SOUTHERN Fire Exchange

Uniting Fire Science and Natural Resource Management

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JOINT
FIRE SCIENCE
PROGRAM

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

New science and tools to improve your fire management program

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Fall 2016| Southern Fire Exchange

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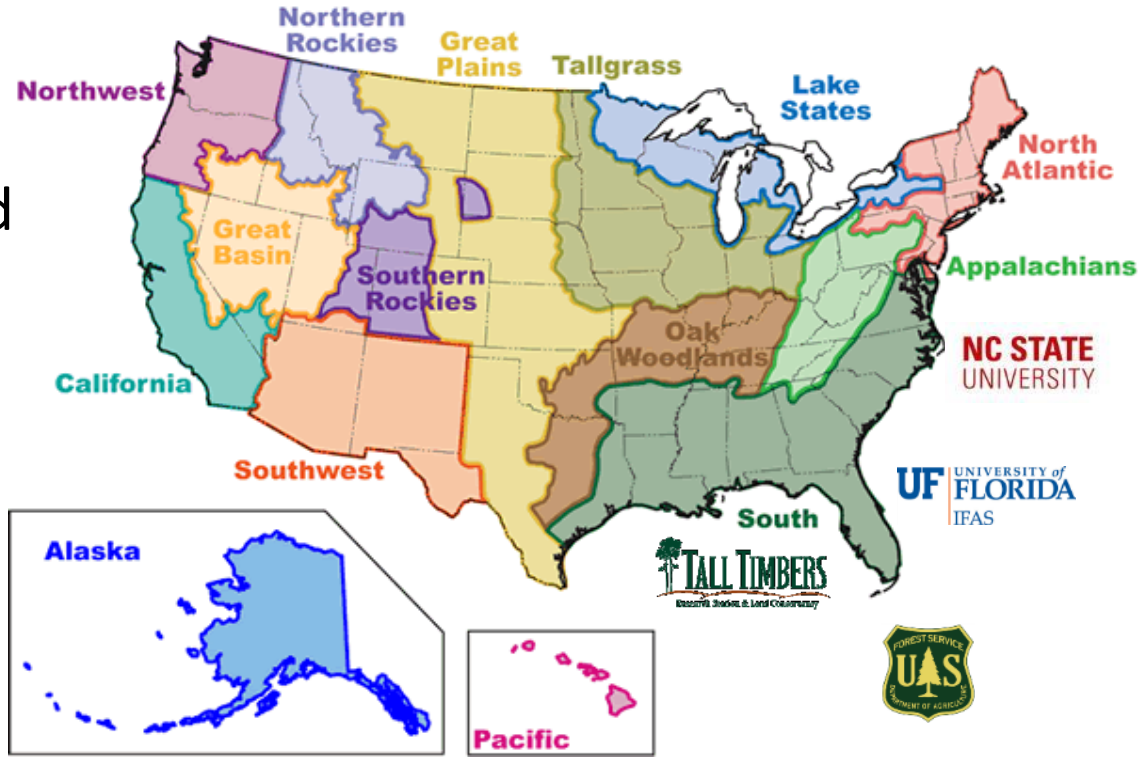
Uniting Fire Science and Natural Resource Management

- SFE is one of 15 JFSP regional Fire Exchanges serving fire managers and science providers
- SFE Started 2010
- Goal: enhance fire science delivery and adoption



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Palustris Experimental Forest, Longleaf, LA

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www.southernfireexchange.org

- Website with news, events, models, and tools
- Monthly Webinar Series
- Fact Sheets Translate Research
- Bi-Monthly Newsletter
- Workshops and Field Tours

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How to take better weather

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What weather tool should you trust?

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What weather tool should you trust?

Sling vs. Kestrel Testing Methods

- Tested a range of RH values (5,10,30,50%)
- Tested a range of air temp values (60,80,100F)
- Randomized block design
- Two experimental phases
  - **Phase 1:** (Tools straight out of the truck / pack)
  - **Phase 2:** (Optimum: new wicks, DI H_20, Factory Calibrated Kestrels)

All research conducted by Chuck McHugh, USFS RMS cmchugh@fs.fed.us

Average RH Error, %

	Phase 1 Avg Error	Phase 2 Avg Error	Difference (%)
SlingA	7.70	5.15	-2.55
SlingB	12.34	6.12	-6.22
3000A	0.95	0.86	-0.09
3000B	1.45	1.68	0.23
4500A	-1.95	0.56	2.51
4500B	4.02	-0.02	-4.04
435A #1		0.37	
435A #2		-2.24	

All research conducted by Chuck McHugh, USFS RMS cmchugh@fs.fed.us

Sling vs. Kestrel Testing Results

- Dry bulb temperature is the same
- Sling was always higher (+) than actual RH
- Calibrated Kestrel closer to actual RH
- Kestrel more accurate at very low RH (< 10%)
- Kestrel calibration does reduce error (although it's costly)

All research conducted by Chuck McHugh, USFS RMS cmchugh@fs.fed.us

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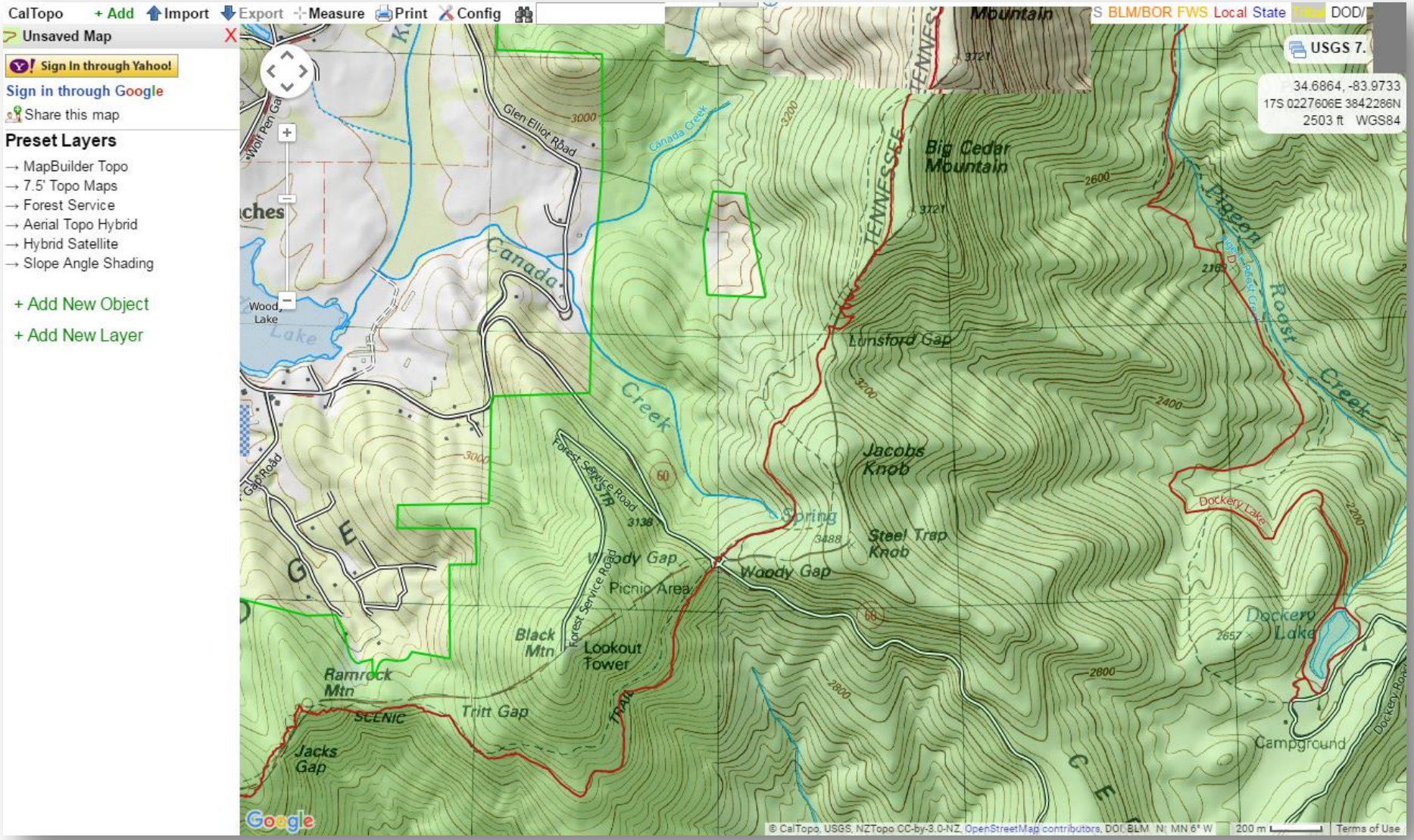
How to make a better burn map

CalTopo.com

- Free for basic users
- Suite of preset map styles make cartography FAST and very SIMPLE.
- Import KML and GPX Files
- Arrange Layers. Drop Points. Edit Tracks / Points.
- Simple export to GeoPDF file with a custom QR code
- Save it to DropBox and load it right into Avenza on your mobile device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Measure
Print
Config
Unsaved Map
Sign In through Yahoo!
Sign in through Google
Share this map
Preset Layers
→ MapBuilder Topo
→ 7.5' Topo Maps
→ Forest Service
→ Aerial Topo Hybrid
→ Hybrid Satellite
→ Slope Angle Shading
+ Add New Object
+ Add New Layer
USGS 7.
34.6864, -83.9733
17S 0227606E 3842286N
2503 ft WGS84
Big Cedar Mountain
Lonsford Gap
Jacobs Knob
Steel Trap Knob
Woody Gap
Picnic Area
Spring
Black Mtn
Lookout Tower
Ramrock Mtn
Tritt Gap
Jacks Gap
Dockery Lake
Campground
Pigeon Roost Creek
Canada Creek
Glen Elliot Road
Wood Lake
Gap Road
Forest Service Road
Google
200 m
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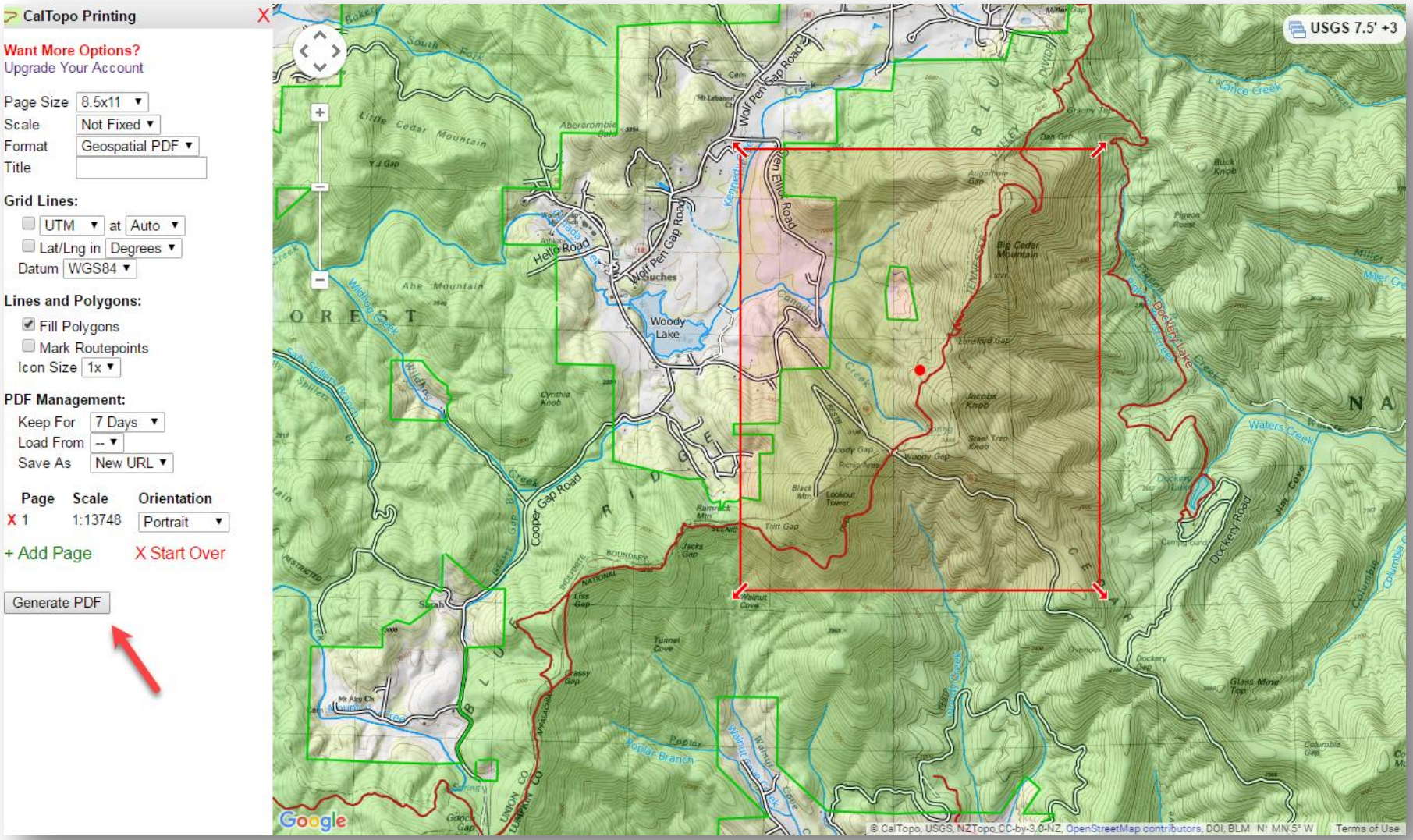
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Wolf Pen Gap Road
Hello Road
Woody Lake
Cooper Gap Road
Dockery Road
Waters Creek
Google
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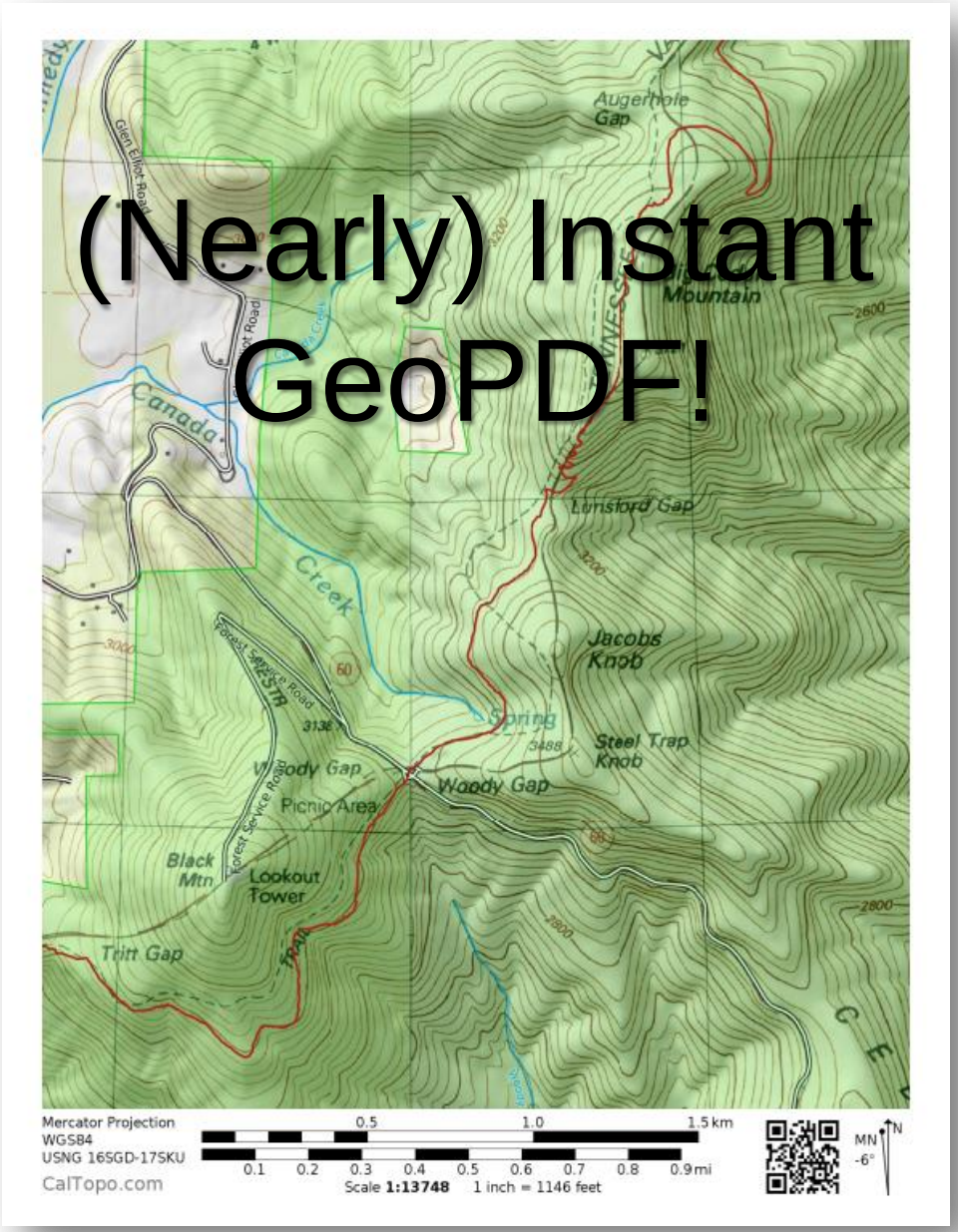
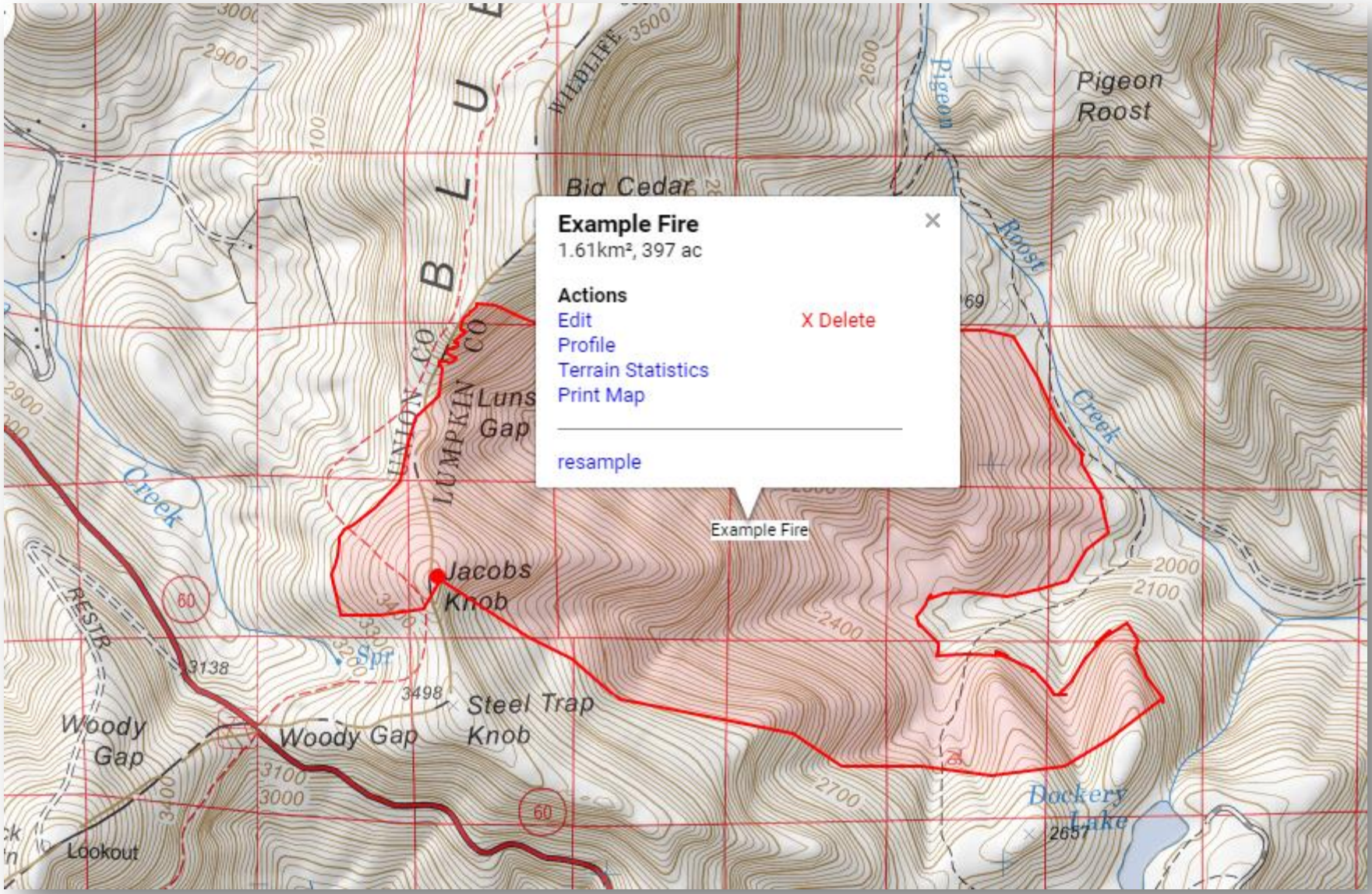

(Nearly) Instant GeoPDF!
Augerhole Gap
Glen Elliot Road
Forest Road
Canada
Creek
Lunsford Gap
Jacobs Knob
Spring
Steel Trap Knob
Woody Gap
Picnic Area
Black Mtn
Lookout Tower
Tritt Gap
Mercator Projection
WGS84
USNG 16SGD-17SKU
CalTopo.com
0.5 1.0 1.5 km
0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 mi
Scale 1:13748 1 inch = 1146 feet
MN -6°
N

caltopo.com


Example Fire
1.61km², 397 ac
Actions
Edit
X Delete
Profile
Terrain Statistics
Print Map
resample
Example Fire
Pigeon Roost
Big Cedar
Luns Gap
Jacobs Knob
Steel Trap Knob
Woody Gap
Woody Gap
Lookout
Dockery Lake
UNION CO
LUMPKIN CO
WILDLIFE
RESTR
Creek
Roost
Pigeon
Spr
60
3138
3498
2657
2000
2100
2400
2700
3000
3100
3500
2900
2600

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How can we manage ticks?

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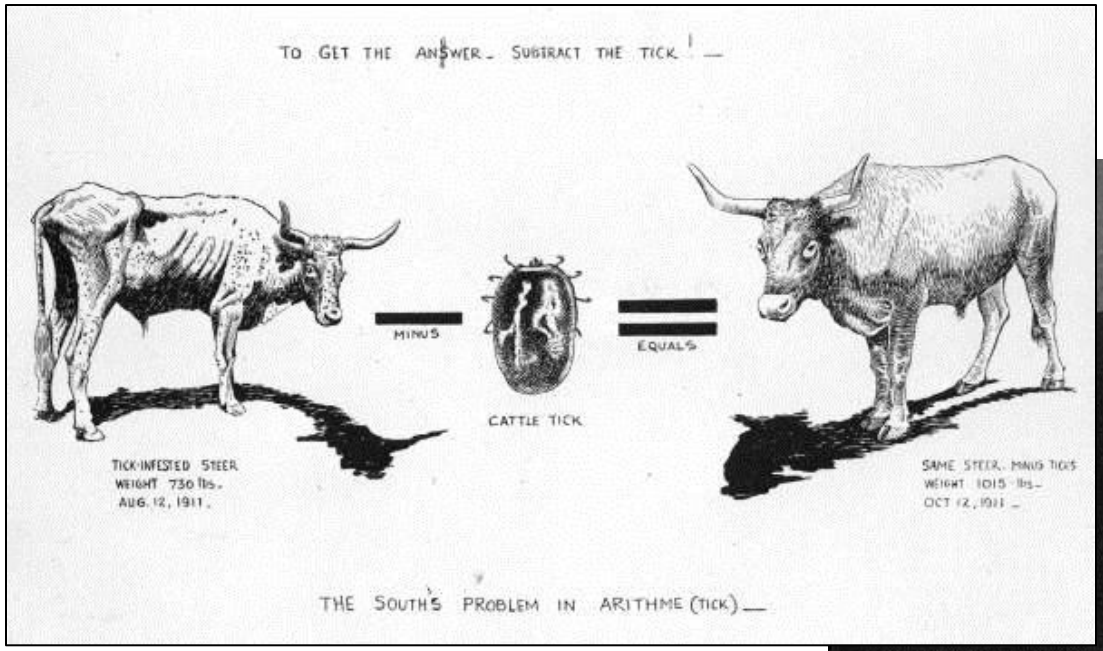

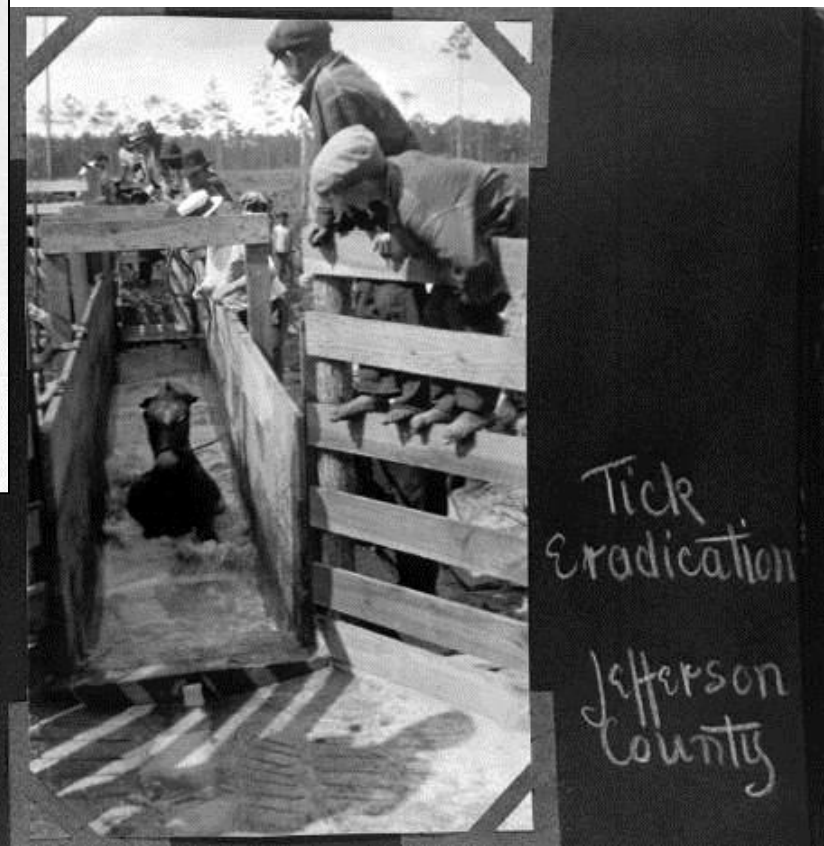

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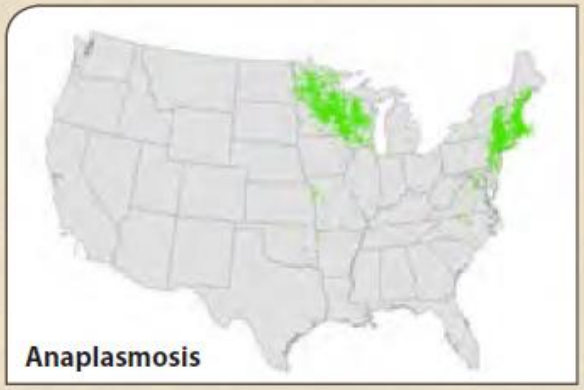
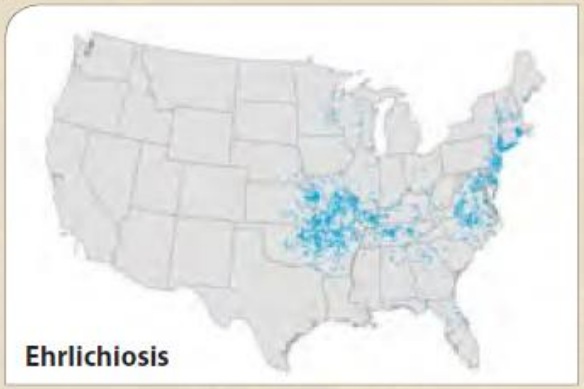
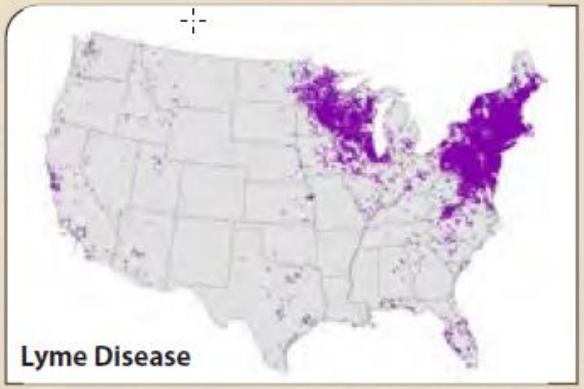
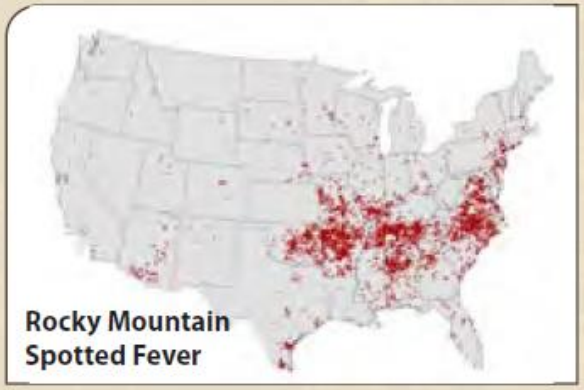
Selected Tickborne Diseases Reported to CDC, U.S., 2013



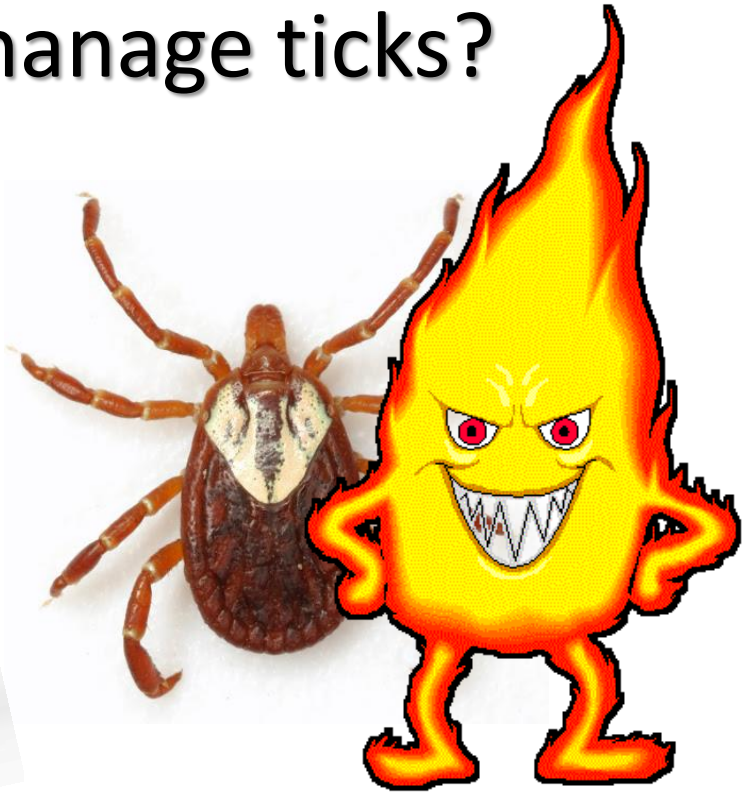






How can we manage ticks?

How can we manage ticks?



PRESCRIBED FIRE!

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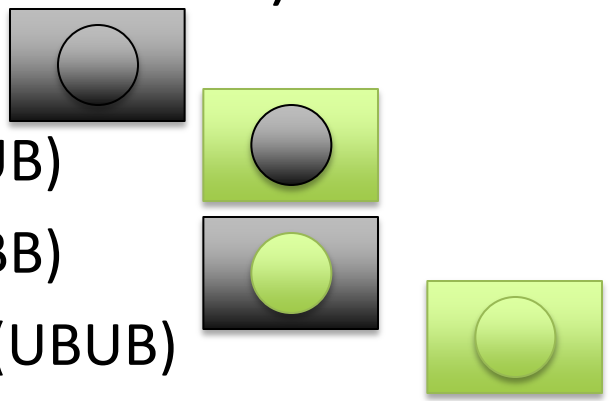
Prescribed Fire and Tick Research Methods

- First long-term (24 months) study of operational prescribed fire impacts on ticks
- Unburned sites: no fire for at least 10 years
- Sampled 4 Site Types (21 different locations):
  - Burned Surrounded by Burned (BB)
  - Burned Surrounded by Unburned (BUB)
  - Unburned Surrounded by Burned (UBB)
  - Unburned Surrounded by Unburned (UBUB)



All research conducted by Elizabeth Gleim, UGA Warnell egleim@gmail.com

Gleim *et al.* 2014. PLoS ONE

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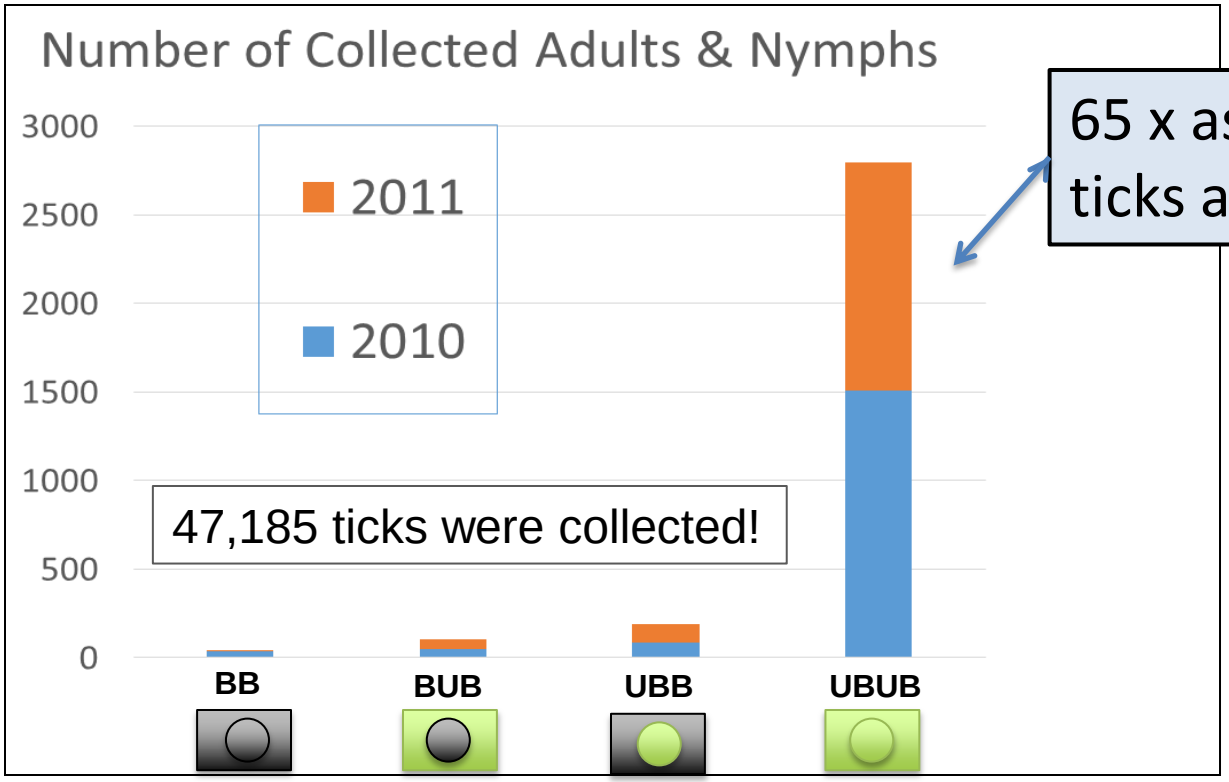


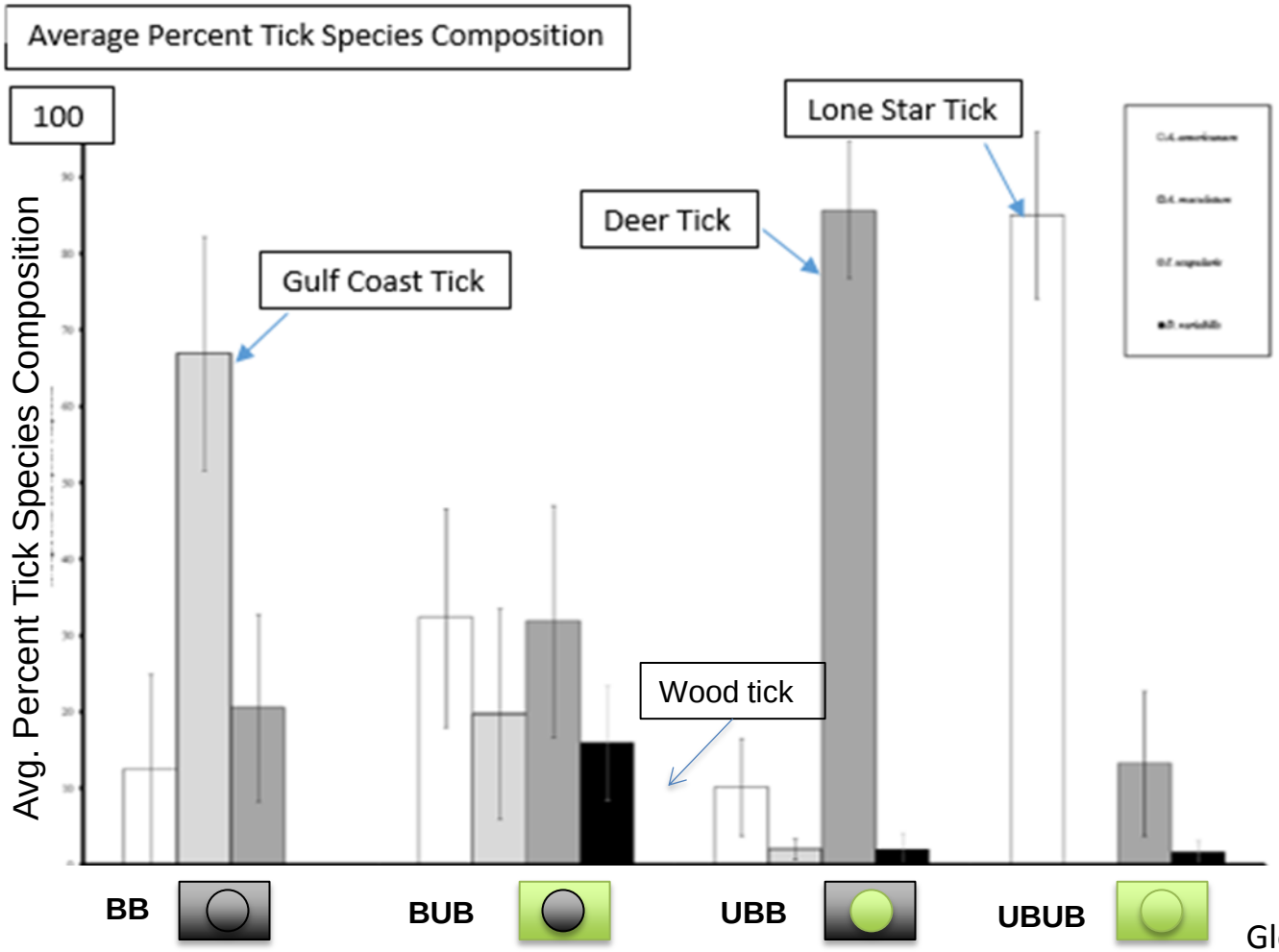
BB = Burned Surrounded by Burned

BUB = Burned Surrounded by Unburned

UBB = Unburned Surrounded by Burned

UBUB = Unburned Surrounded by Unburned

Gleim *et al.* 2014. PLoS ONE



Gleim *et al.* 2014. PLoS ONE

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What will the wind be this afternoon?

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Where will the trees be *sneezing* this afternoon?

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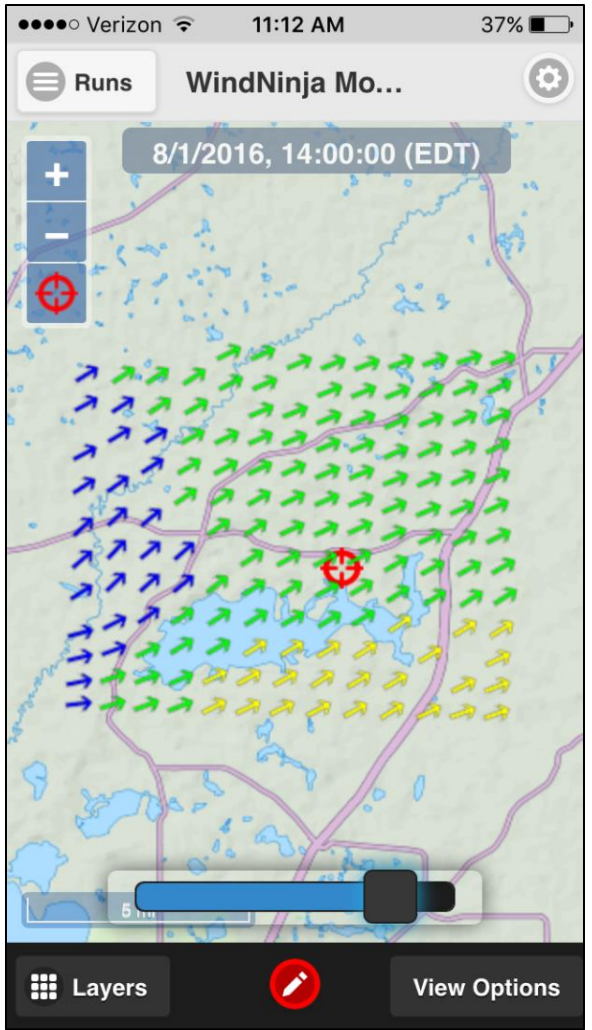
Where will the trees be sneezing this afternoon?

Ask WindNinja!

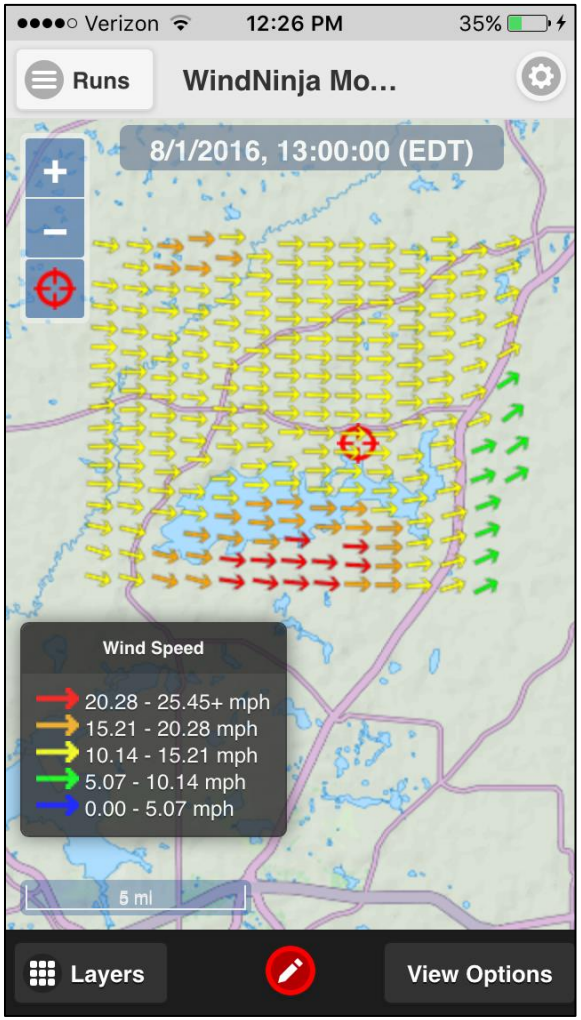
WindNinja

- **WindNinja Mobile** is a mobile app for iOS and Android devices developed by USFS Fire Lab.
- Pocket-sized version of WindNinja desktop application.
- Creates high resolution predicted hourly wind speed and direction graphics.



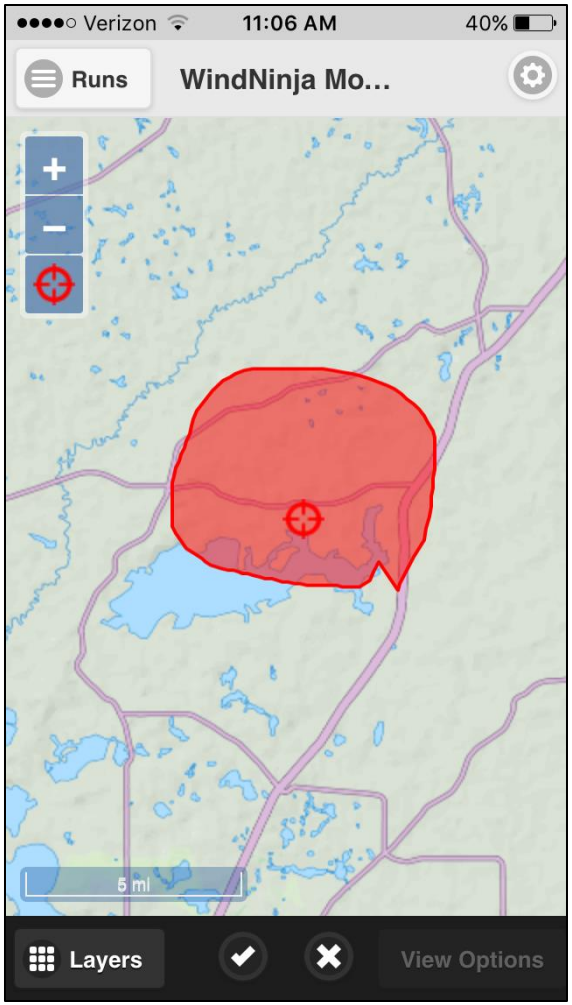
WindNinja

- **WindNinja Mobile** uses NWS weather predictions to model wind interaction with topography and vegetation height on a 3D grid



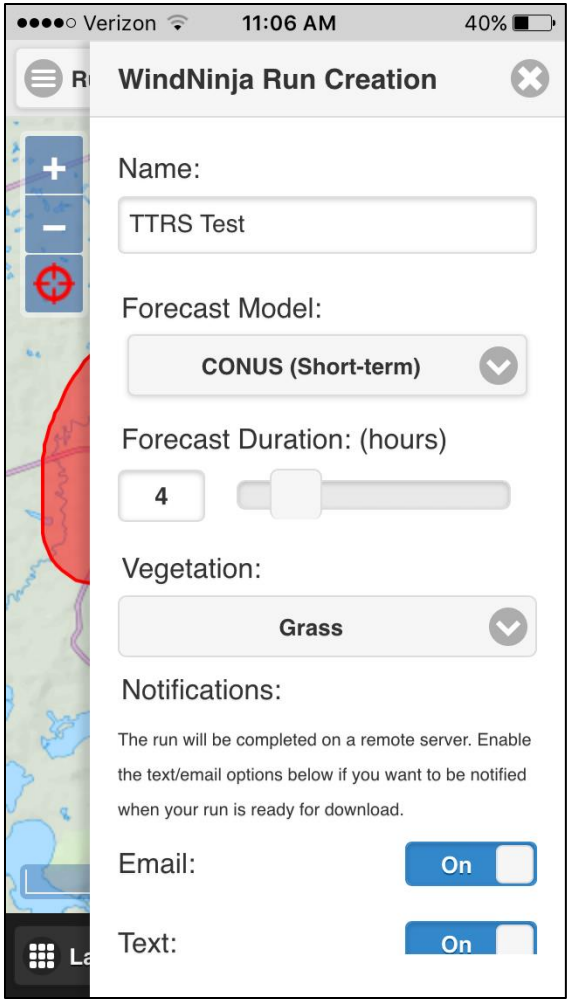
WindNinja

1. Download App
2. Request free account via App
3. Finger swipe to select project area (1km^2 – 50km^2)



WindNinja

4. Name model run
5. Select NWS wind Model
   - CONUS Short-Term (3 km grid, 1hr step, 15 fx, 1 hr. refresh)
   - CONUS Long-Term (12 km grid, 3 hr step, 86 fx, 6 hr. refresh)
6. Duration (hours)
7. Veg Type (Surface height)

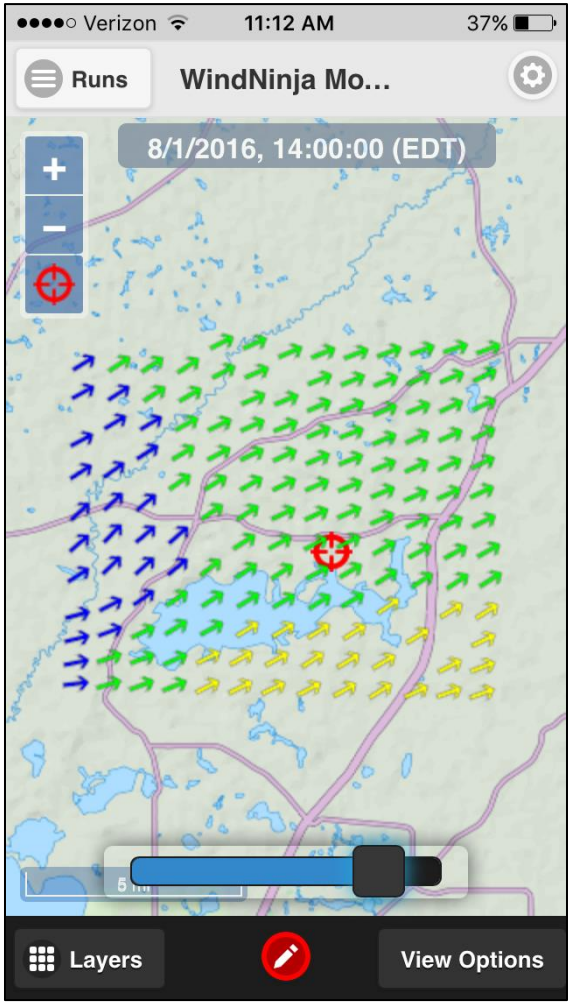


WindNinja

8. Email or text notifies you that your model run is complete.
9. Load the model on the map.
10. Slider to see hourly changes in wind speed and direction.
11. Zoom to view spatial variations in wind speed and direction.

http://www.firelab.org/project/windninja-mobile

Wind.ninja.support@gmail.com



Unfinished research update:

1. Southern Integrated Prescribed Fire Information System for Air Quality and Health Impacts
NCSU and Georgia Tech –JSFP supported project to develop a Rx Fire information system.

2. Advanced material fire shelter project. NCSU – FEMA supported project to make a better fire shelter.

Take-Home Points

- **Kestrel Weather Meters more accurately measure RH than sling psychrometers.**
- **CalTopo.com is an easy way to make custom geoPDF maps.**
- **Prescribed fire management significantly reduces tick populations.**
- **WindNinja Mobile is a new mobile app for modeling interaction of wind and terrain at local scales.**
- **Fire Needs Assessment and Improved fire shelter in the future.**

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Accessible Fire Science for Resource and Fire Managers

Questions?

Thank you!