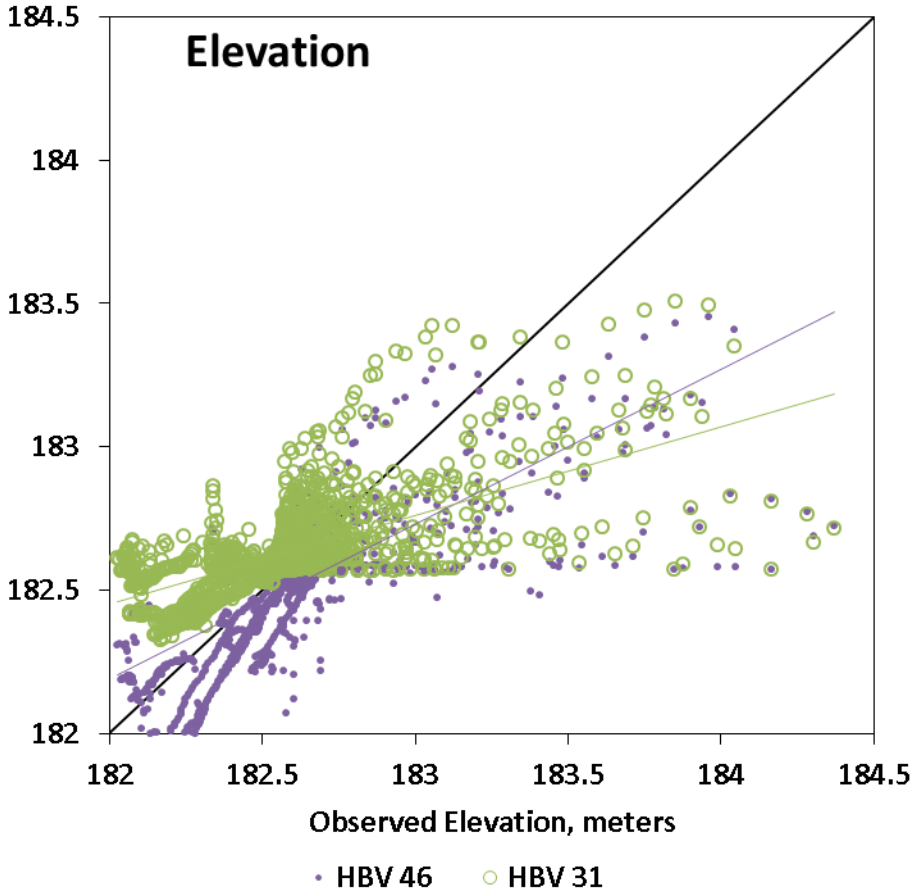
Reservoir levels



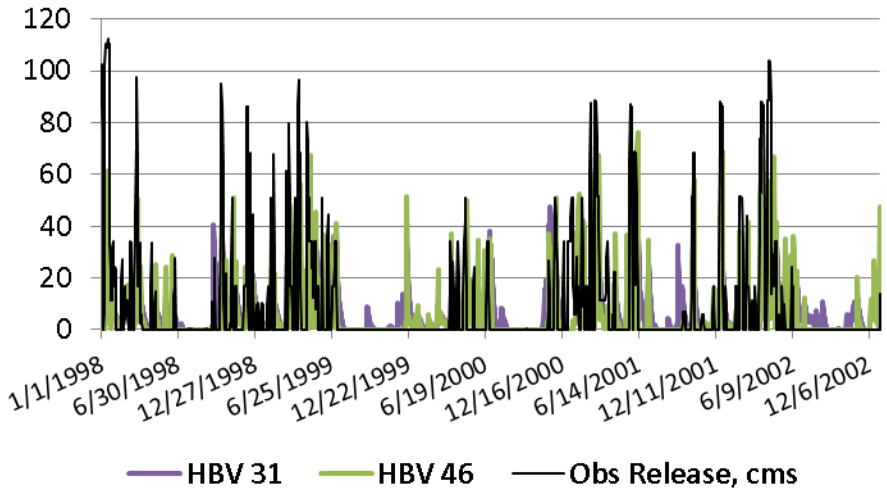
Nash-Sutcliffe Efficiency

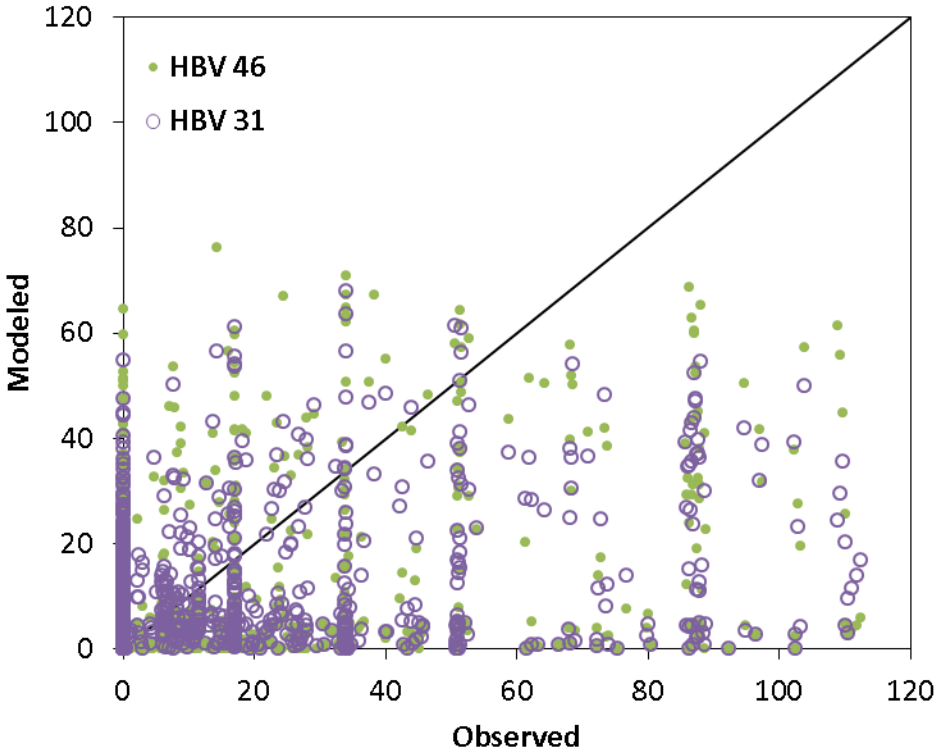
HBV 46 = 0.434

HBV 31= 0.359

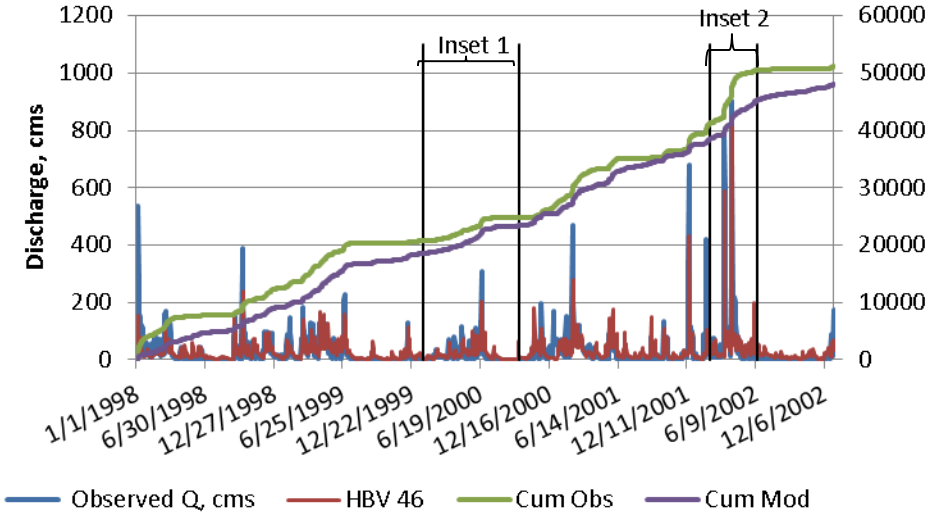


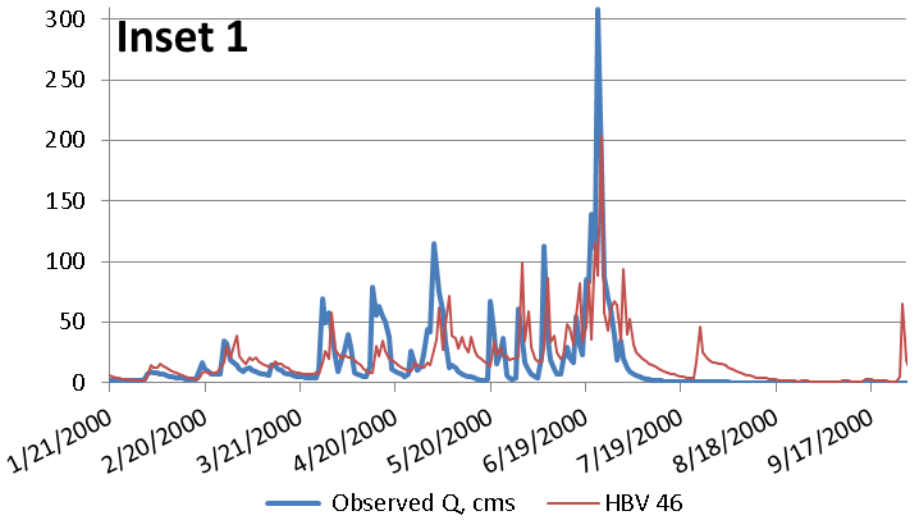
Sardis Dam releases 1998-2002

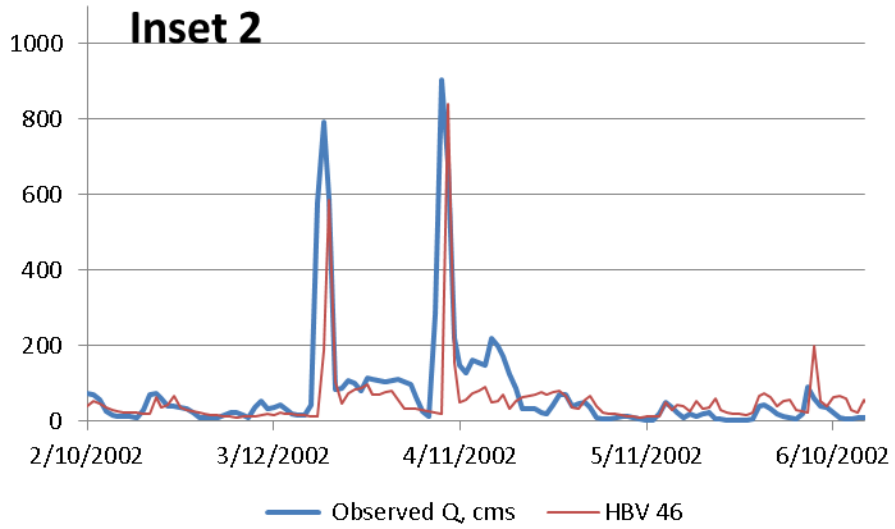




Flow at Clayton







Nash-Sutcliffe Efficiency = 0.355

'1-day shift' NSE = 0.561

What's still needed…?

- Hydrologic improvements
- Better human/natural system interactions
  - 'Trade-offs' between stakeholders' needs/desires
    - Water delivery
    - Reservoir visits/Development
  - If/When will conflicts become a critical issue
- Use as stakeholder decision tool
- Look for interactions between models
- Place to 'house' the model

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Questions…