Lower Flint-Ochlockonee Council Meeting

November 17, 2023

GEORGIA
WATER PLANNING
waterplanning.georgia.gov

Agenda

Objectives:

1. Hear updates on Frost Protection Permitting and GA-FIT
2. Learn about Thomasville's Seed Grant on stormwater management
3. Discuss Habitat Conservation Plan for LFRB
4. Discuss inactive permits & solar farms
5. Review fact sheet
6. Discuss water planning with plan commenters (FWS & DR. Rosemond)

9:45 am	Registration
10:00 am	Welcome, Agenda Review – *Meagan Szydzik, GWPPC*
10:10 am	Chair's Report – *Chairman Campbell*
10:20 am	GAEPD Report – *Jennifer Welte, GAEPD*
10:30 am	Frost Protection Permitting – *Ania Truszczynski, GAEPD*
10:50 am	Inactive Permits and Solar Farm Development – *Ania Truszczynski, GAEPD*
11:10 am	HCP Discussion – *Mark Masters, GWPPC*
11:30 am	GA-FIT Report – *Mark Masters, GWPPC*
11:45 am	Fact Sheet Review – *Meagan Szydzik, GWPPC*
12:00 pm	Lunch
1:00 pm	Thomasville Seed Grant Report & Proposal – *Pam Schalk, Thomasville*
1:15 pm	Presentation by Dr. Amy Rosemond, *UGA Ecology & River Basin Center*
1:45 pm	Next Steps – *Meagan Szydzik, GWPPC*
2:00 pm	Adjourn

Introductions

MURRAY CAMPBELL
Council Chair for:
Lower Flint-Ochlockonee
richardroyal@yahoo.com
(229) 328-6060

JENNIFER WELTE
Georgia EPD
Liaison for:
Lower Flint-Ochlockonee
Jennifer.welte@dnr.ga.gov
(470) 384-7450

ROB BOCARRO
Black & Veatch
Council Advisor for:
Lower Flint-Ochlockonee
bocarrora@bv.com
(770) 754-0318

JASON HOWARD
Black & Veatch
Council Advisor for:
Lower Flint-Ochlockonee
howardje@bv.com
(770) 521-8133

KRISTIN ROWLES
GWPPC
Council Lead for:
Lower Flint-Ochlockonee
krowles@h2opolicycenter.org
(404) 822-2395

MARK MASTERS
GWPPC
Council Advisor for:
Lower Flint-Ochlockonee
mmasters@h2opolicycenter.org

MEAGAN SZYDZIK
GWPPC
Council Advisor for:
Lower Flint-Ochlockonee
mszydzik@h2opolicycenter.org
(770) 543-8497

CLETE BARTON
Georgia EPD
Regional Water Planning Lead:
Clete.barton@dnr.ga.gov

Lower Flint-Ochlockonee Council Members

Name	City	County
Chris Addleton	Cairo	Grady
J. Steve Bailey	Donalsonville	Seminole
C. LaDon Calhoun	Colquitt	Miller
Murray Campbell, Chair	Camilla	Mitchell
Marc E. DeMott	Moultrie	Colquitt
Frederick Dent	Sylvester	Worth
David Dixon	Leesburg	Lee
Hugh Dollar	Bainbridge	Decatur
Connie C. Hobbs, Vice Chair	Newton	Baker
Greg Hobbs	Thomasville	Thomas

Name	City	County
Michael A. McCoy		Dougherty
George C. McIntosh	Dawson	Terrell
Mike Newberry III	Arlington	Early
Calvin D. Perry	Moultrie	Colquitt
Walt Pierce	Edison	Calhoun
A. Richard Royal	Camilla	Mitchell
J. Stephen Singletary	Blakely	Early
Jay Smith	Albany	Dougherty
Mark Spooner	Donalsonville	Seminole
Steve Sykes	Camilla	Mitchell
Cory Thomas	Colquitt	Miller
James L. Webb	Leary	Calhoun
Rep. Gerald Greene		

Chair’s Report

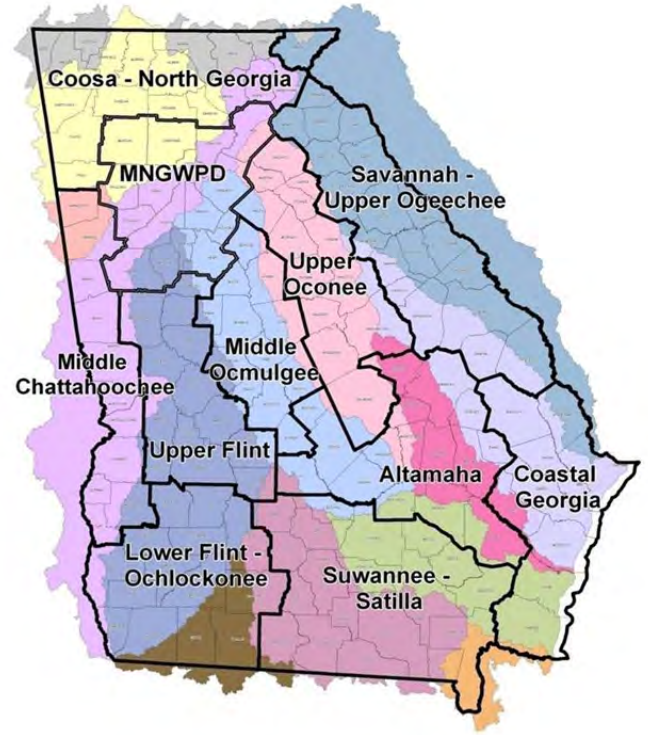
Presented by Chairman Campbell

GAEPD Report

Jennifer Welte, GAEPD

FY24 Seed Grant Application Period

- Applications received through Oct. 31, 2023
- 1 application submitted from this region
  - City of Thomasville: Stormwater Education Program
  - Partners: Golden Triangle RC&D and Keep Thomas County Beautiful
  - Management Practice WQ-2
    - Improve implementation of nonpoint source controls
  - Management Practice WQ-3
    - Continue to fund and implement water quality monitoring
  - Management Practice WQ-4
    - Improve collection, coordination, and utilization of water quality data



EPD Updates: construction/stormwater

- EPD's issuance of the construction stormwater general permits was challenged in July
  - https://epd.georgia.gov/watershed-protection-branch/stormwater
  - Construction sites continue to be covered under the 2018 general permits, which remain in effect during the duration of the legal challenge
- Last week, EPD released a draft Guidance for Requests to Disturb 50 Acres or More under the NPDES Construction Stormwater Permits
  - No more than 50 acres of disturbance is allowed at any one time unless the permittee has received prior written authorization from the appropriate EPD District Office
  - The draft guidance outlines the review criteria and specifies design components expected for such requests
  - Virtual meeting will be held on December 7 and comments are welcome by December 15

EPD Updates: public drinking water systems

- Public drinking water systems: lead service line inventories (due Oct. 2024)
  - EPD & GEFA implementing an online system to accept & track these submissions
  - Training sessions are being held to support systems with implementation
  - https://epd.georgia.gov/watershed-protection-branch/drinking-water
- New Drinking Water Operator Classification
  - Operator Class III G was created by Georgia Board of Examiners for Certification of Water & Wastewater Treatment Plant Operators and Laboratory Analysts
  - Applies to operators of groundwater systems serving a population of 1,000 – 9,999
  - Updates to drinking water rules are proposed (comment period ended on Nov. 9) to incorporate this new classification

Frost Protection Permitting

Ania Truszczynski, GA EPD

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Agricultural Water Withdrawal Permitting Update

Lower Flint Ochlockonee Regional Water Planning Council
November 17, 2023

OUTLINE

1. Frost Protection Permitting
2. Inactive Permits
3. Solar Development

1. FROST PROTECTION PERMITTING

- From Hartsfield-Jackson International Airport in Atlanta to the most southwestern corner of Georgia
- Subarea 4 of the ACF basin – south of Dooly County, area of significant hydraulic connection between the Flint River and its tributaries with the Florian aquifer
  - Small portions of Chattahoochee, Ochlockonee, and Suwannee River Basins are included in Subarea 4

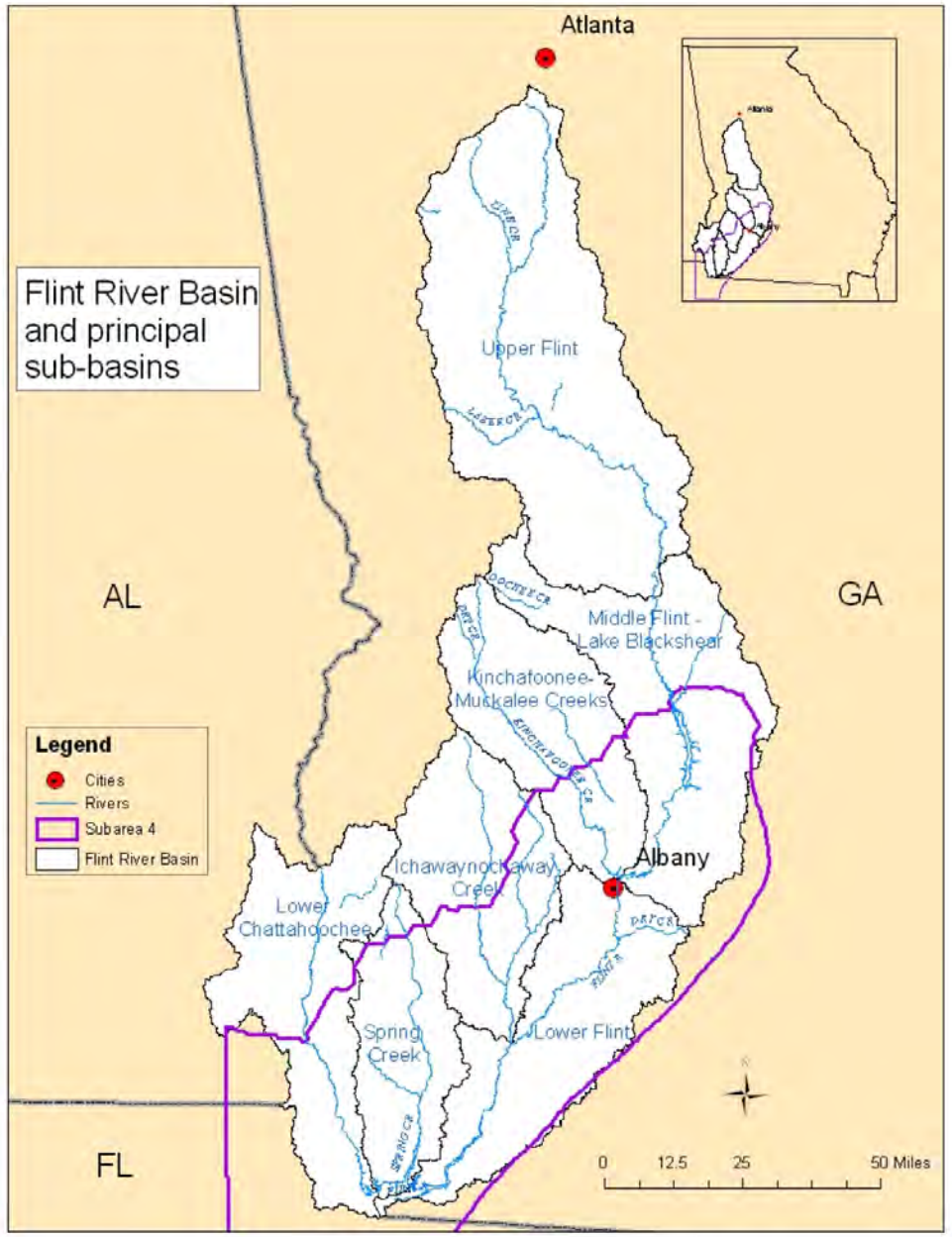


Figure 0.1: The Flint River Basin and sub-basins

1. FROST PROTECTION PERMITTING

- Agricultural water withdrawal permitting – 1988
- Water withdrawal permitting moratorium – 1999
- Flint river drought protection act – 2000
- Flint River Basin Regional Water Development and Conservation Plan – 2006
- Original Regional Water Plans for Upper & Lower Flint – 2011
- Water withdrawal permitting suspension – 2012
- Florida v. Georgia – 2013
- First update of the RWP for Upper & Lower Flint – 2017
- Seed Grant: Water Supply Alternatives for Agricultural Surface Water Irrigators in Ichawaynochaway Sub-Basin – 2017
- Florida v. Georgia – 2021
- Agricultural Water Source Conversion for Streamflow Resilience (ASU and EPD ARPA grant) – 2022
- Second update of the RWP for Upper & Lower Flint – 2023

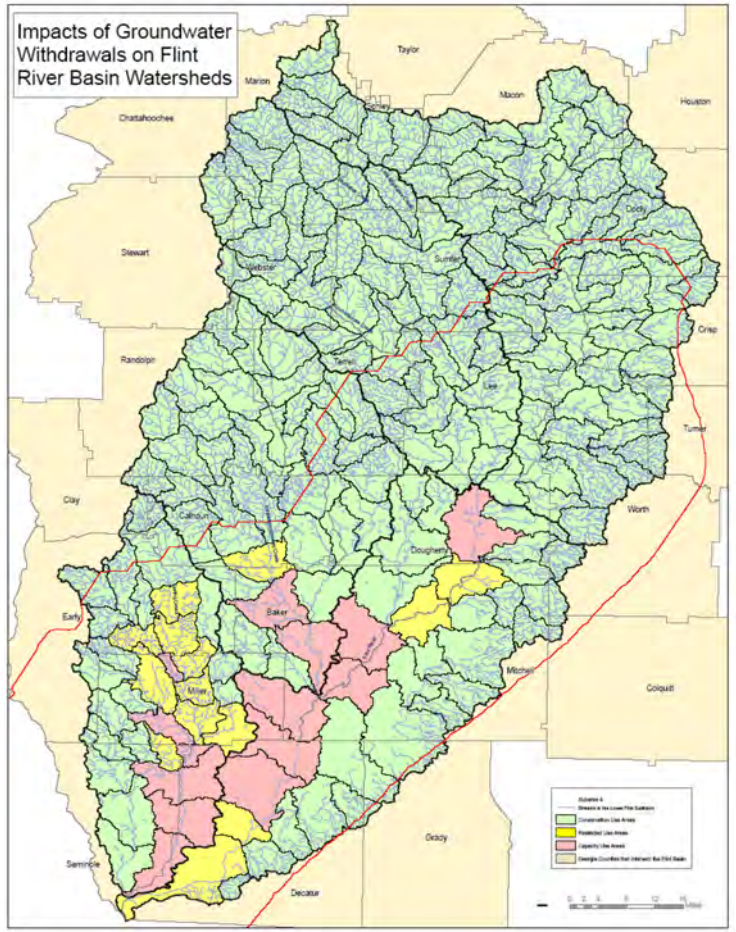


Figure 0.2. Classification of HUC-12 watersheds in the lower Flint River Basin.

1. FROST PROTECTION PERMITTING

- In recent years, various types of citrus, blueberries, and other berry crops have emerged as attractive commodities for some farmers in southwest Georgia.
- These crops cannot be successfully cultivated without frost protection, which can require the application of large amounts of water directly onto plants to protect them during freezing temperatures.
- Water withdrawal permits are required for large amounts of water (100,000 gallons per day or more).
- Frost protection permits are not currently an option for farmers in the lower Flint River Basin (FRB) because of the permitting suspension implemented since July 2012.

1. FROST PROTECTION PERMITTING

- EPD has been evaluating various options for agriculture water withdrawal permitting in the lower FRB.
- Because the use would be limited to the traditional recharge season and limited in quantity, frost protection permits are anticipated to have a negligible effect on flows in the lower Flint River Basin.
  - Frost protection is needed as temperatures reach 35 degrees Fahrenheit.
  - Frost protection permits are anticipated to be used exclusively during the recharge season (October 15 – April 15).
  - Frost protection permits are used only a few days each year.
- As a result, frost protection permits are a reasonable step in re-evaluating the permitting approach for agricultural water withdrawals in the FRB.

1. FROST PROTECTION PERMITTING

- EPD solicited targeted and broad feedback on the proposed permitting framework.
- EPD shared information about the proposed frost protection permitting framework with:
  - Georgia Farm Bureau
  - Georgia Agribusiness Council
  - Georgia Fruit and Vegetable Growers Association
  - Georgia Association of Groundwater Professionals
  - All Georgia State Senators and Georgia House Representatives whose districts include a portion of the suspension area
  - The Commissioner of the Georgia Department of Agriculture
  - The GA-FIT Advisory Board

1. FROST PROTECTION PERMITTING

- Frost protection permitting was discussed at both the Upper and Lower Flint Regional Water Planning Council meetings, which occurred on June 9 and June 15, respectively.
- EPD hosted a stakeholder meeting on Wednesday, June 21 in Albany, Georgia.
- Written comments were accepted through June 30, 2023.
- Following the stakeholder meeting in Albany, a citrus farmer in Lee County invited EPD staff to view the irrigation infrastructure at his farm and offered to provide more information about citrus's water needs. EPD visited the farm on July 12. Representatives from GFB, GAC, GFVGA, GDA, Georgia Association of Groundwater Professionals, and UGA Extension also attended.
- EPD also visited a blueberry farm on July 12 to view the irrigation infrastructure and learn more about blueberry's water needs.

1. FROST PROTECTION PERMITTING

- EPD received 27 substantive comments from 13 commenters. The comments generally focused on:
  - The opportunity to explore frost protection permitting in the red and yellow zones;
  - Who should be eligible to participate in the permitting program (existing permit holders only, everyone, etc.);
  - Whether dedicated wells for frost protection were necessary, or whether a farmer could use a single well for both frost protection and production;
  - Whether variable rate motors should be allowable;
  - Whether telemetry should be required; and
  - Whether surface water should be an allowable water source for frost protection.

1. FROST PROTECTION PERMITTING

- Thanks to the robust feedback received, EPD started accepting applications for **frost protection permits** for water withdrawals from the **Floridan aquifer** for withdrawals in the **green zone** of the suspension area starting **September 1, 2023**.
- Farmers in the **yellow and red zones** of the suspension area can submit **Letters of Interest** to EPD. EPD staff will begin reviewing and evaluating the Letters of Interest to determine the potential impact in the yellow and red zones from frost protection permitting. EPD staff will work with stakeholders throughout this review process.

1. FROST PROTECTION PERMITTING

- EPD has received two applications for 70 new acres irrigated from the Floridan Aquifer in the Green Zone – one in Mitchell and one in Baker County.
- EPD has received 16 Letters of Interest for 165 new acres irrigated from the Floridan Aquifer in the red zone, all in Baker County. EPD has not received any Letters of Interest for the yellow zone.

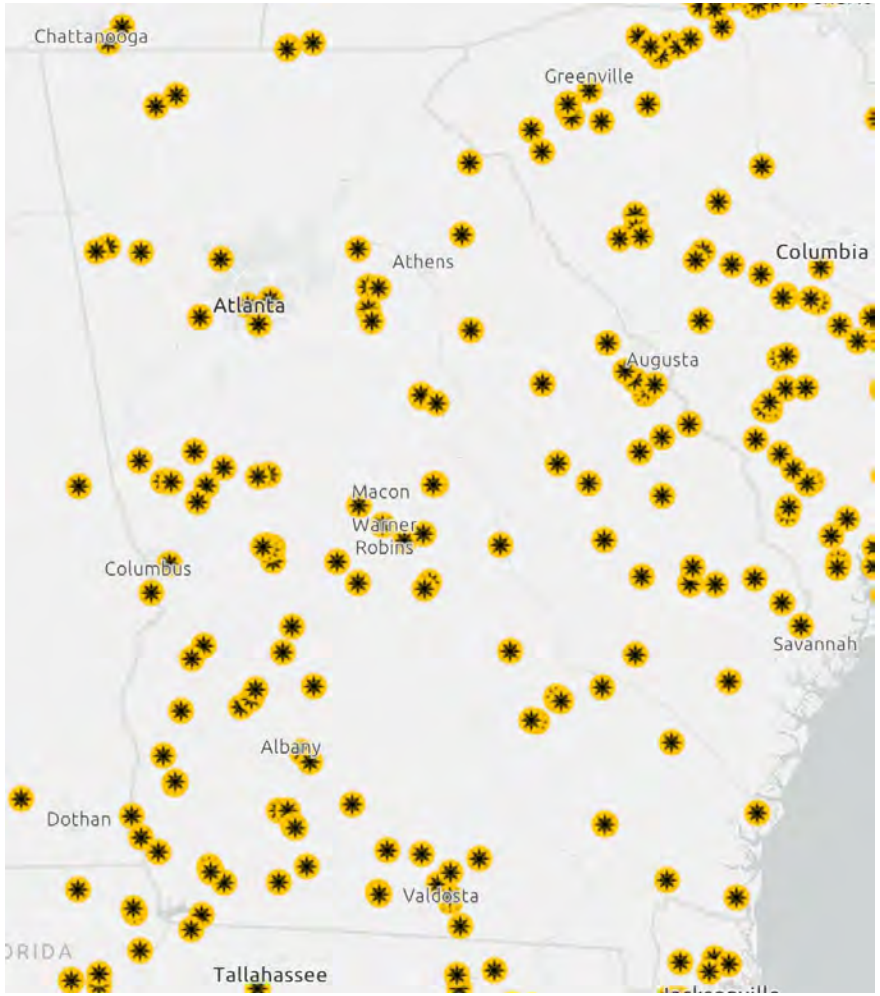
1. FROST PROTECTION PERMITTING

- The 2012 suspension was intended to protect existing users and the water resource. EPD was to evaluate the suspension annually, with future modifications possible depending on the condition of the water resource.
- The Habitat Conservation Plan provides a comprehensive way of revising the suspension and developing an informed and defensible water management approach, particularly for drought.
- The development of a Habitat Conservation Plan includes technical activities that will provide important information about capacity; where capacity exists, new and expanded permits could be considered.
- Farmers in the area have experienced five different permitting regimes in the last 40 years. The process of developing the Habitat Conservation Plan will be engage stakeholders and be important for making a practical water management program that can provide farmers with regulatory certainty and protect the water resource.

2. INACTIVE PERMITS

- Three categories of agricultural water withdrawal permits: active, inactive, and unused.
  - Active: a permit that has been acted upon and used for allowable purposes
  - Inactive: the permit holder has requested inactive status and retains ownership of the permit, without modification, for possible future use.
    - An inactive permit becomes active after the permit holder has given the director 60 days written notice and paid any applicable fees.
  - Unused: a permit that has never been used; these permits expire after two years unless changed to active or inactive status by the permit holder.
- Groundwater: OCGA 12-5-105(d)
- Surface water: OCGA 12-5-31(p)

3. SOLAR DEVELOPMENT



CONTACT

Anna (Ania) Truszczynski

anna.truszczynski@dnr.ga.gov

470-384-7440

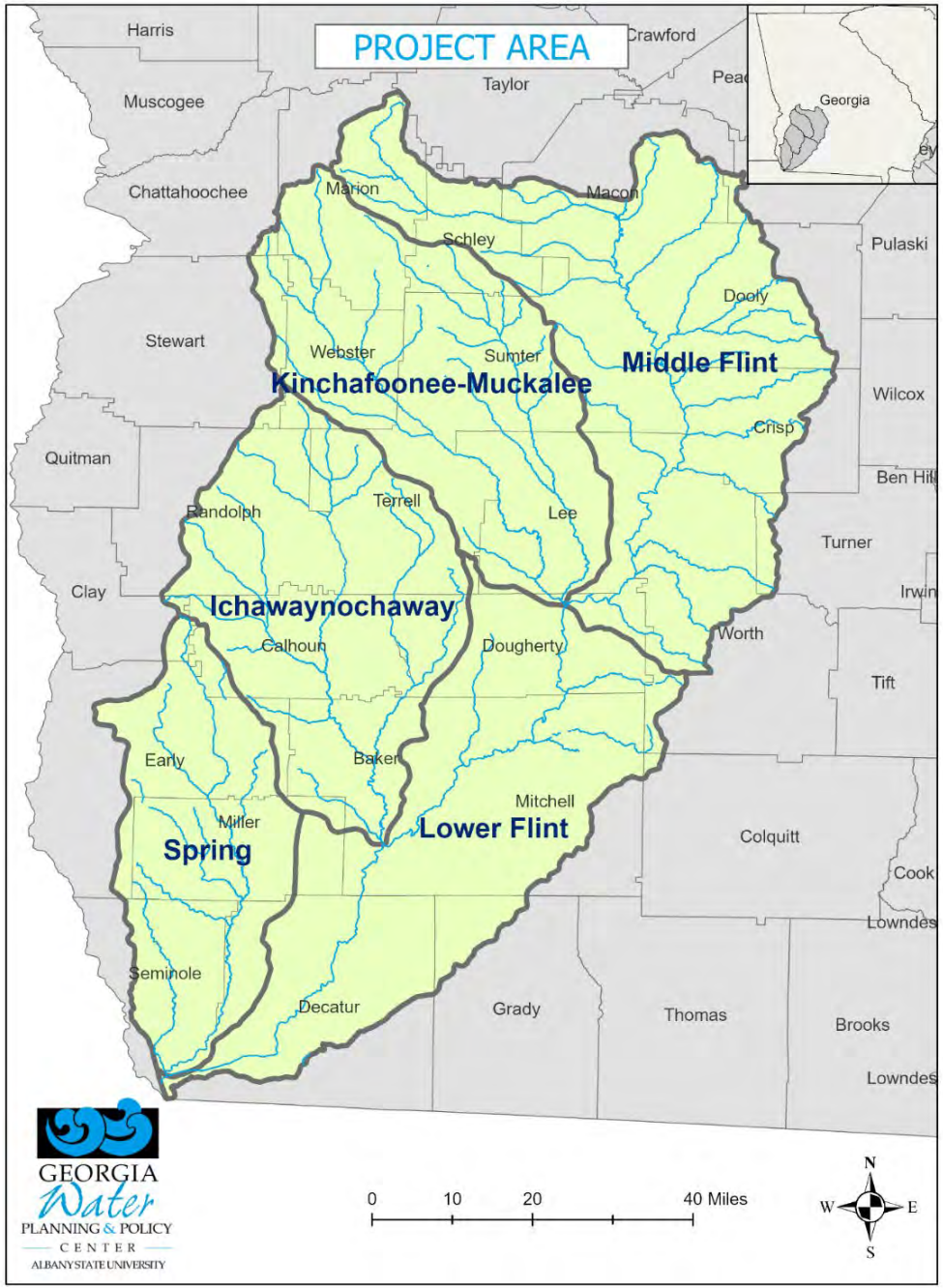
Inactive Permits & Solar Farm Development

HCP Discussion & GA-FIT Report

Mark Masters, GWPPC

GAFIT

GEORGIA FLOW INCENTIVE TRUST



GA-FIT Advisory Board

- Murray Campbell, farmer & Lower Flint-Ochlockonee (LFO) Council (Chair)
- Donald Chase, farmer & Upper Flint Water Council
- David Dixon, Miller Brewing (retired) & LFO Water Council
- Tommy Dollar, farmer, Dollar Farm Products
- Adam Graft, farmer & Upper Flint Water Council (Chair)
- Connie Hobbs, Baker County Commission (Chair) & LFO Water Council
- Tom McCall, Georgia Farm Bureau (President)
- Marty McLendon, farmer & Flint River S&W Conservation District
- T.E. Moye, farmer & Georgia Federal-State Inspection Service (President)
- Andy Payne, farmer and Lower Chattahoochee S&W Conservation District
- Gordon Rogers, Flint Riverkeeper & Upper Flint Water Council
- Richard Royal, LFO Water Council
- Jayme Smith, City of Colquitt, Economic Development
- Jimmy Webb, farmer & LFO Water Council

Technical Support Team

Georgia Water Planning & Policy Center, Albany State University

Georgia Department of Natural Resources, Environmental Protection Division

Golden Triangle RC&D, Resource Conservation and Development Council, Southwest Georgia

Georgia Department of Natural Resources, Wildlife Resources Division

The Nature Conservancy

University of Georgia

U.S. Fish & Wildlife Service

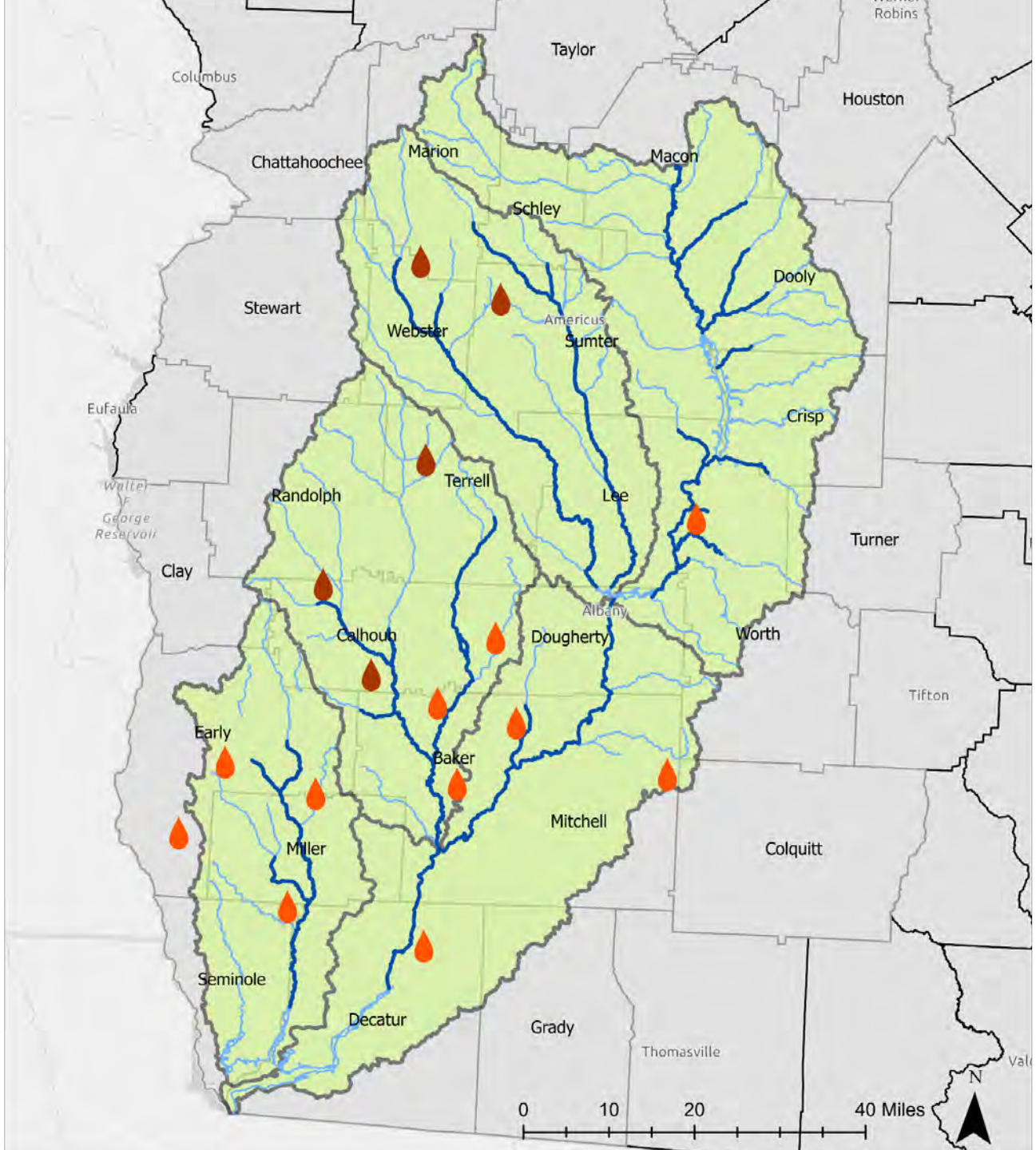
The Jones Center at Ichauway, Natural Resource Research & Management

…and others as needed.

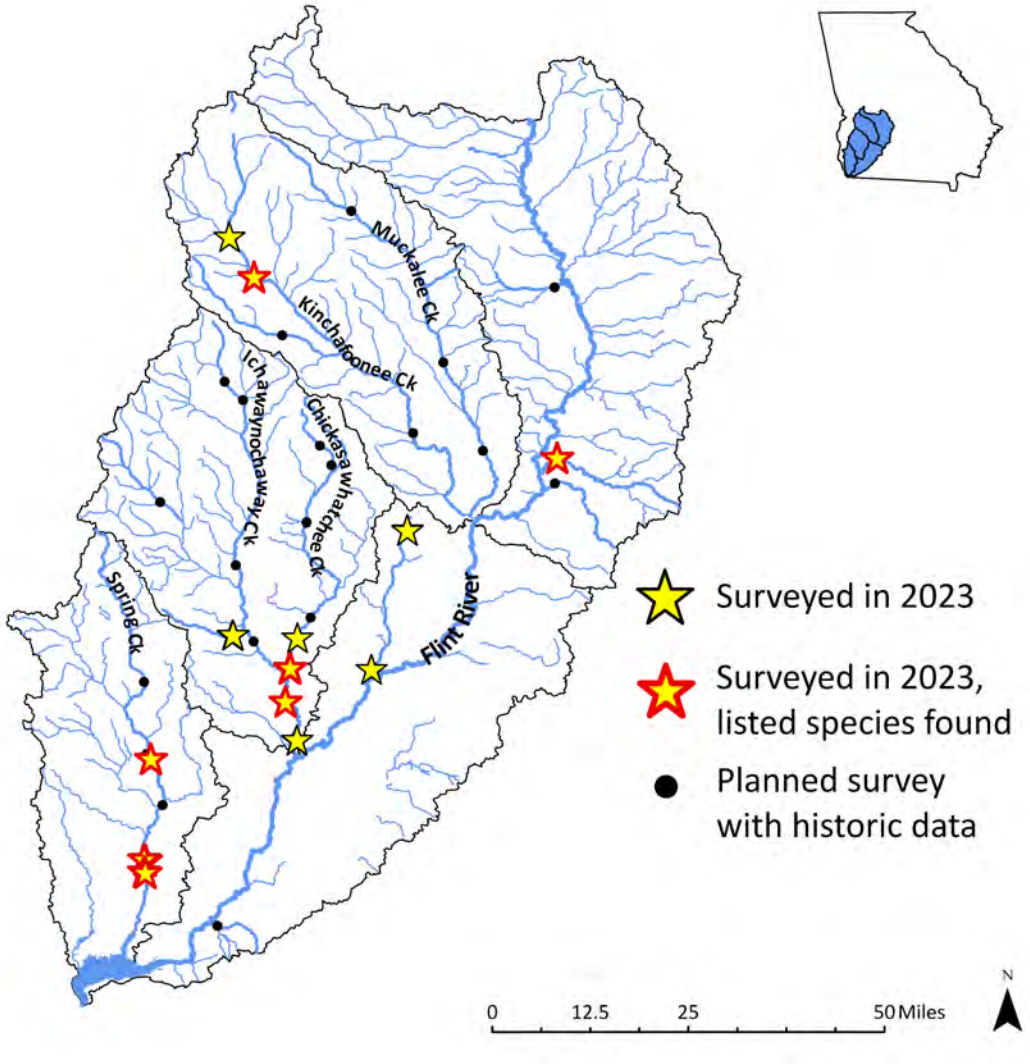
Project Updates

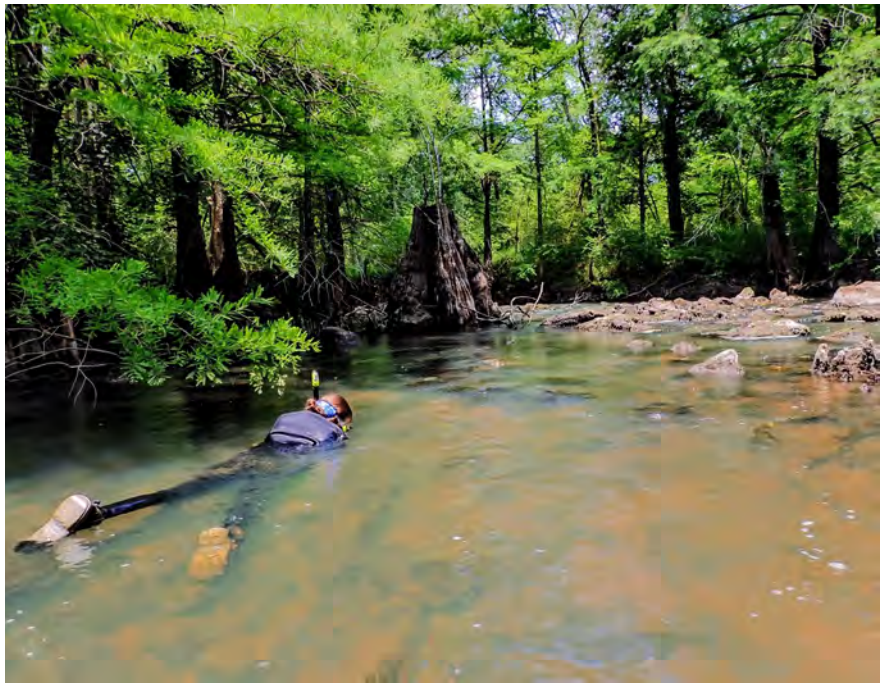
- GA-FIT Voluntary Irrigation Suspension Auction
- Drought SWAP Applications and Prioritization
- Monitoring Wells/GW Research
- Mussel Surveys and Habitat Mapping
- State and Federal Coordination Meetings
- Management Alternatives: Stream and Aquifer Modeling
- USFWS HCP Planning Grant
- Draft HCP Development

Monitoring Wells



Mussel Survey Progress

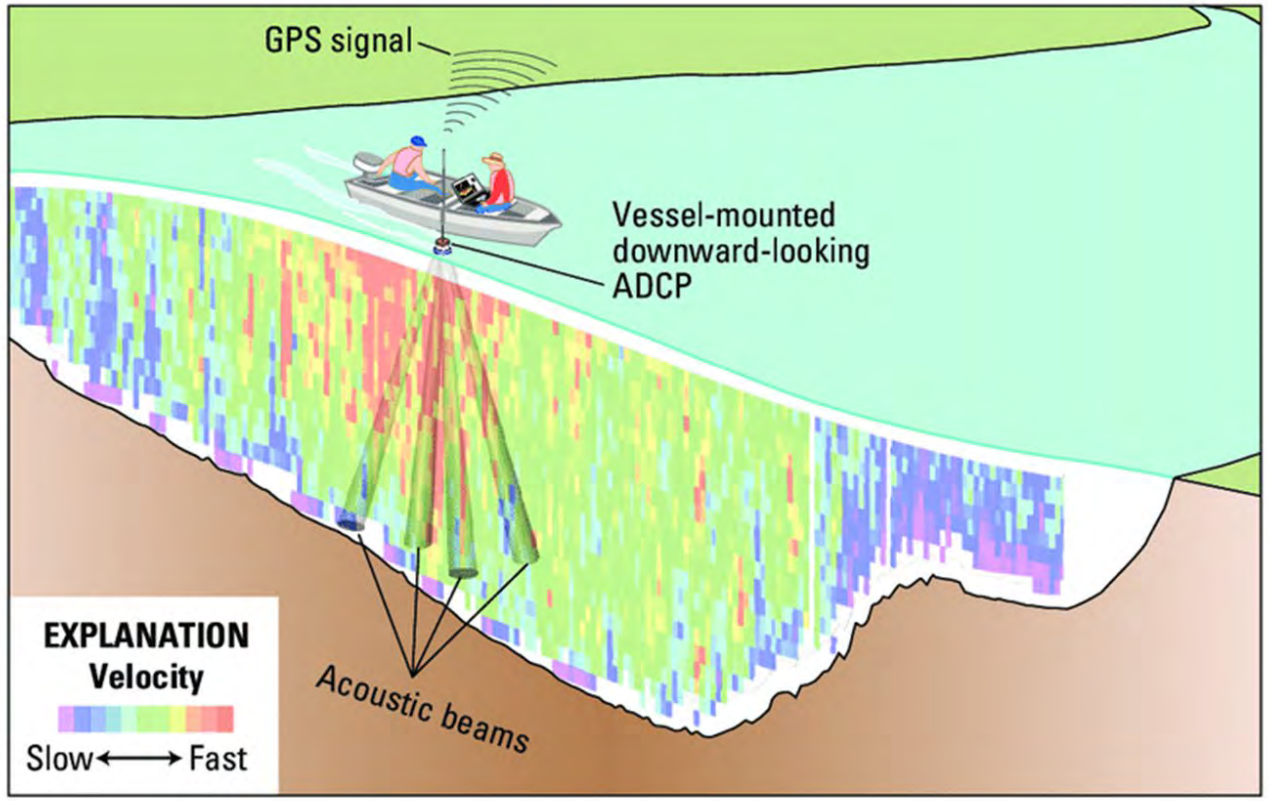




Oval Pigtoe

Shiny-rayed Pocketbook

Stream Bathymetry



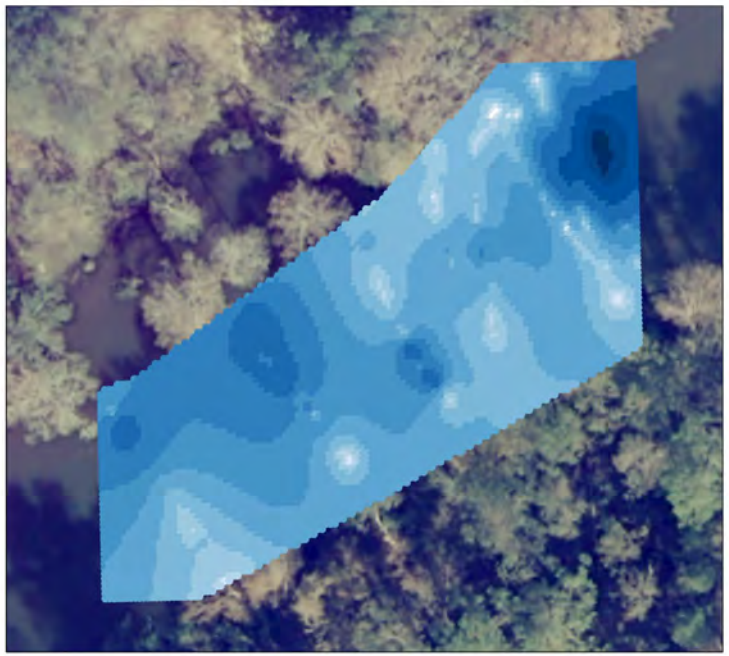
Acoustic Doppler Current Profiler – uses sound (sonar) to measure water depth and velocity

Our goal – create a bathymetric map of stream reaches to see how habitat inundation changes with discharge.

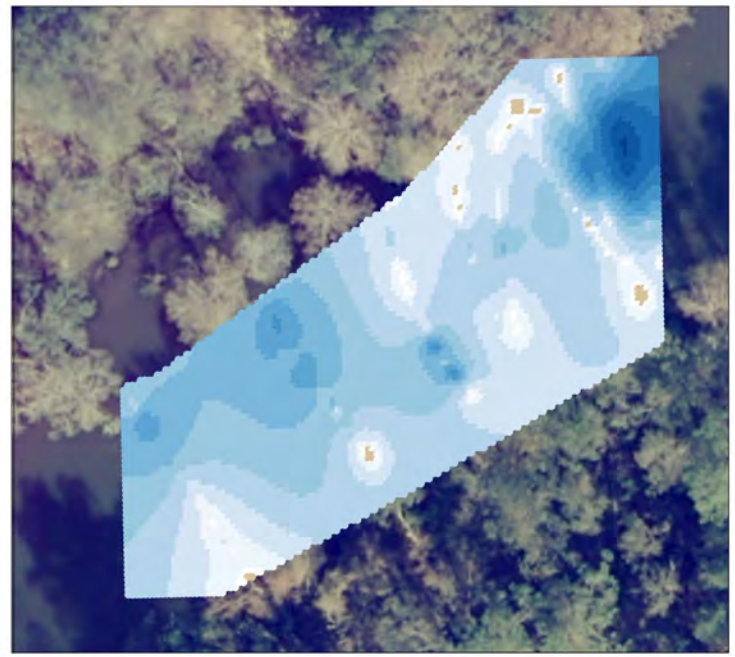
Biological Goals

- Supported by measurable objectives
- Connect to management actions
- Address information needed to refine longer-term actions
- Address streamflows and habitat
- May vary by sub-basin or habitat

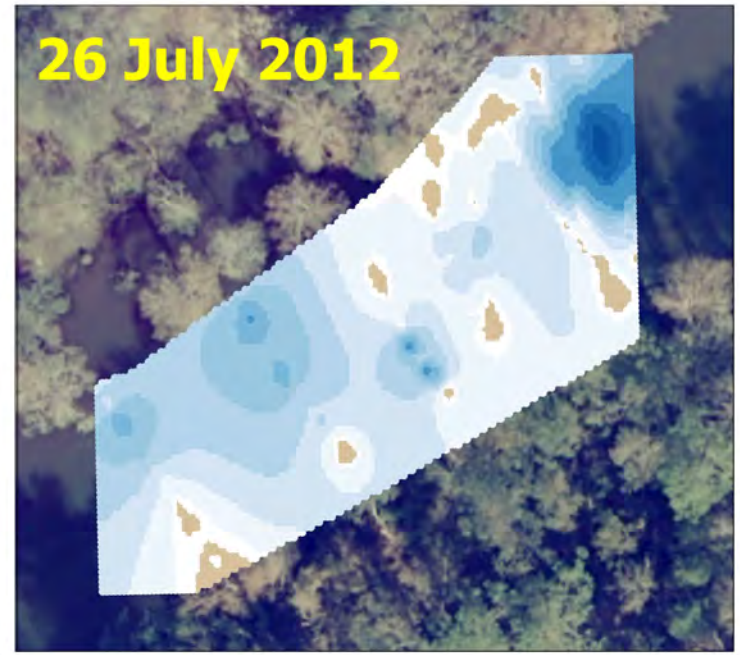
611 cfs, ~30th percentile



135 cfs, ~20th percentile



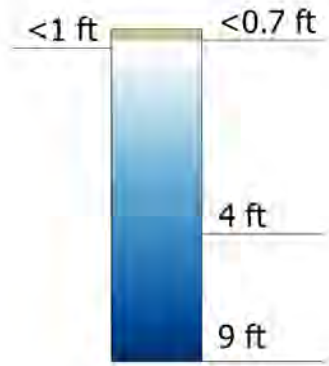
33 cfs, lowest flow of record

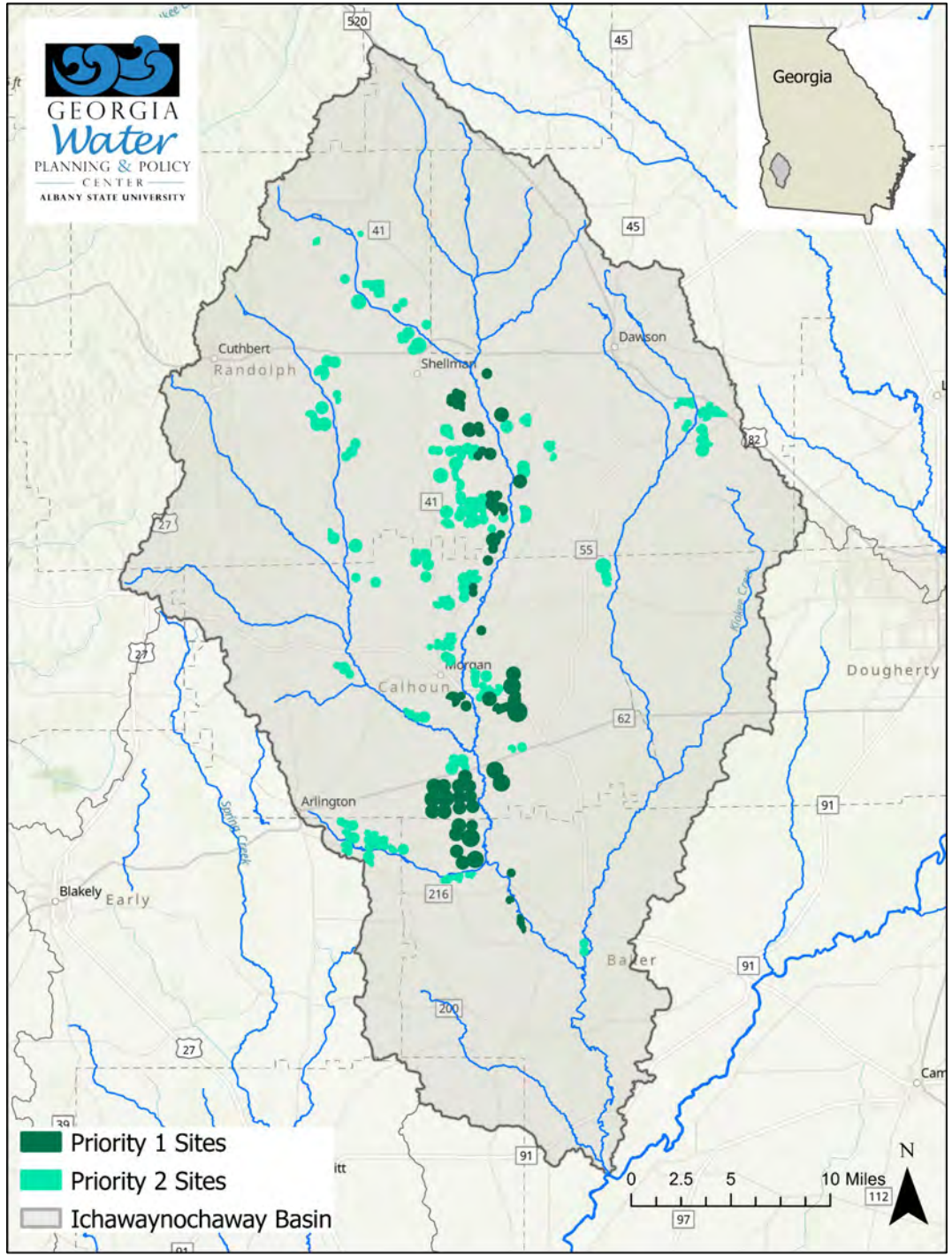


0 25 50 100 Feet

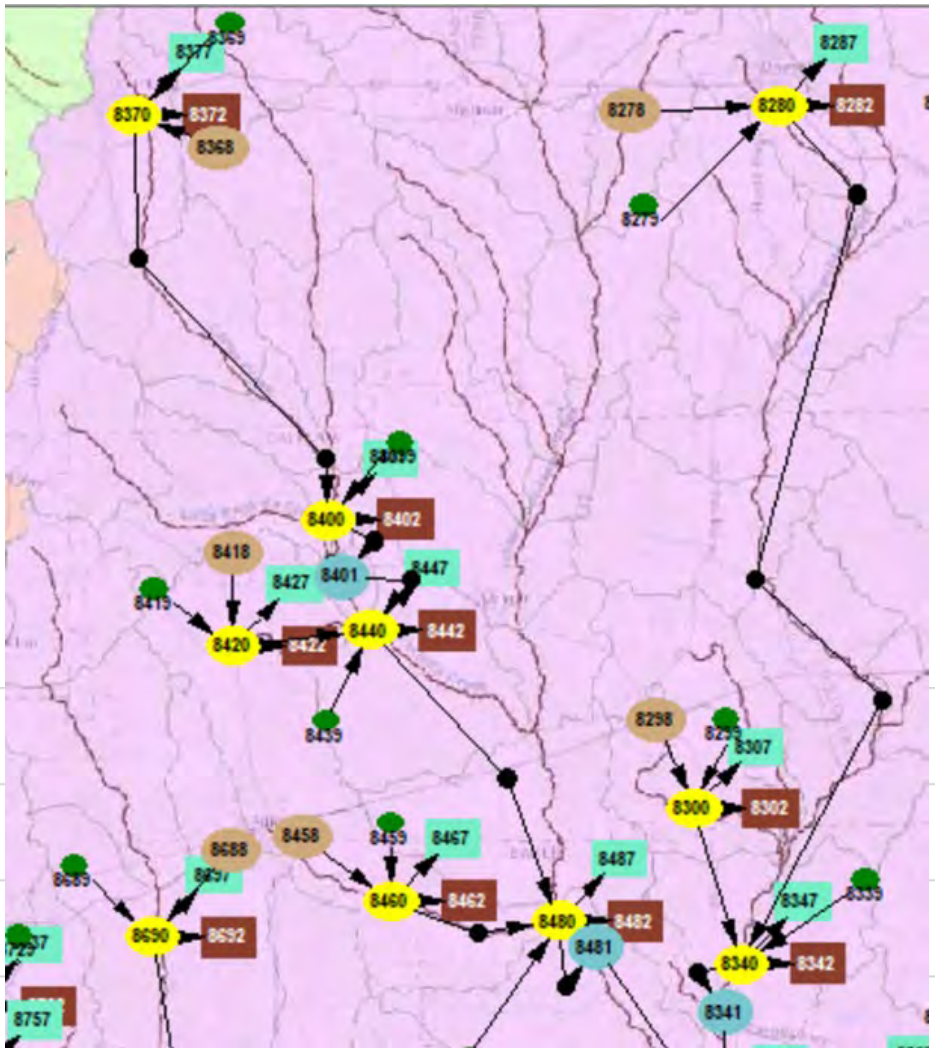
N

Water Depth

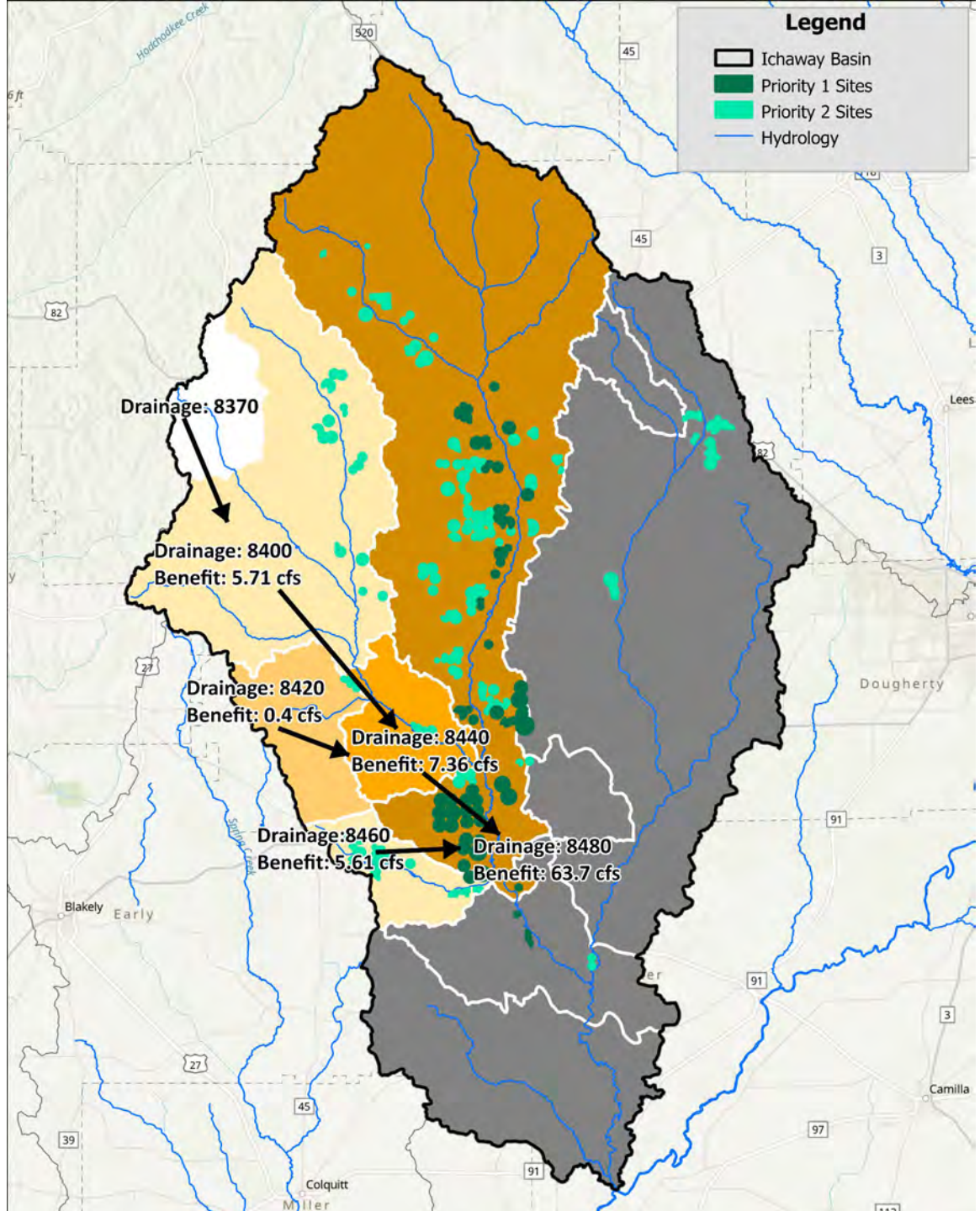


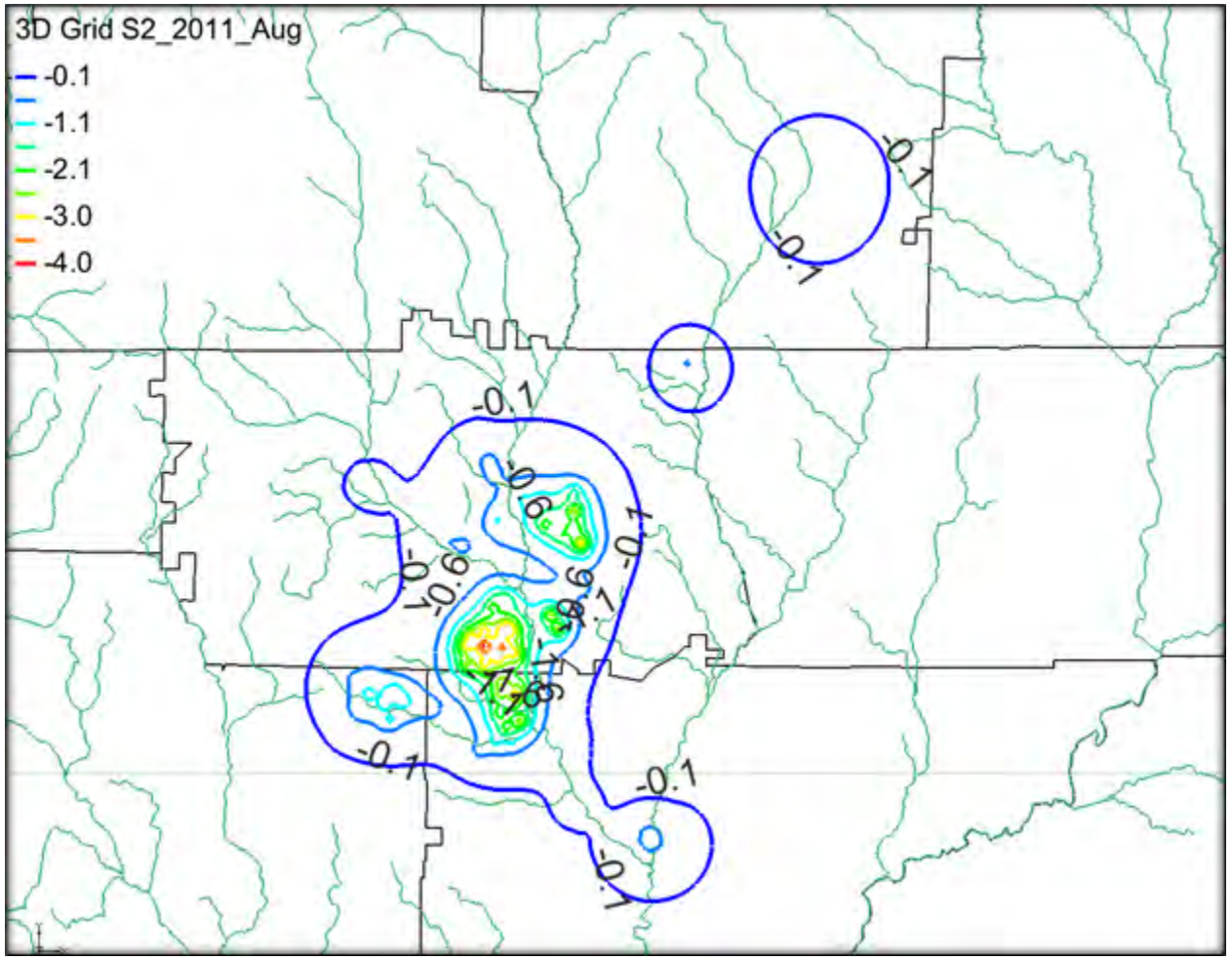

GEORGIA
Water
PLANNING & POLICY
CENTER
ALBANY STATE UNIVERSITY
Georgia
Cuthbert
Randolph
Shellman
Dawson
Calhoun
Morgan
Dougherty
Arlington
Blakely
Early
Baker
Priority 1 Sites
Priority 2 Sites
Ichawaynochaway Basin
0 2.5 5 10 Miles
N

Surface Streams and Flow Benefits



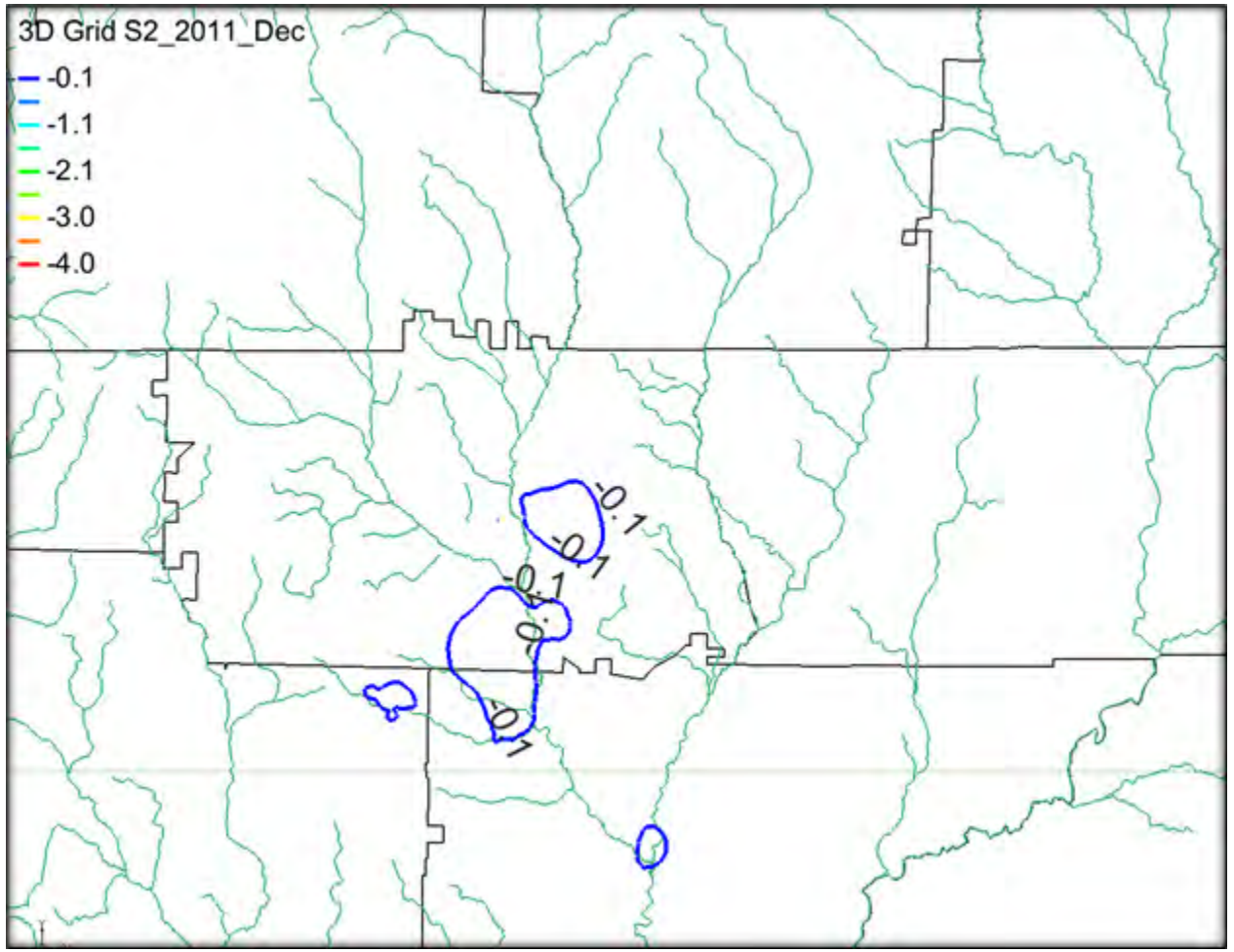
			8370	5.24 cfs baseline
			↓	
			8400	27.73 cfs baseline, 5.71 cfs benefit
			↓	
13.47 cfs baseline, 0.40 cfs benefit	8420	→	8440	49.51 cfs baseline, 7.36 cfs benefit
			↓	
1.64 cfs baseline, 5.61 cfs benefit	8460	→	8480	94.21 cfs baseline, 63.7 cfs benefit


Legend
Ichaway Basin
Priority 1 Sites
Priority 2 Sites
Hydrology
Drainage: 8370
Drainage: 8400
Benefit: 5.71 cfs
Drainage: 8420
Benefit: 0.4 cfs
Drainage: 8440
Benefit: 7.36 cfs
Drainage:8460
Benefit: 5.61 cfs
Drainage: 8480
Benefit: 63.7 cfs
Dougherty
Blakely
Early
Colquitt
Camilla



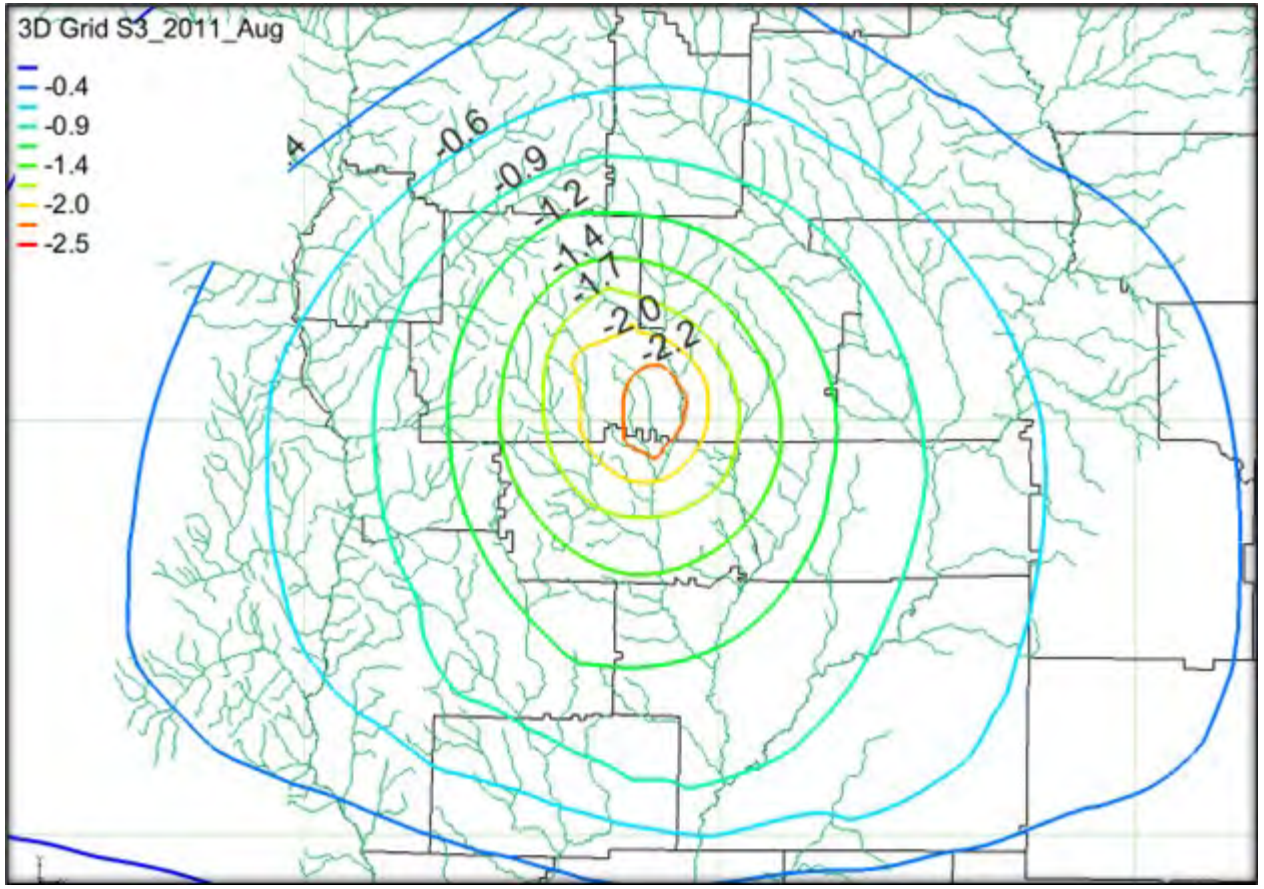
Peak Season (August 2011) Drawdown in the Claiborne Aquifer

Up to 4 feet of drawdown at the lowest point in the cone of depression in August 2011 with the highest monthly application depth



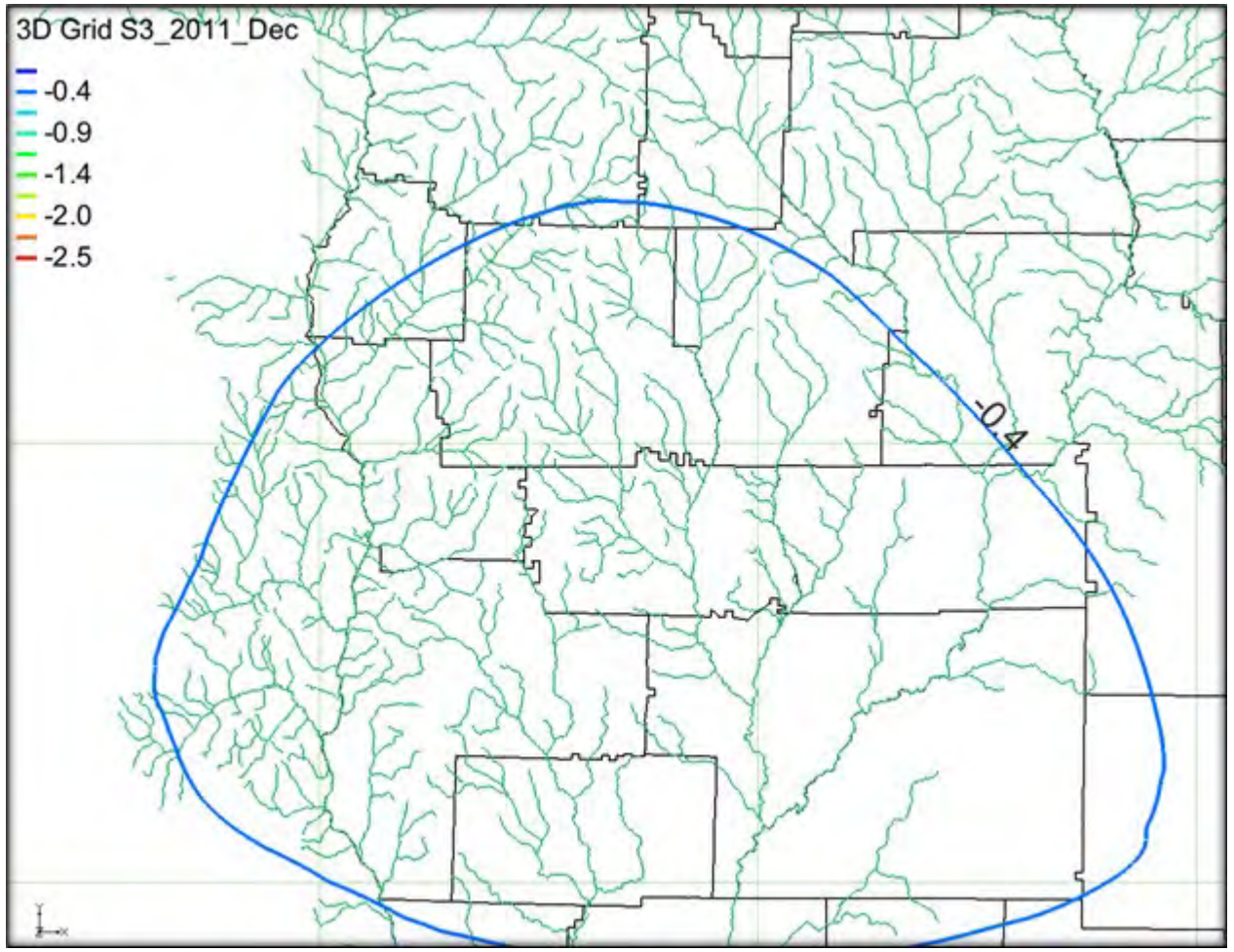
Post-Season(December 2011) Drawdown in the Claiborne Aquifer

At the end of the growing season, the drawdown taking place at the peak of the season disappears, leaving very little residual effect



Peak Season (August 2011) Drawdown in the Cretaceous Aquifer (Eutaw-Midville Layer)

Up to 2.4 feet of drawdown at the lowest point in the cone of depression in August 2011 with the highest monthly application depth



Post-Season(December 2011) Drawdown in the Cretaceous Aquifer (Eutaw-Midville Layer)

Up to 0.6 feet of residual drawdown at the beginning of the following year

Management Actions to be evaluated

Drought management to avoid and minimize low flows

- Source switching (surface water to confined Claiborne or Cretaceous aquifer)
- On-farm conservation planning and BMP implementation (irrigation scheduling, soil moisture sensors, etc.)
- Voluntary temporary suspension of irrigation through incentives (Flint River Drought Protection Act)
- Low flow restrictions on surface water permits
- Streamflow augmentation

Actions to mitigate impacts to mussel populations

- Public education
- New/expanded water use in areas where resource capacity exists
- Agricultural easements, solar conversion or other that remove land from irrigation
- Expand lands managed for restoration forestry
- BMPs to reduce nonpoint source runoff (dirt roads, agricultural lands)
- NPDES permit revisions for point sources
- Reintroduction of mussel populations (first step: genetic analysis)
- Fish passage restoration

Others?

Habitat Conservation Plan (HCP)

HCP must include:

- Assessment of the likely impacts on the species
- Measures that the permit holder will take to avoid, minimize, mitigate, and monitor the impacts to the species
- Biological goals and objectives
- Adaptive management, as needed to address scientific uncertainty
- Discussion of alternatives considered
- Identification of funding to implement the plan
- Monitoring and reporting
- Compliance with public participation requirements of National Environmental Policy Act

Fact Sheet Review

Meagan Szydzik, GWPPC

Lunch

Thomasville Seed Grant Report & Proposal

Pam Schalk, Thomasville

Regional Water Plan Seed Grant

Grants Administrator, Pam Schalk

City of Thomasville

2020 Project Goals

Lower Flint-Ochlockonee Regional Water Plan

WQ4-Continue to fund and implement water quality monitoring

WQ2-Improve implementation of nonpoint source controls

Satilla-Suwwannee Regional Water Plan

PSDO-1-Collect water quality data

NPS-1-Study Human Impacts on Water Quality

EDU-2-Support Stormwater Educational Programs

NPSU-2- Manage Stormwater Runoff

Education

The City received the Regional Water Plan Seed Grant in 2020 to help develop a Stormwater Master Plan and provide public education.

Education

Keep Thomas County Beautiful (Official Fan Page)
19h ·

Shout out to Brian, TCMS MERIT!!Yesterday he placed storm drain markers around Jerger Elementary and on Remington Ave. He is planning to do more tomorrow! Contact us at ktcb@live.com if your student would like to earn volunteer service hours installing storm drain markers.

City of Thomasville

Adopt-A-Stream

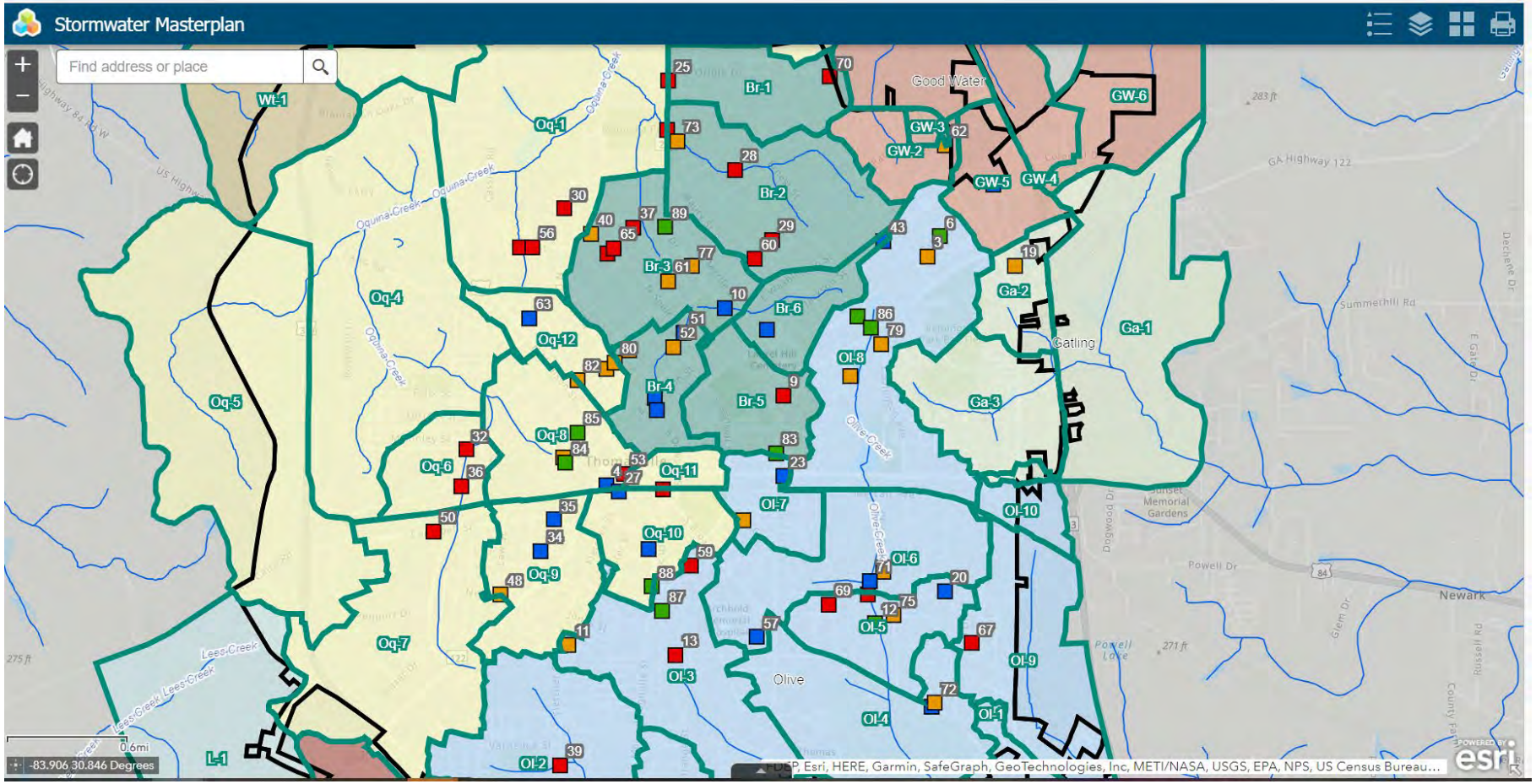
5. Metcalf

30.83419131, -83.9602470

Metcalf- Water continues to sit with no flow at the ditch upstream from creek. Water was flowing, and a small beaver dam was observed on the stream facing side.

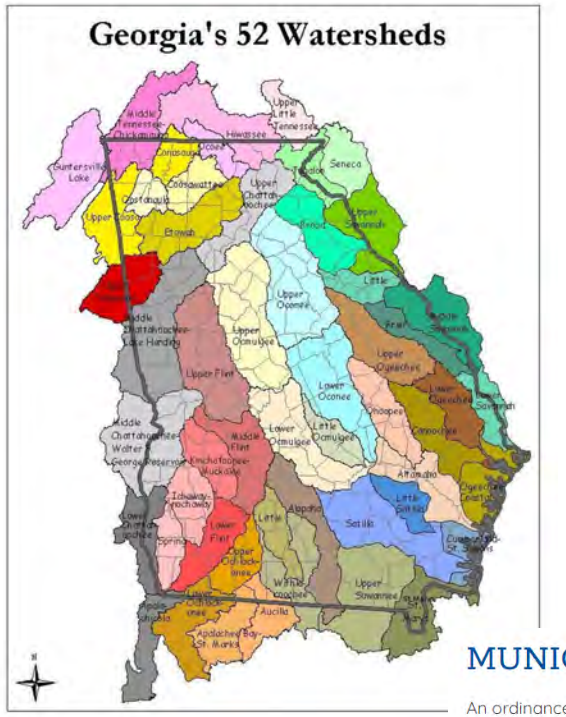
On the RR side all 3 culvert pipes were not running, but it was observed that water was running from the small channels up stream into this area. The green color was also gone as reported last month.

Stormwater Projects



WaterFirst

CARING FOR OUR WATER RESOURCES



2022 WCCR

WATER CONSUMER CONFIDENCE REPORT

MUNICIPAL CODE & ORDINANCES

An ordinance is a local law or regulation that is generally passed by a legislative body (City Council), signed by a City executive, and enforced by the local police department or code enforcement official.

The City of Thomasville's Code of Ordinances was codified by Municode, powered by CivicPlus, in Tallahassee, Florida and formally adopted by Thomasville City Council on August 22, 2022. By clicking the link below, you will be redirected to the external website hosted by Municode, powered by CivicPlus.

2024 Project Goals

Lower Flint-Ochlockonee Regional Water Plan

WQ1: Improve enforcement of existing permits and regulations and implementation of existing plans and practices. The Thomasville Stormwater Master Plan will improve implementation of WQ1. Staff is finalizing the Ordinances and Design Manual: presentation to City Council 4th QRT 2023.

WQ2: Improve implementation of nonpoint source controls. The City will provide continued public outreach:

1. Project WET Program to all 3rd grade students in Thomasville/Thomas County
2. Public Water Events with a focus on Rain Barrels and Rain Gardens to minimize localized flooding which contributes to NPS.
3. Education Brochures in utility bills: Residential Stormwater Tips.
4. Continue the Storm Drain marking program.
5. Adopt-A-Drain program to encourage personal responsibility by the community.

2024 Project Goals

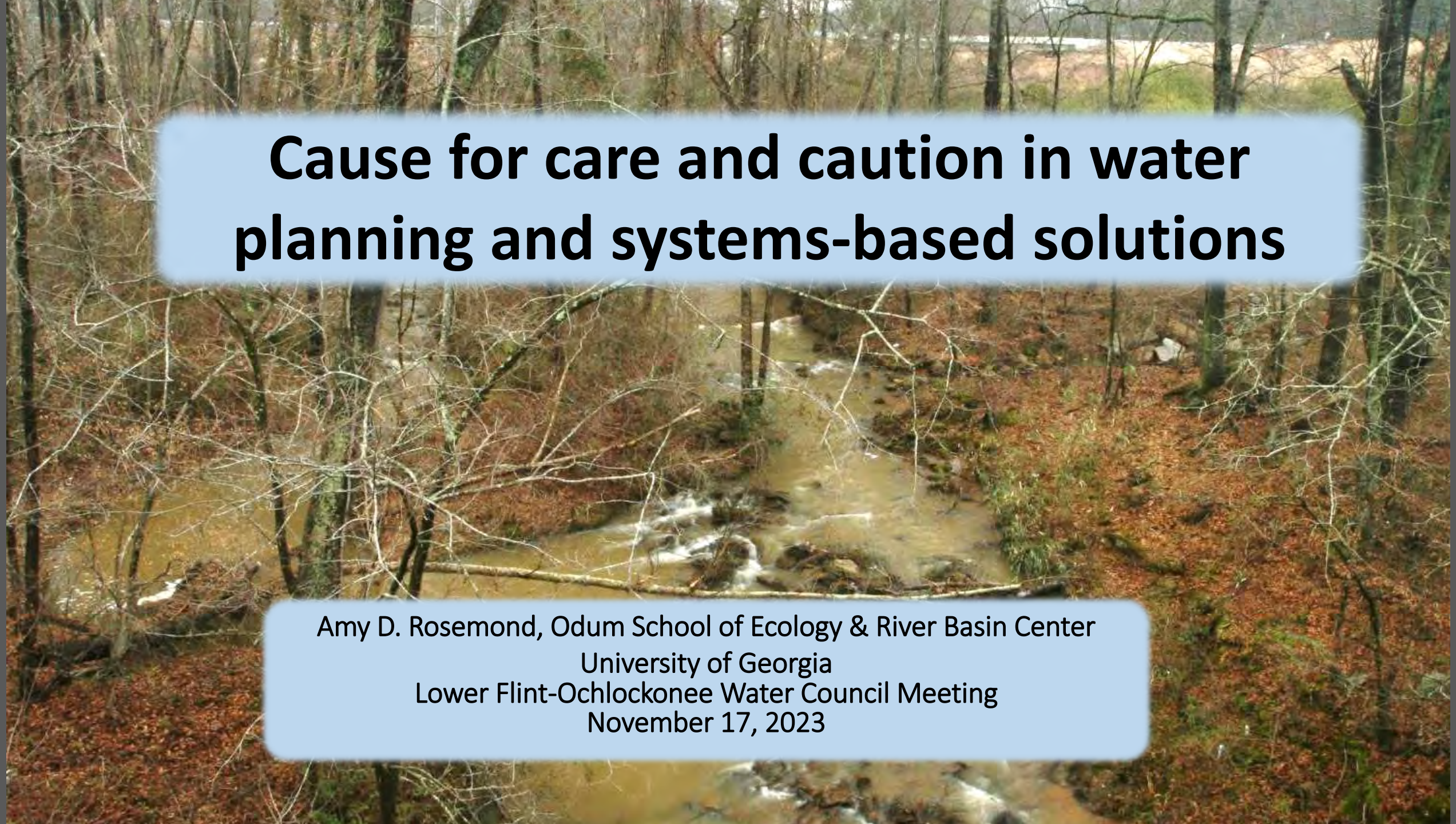
Lower Flint-Ochlockonee Regional Water Plan

WQ3: Continue to fund and implement water quality monitoring. Adopt-A-Stream monitoring training for staff. Staff will monitor water quality during and after construction projects that could impact local impaired streams: sewer rehab project on Olive Creek between Metcalfe Avenue and Tuxedo Drive is anticipated to improve water quality.

WQ4: Improve collection, coordination, and utilization of water quality data. All monitoring reports will be submitted to GA Adopt-a-Stream to enhance WQ4.

Presentation by Dr. Amy Rosemond

UGA Ecology & River Basin Center

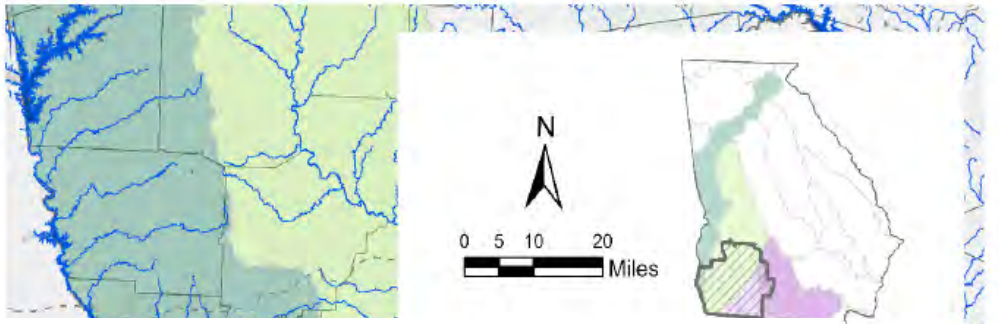


Cause for care and caution in water planning and systems-based solutions

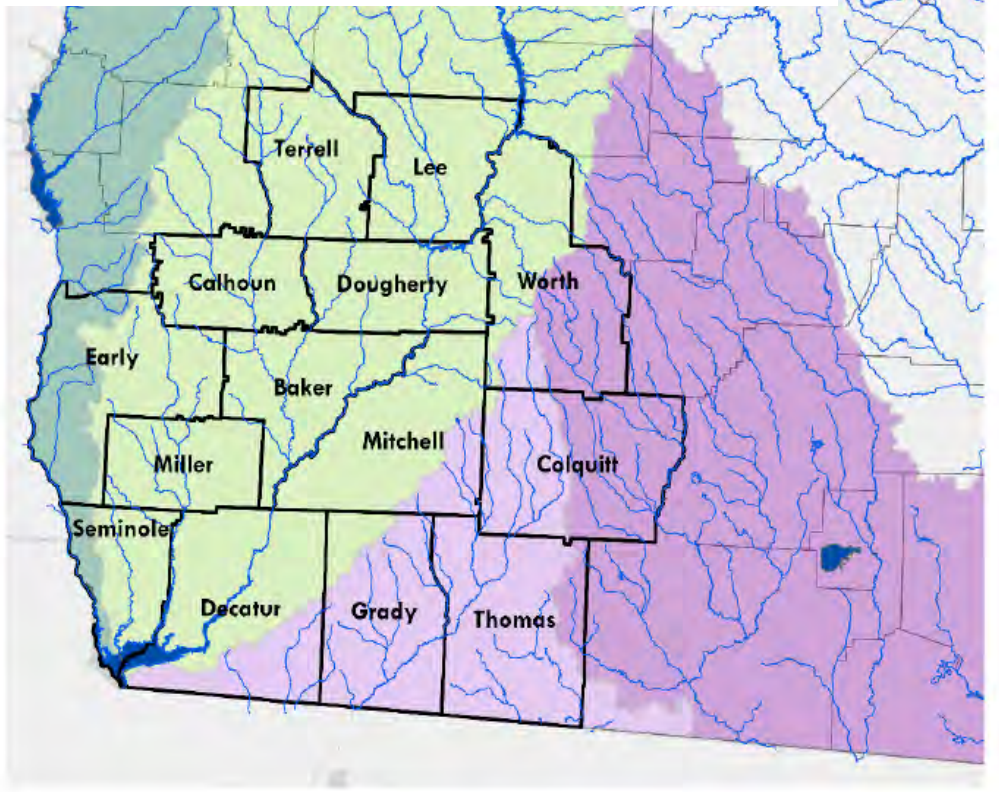
Amy D. Rosemond, Odum School of Ecology & River Basin Center
University of Georgia
Lower Flint-Ochlockonee Water Council Meeting
November 17, 2023

I ♥ WATER!

Figure 2-1: Lower Flint-Ochlockonee Water Planning Region



The Lower Flint-Ochlockonee Water Planning Council will manage water resources in a sustainable manner to support the region's economy, to protect public health and natural systems, and to enhance the quality of life for the region's citizens.



Points brought up in my comments*:

- Consider appointment process of council members so that interests of all people, and river ecology/long-term health are represented. (I say this with humility and recognize the service involved)

- More care/caution needed to have safe, clean, abundant water. Current degraded water quality in the state (61% rivers, 41% of lakes impaired).

- More monitoring and planning for extreme events (not whether they will happen, but when they will happen) is needed for long-term sustainability.

*May 2023 to GA DNR regarding revision of LFO Regional Water Plan

Points for consideration

More care/caution

1. Consider current conditions (miles of impaired streams)
2. Consider temperature effects on
    - Assimilative capacity
    - Food web base of rivers (+ nutrient pollution)
    - Algal blooms in lakes (+ nutrient pollution)

More monitoring and collaboration?

3. Monitor/prepare for extreme events (drought, temp?)
4. Systems approach that focuses on food/water/energy & land/water
    - Are there other groups or people to involve in the water council?
    - Natural infrastructure can be used to address nutrient and thermal pollution

More care/caution

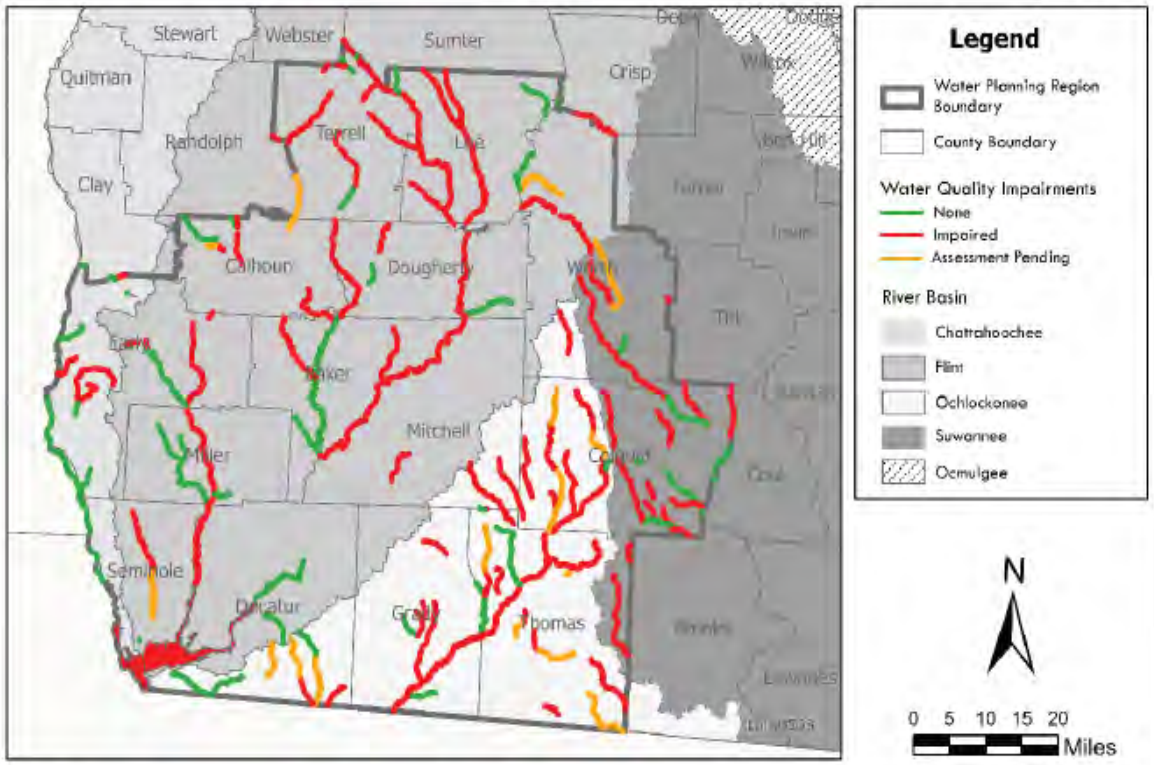
Impaired waters

Increased temperature, nutrients

More care needed: Impairment

899 total miles of river impaired; How does long-term planning take this into account?

Figure 3-12: Summary of Impaired Waters in the Lower Flint Ochlockonee Water Planning Region



River Basin	Total River Miles Impaired in the Lower Flint-Ochlockonee Region			
Chattahoochee	0	6	0	21
Flint	27	171	164	104
Ochlockonee	49	137	69	17
Suwannee	70	64	0	6
Criterion Violated	DO	Fecal Coliforms	Metal	Other

Note: Stream reaches may have more than one criterion violated, i.e. the sum of DO, Fecal Coliform, Metals, and Other may be greater than the total number of stream miles listed as impaired. Metals include mercury trophic weighted residue value and fish consumptive guidance.

Source: Georgia's 2022 305(b)/303(d) List Documents - Approved by U.S. EPA April 22, 2022

More care needed: Temperatures are increasing in U.S. rivers

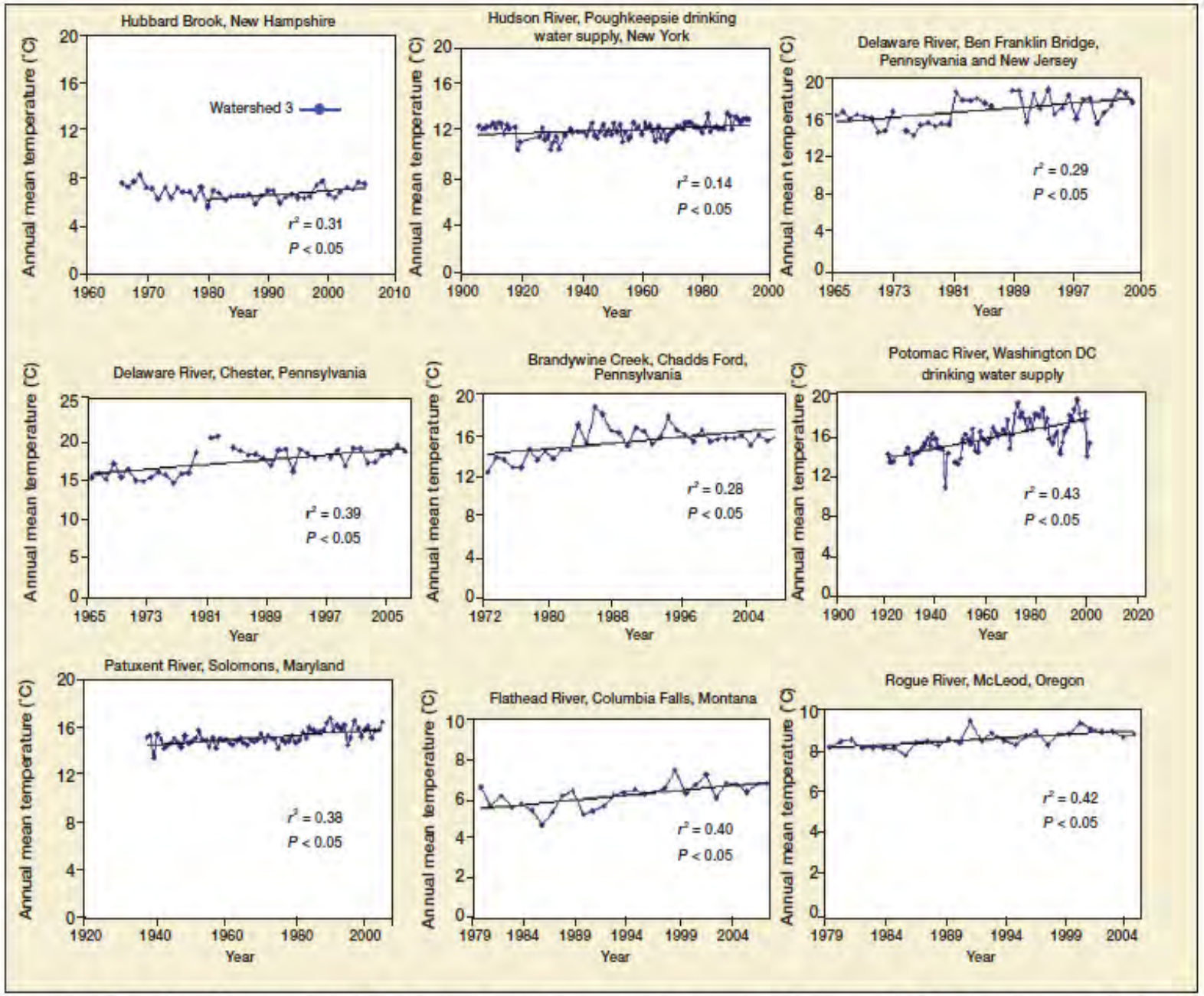


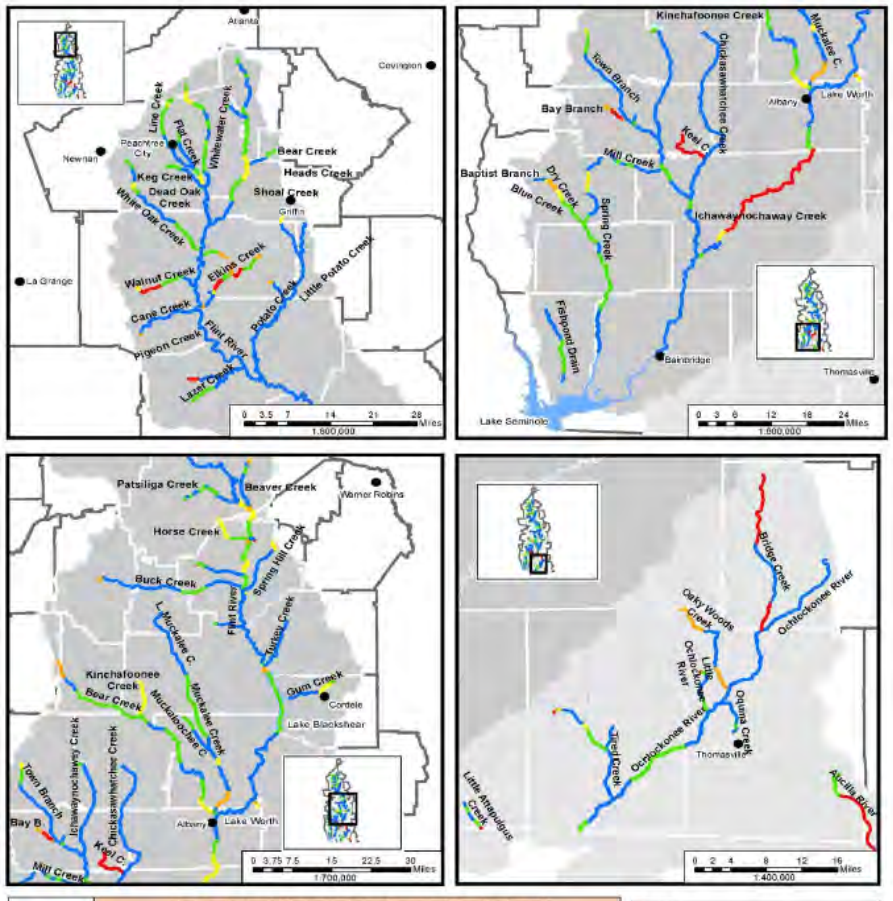
Figure 1. *Examples of long-term trends in historical water temperature in streams and rivers in the US (linear regression). Results from comparative analyses for all datasets using Mann-Kendall trend test and Sen's slope estimates are also found in WebTable 3.*

Kaushal et al. 2010

More care needed: Temperature effects on Assimilative Capacity

Increased temperature will reduce assimilative capacity by reducing solubility of dissolved oxygen (DO)

Figure 3-11: Assimilative Capacity Results from Dissolved Oxygen Assessment: Flint and Ochlockonee River Basins (Current)

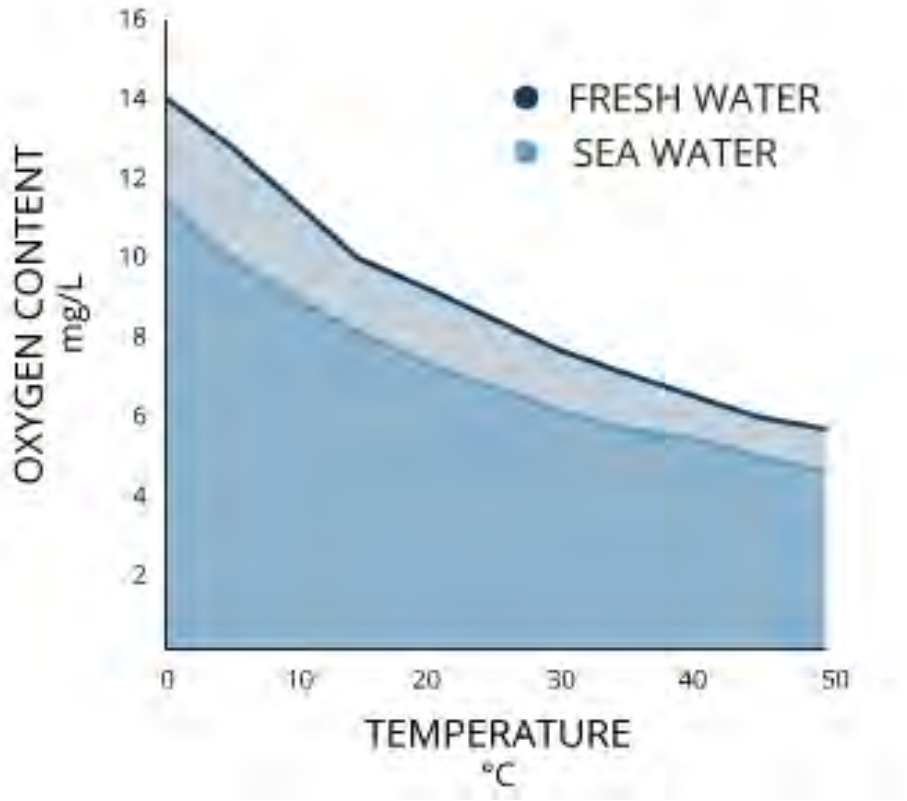


	Flint Basin-Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Current	664	267	72	32	0.51	56
	Ochlockonee Basin-Available Assimilative Capacity (Total Mileage)					
Model Run	Very Good	Good	Moderate	Limited	At Assimilative Capacity	Exceeded
Current	91	29	1	10	0	23

Legend
Available Assimilative Capacity
- Very Good ≥ 1 mg/L DO available
- Good 0.5 mg/L to < 1 mg/L DO available
- Moderate 0.2 mg/L to < 0.5 mg/L DO available
- Limited > 0 mg/L to < 0.2 mg/L DO available
- At Assimilative Capacity 0 mg/L DO available
- None or Exceeded < 0.0 mg/L DO available
- Unmodeled Lakes and Streams

Source: GAEPD, Synopsis Report – Surface Water Quality (Assimilative Capacity) Resource Assessment, July 2022.

Temperature reduces D.O. concentrations due to solubility (~0.4 mg/l,+3.5°F)



https://www.fondriest.com/environmental-measurements/parameters/water-quality/dissolved-oxygen/

Temperature-Oxygen Solubility Relationship	
Temperature (°C)	Oxygen Solubility (mg/L)
0	14.6
5	12.8
10	11.3
15	10.2
20	9.2
25	8.6
100	0

https://www.ysi.com/ysi-blog/water-blogged-blog/2013/05/what-is-affecting-your-dissolved-oxygen-measurements-part-1-of-4

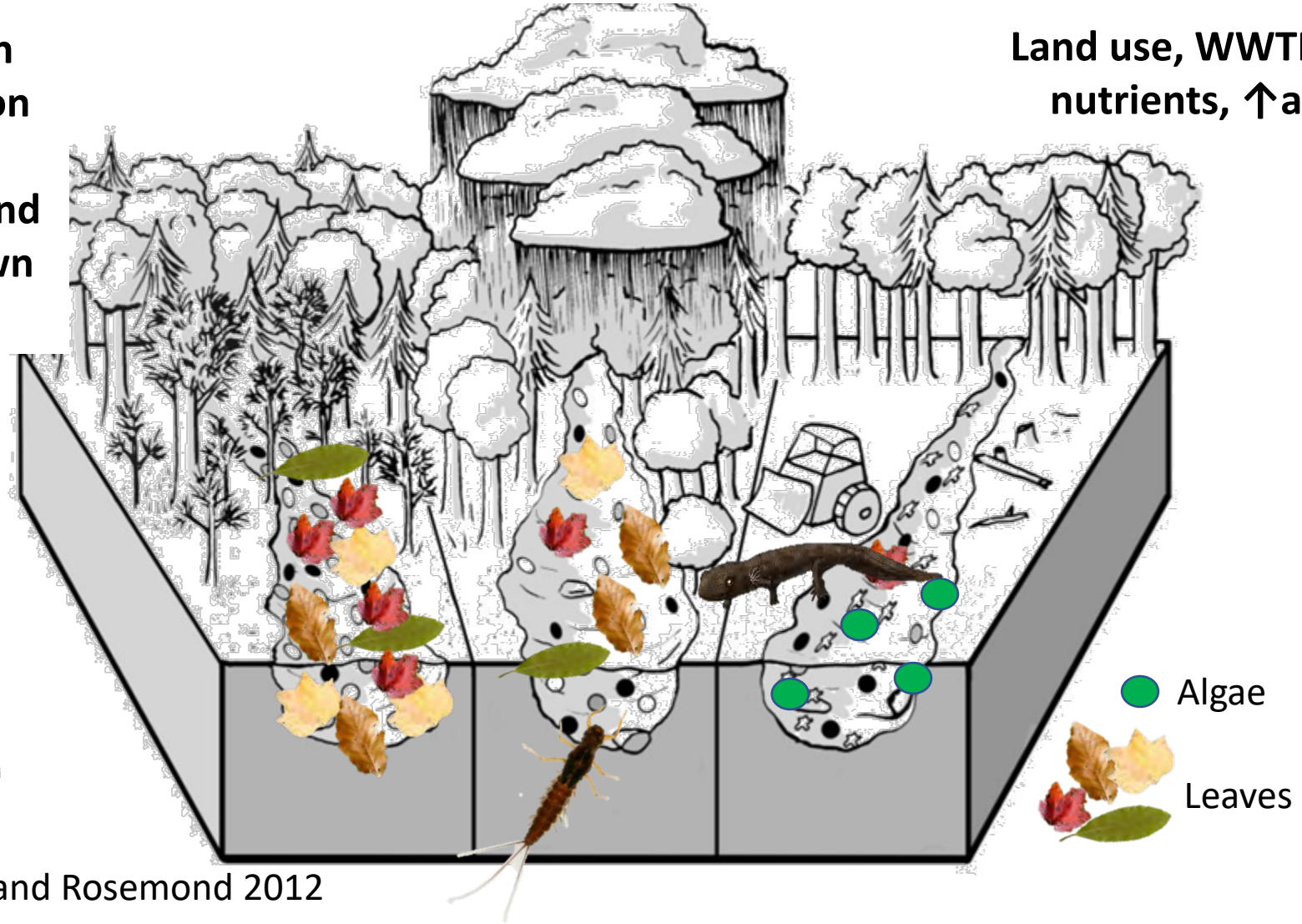
More care needed: +Temperature, +nutrients negatively affects ‘brown’ food web base of streams

Climate Δ: Warming + high/low flows – reduce retention

Streams depend on land inputs of carbon

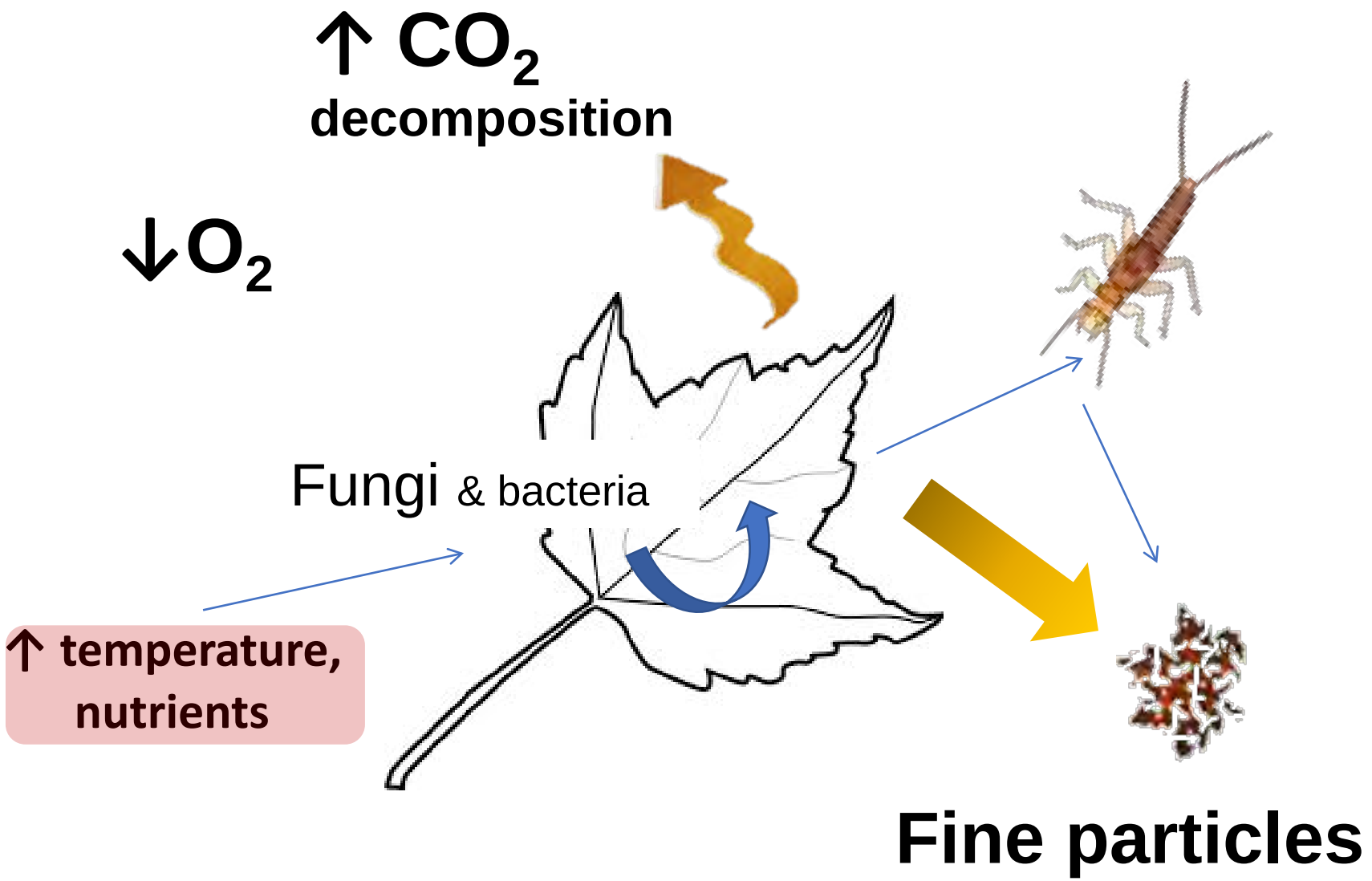
Carbon like leaves and sticks is called ‘brown carbon’

Land use, WWTPs add nutrients, ↑algae

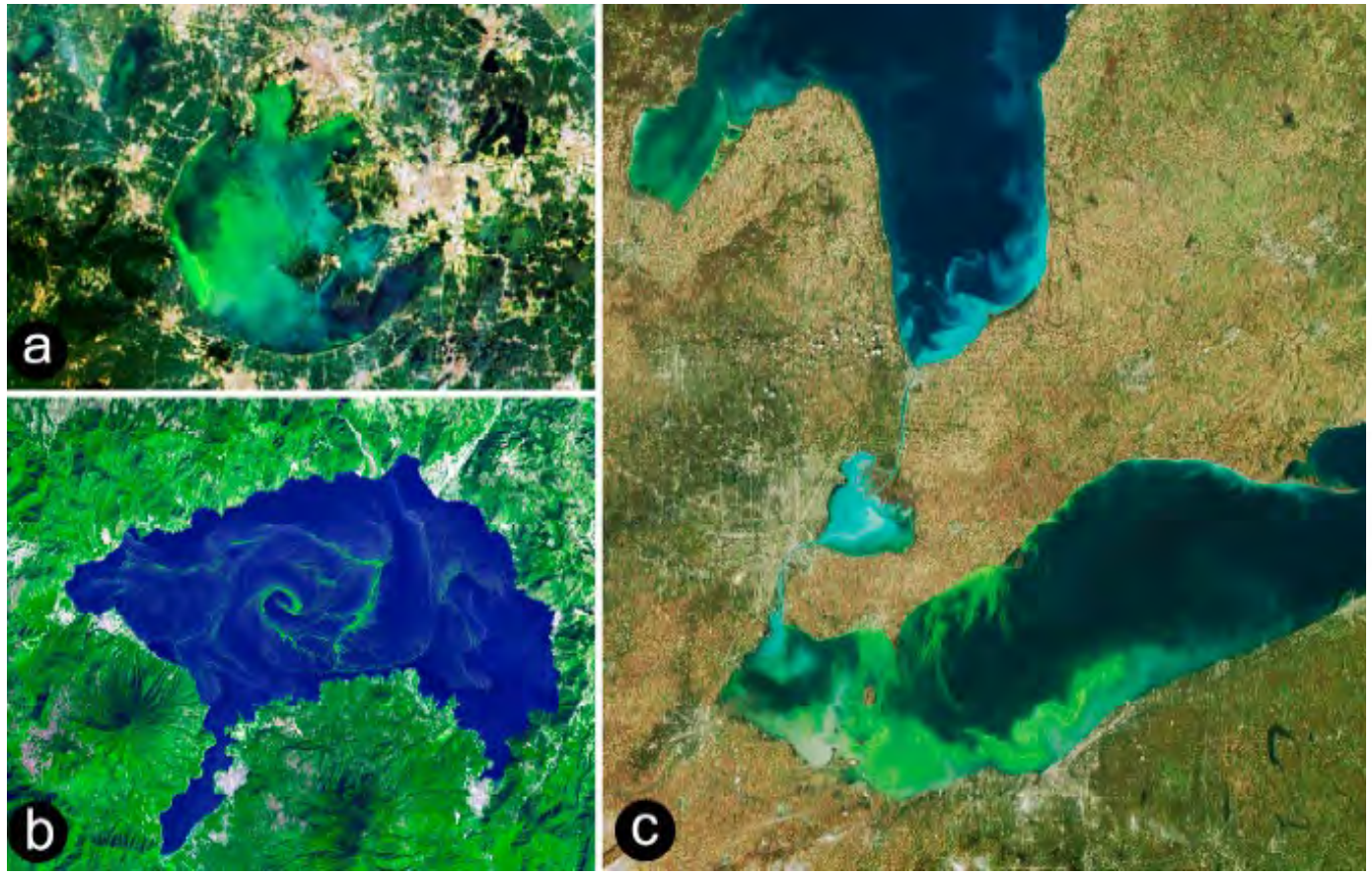


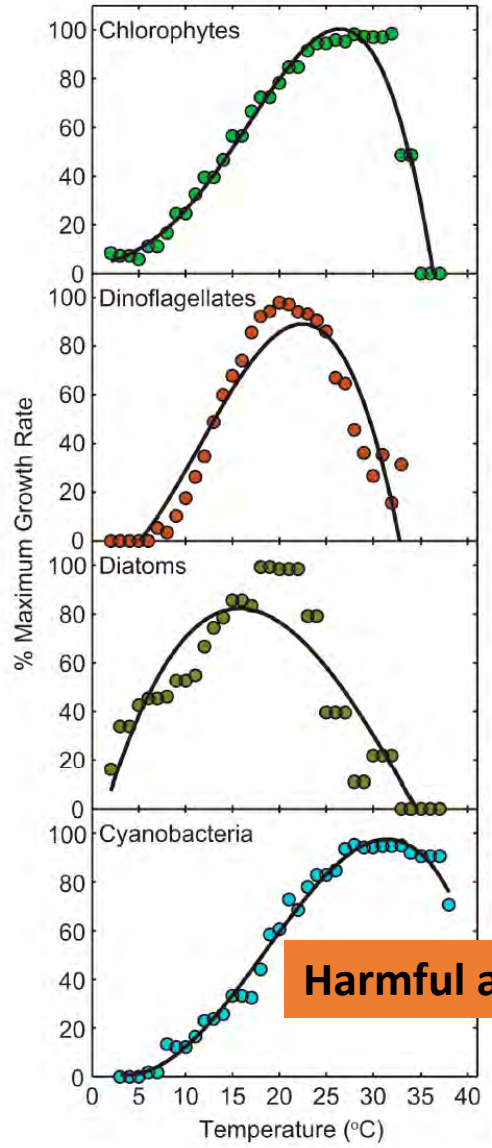
Kominoski and Rosemond 2012

↑ Temperature, nutrients reduce valuable stream carbon



↑ Temperature, nutrients increase HABs





Harmful algae

Harmful algal blooms (HABs) are on the rise globally, including GA

Paerl 2018

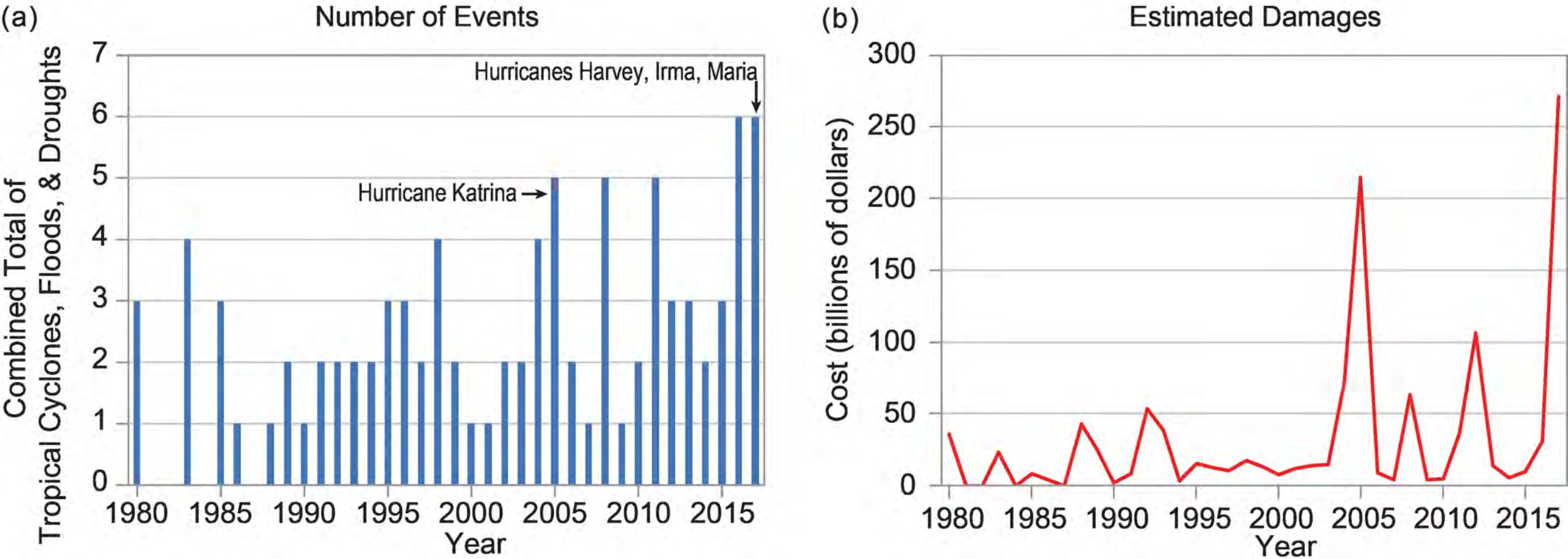
More monitoring/systems approach/collaboration?

Monitoring discharge, temperature, nutrients?

Systems approaches

- People/stakeholders
- Natural infrastructure

Extreme events are increasing. Is monitoring, planning sufficient for baseline & events (e.g., drought, temperature, nutrients)?

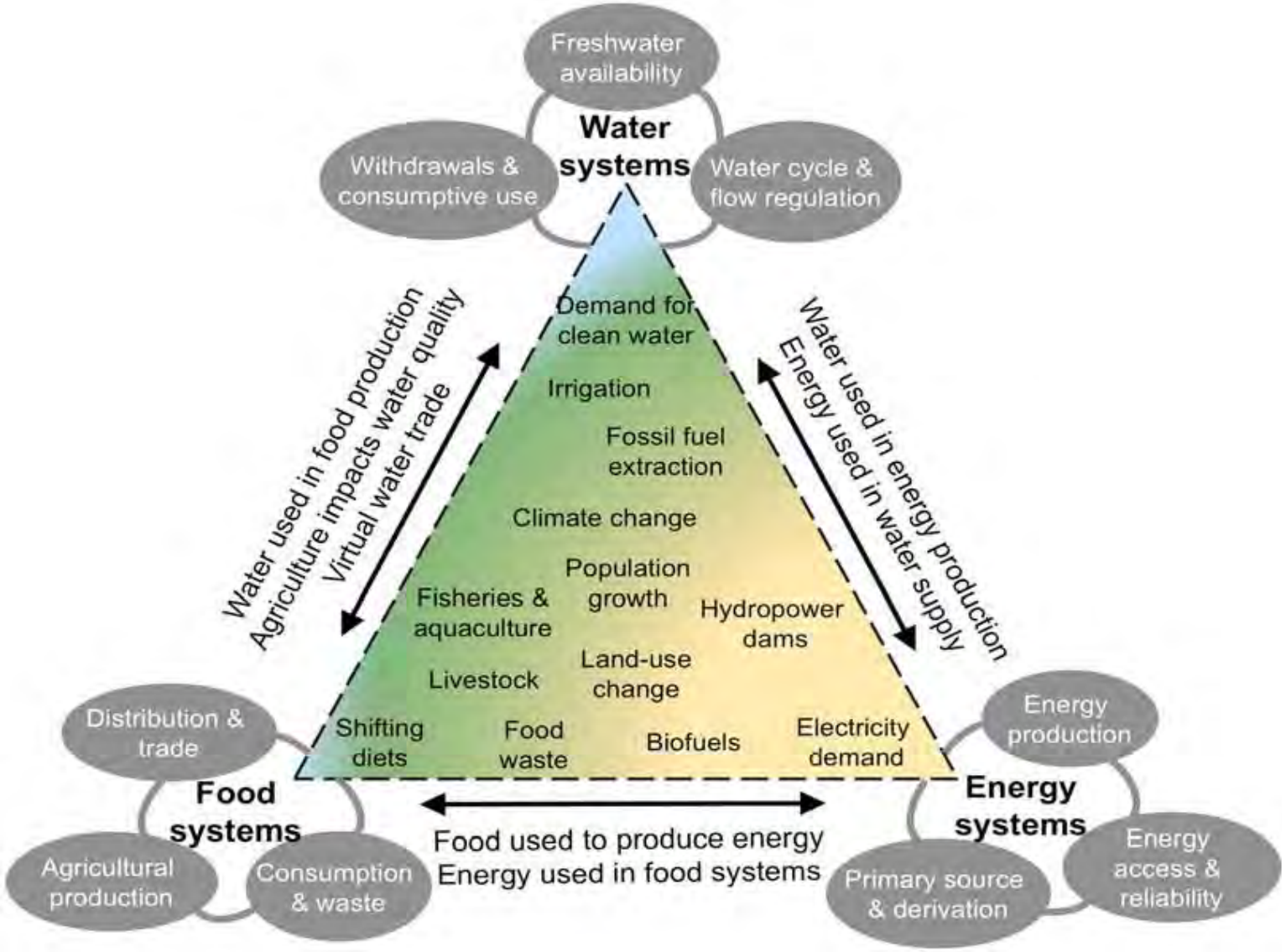


Billion-Dollar Weather and Climate Disaster Events in the U.S.

Figure 3.1: The figure shows (a) the total number of water-related billion-dollar disaster events (tropical cyclones, flooding, and droughts combined) each year in the United States and (b) the associated costs (in 2017 dollars, adjusted for inflation). Source: adapted from NOAA NCEI 2018.[19]

https://nca2018.globalchange.gov/chapter/3/

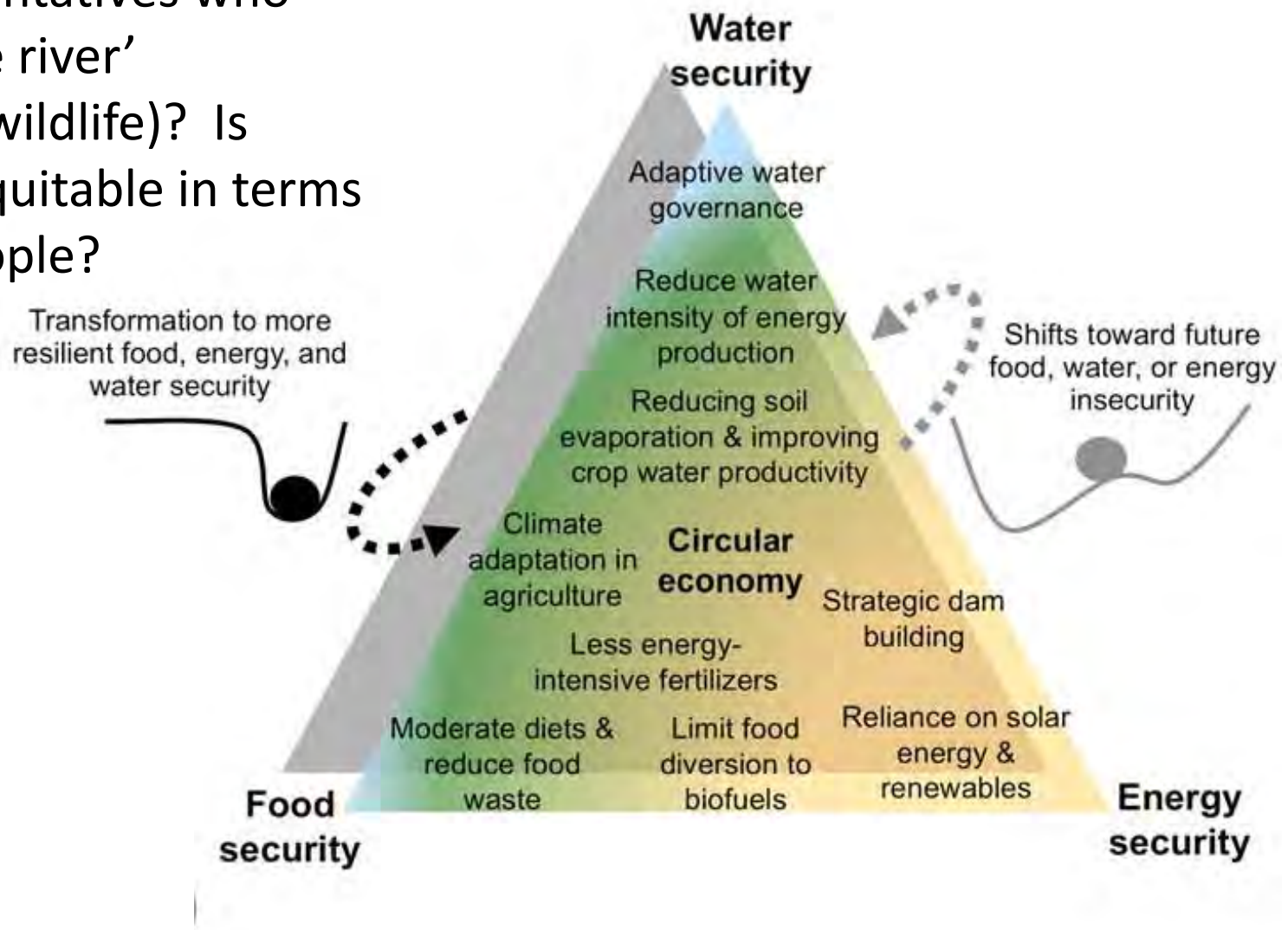
Systems approach: people with multiple demands for water



D'Odorico et al. 2018

Systems approach: people can also be part of the solution -'all hands on deck' for water security!

Are there representatives who can 'speak for the river' (ecology/health/wildlife)? Is representation equitable in terms of benefits to people?



D'Odorico et al. 2018

Systems approach, Land/water: Watershed vegetation cools streams + provides carbon inputs

Riparian vegetation can cool streams ca. 3.5°F; C.R. Jackson, unpublished

http://www.chesapeakebay.net/issues/issue/forest_buffers

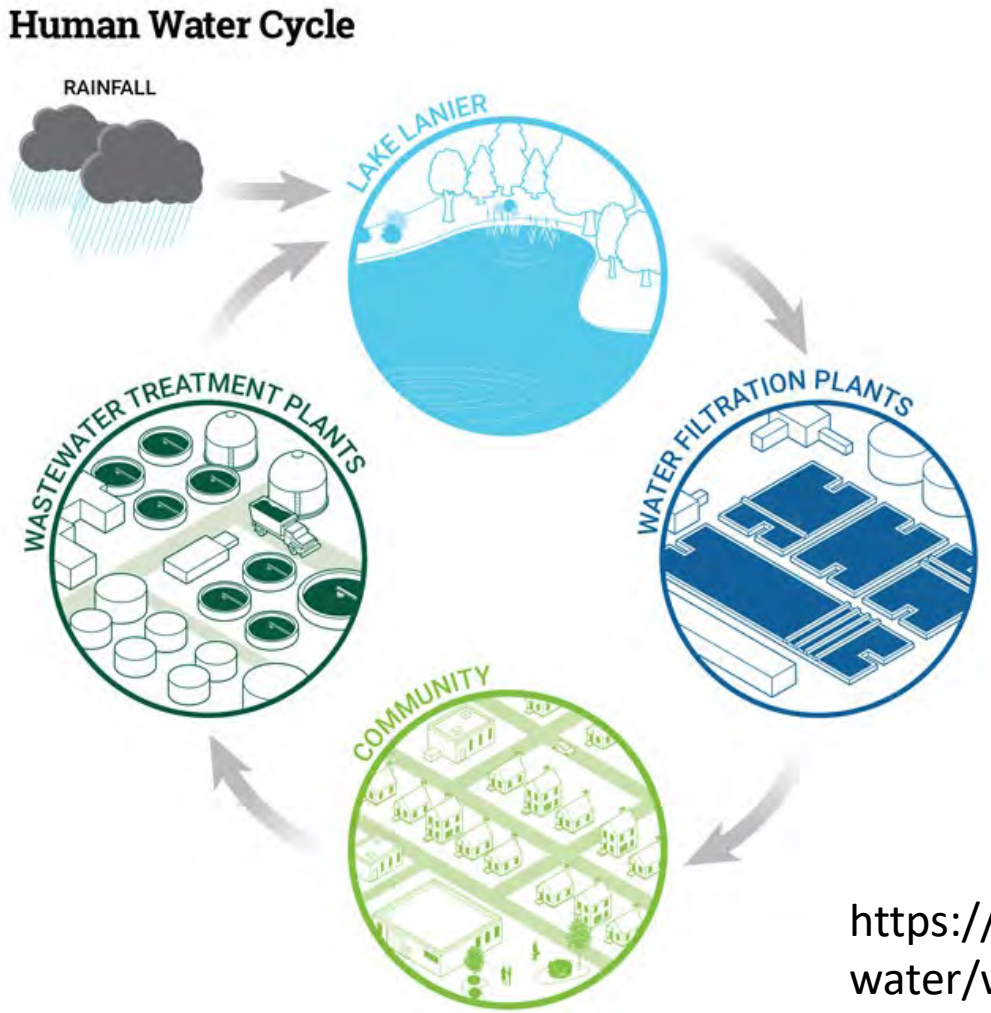
Systems approach: Land/water connections that address nutrient inputs and temperature

At UGA:
The Institute for Resilient Infrastructure Systems https://iris.uga.edu/about-infrastructure/

Network for Engineering with Nature https://n-ewn.org/

US Army Corps of Engineers + UGA + other partners

Systems approach: More aggressive and innovative wastewater treatment & water conservation/reuse?



https://www.gwinnettcounty.com/web/gwinnett/departments/water/whatwedo/wastewater

Thank you!

Amy Rosemond (rosemond@uga.edu)

https://rosemondlab.ecology.uga.edu/

Next Steps

Meagan Szydzik, GWPPC

Next Steps

- Future Council meetings
  - Look out for emails for scheduling
  - Additional topics of interest?

Adjourn