

# Northern Rocky Mountain Science Center

## Fire Science

### What is needed?

Fire shapes western landscapes. When a wildfire burns, people often think of the loss of green forests and, in some cases, loss of human life or property. Yet many plants and animals are adapted to fire. Thus, fire often is required to maintain healthy ecosystems. USGS scientists work to understand the role of fire as a natural process and its effects on soil, water, animals, plants, and people.

Two topics have significant bearing on problems facing fire managers today:

- *A critical need to assess effects of wildfires and fire use on public lands* – Managers need information for accurate delineation of burned areas and to quantify severity of impacts. This basic information feeds a myriad of decision-making factors: economic evaluation, rehabilitation choices, erosion and runoff potential, flood and debris flow risks, habitat and wildlife values, and subsequent fire prescription or suppression activities. The information is essential to verify existing fire models, and develop better models in complex landscapes, thereby improving prediction capabilities.



Sharon fire, Glacier National Park, Montana

- *The need to understand relationships and trends in climate, fuels, and fire* - Improved fire chronologies and climate histories, coupled with refined fuel models are essential to evaluate risk levels and make informed prescriptions in fire use.

### What are we doing?

The USGS Northern Rocky Mountain Science Center is building capabilities for the remote sensing and evaluation of burns. Working with diverse institutions and individuals in fire science and information technology, we advance mutual interests of fire science partners by undertaking relevant research, and by disseminating findings through coordination and technology transfer.

Our scientific objectives address current problems:

- *Expand knowledge of the historic role of fire in natural systems, with emphasis on understanding variability and identifying thresholds in fire regimes and vegetation* – We develop applications of this information, linking current fire history and climate to assess how far given areas deviate from conditions of natural fire potential.
- *Provide ways to better evaluate fire potential and risk, incorporating historic, current and projected future conditions* - Contributing factors include lightning potential, fuel accumulation, flood and debris flow below burned areas, and probable fire weather, both in near- and long-term trends. Focus areas are suburban and rural zones that interface with wilderness or semi-wilderness, but also include forest zones where management is feasible and suitably beneficial.
- *Test and identify better ways to prescribe fire to promote forest health and reduce risk to human values* - Land managers, operating under various mandates, have different objectives for fire use; some to sustain natural vegetation types, others to reduce fuels or to enhance certain wildlife values. Products enable managers to identify where fire is needed, under what conditions it should be applied to reach objectives, and how to evaluate results.

- *Develop and implement useful ways to inventory and monitor fire effects* – We assess wildfires and fire use on public lands through the application of remote sensing technology. Objectives are transferable approaches that demonstrate reasonable feasibility on regional-to-national levels. Products provide a basis for evaluating or comparing burns in a standardized framework; to maintain fire atlases, develop prescriptions, monitor changes, and model processes.

Our goals for disseminating findings are:

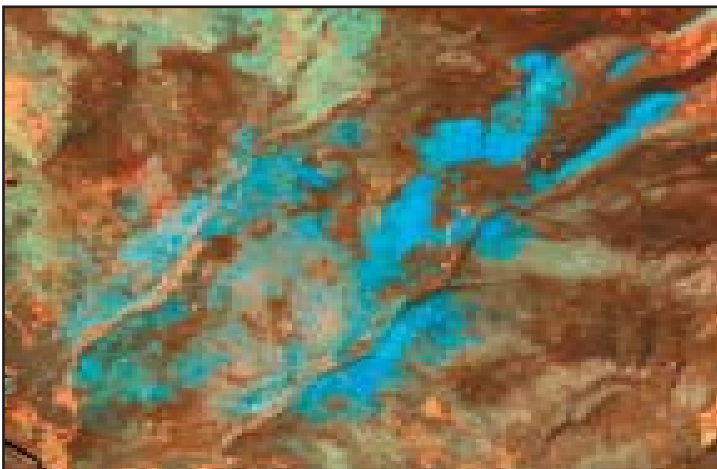
- *Develop better ways to convey fire information to managers and the public through geographic information systems and web tools* - We see this ultimately implemented as a national distributed network that functionally covers all regions.
- *Optimize interaction within the fire science community through partnering, coordination, and cooperation, so that we collectively develop better, more targeted and complementary science* - With standard protocols, burning status and trends may be aggregated for regional or national reporting, planning, and distribution of resources.

## Who will benefit?

Managers of public lands in the Northern Rocky Mountains and the concerned public will benefit from the information developed and shared through this fire science initiative. It involves collaboration with land management agencies and scientific institutions including the National Park Service, U.S. Forest Service, University of Montana, and Montana State University. The USFS Rocky Mountain Research Station's Fire Sciences Laboratory in Missoula is a key partner, as is the Interagency Joint Fire Sciences Program. The USGS EROS Data Center also has a key role in the implementation and production of remote sensing products for multi-regional to national

## For additional information contact

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False-color composite of raw LANDSAT data.



Burn severity from low (dark to light) through use of the Landsat-derived "Normalized Burn Ratio" and change detection techniques.

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