

Wildland Fire Ecology at Virginia Tech

Dr. Adam Coates

Wednesday, November 8, 2017

Central Appalachian Fire Learning Network



Objectives



Tom Yawkey Wildlife Center, March 2015

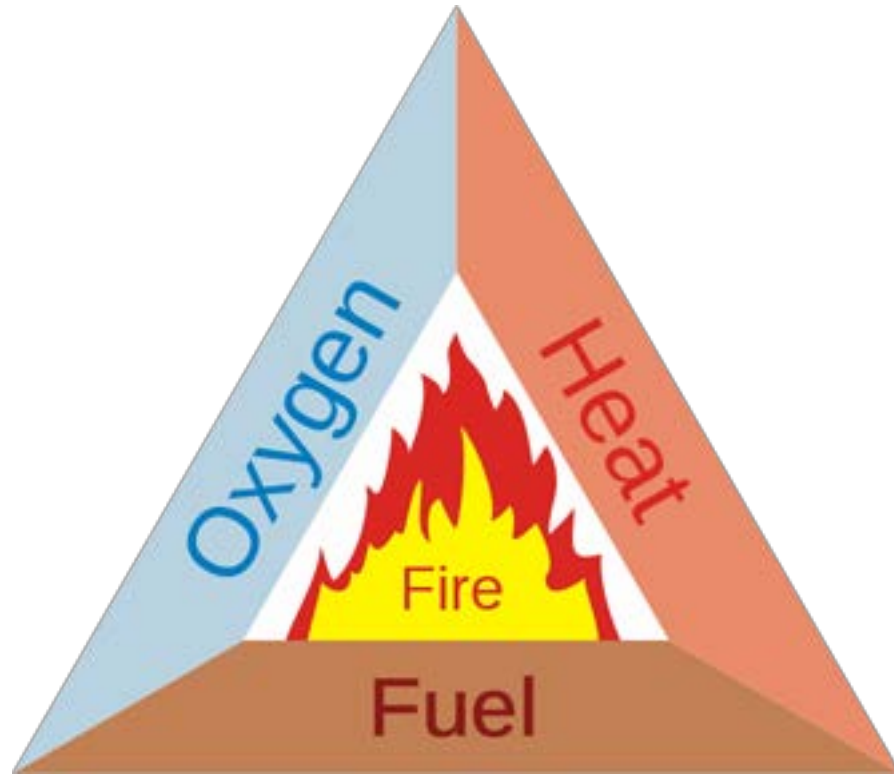
- Personal Introduction
- Completed Research
 - Southern Appalachian Mountains
 - Southeastern Piedmont
 - Coastal Plain
- Program Objectives
 - Undergraduate Training
 - Graduate Research
 - Agency Collaboration
- Next Steps

Personal Introduction

- BS (2003), MS (2006), Ph.D. (2017) all in Forest Resources from Clemson University
- Married with three kids (Sam – 8, Kate – 5, Natalie – 3)
- Spent time working in research, production agriculture, and non-profits



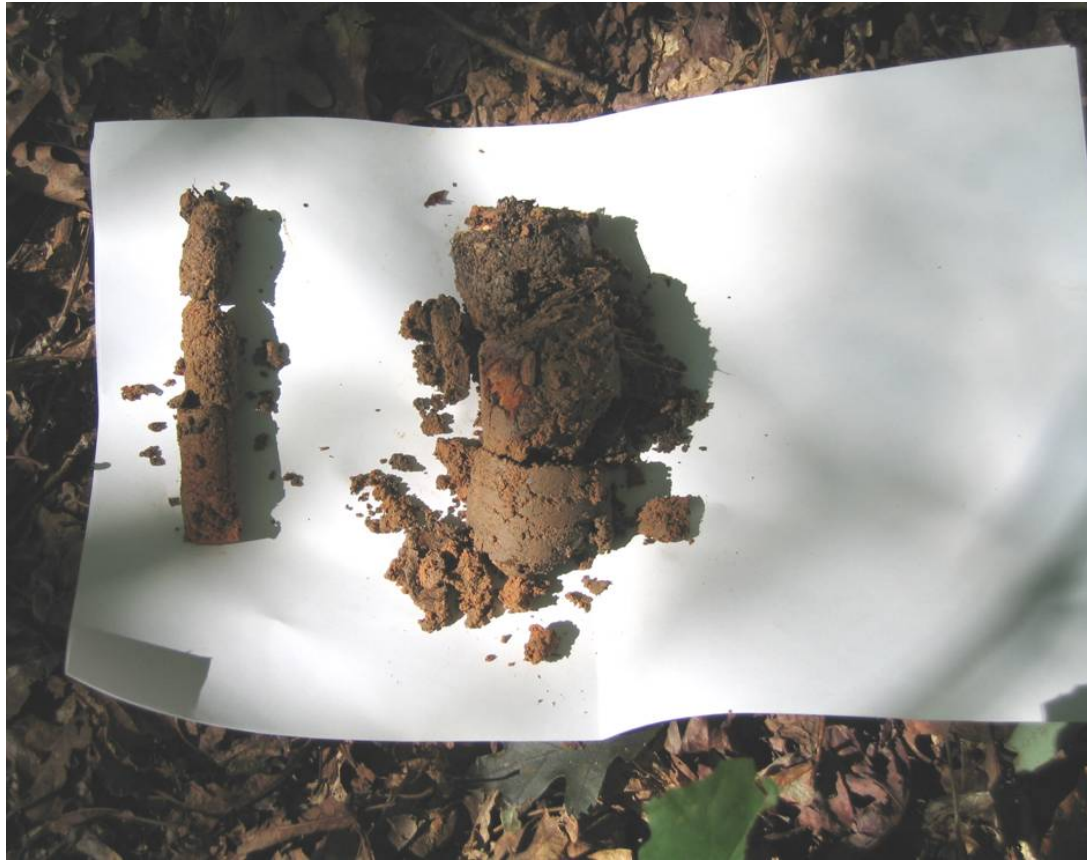
My “fire story”



Fire Triangle

- First learned about fire in the summer of 2001
 - Dr. Tom Waldrop – Table Mountain Pine
- Summer 2003: Chauga Ridges
 - Rhododendron and mountain laurel
- Spring 2004: Graduate School

Forest soils



Clemson Experimental Forest, 2005

- The broad focus of my research has been focused on fire's effects on soils across Southeastern ecosystems
- Numerous properties have been evaluated
 - Physical properties
 - Chemical properties
 - Biological properties

Southeastern Piedmont and Southern Appalachian Mountains

- Impact of prescribed fire and harvesting on soil properties and processes



Southeastern Piedmont, 2004



Southern Appalachian Mountains, 2005

Brief results

- Singular implementations of fire and harvesting had little effect on forest soil properties and processes such as:
 - Soil carbon
 - Soil nitrogen
 - Soil macro- and micronutrients
 - Soil bulk density



Green River, 2006

Coastal Plain



Tom Yawkey Wildlife Center, March 2016

- Most studies related to forest soils have focused on these properties and processes
- Emerging interests in global carbon cycling
 - Which compounds are produced during wildland fires?
 - How might these impact long-term forest health?
 - How might they directly impact human health?

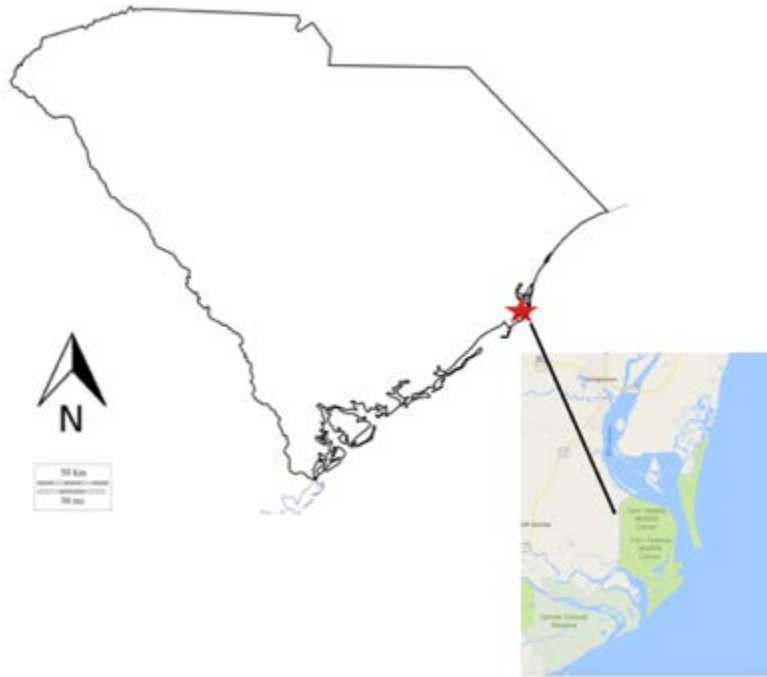
Water quality might be affected

- Decomposing biomass (burned or unburned) may have effects on surface water quality
- Surface waters are treated for human consumption
- Treatment of compounds and chemicals from surface waters may create more harmful substances
 - Carcinogenic properties
 - Negative birth outcomes



Image: lactobacto.com/tag/drinking-water/

Brief results



Tom Yawkey Wildlife Center, Georgetown, SC

- When evaluating the chemical makeup of decomposing litter and duff materials, we found that prescribed fire does very little to alter organic materials
- This study was conducted on long-term unburned and frequently burned longleaf pine stands
 - Burning season had no impact on the results



Incomplete combustion of forest detritus
Tom Yawkey Wildlife Center, March 2015

Water quality not altered at these sites



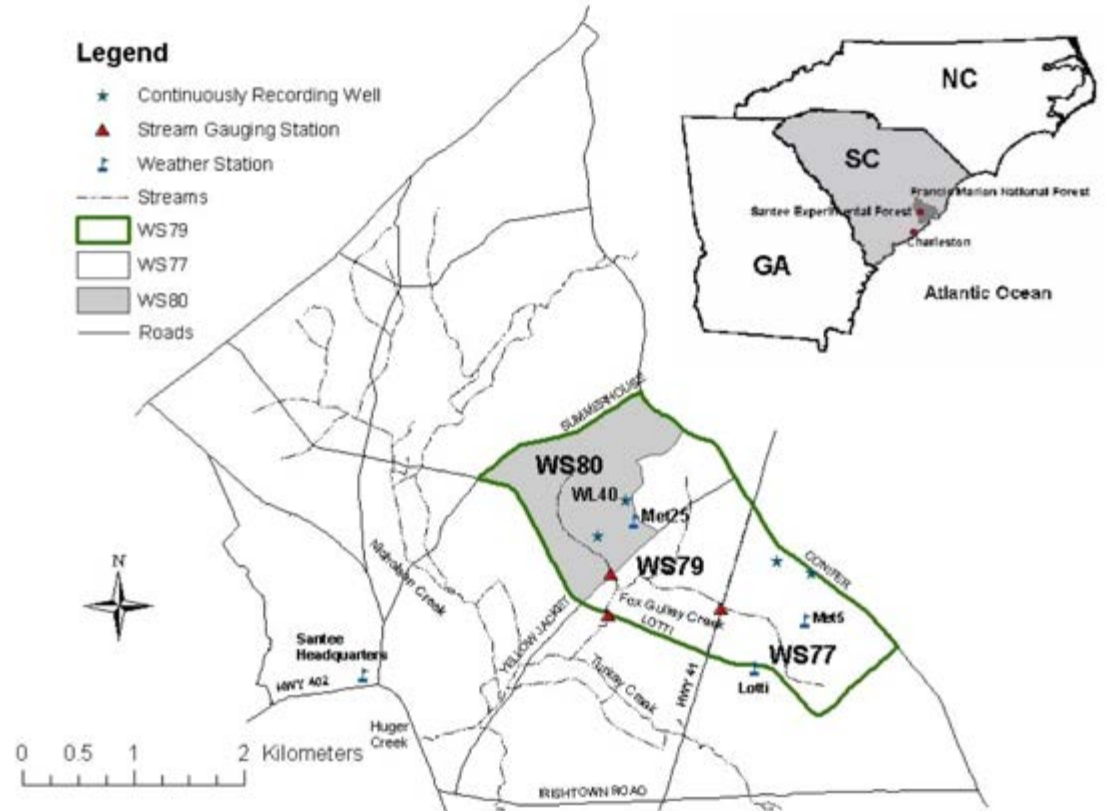
Baruch Institute, Georgetown, SC
January 2016



Tom Yawkey Wildlife Center, March 2016

Additional preliminary water quality results

- Looking at two forested watersheds near Charleston, SC, we have seen that:
 - Frequent fire over the last 40 years has reduced fuels and altered species composition
 - Water quality benefits from frequent prescribed fire



Santee Experimental Forest
Cordesville, SC

How will all of this translate to Virginia Tech?



Image: asmegeo.com

- 50/50 Teaching/Research appointment
- #1 Forestry program in the nation
- Few schools in the Eastern US have made similar commitments to expanding our knowledge of fire science

Teaching expectations

- Provide opportunities for undergraduate students to obtain wildland firefighter training and experience
- Involve undergraduate students in meaningful research experiences
- Introduce undergraduate students to the many employment opportunities that include wildland fire knowledge and experience



Tom Yawkey Wildlife Center, February 2015
HGTC Student Field Assistants

Research expectations



Tom Yawkey Wildlife Center, March 2016

- Address the critical needs present throughout Virginia and the Eastern US
- Collaborate with agencies and field personnel to address “real world” fire science
- Recruit, train, mentor, and produce high-caliber graduate students:
 - Scientists
 - Managers and practitioners

What's in the works: Teaching

- Developing new curriculum for FREC majors
 - One undergraduate course in wildland fire ecology and management
- Possibly one cross-campus undergraduate course
 - Possible substitute for BIOL 102, CHEM 102
- One undergraduate/graduate course in advanced forest fire ecology and ecosystem restoration



Tom Yawkey Wildlife Center, post-burn March 2016

What's in the works: Research

- Graduate students arriving in January
 - Ph.D.: Mr. George Hahn (WCU, NCSU)
 - M.S.: Mr. Chris Dukes (Clemson)
- New research:
 - Appalachian pines
 - Oak issues (i.e. seasonality, delayed mortality, etc.)
 - Mountain laurel flammability
 - Smoke chemistry
 - Potential DoD proposals



Tom Yawkey Wildlife Center, March 2015

What's in the works? Research



North Carolina SBR FLN, August 2017

- SBR FLN Data Analysis
 - Overstory and regeneration
 - Fuels
- Recruitment of first-generation VT forestry graduates and underrepresented groups
- Potential work at Shenandoah National Park
- Meetings
 - AFE 20/20: November 2017
 - VAFHP: January 2018
 - Fire Continuum: May 2018

What's in the works: Research

- Agency collaboration
 - Meeting all of you!
 - Learning about the work important to you and the challenges you face
 - Developing new research projects and products together



North Carolina SBR FLN, August 2017

Some new research we would like to develop



North Carolina SBR FLN, August 2017

- Restoration objectives in the Central Appalachians
- Long-term fire monitoring
- Short-term prescribed fire impacts
 - Water
 - Wildlife
 - Vegetation
- Large burn unit impacts
- Landowner education

Synopsis

- Macro- to micro-scale fire implementation, impacts, and effects have been part of my background
- I am very passionate about mentoring and teaching students and involving them in research and training that will advance their careers
- I really hope to develop great partnerships and relationships with you all so that we can develop this program together
- Together we can really lead the way to new and great things

Questions?



Green River, 2005



Tom Yawkey Wildlife Center, 2016
Image: James Calvin Lee, SCDNR