USGS Fire Science Update

TFRSAC 2022 November

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For additional information:

www.usgs.gov/fire

USGS Fire Science Fact Sheet

https://doi.org/10.3133/fs20193025

USGS Wildland Fire Science Strategic Plan, English & Spanish

https://doi.org/10.3133/cir1471

12-year compendium of fire science at USGS

https://doi.org/10.3133/ofr20191002

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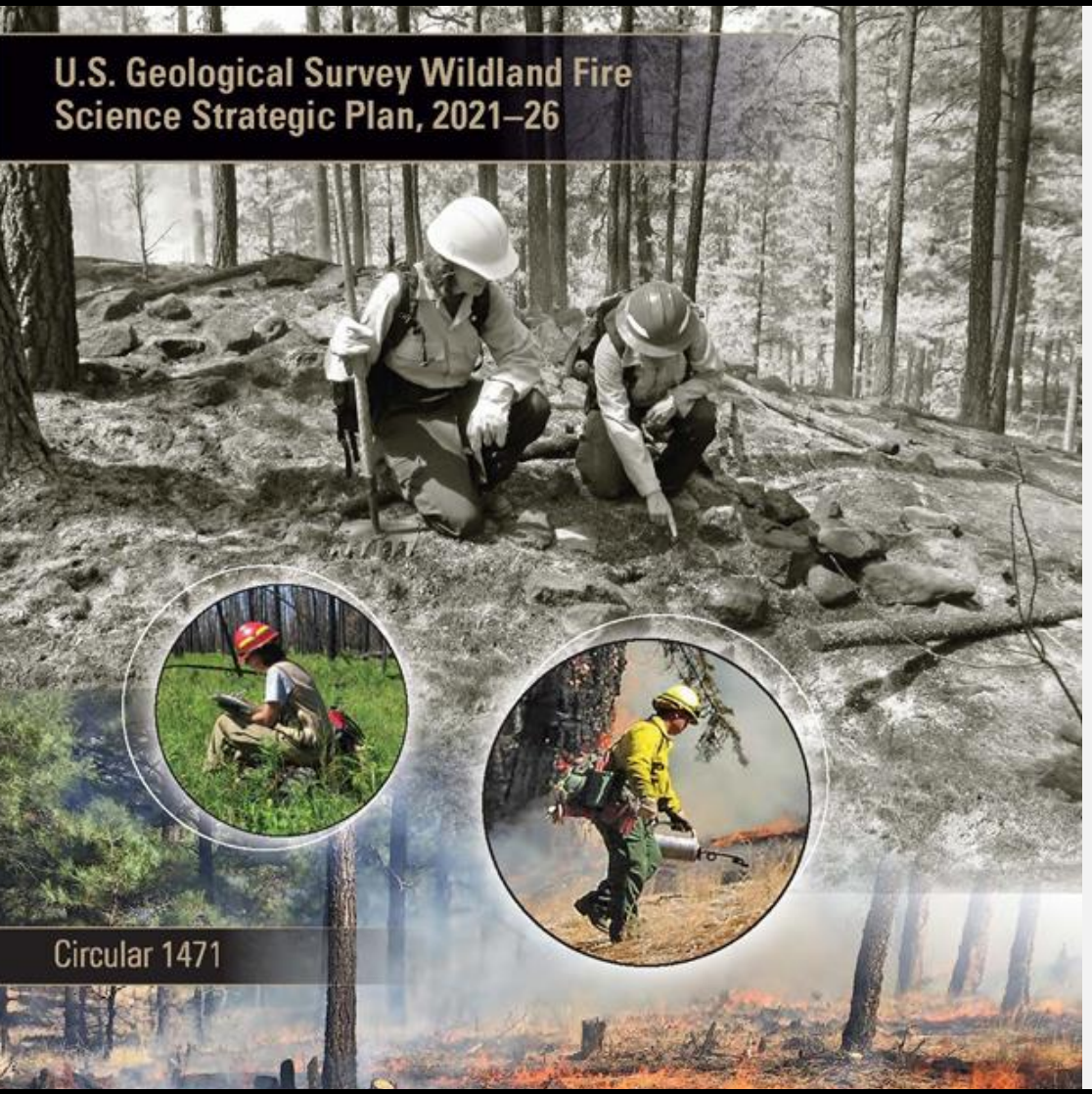


USGS Wildland Fire Science Strategic Plan

Priority 1: Produce state-of-the-art, actionable fire science

- **Goal 1:** Impact of climate change and other stressors
- **Goal 2:** Fire and its management for conservation, ecosystem resilience, and post-fire recovery
- **Goal 3:** Protect human lives, livelihoods, property, & infrastructure
- **Goal 4:** Develop state-of-the-art tools and decision-support

Priority 2: Engage stakeholders in science production

Priority 3: Effectively communicate USGS fire science capacity, products, and information

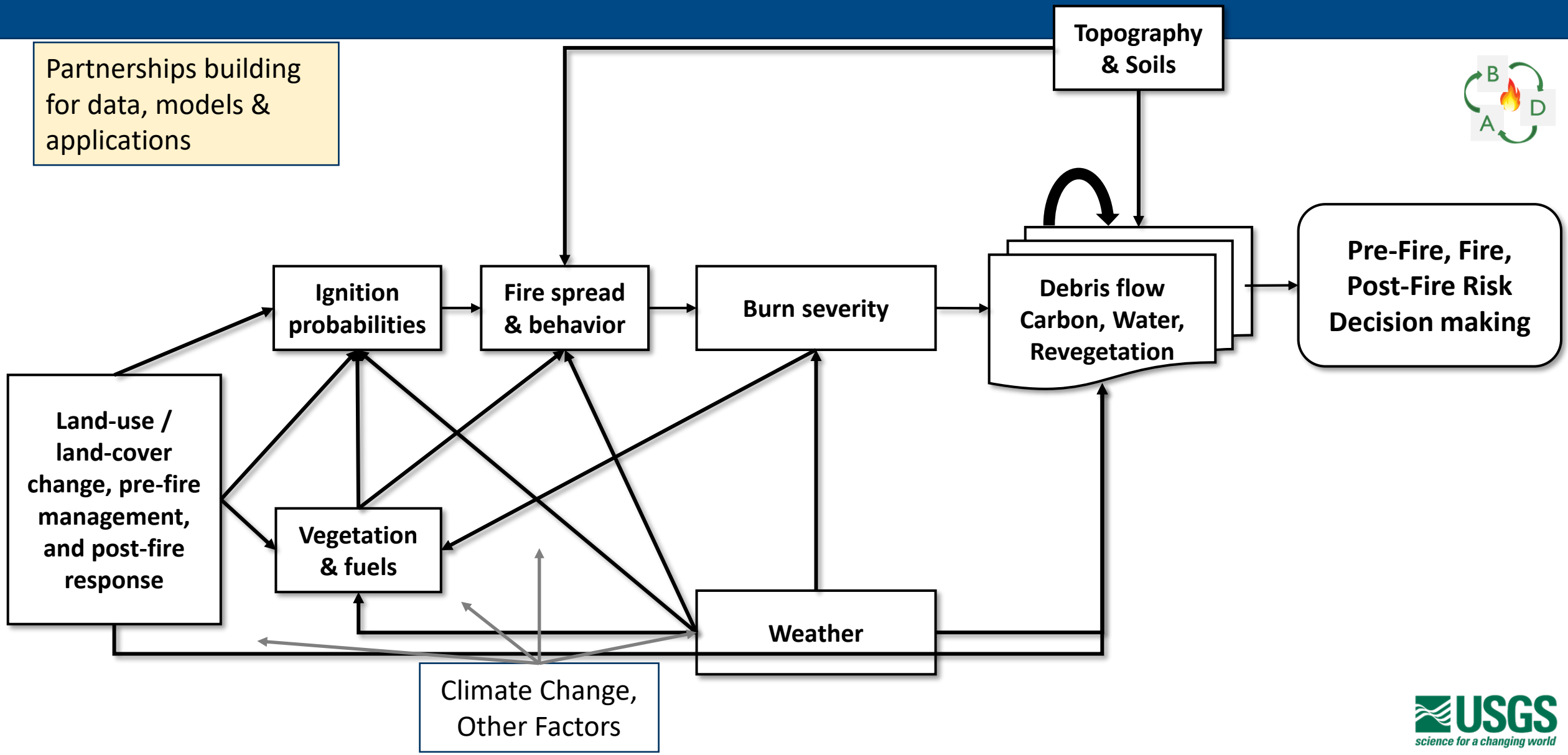
Priority 4: Enhance USGS organizational structure and advance support for fire science

U.S. Department of the Interior
U.S. Geological Survey

USGS Wildland Fire Science Strategic Plan (English, Spanish) https://doi.org/10.3133/cir1471

Advanced Integrated Fire Research

Partnerships building for data, models & applications



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BIL SCIENCE SUPPORT
RISK EVALUATIONS AND ASSESSMENT

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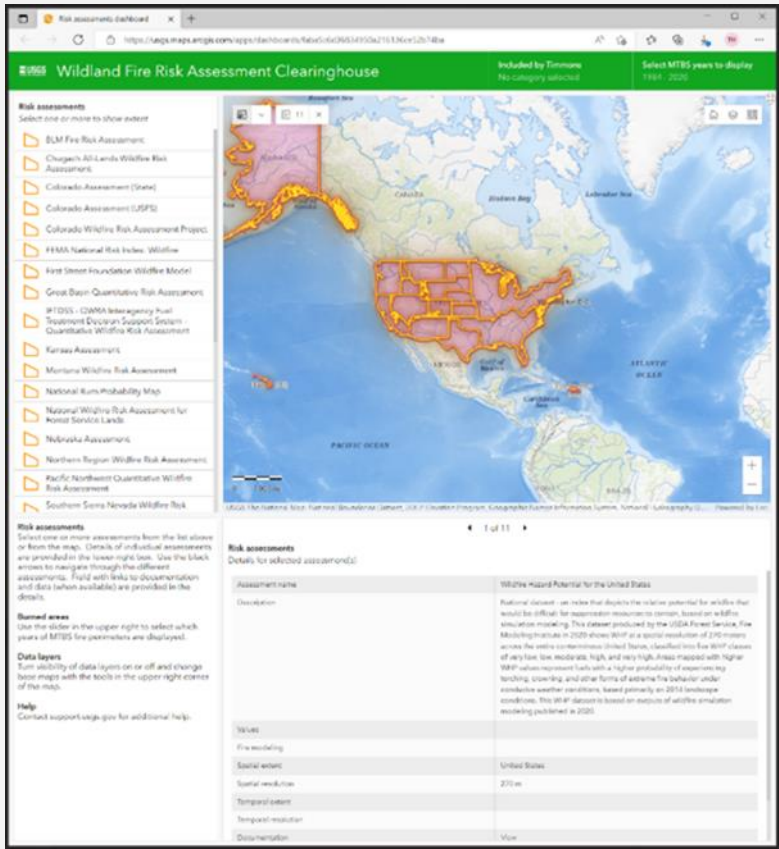
Evaluating risk and hazard reduction with systems and tools that adequately reflect DOI lands.

- National level metrics do not account for local or regional variation in fuels, values at risk, or ecosystem outcomes, particularly on DOI lands.
- Test national risk approaches for WUI losses and other values at risk towards developing better national fire risk model.
- Create a database of all current regional to national risk and prioritization assessments and layers for all DOI lands to characterize and communicate shovel ready projects the scales of large damaging wildfires.
- Produce rapid assessments of at-risk watersheds in relation to changes in fuels and fire history.
- DOI Innovation Landscape Network will test new prioritization approaches and tools for treatment prioritization, monitoring, and hazard assessments.

Risk Assessment Clearinghouse created in Year 1 to capture metadata of existing risk assessments and evaluate their ability to map hazards/susceptibility and identify gaps in DOI values at risk.



BIL SCIENCE SUPPORT
MONITORING TREATMENT EFFECTIVENESS
TLS FOR PLOTS, ALS FOR LANDSCAPES

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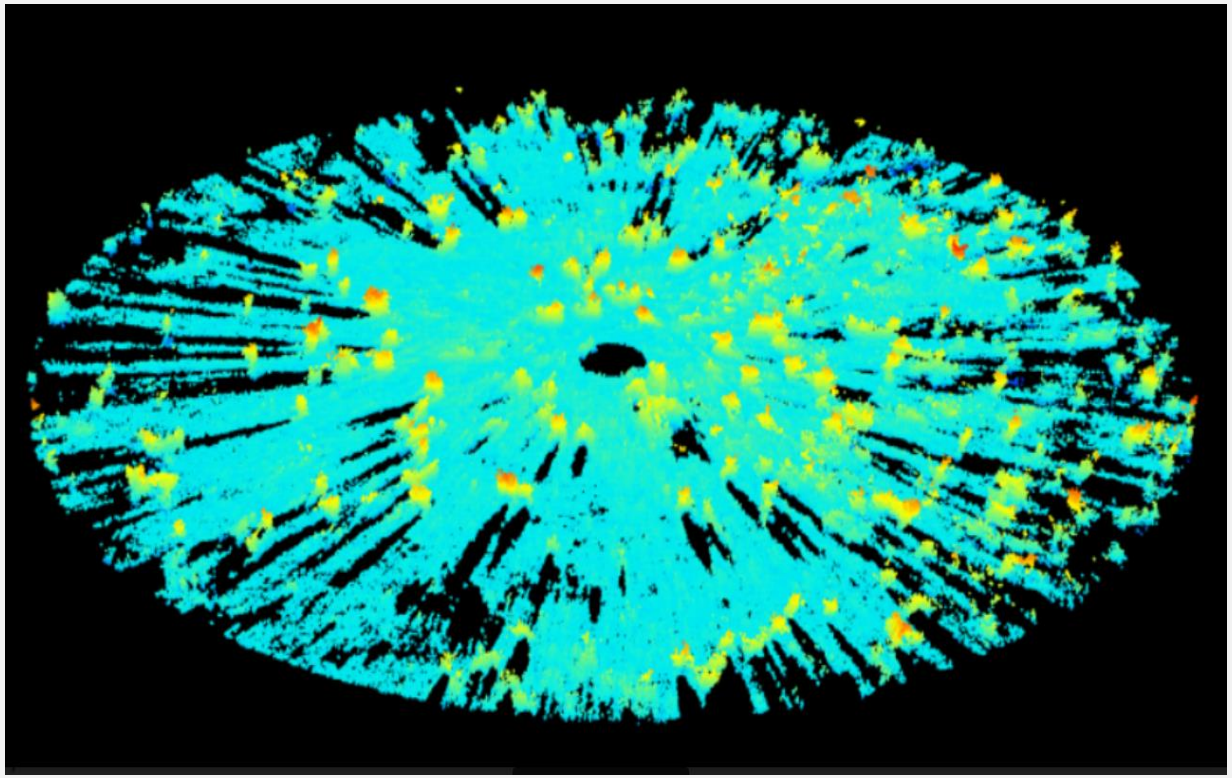
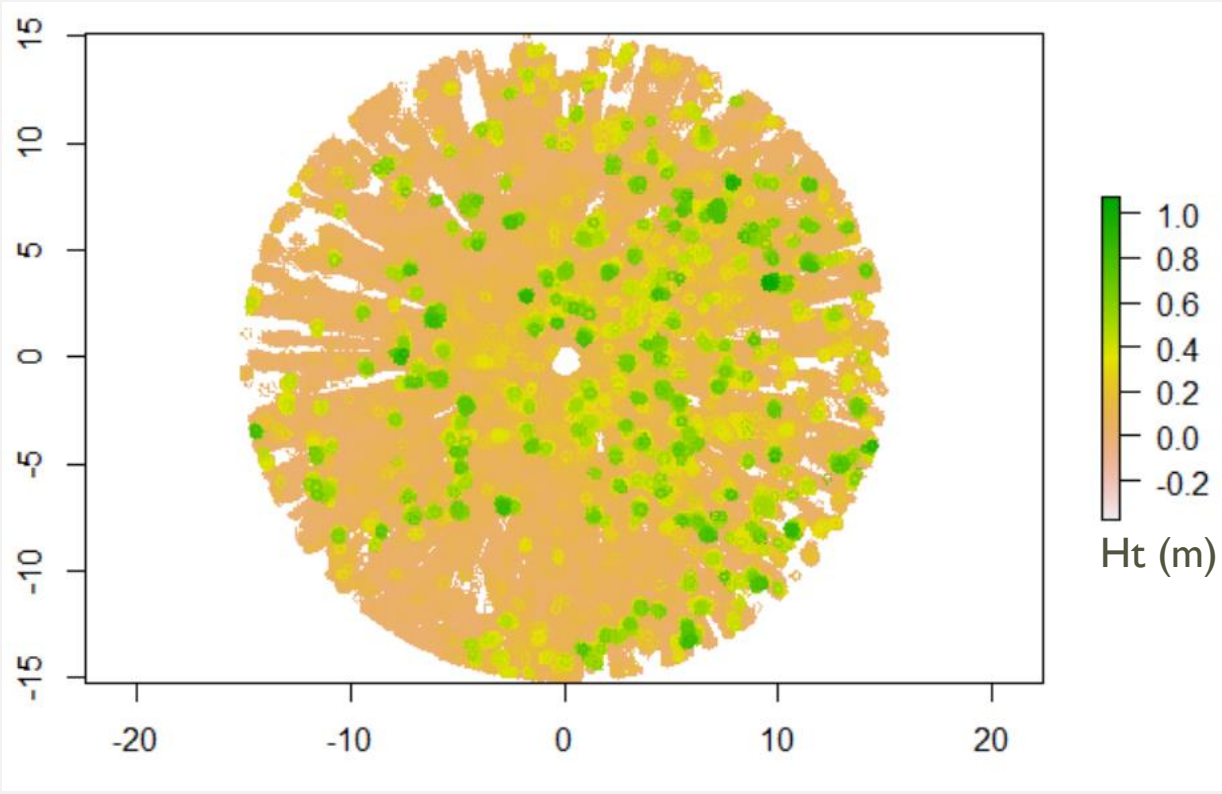
TLS provides repeatable, rapid, and cost-effective means of monitoring changing ecosystem structure in response to fuel treatments and vegetative change. Co-locate plots with existing monitoring efforts for maximum value.

- *Leica BLK360:* 2 lbs. TLS that takes plot data in 3 minutes; color panorama included.
- Scans of sagebrush in SW Idaho using TLS; automatic scripts separate sagebrush from grass





BIL SCIENCE SUPPORT
SCENARIO MODELING: ADVANCING NEW TOOLS

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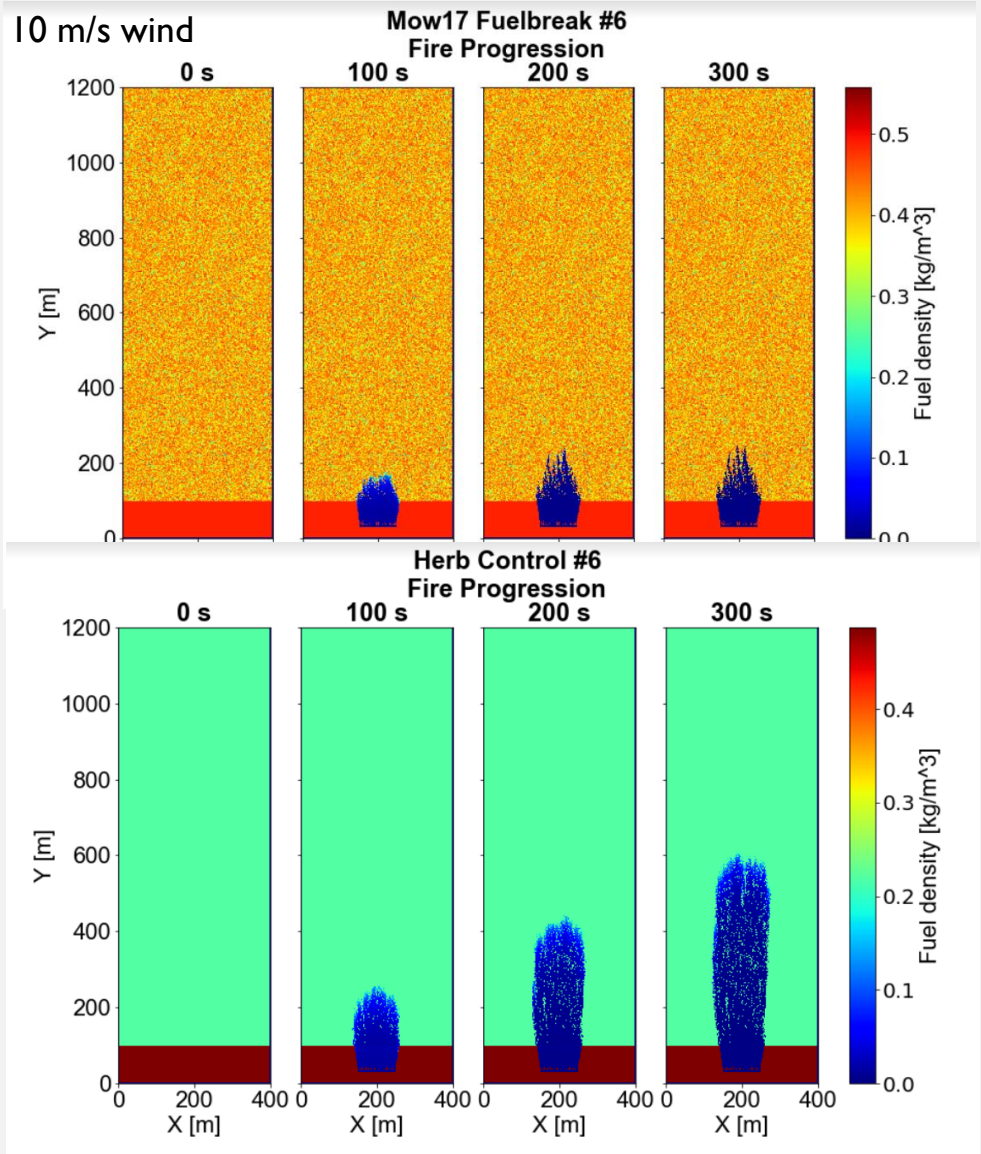
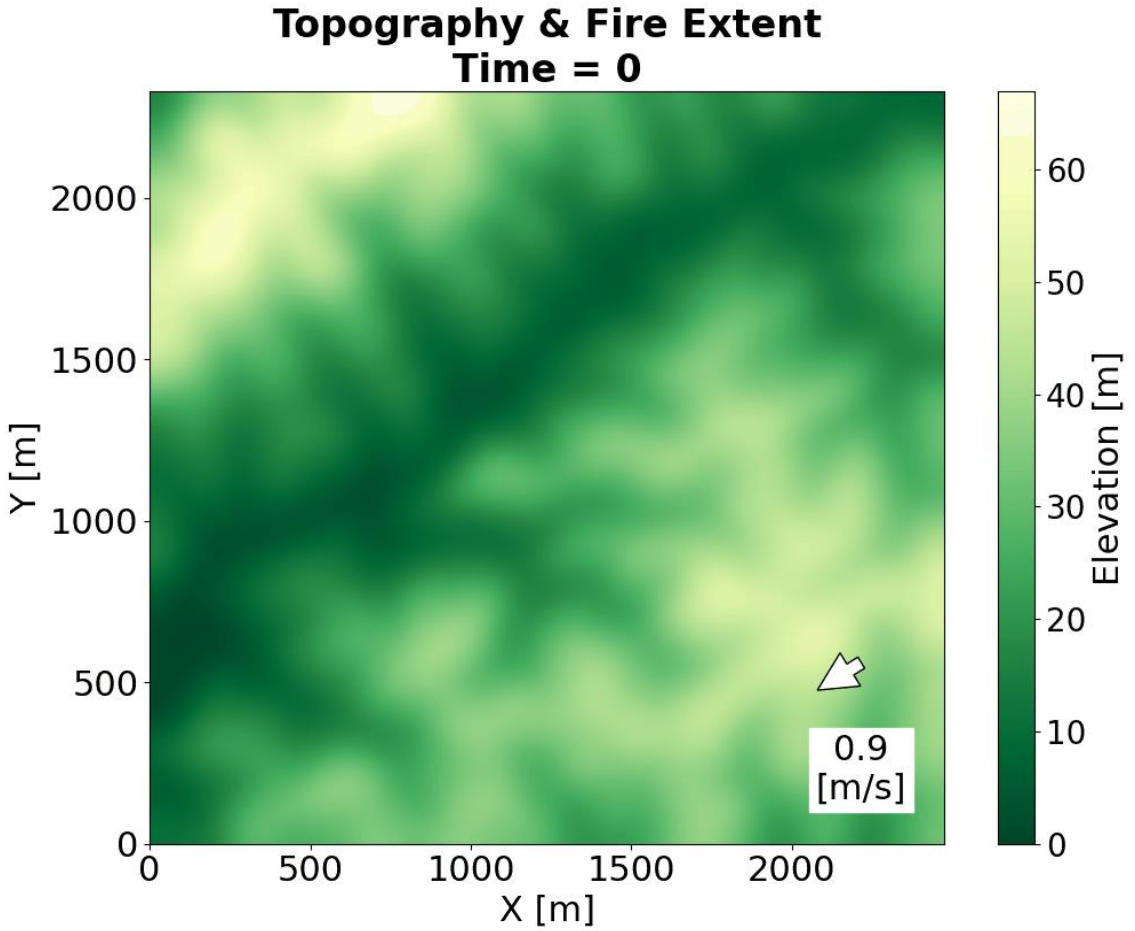


QUIC-Fire/BurnPro3D/WiFire Commons for fuel break and prescribed fire scenarios



SCIENCE-TO-MANAGEMENT: INNOVATION LANDSCAPE NETWORK

- Develop a network of landscapes for applications
  - Continuous focus - Local managers/staff, post-doc, facilitation, regional experts
  - When needed – special expertise and support
- Multiple landscapes will have a supporting science team, interdisciplinary expertise
- National coordinator and access to national data and science support
- Converging local to national

Data Sets

- EROS - Landfire
- MTBS & Fire Boundaries
- Invasive Species
- Plant & Wildlife Distribution
- Ecosystem Status
- Weather
- Values – e.g., infrastructure, ecosystem services

Model & Science Support

- Fire Behavior & Risk
- Invasive Spp Spread
- Climate Change & Carbon
- Post-fire Risks
- Fire Ecology
- Wildlife Habitat
- Water Flow & Quality

Landscape Team

- Land Mangers – Treatments, Values/outcomes, Plans
- Post-Doc & Scientists – Modeling & Analysis, Data, Monitoring
- Facilitator/Planner

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LINKING TREATMENTS TO CLIMATE CHANGE: INTERAGENCY MODELING COOPERATIVE

What

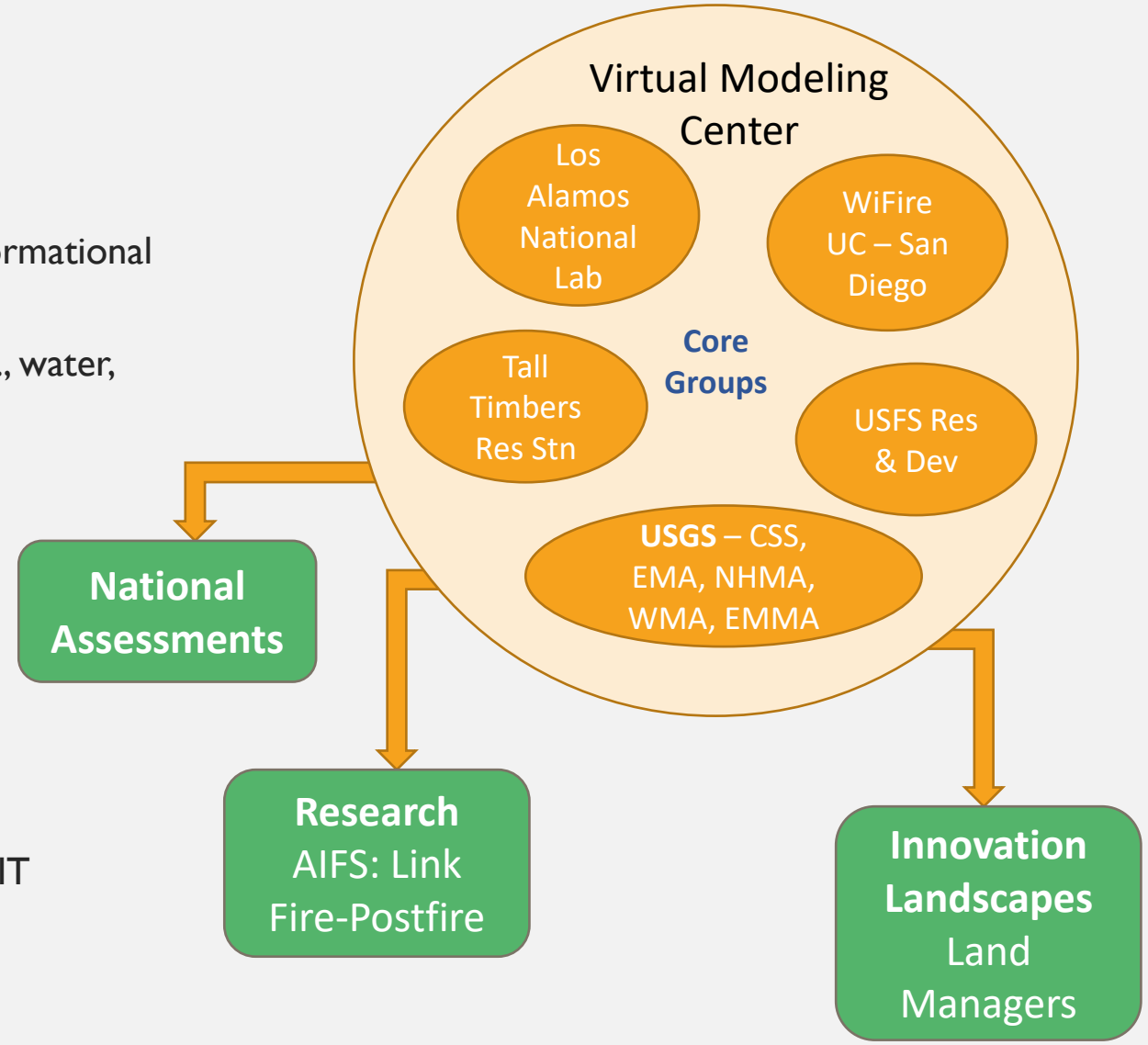
- Community of willing experts – modeling, analytics, data
- Extend concept of NSF-funded WiFire Commons

Why

- Join efforts to solve science and management problems – transformational
- Complicated issues, quickly changing, existential need
  - Fire linked to climate, carbon, wildlife, ecosystem services (e.g., water, grazing, timber), invasive species, vegetation growth, …

How

- Organized partnership – MOU, charter
- Core & contributed funding, home agency, operational principles
- Open source; model code and data curation
- Easy access to data and models
- Application targets – science and management
- Identify near-term demonstration targets
- Establish Fire Science Enterprise Architecture, integrate with WFIT



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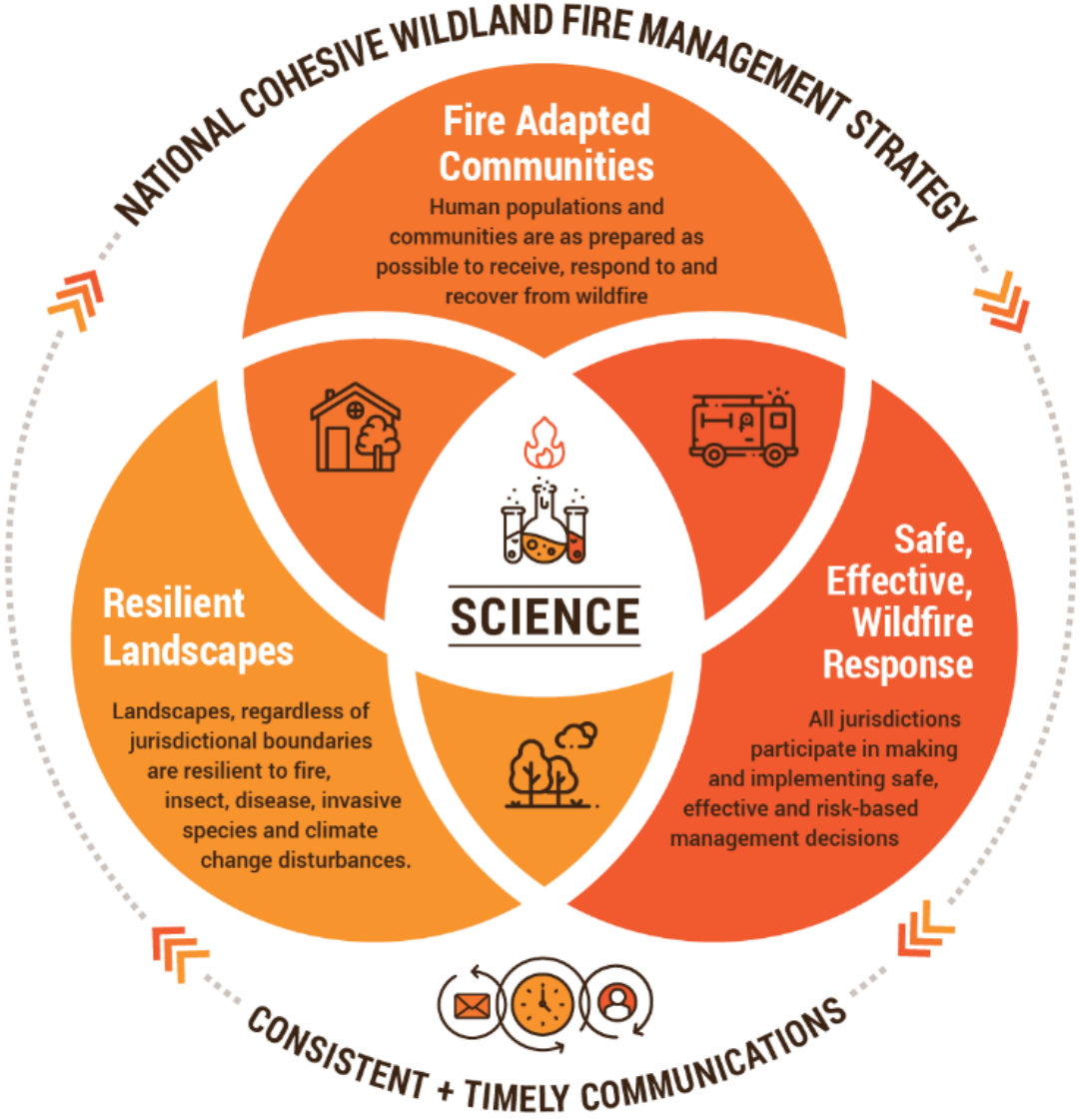
National Cohesive Wildland Fire Management Strategy

Wildland Fire Leadership Council

2023 Update

- Climate change & stressors
- Science throughout



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Wildland Fire Mitigation and Management Commission

Workgroup Topics

Aviation SPECIAL TOPIC

strategy to meet aerial firefighting equipment needs through 2030 in the most cost-effective manner

Response Coordination

evaluation of coordination of response to and suppression of, wildfires occurring across jurisdictions. Includes suppression remediation.

Science, Data & Technology

policy change for modernizing and expanding use of technology. Includes data-mining issues and data diversity.

Public Health & Infrastructure

utilities, transportation, occupational health, monitoring and alert infrastructure, water, public health, and evacuation. Physical health infrastructure.

Appropriations

assessment of Federal spending, performance measures, and accountability for wildland fire-related disaster management

Communities

structure ignition zone (e.g., modifications to structures and landscapes, defensible space) insurance, Community Wildfire Protection Plans, land-use planning, codes and ordinances, long-term recovery planning, risk assessment, community risk reduction.

Workforce

compensation, recruitment and retention, staffing structure, and ways to meet the challenge of filling workforce capacity needs (including workforce support structures like housing as well as workforce health and wellbeing)

Post-fire

Social recovery, long-term recovery planning, flood after fire. Includes and remediation and reforestation post fire,

Cohesive Strategy

review of the Cohesive Strategy and recommendations for increasing its effectiveness

Landscapes

landscape treatments, prescribed fire, landscape planning (including discussion of CEs and capacity). Includes industry and wood utilization.

Systems

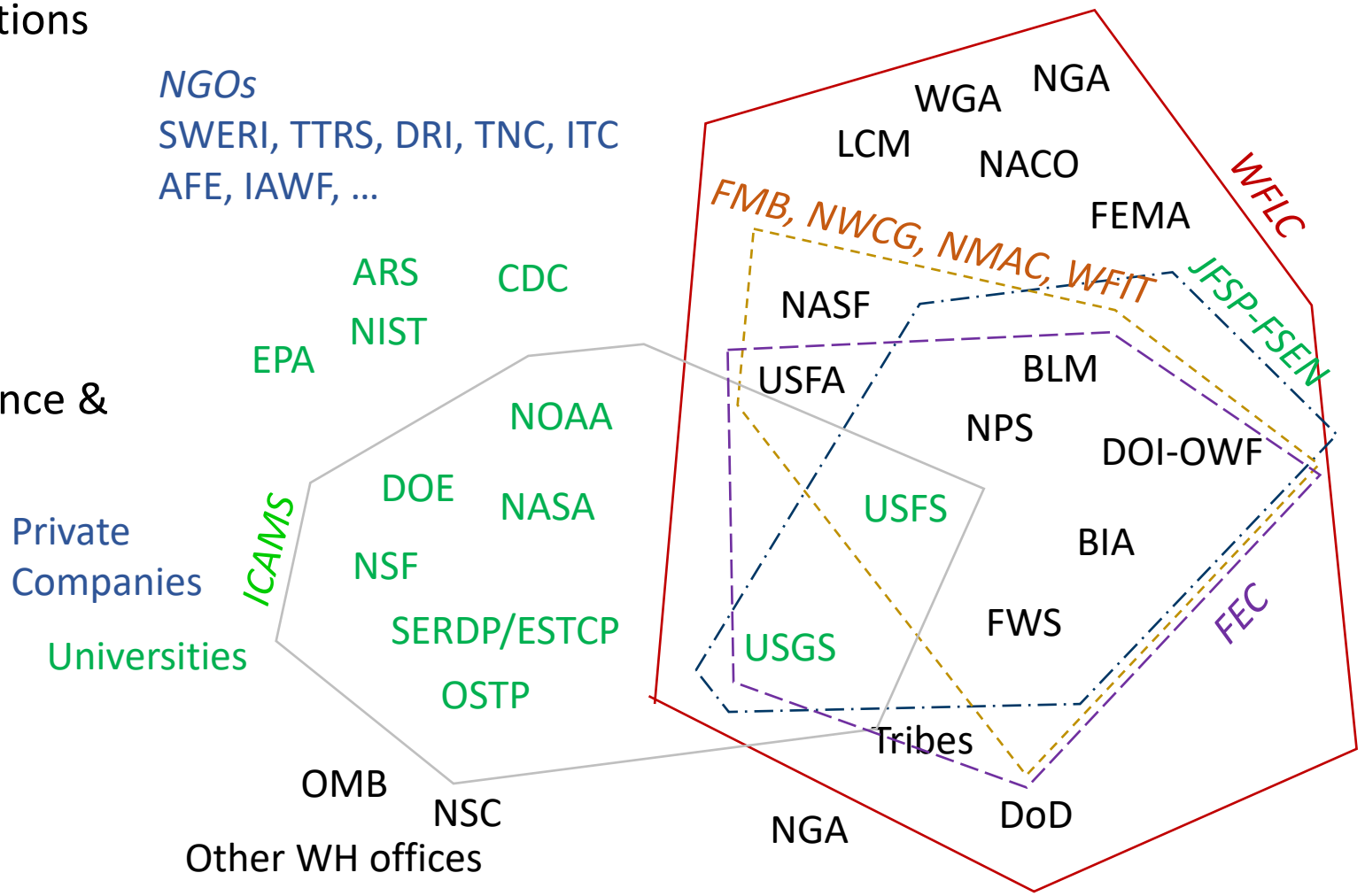
review of systemic change options

https://www.usda.gov/topics/disaster-resource-center/wildland-fire/commission

All workgroups will share members, include crosscutting themes like climate change and equity, and may hold joint sessions.

What are the sources of science for fire management?

- Many Science & Management Organizations
  - Governance & leadership groups/committees
  - NGOs & Companies
  - Dozens of universities
  - Professional societies, publications
- Need overall science strategy
- Collaboration/coordination across science & management



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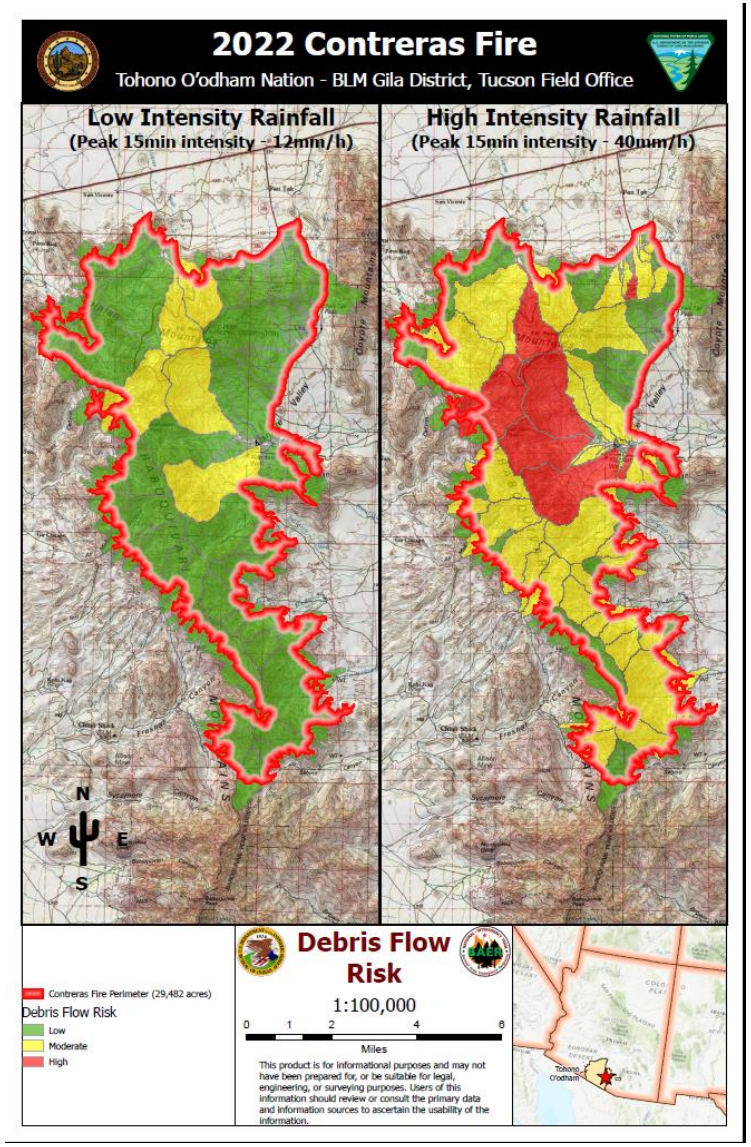
USGS Active Incident Response

- USGS continuing to grow capacity to support active incident response.
- Serving and/or in training as GIS specialist, IR interpreters, public information officer, UAS pilot, radio operator, hydrologist, documentarian…



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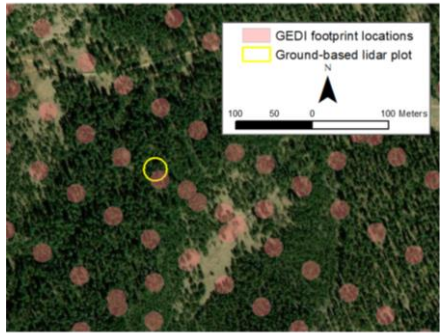
Emergency Supplemental
Post-Fire Integrated Science Project

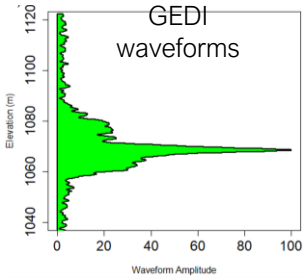
Post-fire Hazards and Impacts to Resources and Ecosystems (PHIRE): Support for Response, Recovery, and Mitigation

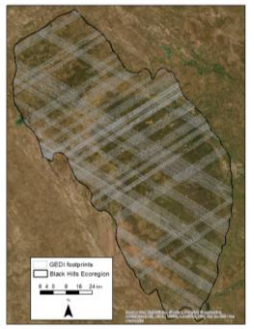
- Provide improved tools, information, and assessments to enhance understanding of short- and longer-term post-fire environmental dynamics related to post-fire trajectories of vegetation recovery associated with the characteristics of fire and their relationship to ongoing hazards and resource vulnerabilities including post-fire debris flows, sedimentation, and changes in water quality and quantity.
- Study areas – California: Caldor Fire, Dixie Fire, KNP Complex; Washington: Cedar Creek Fire, Muckamuck Fire

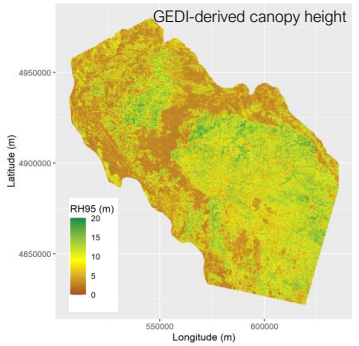
Scaling of RS data and derived products



Space-based

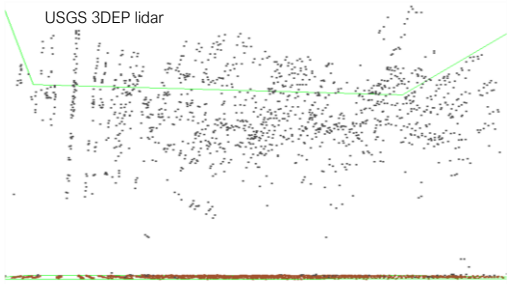


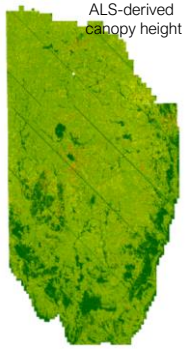




Regional-level

Airborne

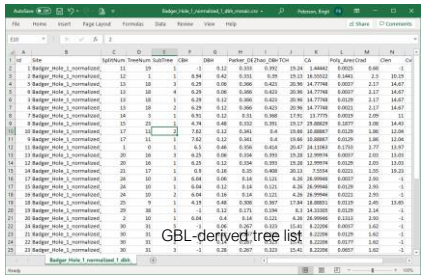




Landscape-level

Ground-level

Plot-level



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