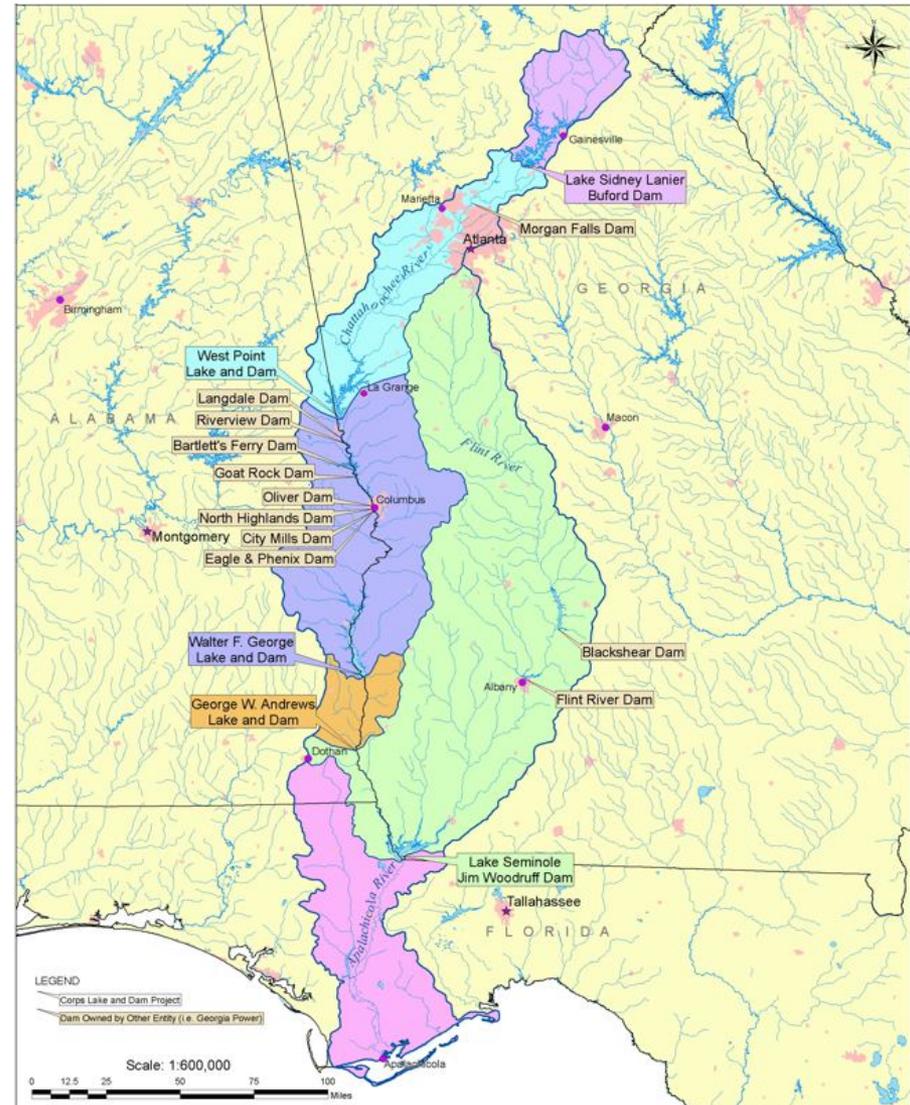


History of NIDIS Drought Early Warning System (DEWS) for the ACF River Basin

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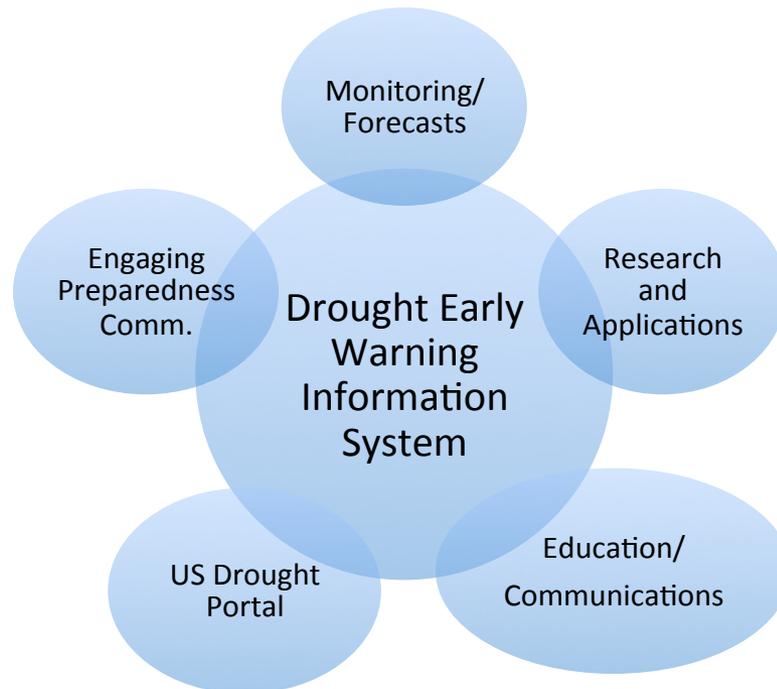
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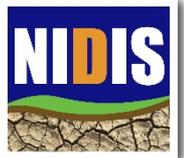
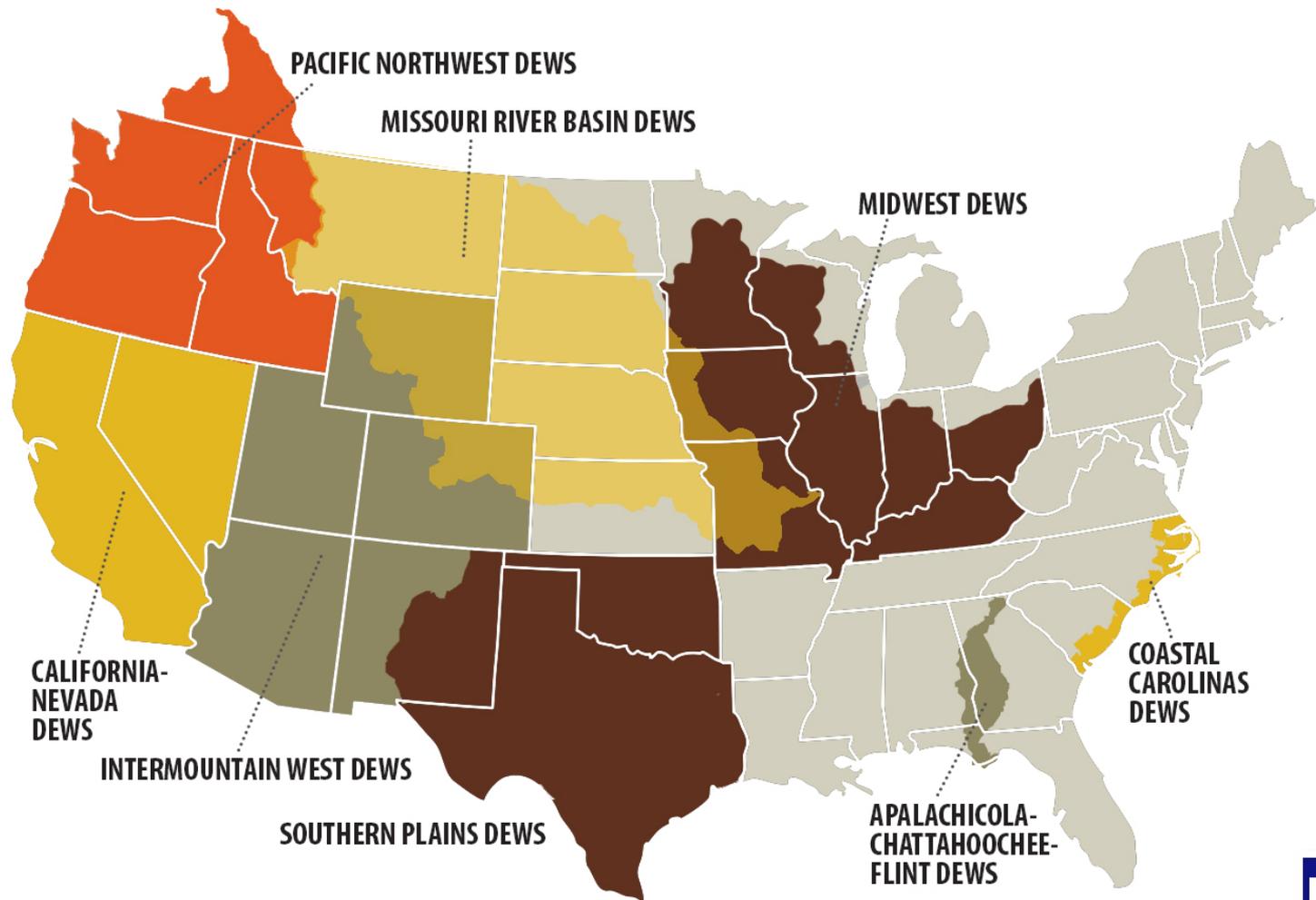
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What is Drought Early Warning?

International Strategy for Disaster Reduction: “Provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response”



NIDIS Regional Drought Early Warning Information Systems



Stakeholder Meetings

- Lake Blackshear, Dec 2009
- Apalachicola, April 2010
- Middle Chattahoochee and Flint, May 2010
- Upper Chattahoochee, Aug 2010
- Albany, Dec 2010
- Lake Lanier, Dec 2011

Meetings illuminated a need for communication and education around drought



Common Sub-Basin Needs

- Drought education and enhance communication
- Forecast improvements
- Improved data sets and presentation of info in graphical format
- Consistency in drought planning among three states
- ACF Basin Webinars and Climate Outlooks
- Development of drought indices
- Improved interactions with the Corps
- Resolve discrepancy in understanding of groundwater issues





ACF River Basin Drought Assessment Webinars

- Monthly webinars (bi-weekly during drought) conducted by SECC (now by Auburn) continuously since 2011.
- Presenters
 - State climatologists
 - USGS South Atlantic Water Science Center
 - Southeast River Forecast Center
 - Army Corps of Engineers
 - Apalachicola National Estuarine Research Reserve



ACF River Basin Drought Assessment Webinars

- More than just drought assessment webinars
- State climatologists from all three states engaged
- Covers a larger area
- Educates participants on a variety of climate concepts
- Conduct research to improve/develop drought indicators/information used for the webinars

Evaluation of ACF Drought Webinars

- NIDIS requires evaluation to move its pilot from the prototype stage to full-fledged regional drought early warning system (RDEWS).
- NIDIS partnered with National Drought Mitigation Center (NDMC) to gather evaluation data.
- Online survey (35 respondents), interviews with state agency and water management stakeholders (6 participants), and focus groups with the ACF Stakeholders (28 members).

Stakeholders' Use of NIDIS Webinar Information

- Education and outreach
- As a conduit for trans-basin, cross-sector, and cross-scale communication
- Support of research, monitoring, and habitat conservation efforts by state agencies
- State policy-making

“NIDIS is considered a trusted and unbiased source of information, the information was appropriate and useful covering the whole basin, benefits people’s awareness and communication, and the format of the information makes it easy to share and read later.”

Recommendations

- Broader public awareness of NIDIS resources
- Expand NIDIS's audience (e.g., work with state and local governments, regional commissions of counties, state agencies, fisheries management councils, water management districts, extension, master gardeners, NRCS, utilities, and agricultural producers)
- Improvement of information/additional research
- Stakeholders would like to see improvement in the predictive quality of drought information, as well as research on local impacts of drought

Recommendations

- Tailoring webinar content to stakeholder needs
- Additional focus is needed to communicating climate science, translating information to users' language, and tailoring information to specific audiences (agriculture, shellfish/fisheries, municipal water, etc.)
- Webinar could include education about the skill of forecasts and how to appropriately use them, how ecological (freshwater and marine) systems are impacted by drought, and how management of water upstream affects the rest of the basin.



Drought Research – ACF Focused

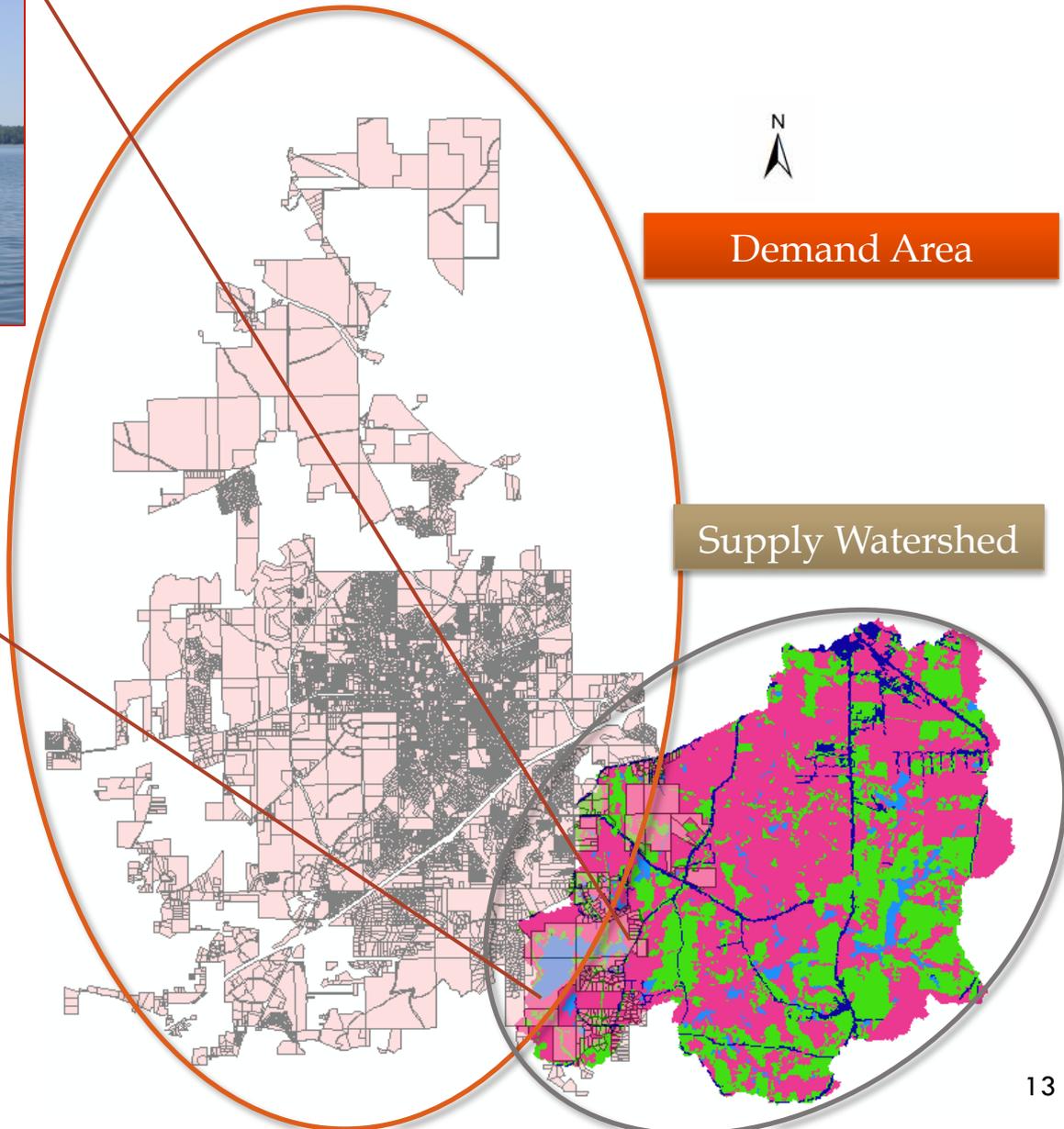
Reducing drought risks for small- to mid-size communities



Lake Ogletree

Sharda, V., P. Srivastava, L. Kalin, K. Ingram, and M. Chelliah. 2013. Development of Community Water Deficit Index: Drought-Forecasting Tool for Small- to Mid-Size Communities of the Southeastern United States. *Journal of Hydrologic Engineering*, 18(7): 846-858.

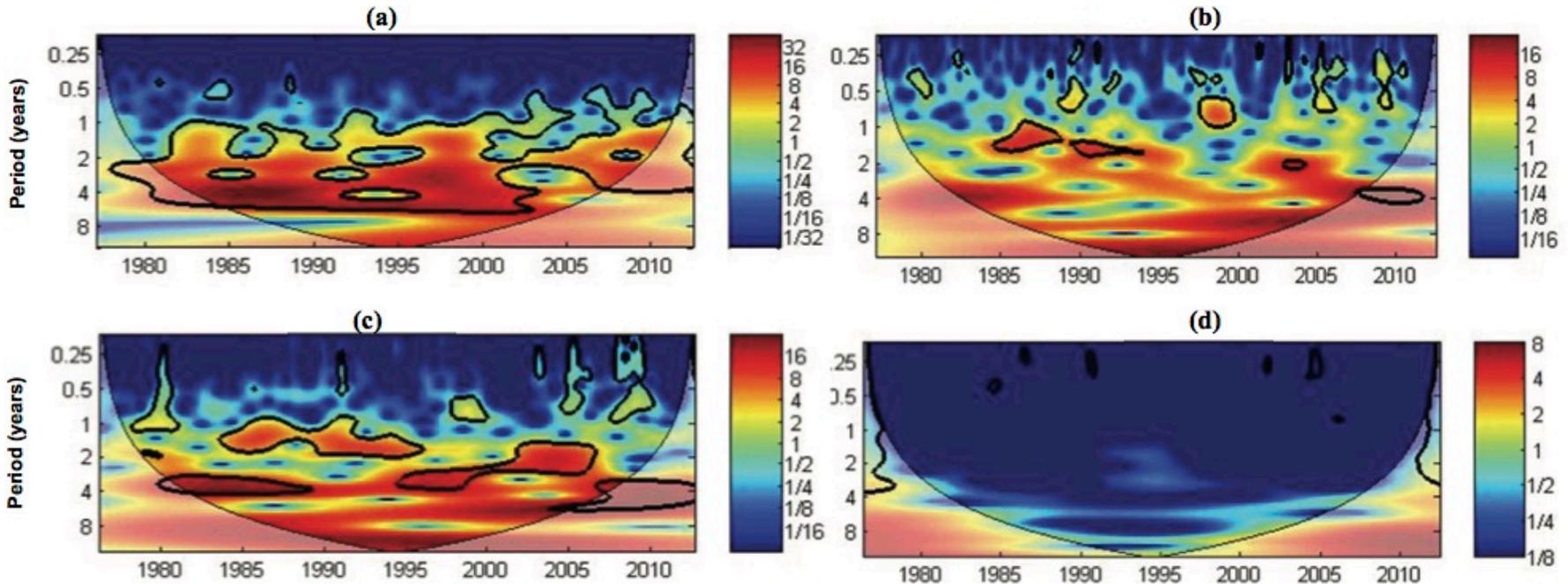
Sharda, V. and P. Srivastava. 2016. Value of ENSO-forecasted drought information for the management of small to mid-size communities. *Transactions of the ASABE* (In Press).



Demand Area

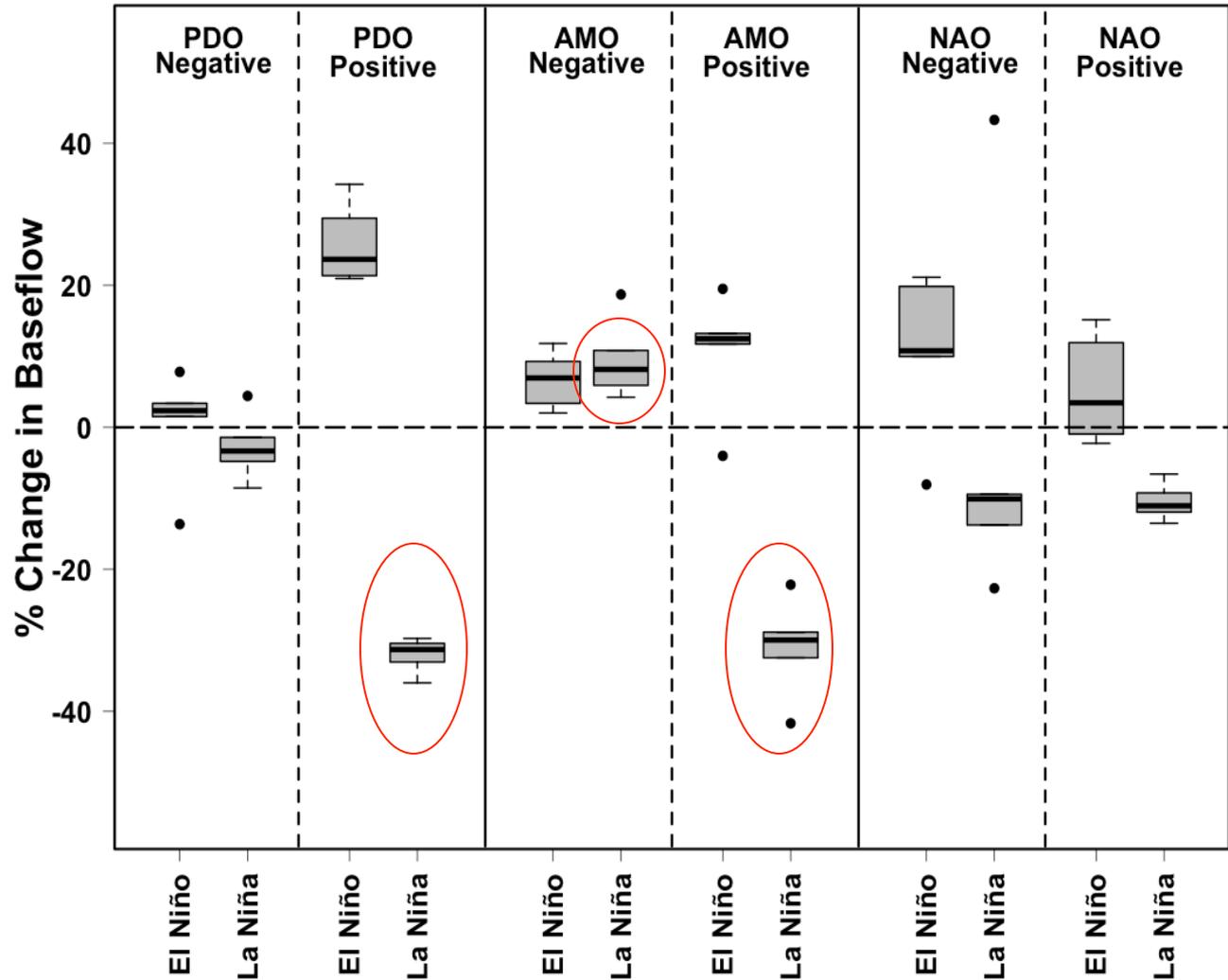
Supply Watershed

Can groundwater levels be used as a drought indicator in the Apalachicola-Chattahoochee-Flint (ACF) River Basin?



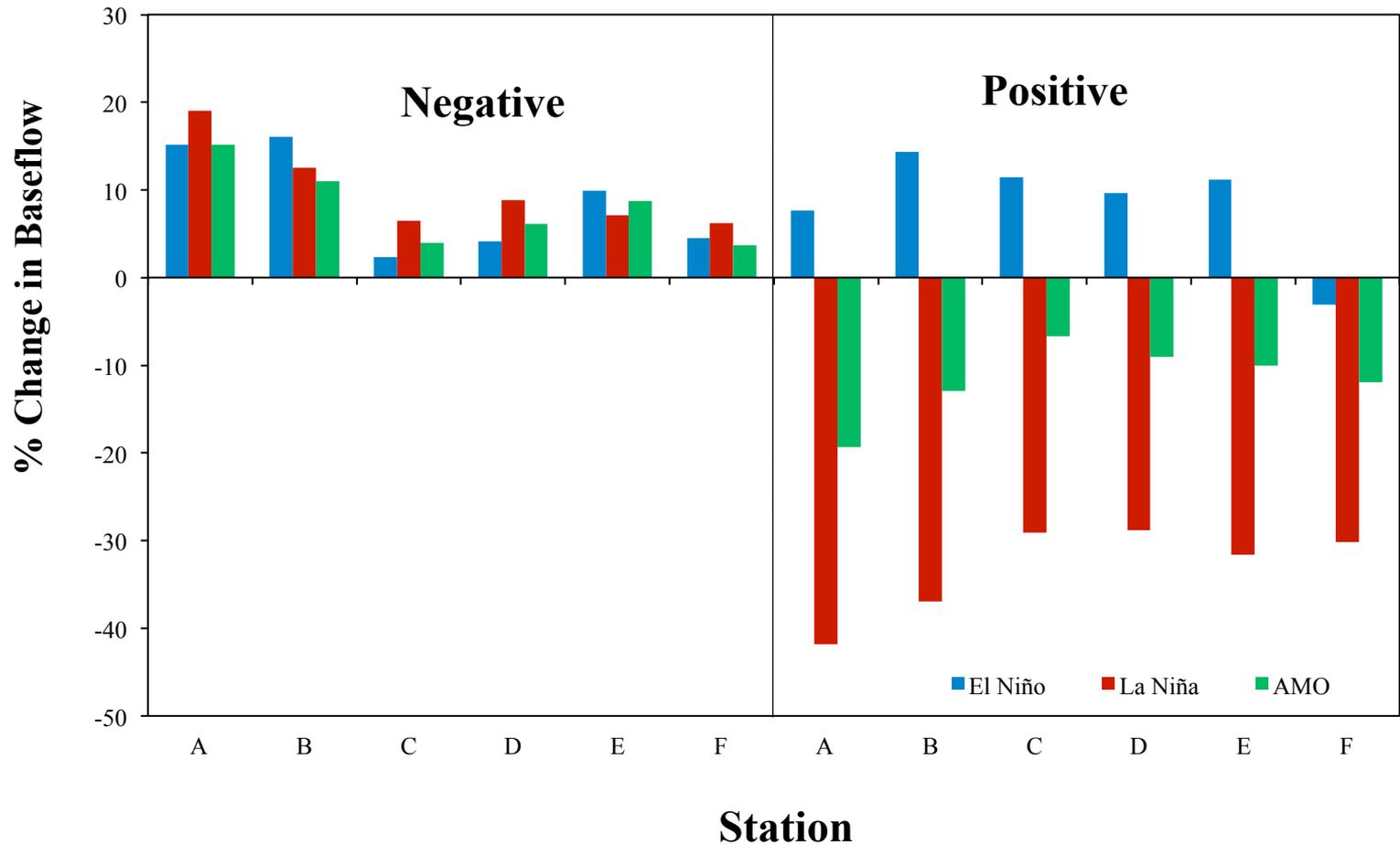
- Shallow and moderately deep well respond to climate variability – can be used as drought indicators
- Recovery times (from droughts) can be more than two years

How other climate variability phenomena modulate the effect of ENSO?



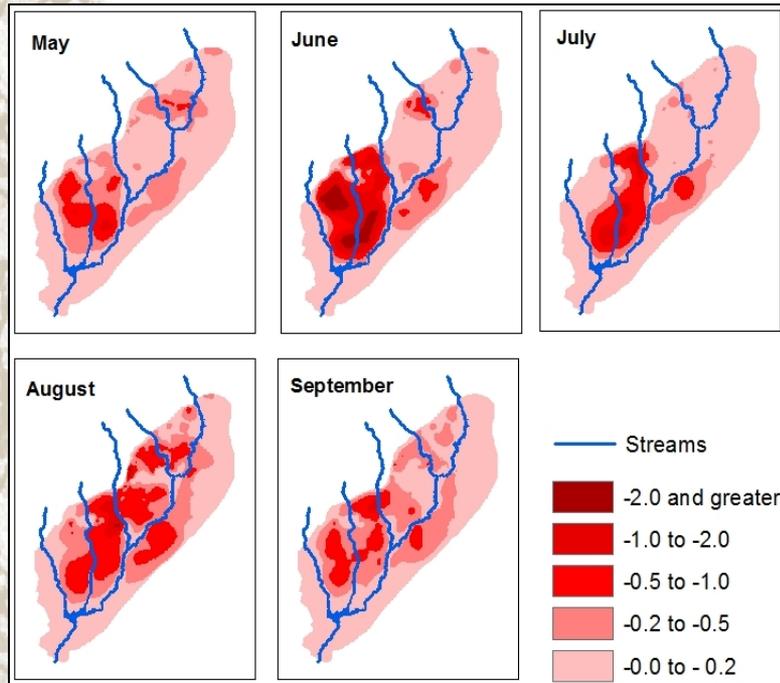
How other climate variability phenomena modulate the effect of ENSO?

AMO

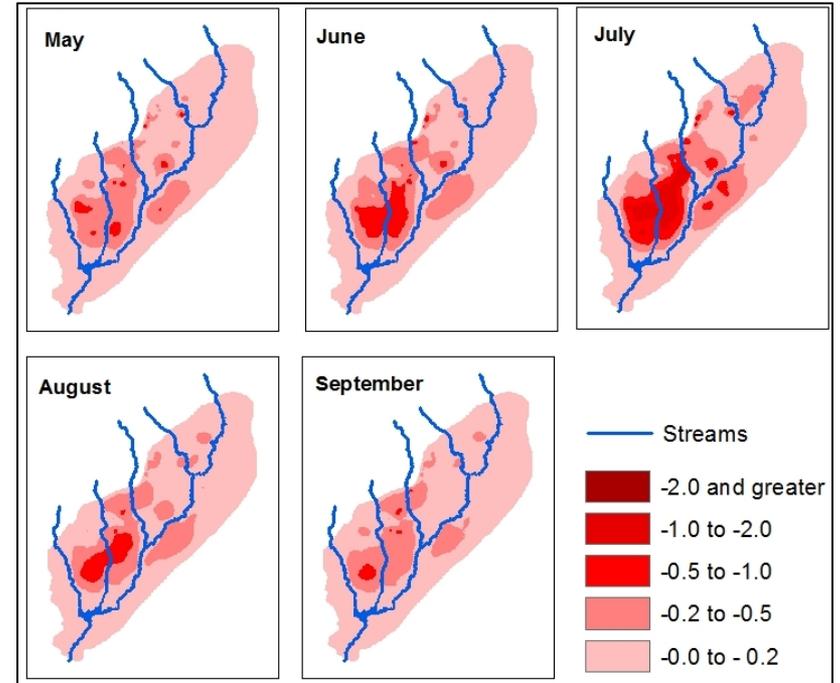


Singh, S., P. Srivastava, A. Abebe, and S. Mitra. 2015. Baseflow response to climate variability induced droughts in the Apalachicola–Chattahoochee–Flint River Basin, U.S.A. *Journal of Hydrology*, 528: 550-561.

Groundwater level drawdown due to irrigation pumpage in WY 2011 and 2012



WY 2011



WY 2012

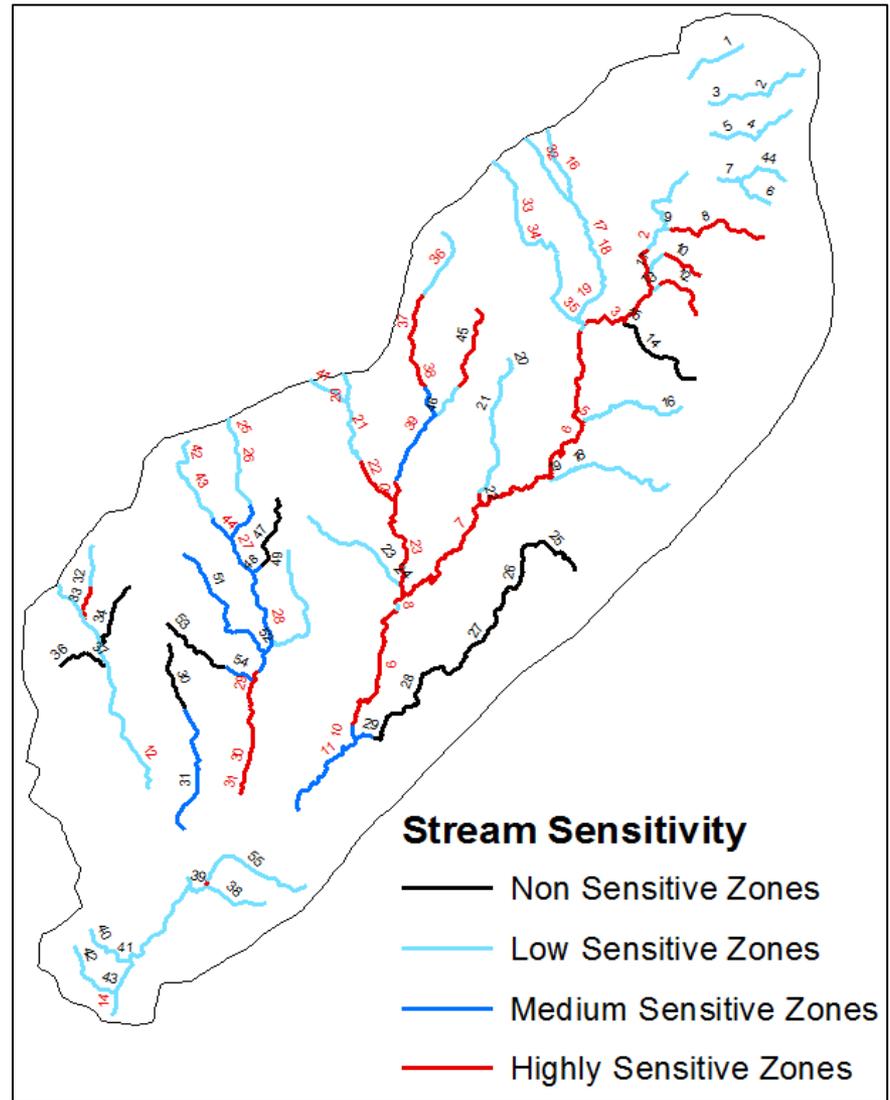
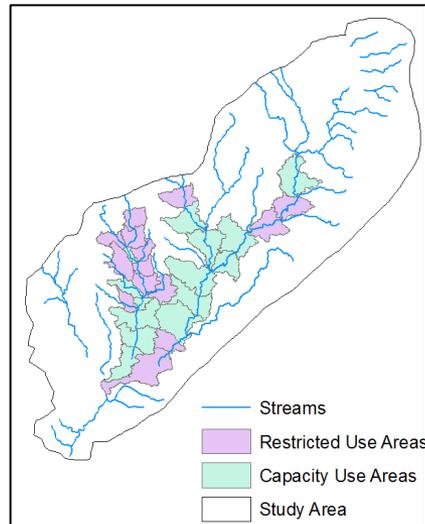


Mitra, S., P. Srivastava, and S. Singh. 2016. Effect of irrigation pumpage during drought on karst aquifer systems in highly agricultural watersheds: example of the Apalachicola-Chattahoochee-Flint river basin, southeastern USA. *Hydrogeol J* (2016) 24:1565–1582.

Stream segments sensitive to irrigation water withdrawal (preliminary results)

Identified critical reaches where stream-aquifer hydraulic connectivity is strong and stream-aquifer flux is sensitive to pumpage.

Analysis of water restriction scenarios suggests that reducing pumpage in highly sensitive and capacity use areas are more effective in streamflow recovery than reducing irrigation intensity (15% or 30%) throughout the study area.



Apalachicola-Chattahoochee-Flint (ACF) River Basin DEWS

Planned Activities

- Add more indicators (e.g. coastal) to the suite of indicators
- Engage wider community - state and local governments, regional commissions of counties, state agencies, fisheries management councils, water management districts, extension, master gardeners, NRCS, utilities, and agricultural producers
- Develop educational products for stakeholders
- Continue to refine the content of the webinars for the stakeholders

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