

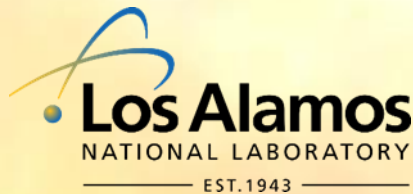
Prescribed Fire Science:

An overlooked research agenda



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FORUM

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Prescribed fire science: the case for a refined research agenda



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<https://fireecology.springeropen.com/articles/10.1186/s42408-020-0070-8>





Wildland Fires

Wildfires

US: 7-14 million acres each year

Prescribed fires

US: 10-14 million acres each year

Wildland Fire Science

Wildfires

Prescribed fires



3:1 wildfire: Rx funding



Over 13 yrs: 50% more

International Journal of
WILDLAND FIRE

Over 14 yrs: 3:1

Wildfire and Rx fire science are *different*

Differ in focus:

- ❖ Fire behavior
- ❖ Fuels
- ❖ Fire weather
- ❖ Fire effects
- ❖ Costs and economics
- ❖ Operational challenges
- ❖ Social, political, & legal environment



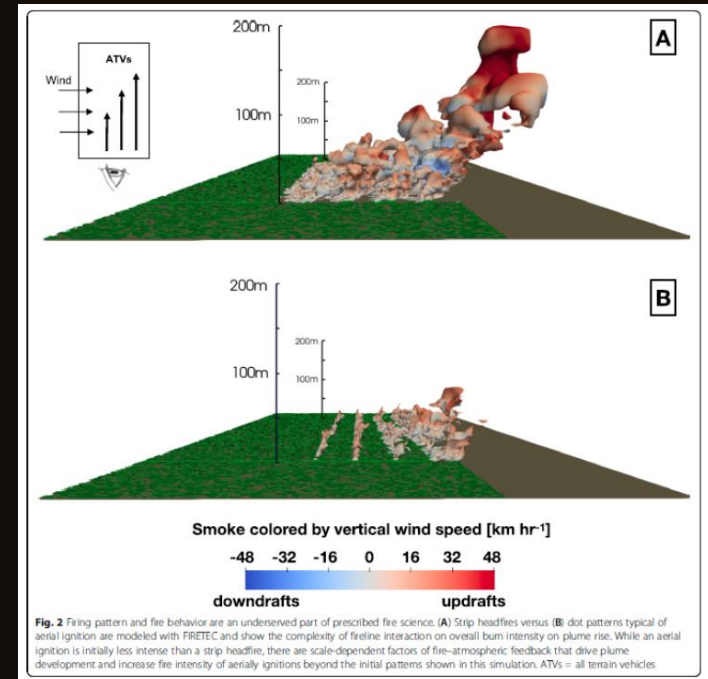
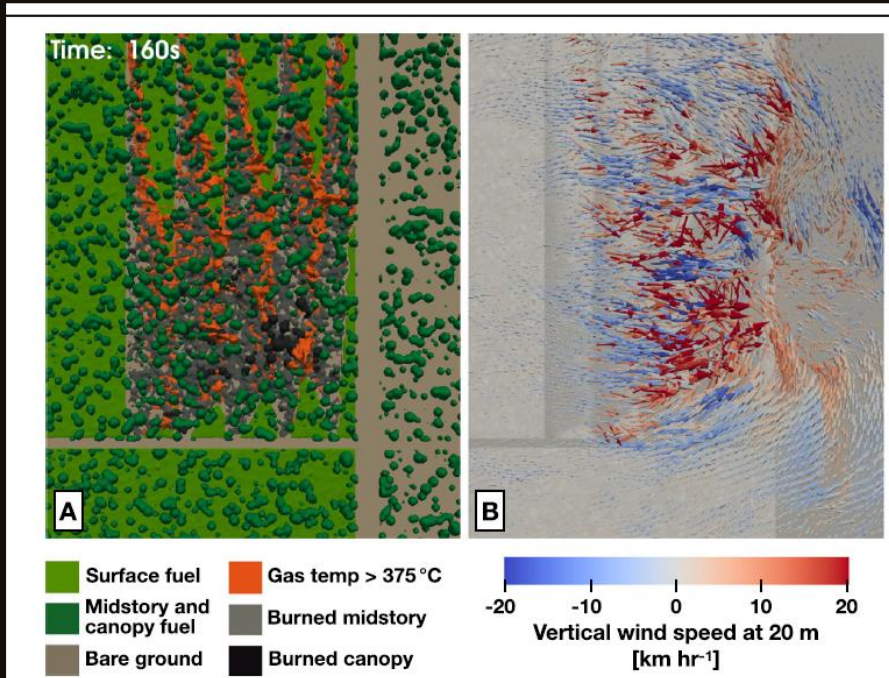
Fire behavior

Fire behavior differences:

- Ignitions intentional
- Fireline interaction dominant
- **Backing fire** important
- Diurnal primary
- Intensity > spread rate
- Concept of marginal fire



Importance of Rx fire behavior



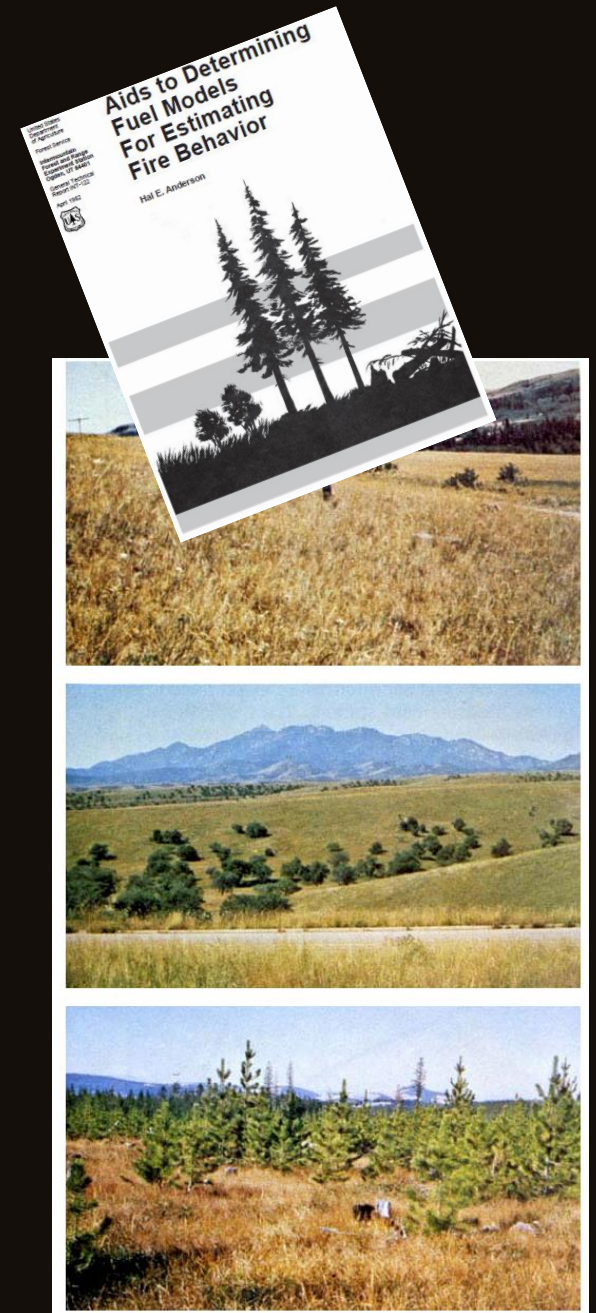
Hiers *et al.* 2020 *Fire Ecology*

- Escapes & Spotting
- Firefighter safety

Fuels

Fuels differences:

- Potential emissions
- Moisture dynamics
- Regionally prioritized
- ***Fine spatial and temporal scale***
 - ***3-D and 4-D***

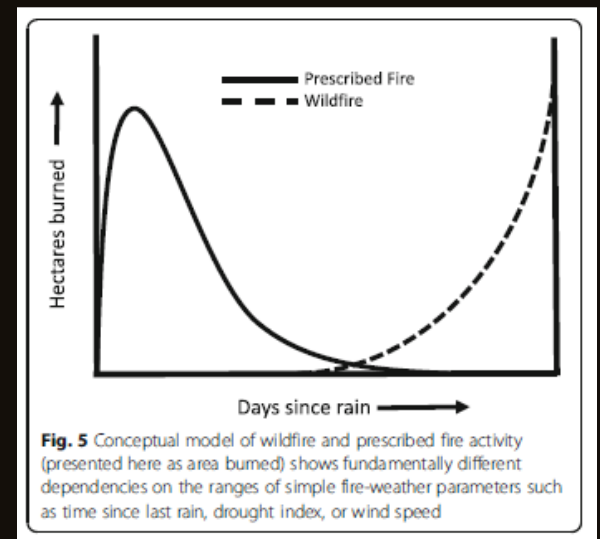




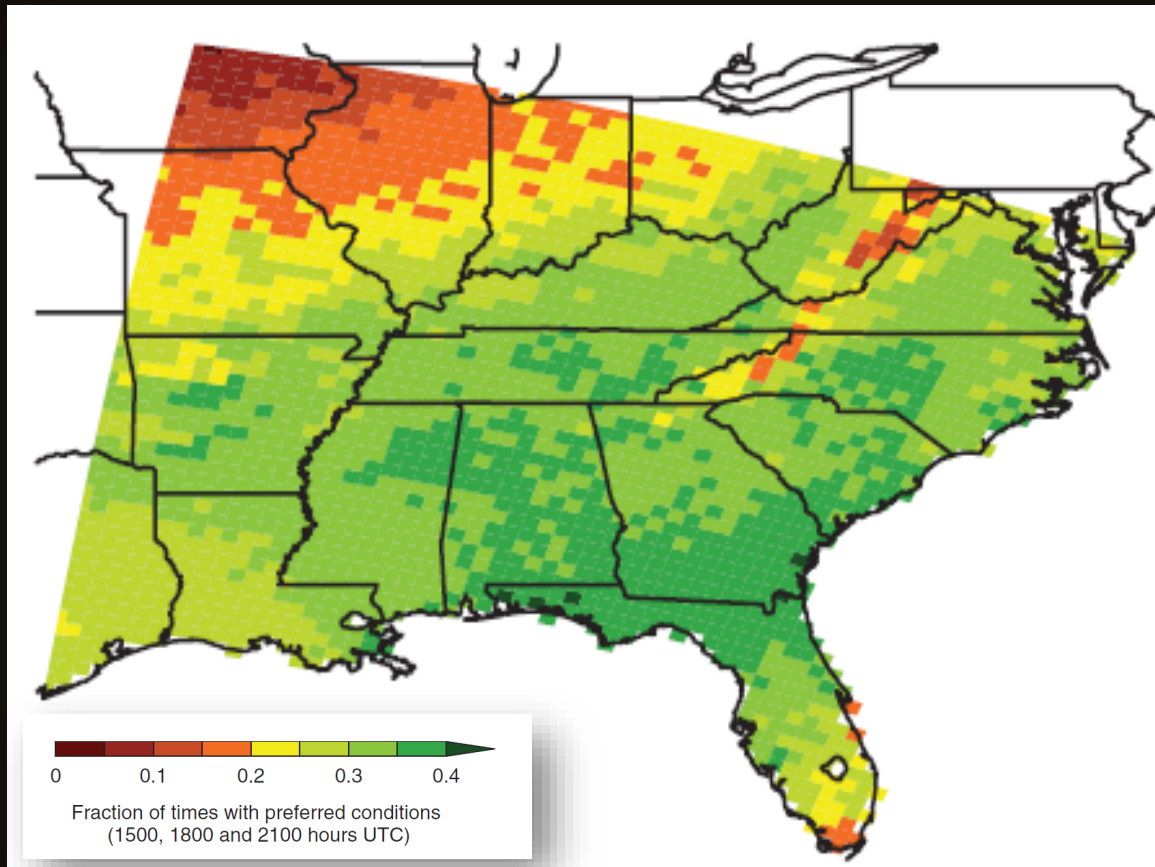
Fire Weather

Rx Fire Meteorology

- Fine scale issues
- Ignition sources
- Marginal v. Extreme fires
- Climate data v. weather data and observations
- *Deep manager understanding*



Rx Fire Weather

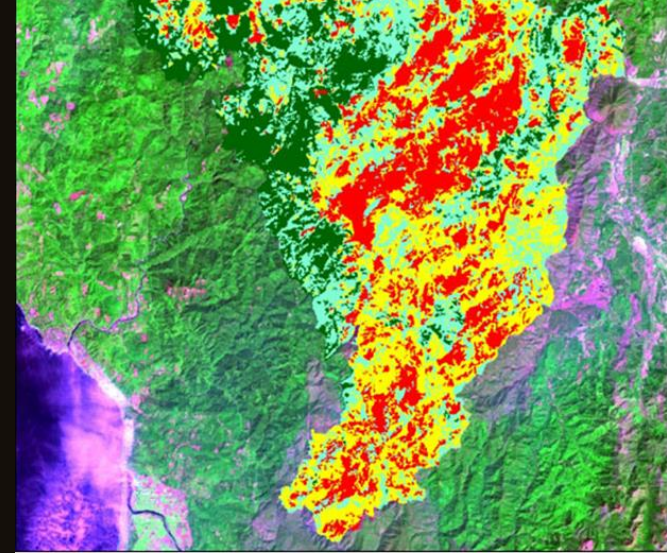


Chiodi et al. 2018 *Int. J. Wildland Fire*

Fire effects

Rx Fire Effects

- A *primary objective*, not a consequence
- Marginal v. Extreme fires
- Patchiness matters
- ***Scales differ***
- Variation prescribed in season, weather, size, location, frequency, shape, etc...



Preliminary Burn Severity
■ unburned ■ low ■ moderate ■ high

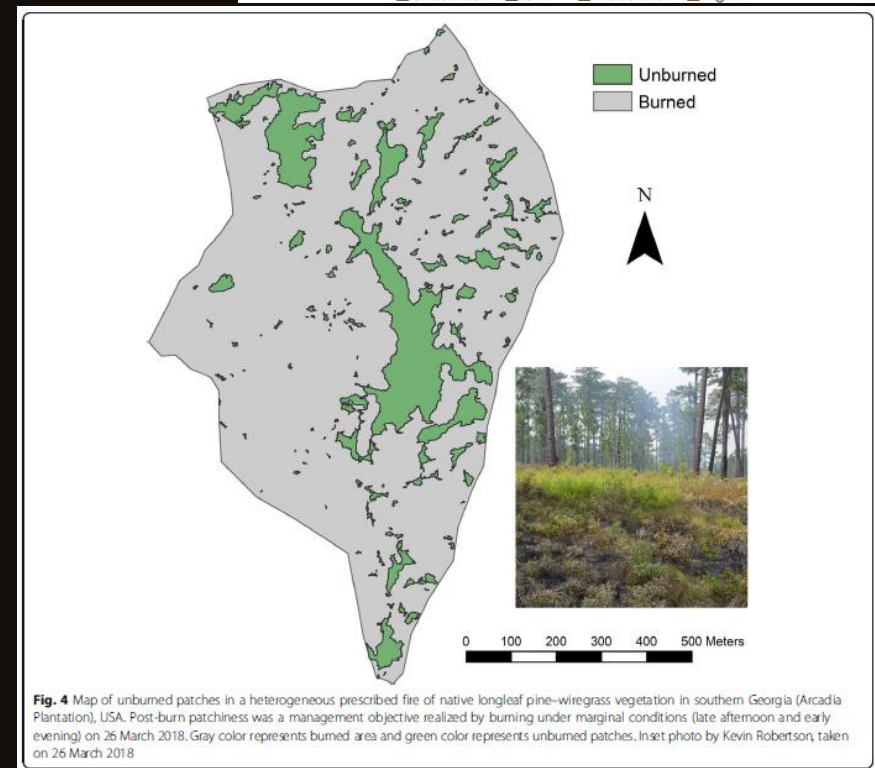


Fig. 4 Map of unburned patches in a heterogeneous prescribed fire of native longleaf pine-wiregrass vegetation in southern Georgia (Arcadia Plantation), USA. Post-burn patchiness was a management objective realized by burning under marginal conditions (late afternoon and early evening) on 26 March 2018. Gray color represents burned area and green color represents unburned patches. Inset photo by Kevin Robertson, taken on 26 March 2018

This variation matters...



Kreye et al. 2017 Forest Science

Social, political, legal environment

Stark differences:

- **Acts-of-God v. Asking permission**
 - Favorability v. Responses
- Private v. Public
- Regional and cultural
- **State laws dominate**
- Communication
- Communities-of-Practice



Fire Operations

Scale differs:

- **Economics**
- Operational impediments
- **Decision support tools**
- Planning vs. response



Research & Collaboration Needs

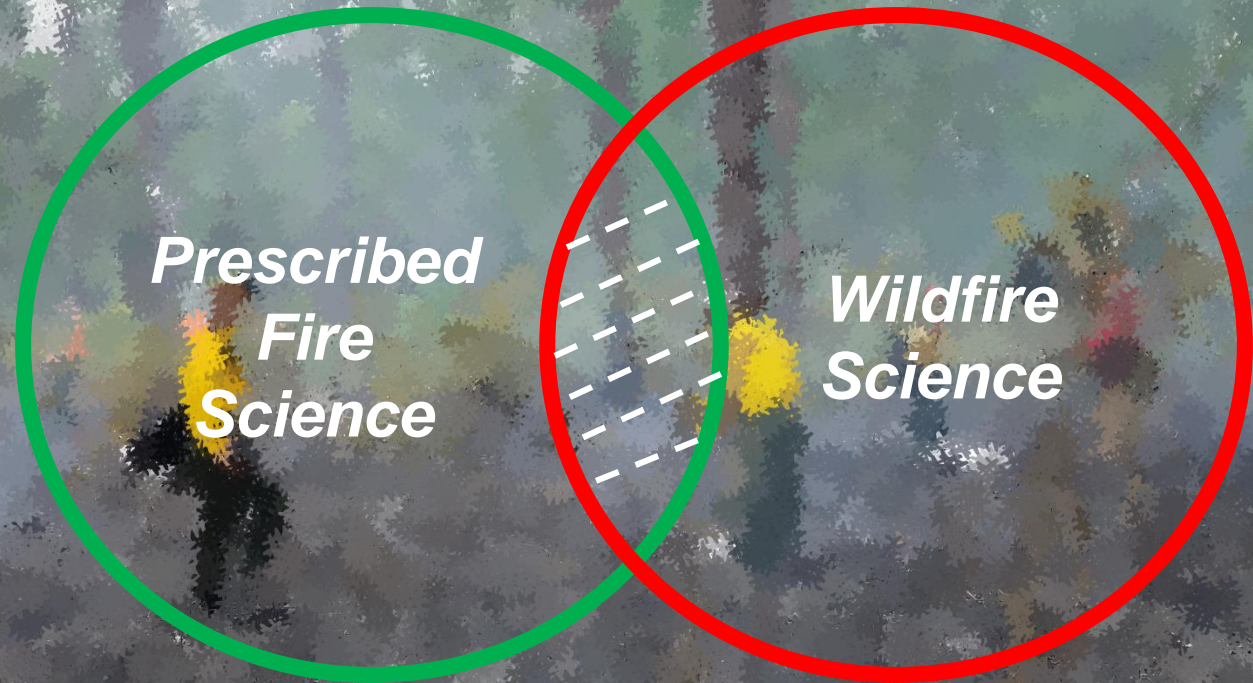
Major Research Topics:

- Interaction of firelines
- Marginal fire behavior
- Smoke and its management
- Relevant scales for fire effects
- Scales of dependence between fuels & fire behavior
- How do we overcome impediments?



Rx Fire Science Consortium, April 2017

Major Opportunities



Rx Fire Science “made for” Coproduction of Actionable Science



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Mike Gallagher & many others in Rx Fire Science Consortium

Prescribed Fire Science

- > Tremendous interest in maintaining and increasing pace and scale of Rx fire.
- > Need for decision support.
- > Opportunities for manager-scientist collaboration...
- > Opportunities for new Science...



Prescribed Fire Science



Fire Ecology Strategic Planning Workshop,
December 2015

Jim Brenner
Dr. Sam Fuhlendorf
Kevin Hiers
Dr. Kay Kirkman
Dr. Leda Kobziar
Deborah Miller
Dr. Kevin Speer
Dr. Morgan Varner
Dr. Joan Walker

Robert Abernathy
Dr. David Goodwin
Mark Melvin

Zach Prusak
Dr. Hillary Swain

Marcus Beard
Vince Carver
Alan Dozier
Neal Edmondson
Susan Kett
Steve Miller
Caroline Noble
Roger Ottmar
Frank Sorrels

Aubrey Iler

Dave Perkins
Tom Rankin



Rx-CADRE,
Eglin AFB



**Rx Fire Science
Consortium Events**
Tallahassee, FL
Missoula, MT
Richfield, UT
New Jersey Pine Barrens