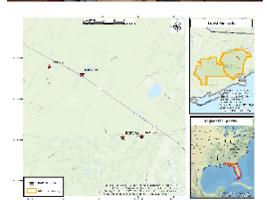


SRS 4353 - Center for Forest Watershed Research – Tallahassee FFWRP @ Florida A & M University



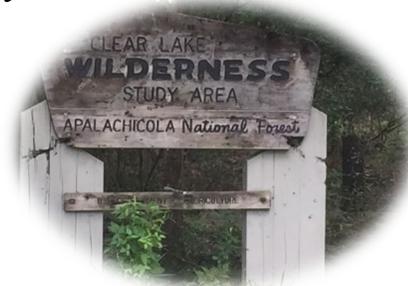
J.M. Grace III, Ph.D.
FFWRP Program Manager / Coordination Lead & General Engineer

developed presentation to the
2019 SRS FL-GA Stateline Meeting
held @ The Wakulla Environmental Institute (WEI), Crawfordville, FL
May 14, 2019

Presentation Outline

The SRS Connection in the panhandle at Florida A & M University

- **Introduction**
 - Brief background on the USDA Forest Service Initiative @ FAMU
- **The Florida Forest Watersheds Program**
 - In a Nutshell
 - Focus & Priority Areas
 - Panhandle Watersheds / Subbasins (HUC-8s)
 - State of the Program
- **Projects and Efforts through the FFWRP**
 - Examples from current FFWRP Program of Work
 - Multiple studies presented & intersections highlighted
 - Partnering
 - Path Forward
- **Chipola EFR**
 - Background & Opportunities
 - How can we work together more effectively?
- **Questions and Comment Section**



Background - FS/SRS/FAMU

- FAMU (& 1890s in general) have a unique contribution to agriculture & natural resource workforces.
- In the 1990s, we/SRS focused efforts to enhance program delivery in forestry-related sciences through capacity building.
- FAMU (& 1890s in general) have been and will continue to be critical to helping us realizing our goals of having a workforce that is reflective of the population we serve.





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OVERVIEW OF THE FLORIDA FOREST WATERSHEDS PROGRAM

FFWRP in a Nutshell

- The Goal -
 - *to enhance natural resource science (STEM) research, education, and outreach at FAMU as well as serve as a catalyst for integrative research to better understand sustainable watersheds in the Coastal Plain Region and beyond.*
- Capacity Building – Redirected and Refocused
 - SRS Commitment – Reinforced
 - Accountability and transparency valued
 - Relationship with multiple Centers and Institutes at Florida A & M University
 - Partnering - *Key for Impact, Relevancy, and Visibility*

Program Goals & Direction

- Serve as an integrating unit and a framework in the Gulf Coastal Plain region.
- Keenly focused on educating the next generation of future generations of natural resource professionals, managers, and scientists for a diverse candidate pool natural resource sciences.
- Priority areas vary slightly from year to year to address highly relevant topics.



FFWRP Focus Areas

- a) Focus 1: *Development of fundamental understanding of water resource and soils in forest watersheds in the Coastal Plain region.*
- b) Focus 2: *Development of knowledge that promotes enhanced forest road management by initiating science aimed at providing the information and tools necessary to promote sustainable road management practices in a changing climate and with changing forest values.*
- c) Focus 3: *Understanding and improving forestry best management practices (BMPs) in forest watersheds (and blended-use watersheds) in the Coastal Plain.*
- d) Focus 4: *Development of knowledge, methods, and framework to promote sustainable land use alternatives such as agroforestry through the experimentation at the field, watershed, and basin scales.*
- e) Focus 5: *Research bridging to Center for Forest Watershed Research Unit's (CFWR) (SRS-4353) mission.*
- f) Focus 6: *Enhancing academic programs, expanding on existing programs and offerings, or initiate experiential or hands-on learning programs.*

2019 FFWRP Priority Areas

A. Roads and Road Infrastructure

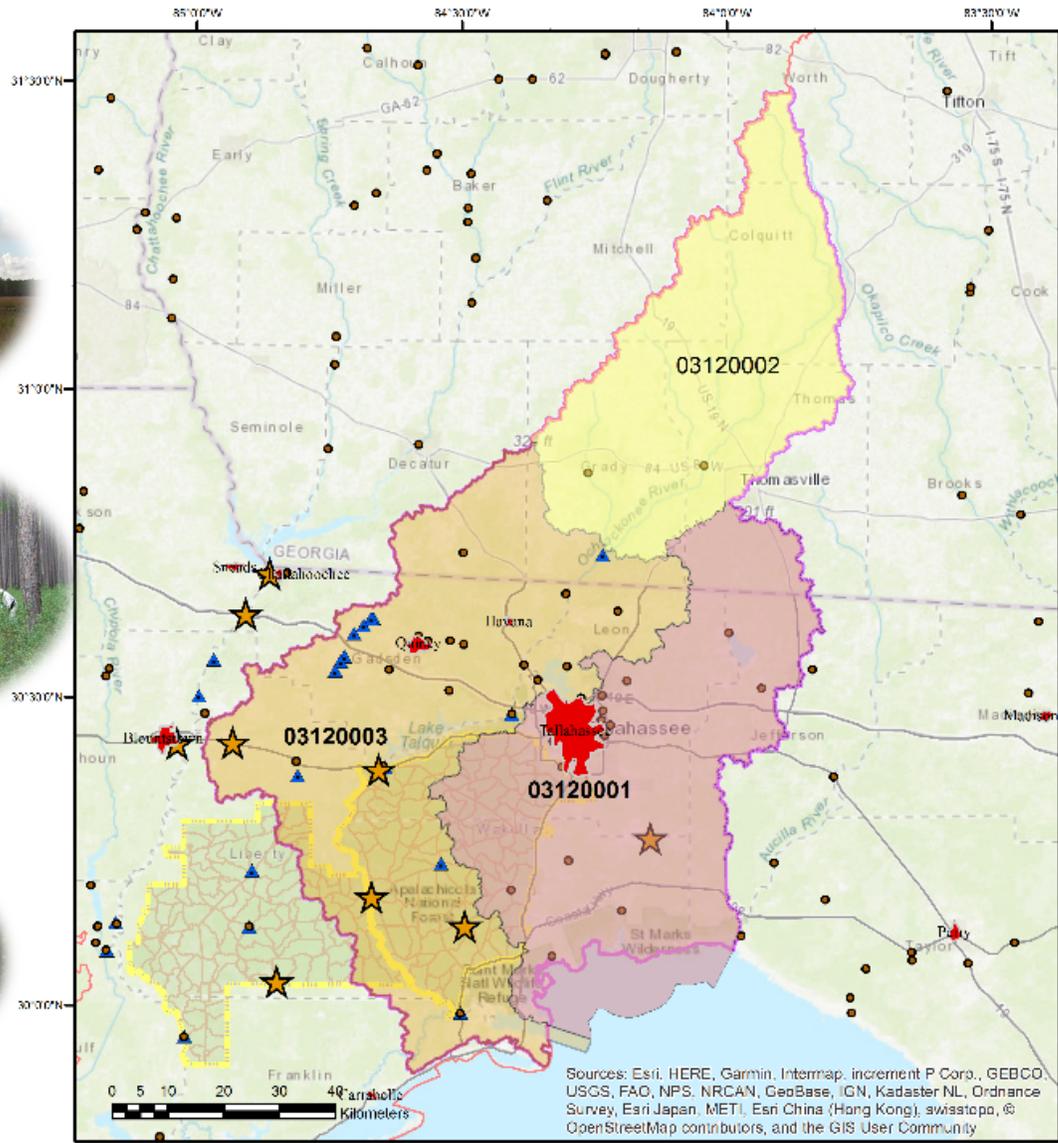
B. Longleaf Pine Ecosystems

C. USDA Forest Service Experimental Forests and Ranges (Southern US)

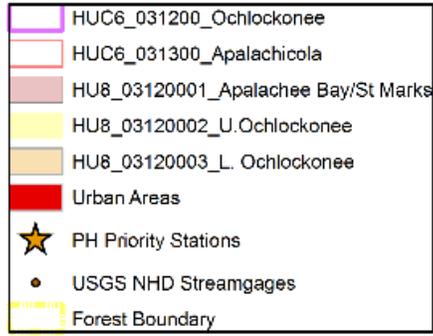
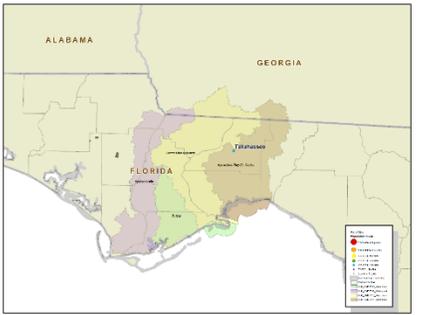
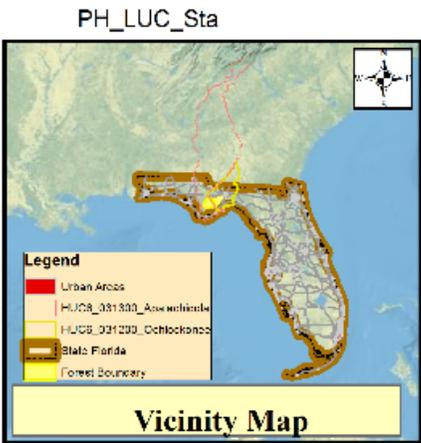
D. Coastal Plain Watershed Resiliency



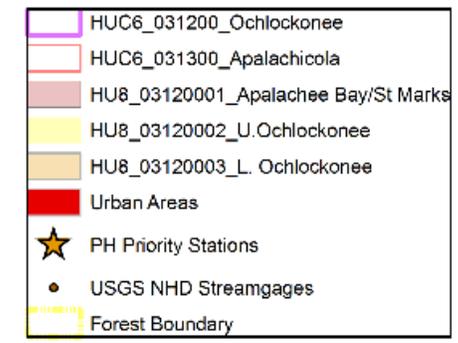
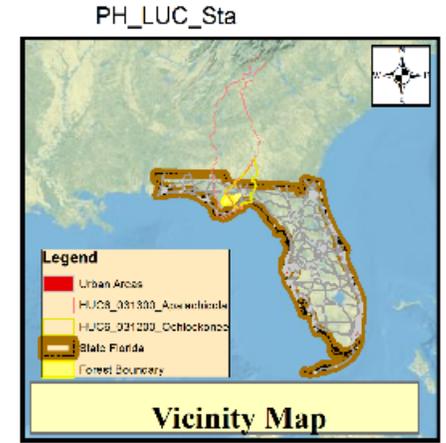
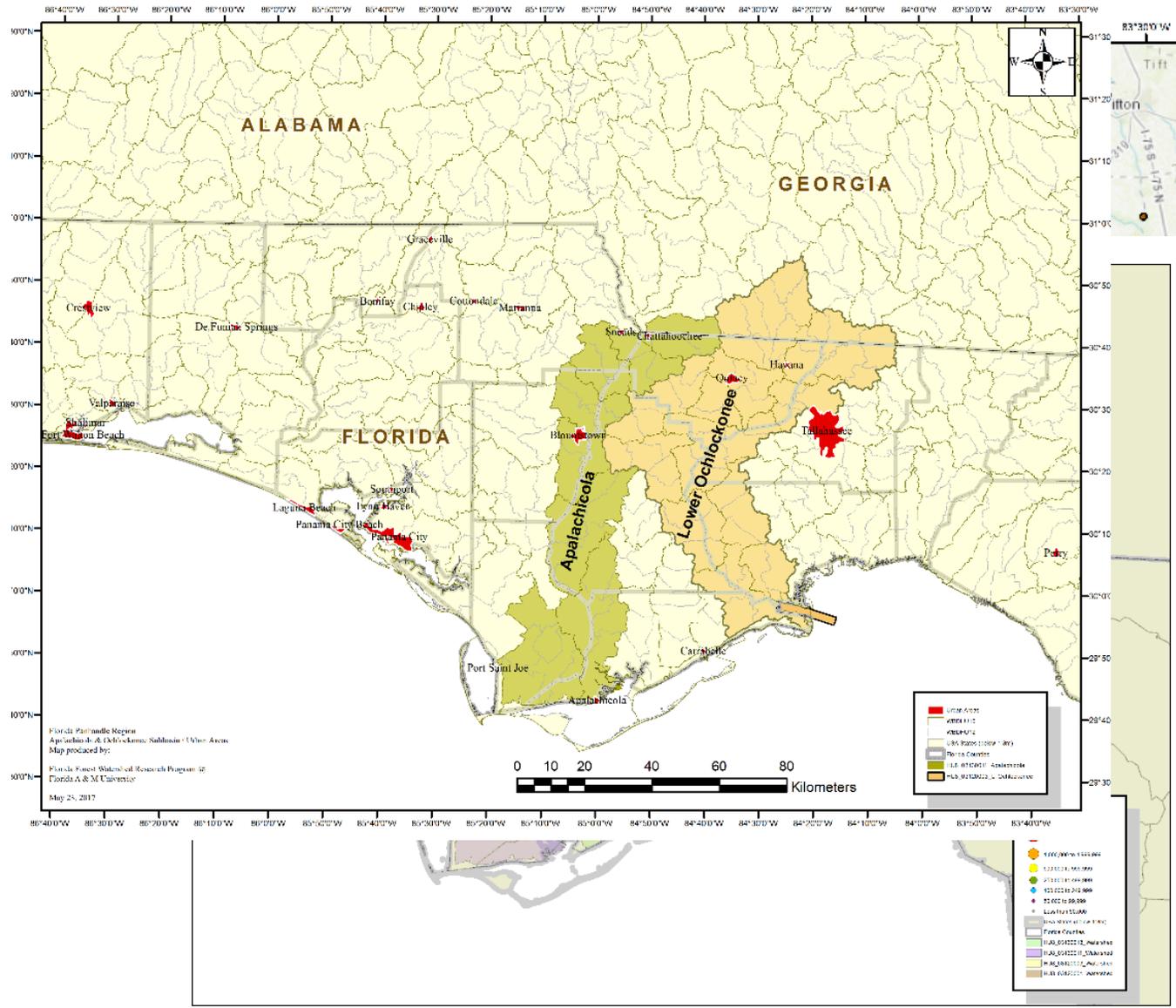
Focus Sub-basins & Watersheds



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community



Focus Sub-basins & Watersheds



State of the Program

- The initiative has turned the corner and our efforts are bearing fruit:
 - **Enhanced output** – posted a significant increase in deliverables.
 - **Enhanced visibility** – we have caught the attention of many in the region.
 - **Enhanced relevance** – we have a finger on the pulse of the science in the region.
- Establishing highly collaborative, relevant, and impactful research as our building block was KEY in re-envisioning our program.
- FAMU CAFS has been critical to our efforts and the partnerships that we are nurturing will continue to energize the FFWRP.



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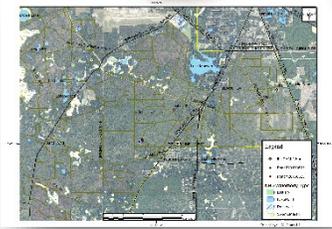
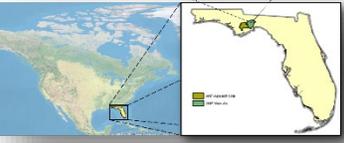
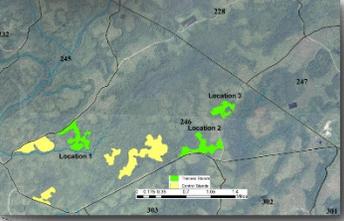
May 14, 2019

HIGHLIGHTED FFWRP SUPPORTED PROJECTS



SRS 4353 - Center for Forest Watershed Research – Tallahassee

FFWRP @ Florida A & M University



- **Restoring Florida’s Open Scrub to Enhance Water Supply - Ngatia et al.**
 - *Water Use, Management Effects / Land-use influences on Water Resources, ET*
- **Ephemeral wetland hydrological process in surface and shallow groundwater in the forests of north Florida – Hsieh et al.**
 - *water quantity, water quality, water source identification through isotope tracing*
- **Soil and nutrient accumulation rates and sulfur chemistry of ephemeral ponds – Hsieh et al.**
 - *watershed influences on surface water quantity and quality, water chemistry, management influences*
- **Panhandle Land-use Influences on Water Resources– Lotic Systems – Lee et al.**
 - *water quality, quantity, modeling as DSTs*
 - *Evaluating model applicability as a planning tool in forest management.*
- **Nutrient loading as a f (watershed type) into the Apalachee Bay – Jagoe et al.**
 - *Land-use effects, water quality, watershed outflow, & peak flow rates*
- **Effects of vegetation type on carbon and nutrients...in wetlands - Ngatia et al.**
 - *Watersheds and land-use influences, wetland water quality, wetland pore water, carbon sequestration*
- **Effects of land-application of the treated wastewater - A. Jain et al.**
 - *Watershed influences on surface water quantity and quality, water chemistry, management influences.*
- **Informing management...to provide for sustainable ES - O. S. Mbuya et al.**
 - *Watershed management and restoration influences on surface water quantity and quality, land-use effects, evaluating model applicability as a planning tool in forest management*

SRS 4353 - Center for Forest Watershed Research – Tallahassee

FFWRP @ Florida A & M University



- **Strengthening Florida Forest Watersheds Research Program and Educating Future Generations in Agriculture, Forestry and Natural Resources**– *Leong et al.*
 - *9-12 Grade Engagement in Natural Resources, Education, Outreach, Partnership Development*
- **Undergraduate Experiential Learning Program for Research in Forestry and Natural Resources** – *Leong et al.*
 - *Undergraduate experiential learning, research engagements, seed projects, integrative efforts, partnership development*
- **Enhancing undergraduate learning through engagement in research in natural resource sciences** – *Jain et al.*
 - *Undergraduate experiential learning, research engagements, water quality investigations,*

Restoring Florida's Open Scrub to Enhance Water Supply - *L. Ngatia et al.*

Background

- Restoration of degraded ecosystems through active management has gained increased interest as a means of promoting sustainable systems.
- The Ocala NF plans to restore over 20,000 hectares from dense sand pine-dominated strands to open scrub ecosystems.
- However, little is known about water use in sand pine so predicting the restoration effect on the water budget is difficult.



Objectives in this work are to:

- 1) *quantify tree-level water use and ecosystem-level ET under alternative management regimes: sand pine-dominated and open scrub stand types.*
- 2) *train and educate future scientists (students) in conducting tree physiology and hydrological research.*



Benefits:

- *Quantification of tree-level water use in the sand pine –dominated systems.*
- *An assessment of the influence of stand type on water use and ecosystem-level ET.*
- *A Master's candidate trained in the complete research cycle.*

Cooperators:



Enhanced Fuzzy Logic Indicator-based Modeling Approach (FLIMA) for Prediction of Sustainability of Natural Resources in Woody Biomass Harvest and Handling for Biofuel Production - *S. Dev et al.*



Background

- Forest biomass for biofuel production has remained an area of interest as a renewable source of energy.
- Yet, the feasibility and sustainability of forest biomass operations remains relatively unknown.
- Improved knowledge and tools are required for decision support.

Primary objective in this work is to:

1) *Obtain a (fuzzy) rule base which provides logical thinking and reasoning on how to assess sustainability of forest biomass harvest, water use, and water quality based on available data (and gather field assessment data as appropriate).*



Benefits:

- *Development of a decision-making tool for assessing water quality and soil nutrients in the Apalachicola Forest watershed for sustainable harvest of forest biomass*
- *A Master's candidate trained in the complete research cycle.*

Cooperators:



Ephemeral Wetland Hydrological Process in Surface and Shallow Ground Water in the Forests of North Florida & Soil and Nutrient Accumulation Rates and Sulfur Chemistry of Ephemeral Ponds - *Y.P. Hsieh et al.*

Background

- Many freshwater wetlands in the southeastern US Coastal Plain are isolated, seasonal systems with complex hydrology yet to be described.

Objectives in this work are to:

- 1) *establish baseline oxygen and hydrogen isotopic data of rainwater, shallow ground water and spring water in the Apalachicola National Forest (ANF);*
- 2) *identify sources and seasonal trends in the water balances of isolated wetlands;*
- 3) *train and educate future scientists (students) in conducting forest hydrological research and the stable isotope technology; and*
- 4) *generate results to secure future research and education funding for the Center.*



Benefits:

- *Quality data set that can be used for subsequent explorations.*
- *Enhanced capability to predict change in freshwater wetland ecosystems in response to changing climate conditions.*
- *Enhanced training opportunities of graduate and undergraduate students at FAMU.*

Cooperators:



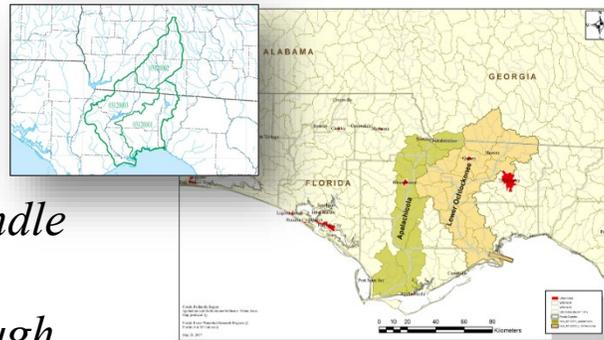
Panhandle Land-use Influences on Water Resources – Lotic Systems - *T.C. Lee et al.*

Background

- US minority populations in U.S. are often disproportionately effected negative consequences of environmental impacts.
- The need exists to engage underrepresented STEM students in water and environmental issues to enhance awareness thereby improving the understanding of linkages between environmental and human health.

Objectives in this work are to:

- 1) *investigate the influence of watershed type in the panhandle region,*
- 2) *engagement of students through increased interactions with scientists and water quality research efforts, and*
- 3) *develop outreach materials to engage K-12 and university students.*



Location:
 - replicate watersheds within the Apalachicola (HUC – 03130011) and the Ochlockonee (HUC – 03120003) subbasins.



Benefits:

- *Assess local levels of water quality in key urban and forested areas.*
- *Development of a model curriculum aimed at engaging undergraduate students at FAMU around water resource issues.*

Cooperators:

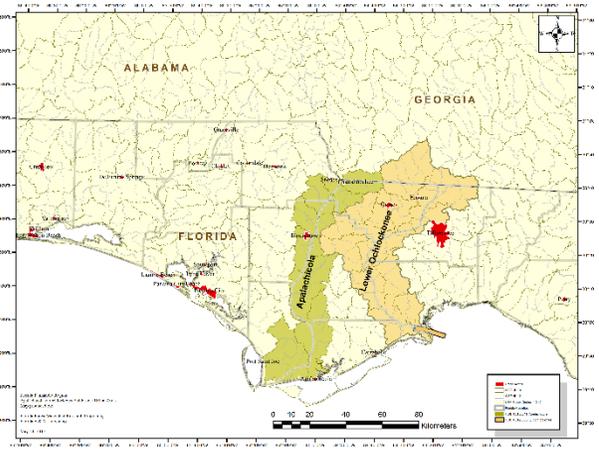


Nutrient loading as a function of watershed type into the Apalachee Bay - *C. Jagoe et al.*



Background

- The Apalachee Bay is fed by the Ochlockonee, Wakulla, St Marks, Aucilla and Ecofina Rivers which drain multiple land uses with management, land use, and flow regime changes that are expected to have altered the bays nutrient loading over the past few decades.



Location:
 - the Apalachicola (HUC – 03130011) and the Ochlockonee (HUC – 03120003) subbasins.

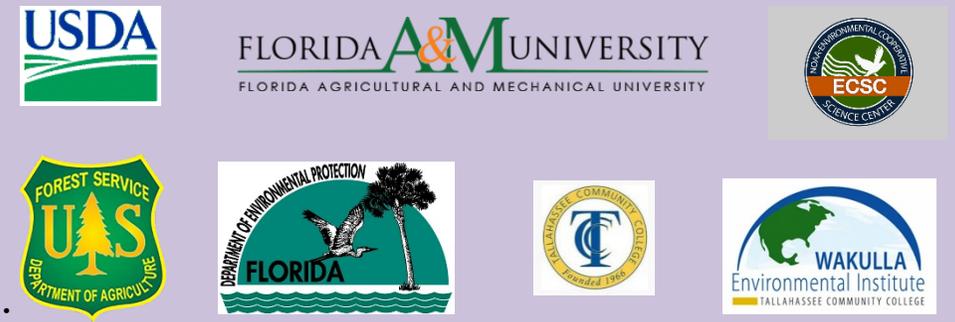
Objectives in this work are to:

- 1) *assess current nutrient loading from terrestrial sources into the bay;*
- 2) *examine potential differences in nutrient concentrations among the rivers reflecting differences in land uses in their watersheds.*
- 3) *engagement of students through water resource research efforts from upland to coastal systems.*

Benefits:

- *Quality data set that can be used for subsequent explorations.*
- *Project with direct interface with multiple efforts in the region for enhanced partnering and deliverables.*
- *Cohort of engaged, well-trained undergraduate students at FAMU with research experience and knowledge of water quality and environmental challenges.*

Cooperators:



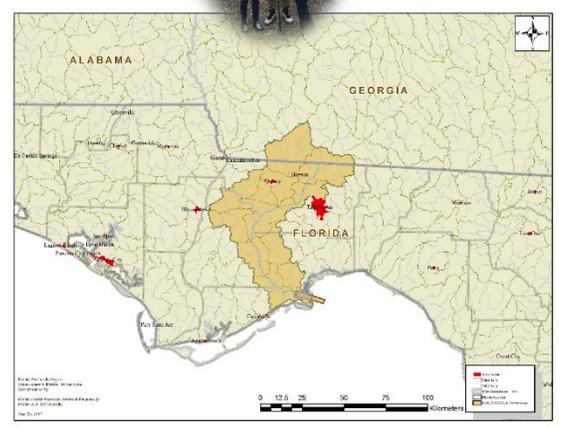
Effects of vegetation type on carbon and nutrient composition, greenhouse gases, and methanogenesis pathways in wetlands - *L. Ngatia et al.*

Background

- Wetlands can be both sources and sinks of carbon and nutrient dynamics can be influenced by dominant vegetation types within and surrounding these areas
- In the Coastal Plain ecoregion questions remain related to the influence of vegetation types/structure and surrounding land-use on water quality, carbon and nutrient composition.

Objectives in this work are to:

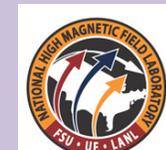
- 1) *quantify the influence of wetland vegetation types on nutrient cycling and GHGs emissions.*
- 2) *determine soil C composition, C thermal stability, and soil N for wetland types through solid-state Nuclear Magnetic Resonance (ssNMR) and Multi-element Scanning Thermal Analysis (MESTA).*
- 3) *determine the source of C in different land use/cover conditions.*



Benefits:

- *A robust assessment of the influence of vegetation composition and type surrounding wetlands on soil carbon quantities, composition and stability.*
- *The application of ssNMR and MESTA for describing the influence of vegetation on soil carbon and nutrient dynamics will enhance our understanding of management and land use effects.*

Cooperators:



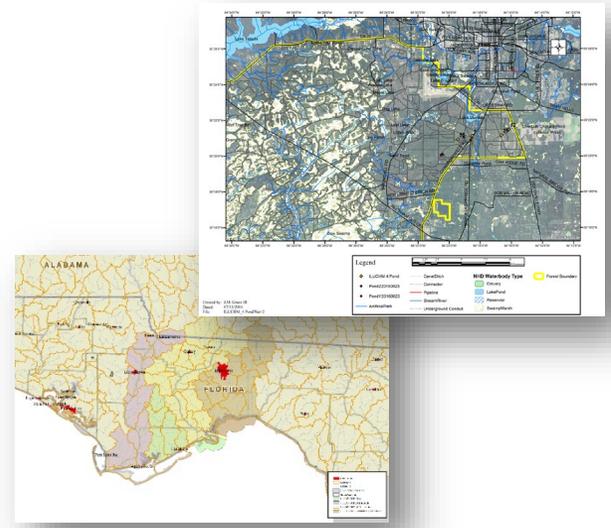
Effects of land-application of the treated wastewater on surface water resources - *A. Jain et al.*

Background

- Land-application of treated wastewater is being explored as a potential option to satisfy supplemental irrigation needs in many locations, particularly on golf courses. However, the fate and transport of such irrigation waters are not well understood and broad application of treated wastewater with higher nutrient concentrations may have water resource consequences.

Objectives in this work are to:

- 1) *assess the nutrient (N and P) movement from the land-application of the City of Tallahassee's treated wastewater to the nearby surface water bodies in Southwood area;*
- 2) *determine the overall water quality effects of water bodies receiving drainage from land-applied areas;*
- 3) *educate and train undergraduate students in conducting water quality research.*



Location:
City of Tallahassee,
Southwood



Benefits:

- *Study will be useful to protect and improve water quality in the surface water bodies to reduce impacts on human health and aquatic ecosystems.*
- *Research experience for undergraduates in watershed management and water quality.*
- *Quality data set that can be used for subsequent explorations wastewater reuse.*

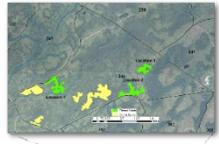
Cooperators:



Informing management of productive forest watersheds to provide for sustainable ecosystem services - *O. S. Mbuya et al.*

Background

The Apalachicola National Forest (ANF) in addition to receiving some flows from Alabama, Georgia and north Florida (>6.2 million hectares of basins) is located within one of the richest biodiversity hotspots in the nation in terms of fauna and flora. Due to these facts, it is clear that managers need improved science and understanding of the influence of activities on the critical ecosystem services the public lands provide to an array of communities.

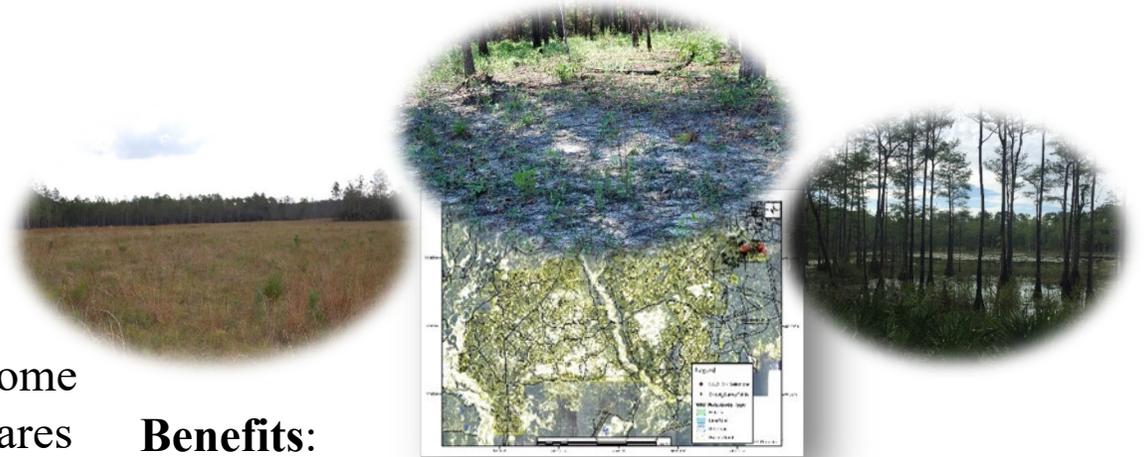


Location:

- the Apalachicola (HUC – 03130011) and the Ochlockonee (HUC – 03120003) subbasins.

Objectives in this work are to:

- 1) *determine the effect of restoration (fire, harvesting, and thinning) on forest ecosystem services (biomass, soils, water resources, and stand structure in the ANF, and*
- 2) *develop improved decision support tools to guide restoration/management activities for enhanced water resources.*



Benefits:

- *Improved knowledge of the influence of restoration on water availability and flows across the panhandle region.*
- *Direct linkage to efforts in the region for enhanced water flows to Gulf coastal ecosystems.*
- *Provides opportunity for graduate training in natural resource sciences.*

Cooperators:



4353 Tallahassee / FFWRP Partners



Logo Key:

- a. FAMU (Florida A & M University) -FAMU DoR (Florida A & M University Division of Research)
- b. FAMU Center for Water and Air Quality (now Center for Water Resources)
- c. UF-IFAS (University of Florida-Institute of Food and Agricultural Sciences)
- d. TTRS (Tall Timbers Research Station)
- e. FAMU COPPS (FAMU College of Pharmacy and Pharmaceutical Sciences)
- f. FAMU CAFS (FAMU College of Agriculture and Food Sciences)
- g. FL DEP (Florida Dept. of Environmental Protection)
- h. NHMFL (National High Magnetic Field Laboratory).
- i. FSU (Florida State University)
- j. TCC (Tallahassee Community College)
- k. FAMU SOE (FAMU School of the Environment, NOAA Environmental Cooperative Science Center)
- l. TCC Wakulla Environmental Institute
- m. FAMU-FSU COE (Florida A & M University-Florida State University College of Engineering)
- n. COT (City of Tallahassee)
- o. USGS (United States Geological Survey)
- p. Additional partners without logos represented are: NFnF (National Forests in Florida), ARS-SEWRL (Agricultural Research Service – Southeast Watershed Research Laboratory),

Path Forward

- FFWRP welcomes the opportunity (and expects to) partner more closely with all stakeholders in the region including colleges & universities, agencies, organizations, and communities.
- FFWRP looks to engage professional expertise and scientists from within and outside of the SRS to attack highly relevant and impactful work such as:
 - Piloting integrative restoration and resilience project initiatives,
 - Teaming on efforts that will inform DSTs across the region,
 - Development of projects (and Centers) that cross institutional boundaries, and
 - Development of bridge opportunities to enhanced agency/organization, faculty, and student interactions while increasing the pool of diversity candidates.



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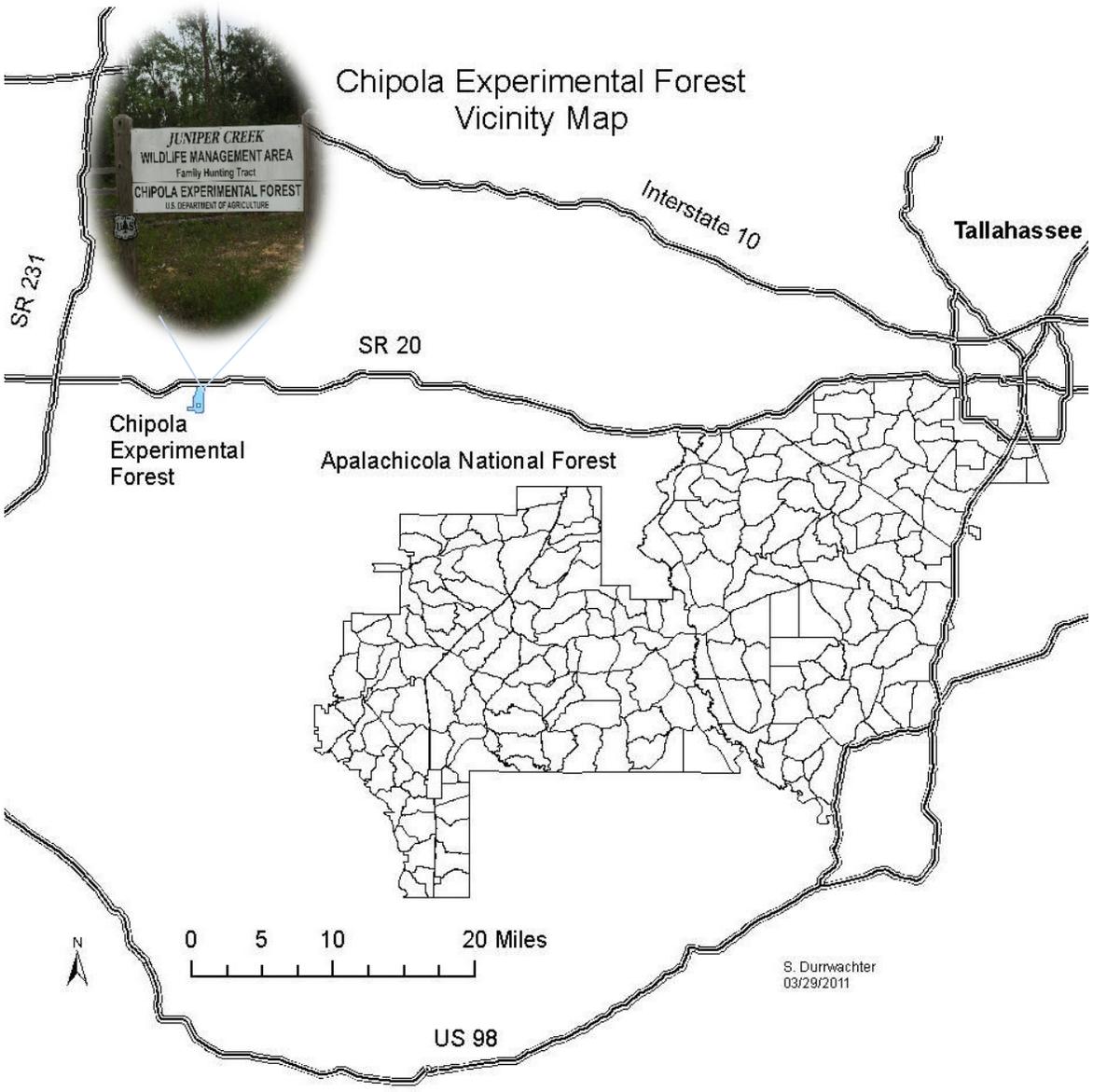
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CHIPOLA EFR – *COLLABORATIONS?*

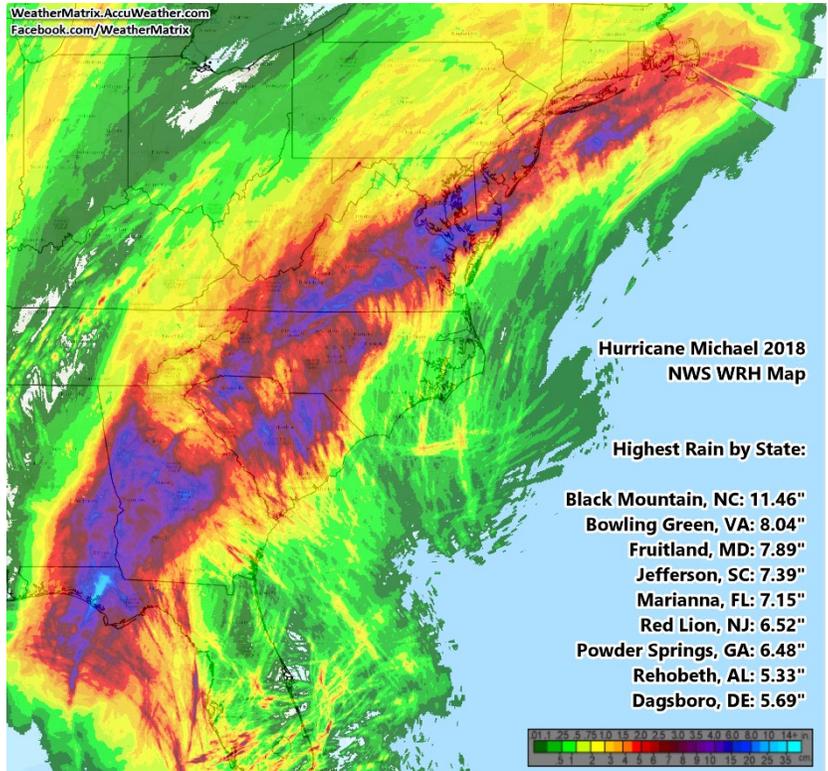
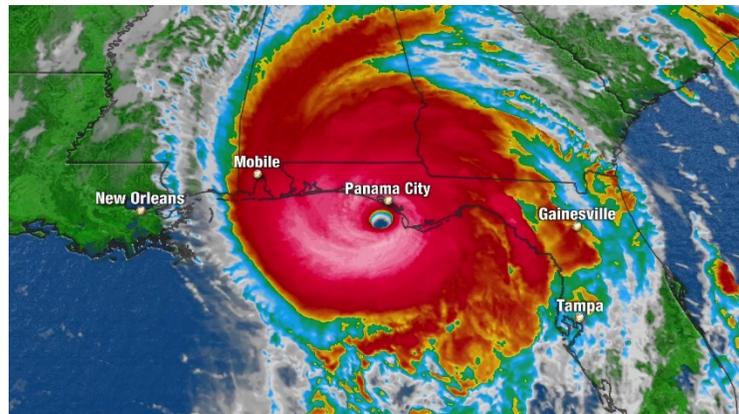
Chipola Experimental Forest and Range - *Background*

- Established in 1952 on 2760 acres - “to provide for research to restore the cutover sandhills in the region “Deserts in the Rain”.
- Multiple reductions in the land area with the SRS purchasing its current acreage ~ 923 acres
- In 2011, the Florida Fish and Wildlife Commission established family hunting areas within the forest and designated the entire area as the Juniper Creek Wildlife Management Area.



* Source: USDA Forest Service, Environmental Assessment, Chipola Experimental Forest , October 2011

Chipola (and greater FL panhandle) & Hurricane Michael



* Source: Scuttlebutt Sailing News, October 10, 2018

* Source: Scuttlebutt Sailing News, October 10, 2018

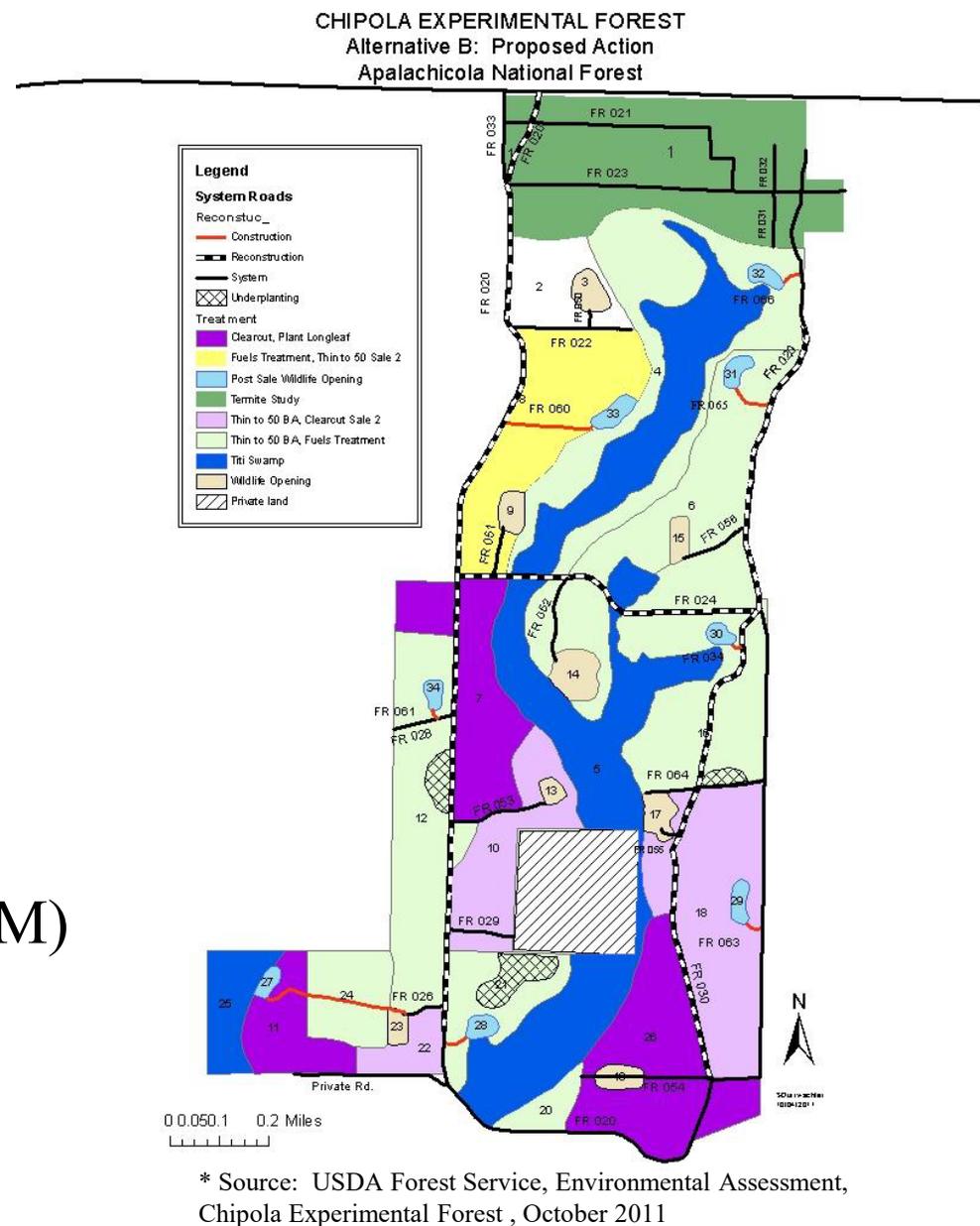
* Source: Hurricane Michael's Greatest Hits, AccuWeather.com, Hurricane Michael Rain, Final NWS Map, Oct 2018

- NOAA post-analysis upgraded to Cat 5 at landfall (160 MPH)
- Largest storm to ever make landfall in the FL panhandle

<https://www.wbrz.com/news/noaa-hurricane-michael-upgraded-to-a-category-5-at-time-of-u-s-landfall/>

Chipola Experimental Forest and Range – *The Opportunity*

- Management prior to Hurricane Michael
- Catastrophic losses has resulted in a salvage.
- EFR redesign focus.
- Unique opportunity in the panhandle for Recovery/Resiliency work.
- The CFWR-Tallahassee (FFWRP at Florida A & M) encouraging work in the two EFRs in Florida (Chipola and Olustee).





Thanks for your attention.

QUESTION & ANSWER PERIOD

2019 FFWRP Concept Reviews

Proposed Concept Title	PI	Project Type	Responding to Elements
Failing Drain Culverts on the Apalachicola National Forest as a Potential Contributor to High Iron (Fe) Concentrations within the New River Planning Unit (WBID 1034B)	V. Ibeanusi	Research	Priorities A, B, & D
Survey and Monitoring of Pest Insects in Hurricane Impacted Longleaf Pine Forests in North Florida	M. Haseeb	Integrated (Research & Education)	Priority B
Restoring Florida's pine stand after hurricane Michael and the influence on water supply	L. Ngatia	Integrated (Research & Education)	Priorities B, C & D
Integrated Pest Management of the Redbay Ambrosia Beetle, <i>Xyleborus glabratus</i> Eichhoff (Coleoptera: Curculionidae), an Exotic and Newly Introduced Forest Pest Species in Florida	L. Kanga	Integrated (Research & Outreach)	Priority D
Wild Thoughts: Sociohistorical Determinants of Environmental Consciousness in the Gulf Coastal Plain Region	M. Turner	Integrated (Research and Education & Outreach)	Priorities B, C & D