Future Fire: Climate Change and Wildland Fire Governance in Alaska

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Background: Change in Alaskan Fire Regimes

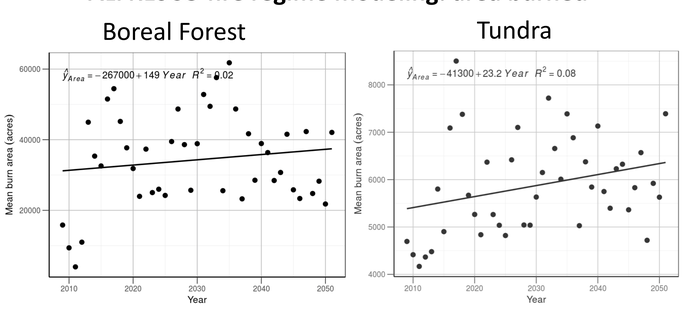
Future fire regimes:

- Climate change has caused an increase in statewide fire activity in the past few decades[7]
- Climate change will likely cause further increases in fire activity over the next few decades, with more large fire years[10,14]

Expected consequences:

- Transitions in vegetation regimes with loss of ecosystem services such as subsistence use and carbon sequestration[4,13]
- Increase in suppression costs for fire management agencies[8]

ALFRESCO fire regime modeling: area burned



Mean statewide annual area burned in acres for boreal forest and tundra regions of Alaska for the years 2009-2051, derived from modeling by the frame-based, spatially explicit ALFRESCO model (https://uasnap.shinyapps.io/jfsp-v10/)

Theoretical framework: Adaptive governance

Characteristics of adaptability:

Characteristic	Definition	Advantages	Internal & external variables
Polycentricity	Multiple semiautonomous, coordinated centers of authority[2]	Allows experimentation, innovation, redundancy, and diversity among governing organizations	History of institutions, culture of street-level bureaucrats, regulation, resources[9]
Appropriate system scales	Scale of activity in the governance system fits scale of the ecosystem[12]	Facilitates communication and coordination among governing organizations across multiple levels	Biophysical context, history of institutions, networks[9]

Definitions:

- An environmental **governance system** is the actors, networks, organizations, and institutions (including laws, regulations, policies, and social norms) that influence governing of a natural resource or ecosystem[3]
- **Adaptive governance** refers to characteristics that allow a governance system to adapt to social or ecological change[6]

Research Objective

Explore how the wildland fire management system in Alaska will respond to climate change:

1. What are the external drivers of priorities and challenges in the fire management system?
2. What are the internal factors that shape priorities and challenges in the fire management system?
3. Considering the current and anticipated priorities and challenges, what management changes might be needed to make the system more adaptable?
4. Does the fire management system reflect characteristics of adaptive governance?

Methods

Participatory research approach:

- My study is part of a broader fire regime modeling project
- We worked with fire managers in interviews, presentations, and meetings to improve science delivery

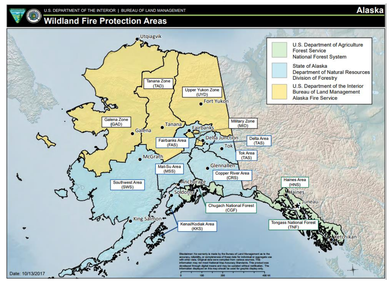
Interviews:

- **Sampling**: purposive sampling[11] of fire managers, land managers, and ecologists from federal and state agencies, Alaska Native organizations, and boroughs
- **Collection**: 41 semi-structured, individual interviews about manager priorities, challenges, science needs, and future directions
- **Analysis**: thematic analysis of transcripts,[1] using focused coding and memoing techniques[5]

Governance system drivers: What influences adaptability?

Institutional background:

- **Current arrangements**:
  - Complex jurisdictional mosaic
  - Three state and federal fire suppression agencies fight fires across jurisdictional boundaries and share suppression resources
  - Initial attack options: critical, full, modified, limited
- **History**:
  - Limited staff forced newer units to rely on existing BLM suppression infrastructure
  - Agencies wrote statewide interagency fire management plans



Protection responsibility areas for suppression agencies. Source: https://fire.ak.blm.gov/predsvcs/maps.php

Current external context:

- **Legal**: mandates for resource management; laws to protect Alaska Native land and subsistence hunting
- **Resources**: limited funding and staffing; sufficient information and scientific input
- **Public pressure**: smoke pollution; subsistence hunting
- **Biophysical**: Alaska is big with few roads; low population density

Internal formal governance structure:

- **Statewide interagency documents**:
  - Mechanisms for communication among agencies about incident management and billing for suppression costs
  - Biannual interagency meetings to discuss needed changes in planning or operations
- **Regional and local collaborative arrangements:**
  - Planning and pooling of resources for large fuel breaks
  - Coordination of public outreach and information

Internal informal governance factors:

- **Networks**:
  - Managers are centralized in Fairbanks and Anchorage and have good relationships
  - Some difficulty with communication between separated land and fire managers
- **Culture**:
  - Managers generally agree on ecological priorities and the need to address climate change
  - Fire managers should be more involved in land management and land managers should be more involved in fire management

"It's trust developed through relationships between the agencies. … I think it's just about those relationships that makes it work."

Conclusions: Advantages and disadvantages in the Alaskan system

Evidence of adaptive governance:

- **Polycentricity**: actors have good relationships across multiple, overlapping agencies with decision-making authority
- **Scale**: the scale of disturbance management may not fit the scale of natural resource management

External constraints to changes in management approaches:

- The agencies have the informal and formal structures in place to adopt new management approaches, but external context may prohibit change
- Biophysical and resource limitations constrain implementation of increased fuels management activity to adapt ecosystems to climate change
- Agencies may have to reconceive of management priorities or responsibilities

Firefighters on a prescribed burn fuel break at Fort Richardson Army Base. *Credit: R. Jandt*

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