# USGS Lower Mississippi-Gulf Water Science Center

1. Tom Byl (HABs)
2. Elena Crowley-Ornelas (Restore: flow alteration & stream-gaging)
3. Ben Miller (karst & caves)
4. Matt Hicks (diatoms stressor-response)
5. Dean Hively (agriculture and remote sensing)
6. Reed Green (lake & reservoir eutrophication)

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# Tom Byl
# (Tennessee)

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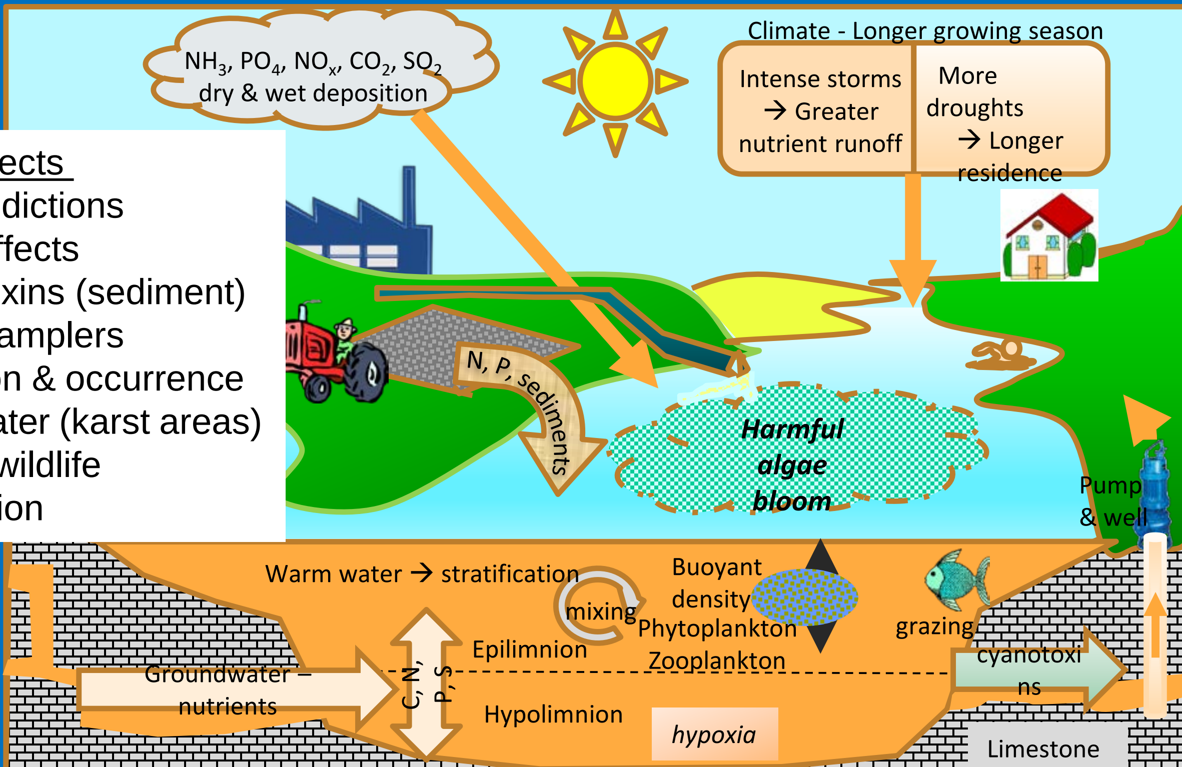
## Potential projects

1. Model predictions
2. Climate effects
3. Historic toxins (sediment)
4. Passive samplers
5. Distribution & occurrence
6. Groundwater (karst areas)
7. Effect on wildlife
8. Identification



# Elena Crowley-Ornelas (Tennessee)

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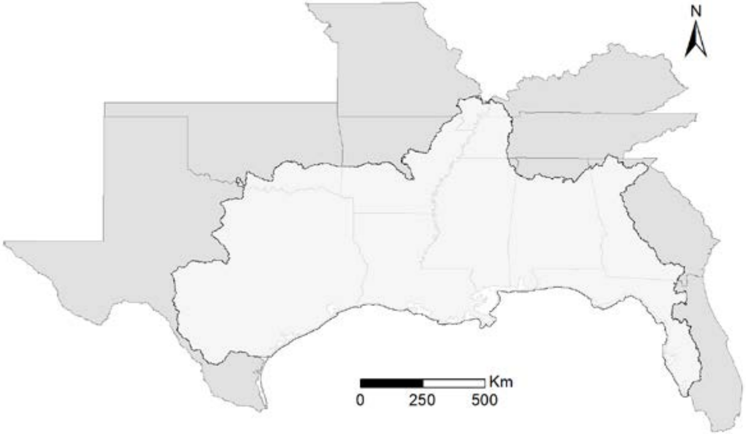
# Baseline Flow & Gage Analysis and On-Line Tool Development Supporting Bay and Estuary Restoration in Gulf States

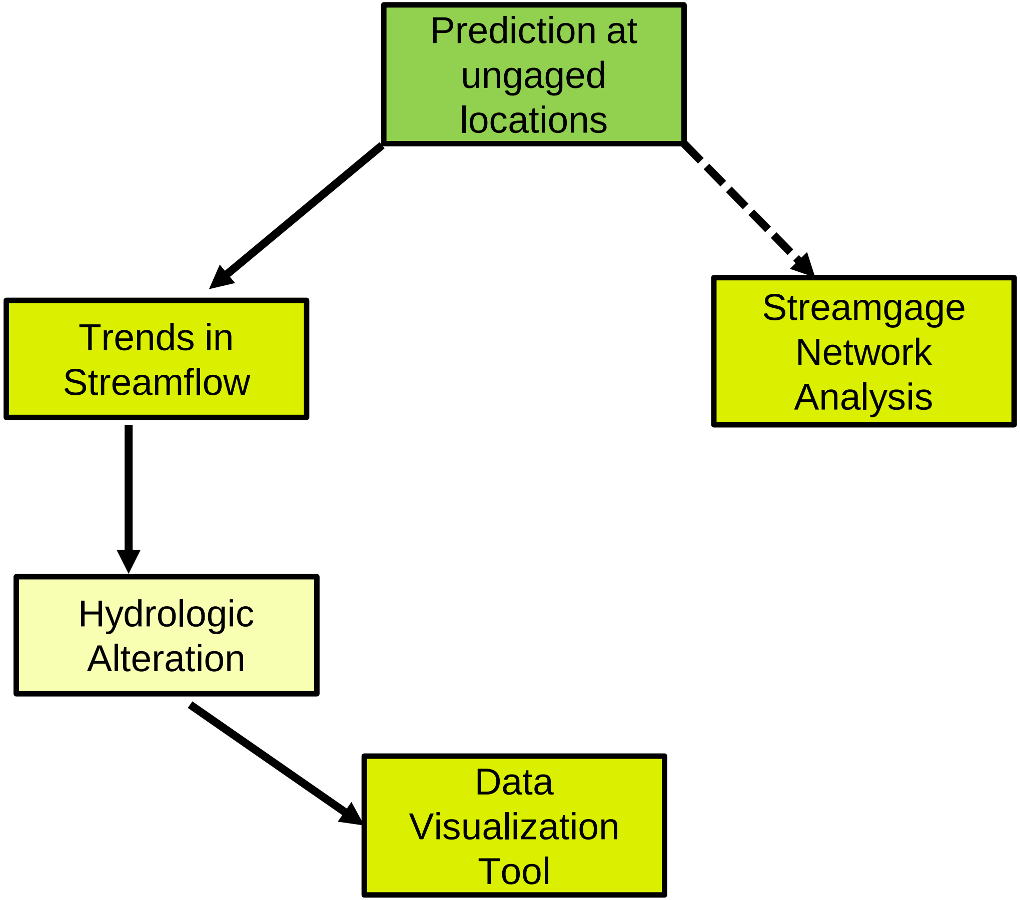
**A comprehensive assessment of streamflow alteration and development of decision-support framework to facilitate restoration**

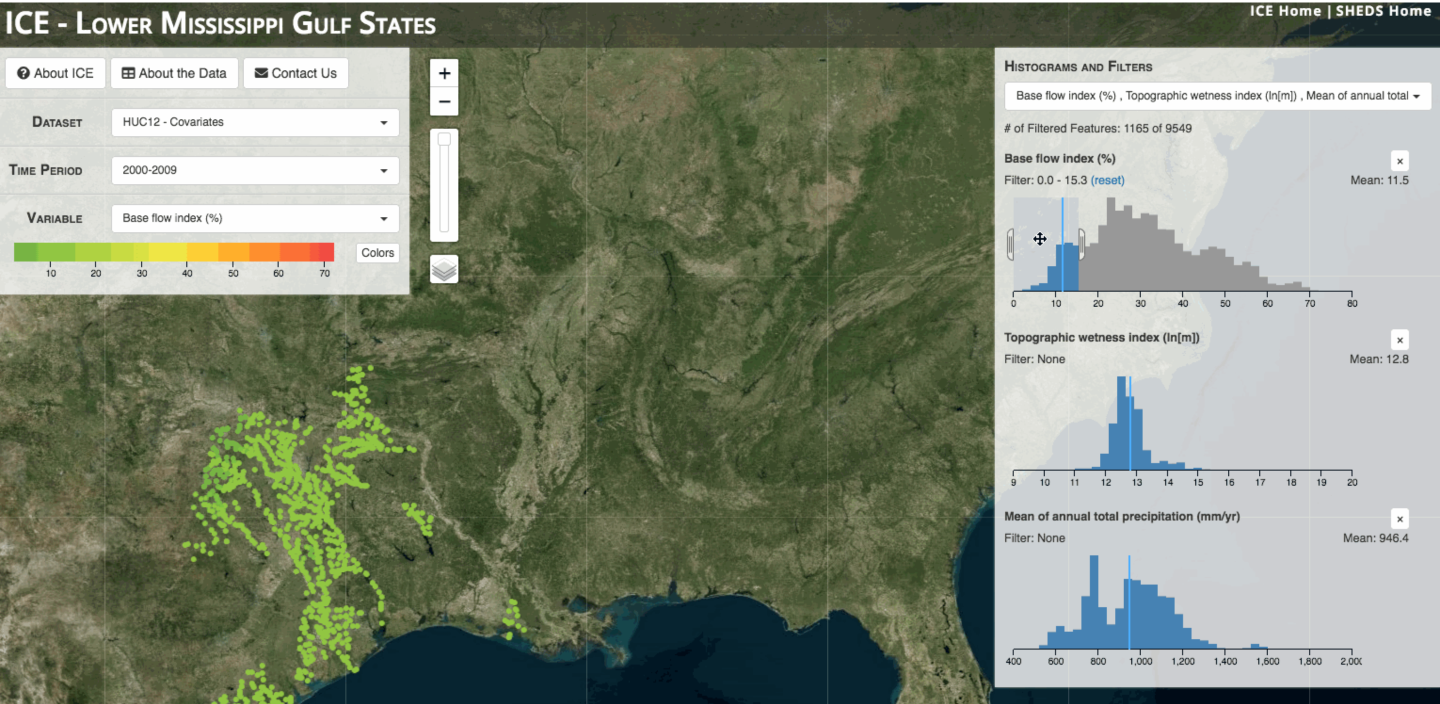
# Project Objectives / Tasks

- Which streams are most altered?
- Where are there gaps in streamgaging network?
- How has streamflow delivery to the Gulf changed through time?
- Assist resource managers in prioritizing restoration

- Quantify flow alteration
- Streamgaging network analysis
- Trends in streamflow
- Online mapping application




Prediction at ungaged locations
Trends in Streamflow
Streamgage Network Analysis
Hydrologic Alteration
Data Visualization Tool




- Filter and visualize sites based on similar characteristics
- Identify sites that may have similar flow regimes

# RESTORE - Streamflow alteration assessments to support bay and estuary restoration in the Gulf States

View

## Summary

Human alteration of waterways has impacted the minimum and maximum streamflows in more than 86% of monitored streams nationally and may be the primary cause for ecological impairment in river and stream ecosystems. Restoration of freshwater inflows can positively affect shellfish, fisheries, habitat, and water quality in streams, rivers, and estuaries. Increasingly, state and local decision-makers and federal agencies are turning their attention to the restoration of flows as part of a holistic approach to restoring water quality and habitat and to protecting and replenishing living coastal and marine resources and the livelihoods that depend on them. Personnel in the Lower Mississippi-Gulf Water Science Center have been working to quantify and map streamflow alteration to support streamflow and estuary restoration along the Gulf Coast.

## Child Items (11)

- *Basin characteristics for sites used in RESTORE Streamflow alteration assessments*
- Estimated quantiles for the pour points of 9,203 level-12 hydrologic unit codes in the southeastern United States, 1950--2009
- Geospatial data supporting assessments of streamflow alteration to support bay and estuary restoration in the Gulf States
- Heuristically-determined geospatial boundary of streams and rivers draining to the Gulf of Mexico in the south-central and southeastern United States, July 2018
- Observed and modeled daily streamflow values for 74 U.S. Geological Survey streamgage locations in the Trinity and Mobile-Tombigbee River basins in the southeast United States: 2000--2009
- Presentations
- *Solar radiation for National Hydrography Dataset, version 2 catchments in the southeastern United States, 1950 - 2010*
- *Streamflow characteristics for sites used in RESTORE Streamflow alteration assessments*
- Summary of basin characteristics for National Hydrography Dataset, version 2 catchments in the southeastern United States, 1950 - 2010
- Summary of streamflow statistics for USGS streamgages in the southeastern United States: 1950 - 2010
- Trend analysis results for sites used in RESTORE Streamflow alteration assessments

Photo credit Texas Parks and Wildlife

## Map »

## Spatial Services

**ScienceBase WMS :** https://www.sciencebase.gov/catal

## Communities

- USGS Lower Mississippi-Gulf Water Science Center

## Provenance

**Data source :** Input directly

# Ben Miller (Tennessee)

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# Karst Hydrology & Cave Studies

- Caves & karst are abundant throughout the southeastern USA & Tennessee in particular
- Karst environments are highly susceptible to contamination from human activities due to the highly connected hydrology
- Karst and cave systems also have a high rate of endemism for biota
- Karst studies focus on
  - Characterizing hydrologic behavior
  - Delineating recharge areas for cave biota using dye trace
  - Gain/Loss studies along karst streams
  - Water quality monitoring of cave & karst systems
  - Biologic surveys
    - Counting species in-cave
    - eDNA work and sampling
    - Food web dynamics using isotopes


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# Matt Hicks
# (Mississippi)

# Objectives

- Stressor-response relationships between diatom assemblage and nutrients in low-gradient, soft bottom streams in the MAP

- Evaluate utility of diatom response variables for:
  - numeric nutrient criteria development
  - Measuring success of conservation efforts aimed to reduce nutrients

# Collaborative

- USEPA Region 4 and Headquarters
- Mississippi DEQ
- USDA/ARS – Jason Taylor

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MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

# Conclusions

- Significant change in diatom assemblage at high levels of TP (secondary shift) = >0.12 mg/L
  - Our species indicator results are congruent with other studies at the regional and continental scale
- Did not find relationships with TN
  - Larger spatial and temporal studies needed for TN
- Diatoms have utility for developing nutrient criteria
- Results can be used to develop benchmarks for water quality improvements in the MAP.

Hicks, MB and JM Taylor. 2019. Diatom Assemblage Changes in Agricultural Alluvial Plain Streams and Application for Nutrient Management. Journal of Environmental Quality. 48:83-92



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# Dean Hively
# (Maryland)

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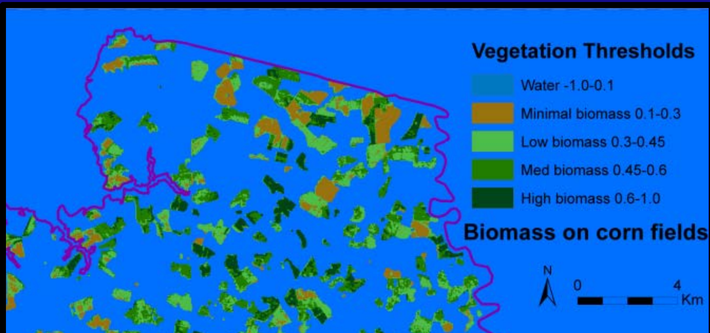
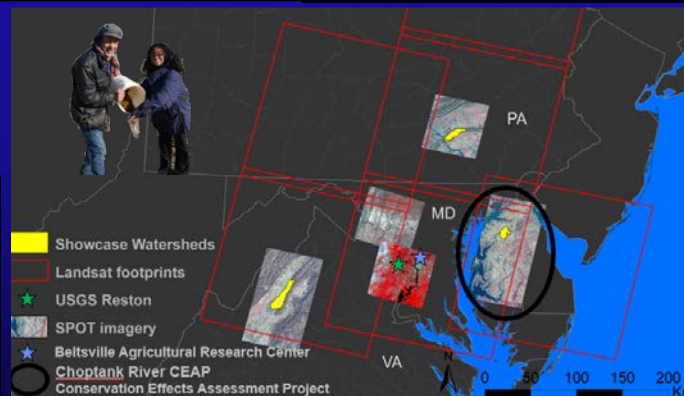
# Understanding agricultural conservation practices

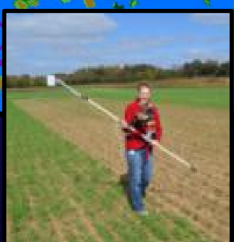

## Dr. W. Dean Hively, Project Chief, based in Beltsville, Maryland

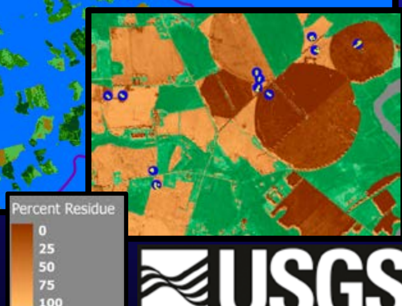
Contact: whively@usgs.gov (301) 504-9031


- **Mapping performance of winter cover crops**
- **Remote sensing of crop residue / tillage intensity**
- **Linking conservation data to water quality trends**
- **Landsat, Sentinel, Worldview, sattelites, proximal sensors**



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# Reed Green (Arkansas)

# Lake and Reservoir Susceptibility to Eutrophicaton and CyanoHABs

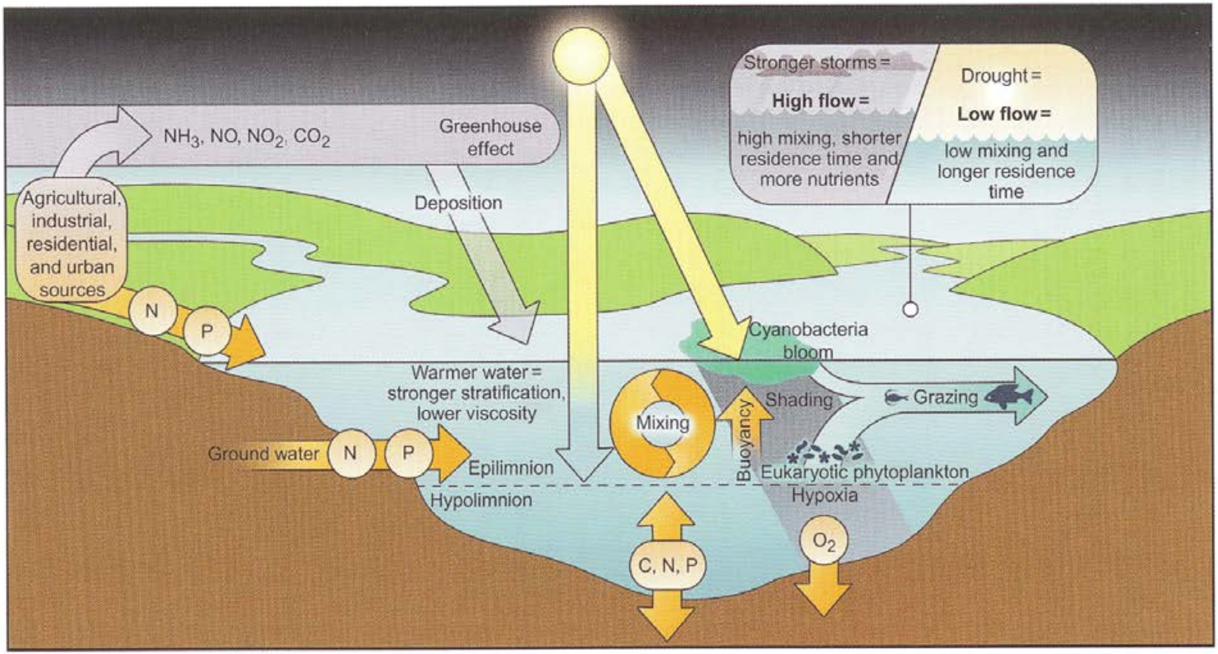
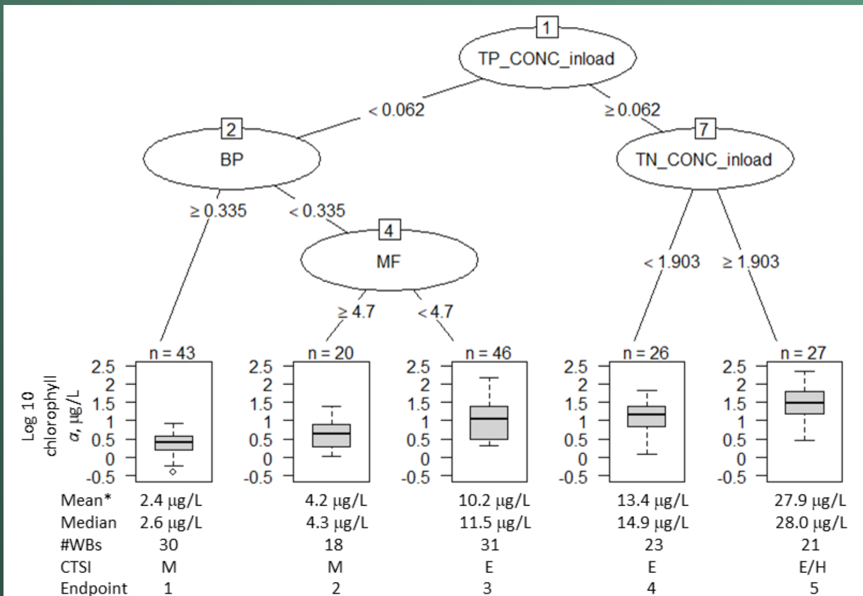



FIGURE 2 Conceptual diagram illustrating external and internal factors controlling growth, accumulation (as blooms), and fate of cHABs in freshwater ecosystems. Factors can act individually or in combined (synergistic, antagonistic) ways.

Wehr, and others, 2015, Freshwater Algae of North America, Chapter 20, figure 2

# Headwater Reservoirs, log 10 Chlorophyll *a*




## End-point #3, Emmit Wood Lake, Alabama

## End-point #4, Lake Fisher, North Carolina

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***Other studies and expertise:***

- Fish community response to streamflow alteration
- Regional groundwater models
- Water use and availability
- Wetland hydroperiod responses to climate change
- Coastal systems: salinity, freshwater flows, subsidence
- Stream-channel geomorphology
- Agricultural BMPs
- Contaminant fate & transport

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