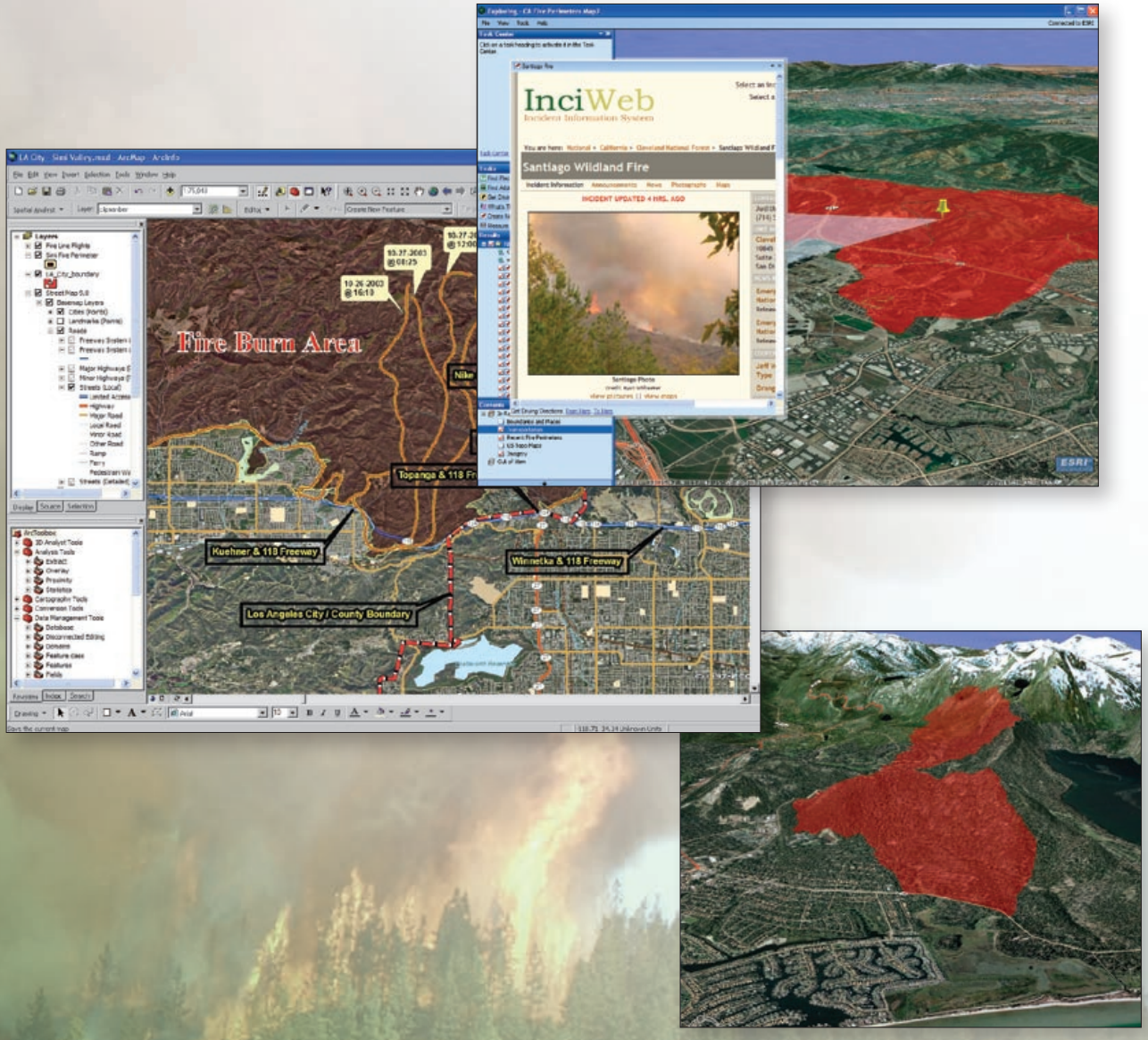
Wildland Fire

GIS Solutions for Wildland Fire Suppression



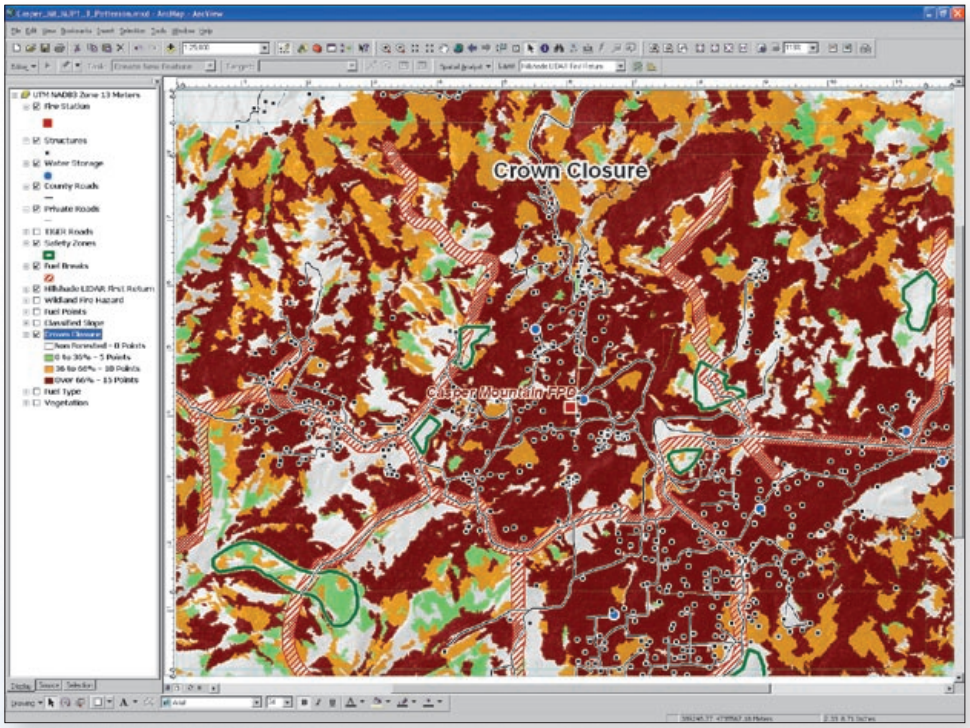
ESRI

Applying GIS Technology to Wildland Fire

Having the Right Information when You Need It Most

When it comes to wildfire protection local, state, and federal agencies must be able to respond at a moment's notice. Protecting life, property, and natural resources requires comprehensive planning, mitigation, coordination, response, and recovery. Agencies must continually improve service levels without increasing budgets.

ESRI and its public safety partners understand the unique challenges you face—from simple fire suppression to complex, large-scale incident response involving numerous agencies. ESRI's geographic information system (GIS) platform is designed to meet the needs of the wildfire protection mission. It gives you the right tools to make accurate decisions under any conditions.



This mountain forest crown closure map was derived from light detection and ranging (lidar) data and verified by Casper Mountain Fire Protection District and Wyoming Forestry Division staff.

Planning

GIS technology provides easy-to-use tools for maximizing all types of information and data for planning requirements. GIS stores spatial information in a digital mapping environment that allows fire managers to quickly select and view data that can influence fire behavior. Factors such as vegetation types, slopes, aspects, natural or man-made barriers, and historical weather patterns can be overlaid to determine fire hazards based on modeling potential fire behavior. The likelihood of wildfire ignitions can be predicted by locating historical fire locations and identifying potential ignition sources (e.g., power lines, roads, industrial areas, housing areas). Additional actions, such as vegetation modification, fire prevention programs, and code compliance, can be planned and modeled using GIS.

Mitigation

GIS allows you to analyze, visualize, and prioritize values at risk, such as housing developments, utility infrastructure, wildlife, and natural or cultural resources. Many communities use GIS to analyze their vulnerability to wildfire. Information-rich maps help determine the actions necessary for developing effective wildfire protection.

Wildfire agencies use GIS to

- Determine areas vulnerable to intense fire behavior.
- Identify critical values at risk.
- Predetermine fire tactics and strategies.
- Establish situational awareness through a GIS-based common operating picture.
- Produce key maps and analysis to support fire suppression operations.
- Identify and analyze fire damage to develop rehabilitation plans.
- Inform the public of changing conditions such as road closures and threatened areas.

Fire Decision Support Tools

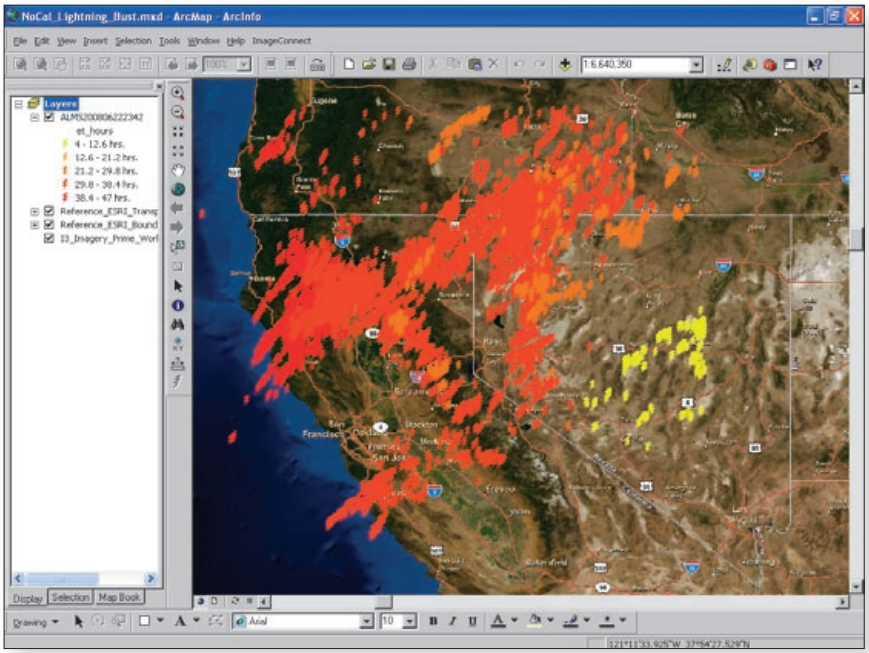
Increasing Situational Awareness and Providing Firefighter Safety

Response

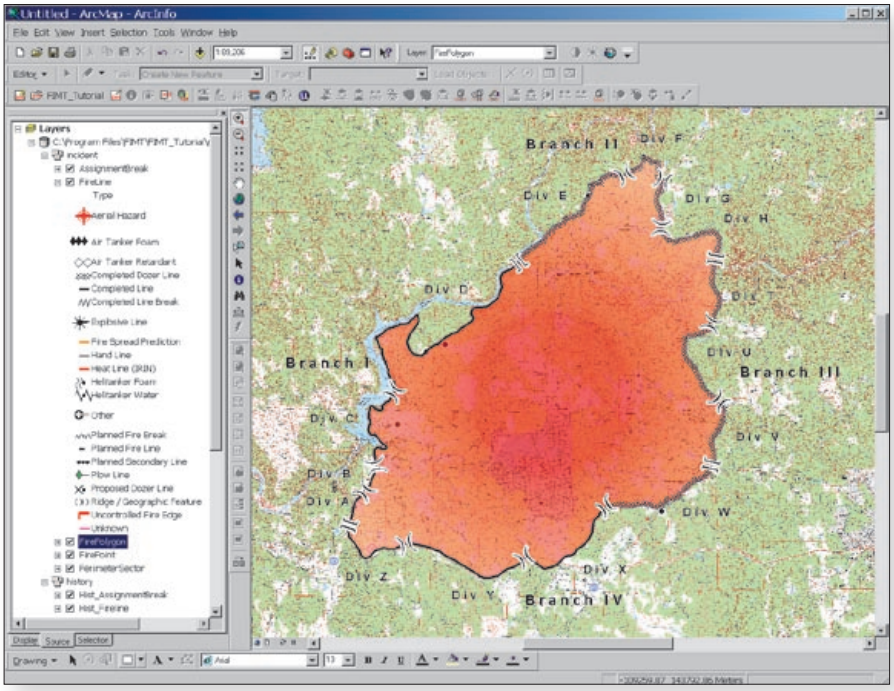
Successful response starts with a map. Today, first responders have access to intelligent maps—maps built using databases and powerful modeling capabilities. GIS provides first responders with detailed information when and where they need it for a faster and safer response.

For example, with little technical skill required from fire personnel, a GIS application on a dispatcher's console, vehicle-mounted computer, or handheld PDA will provide detailed information to answer questions such as the following:

- Where is the fire located?
- What is the best way to access the fire?
- What is the terrain and fuel type?
- Where are the evacuation routes?
- What are the hazards to responding units?
- What are the values at risk?
- Whose jurisdiction is the incident within?



ArcGIS shows lightning strike activity over the western United States. First responders use this data to determine ignition points.



The Fire Incident Mapping Tool extension for ArcGIS is used to manage and support wildfire incidents.

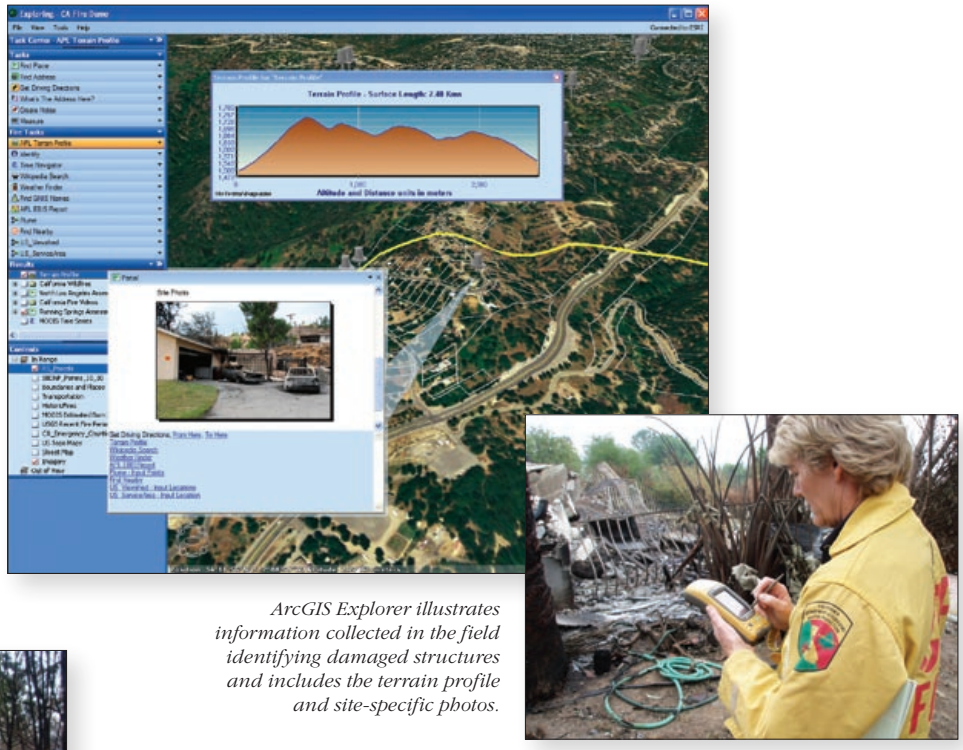
In addition to providing first responders with detailed initial response information, GIS supplies incident commanders with overall situational awareness including

- Current weather conditions
- Location of on-scene and responding units
- Vegetation conditions
- Predetermined protection priorities
- Evacuation requirements
- Suitable locations for staging and incident command posts

Incident commanders use dynamic, real-time data combined with incident data to expand operations and respond to changing conditions.

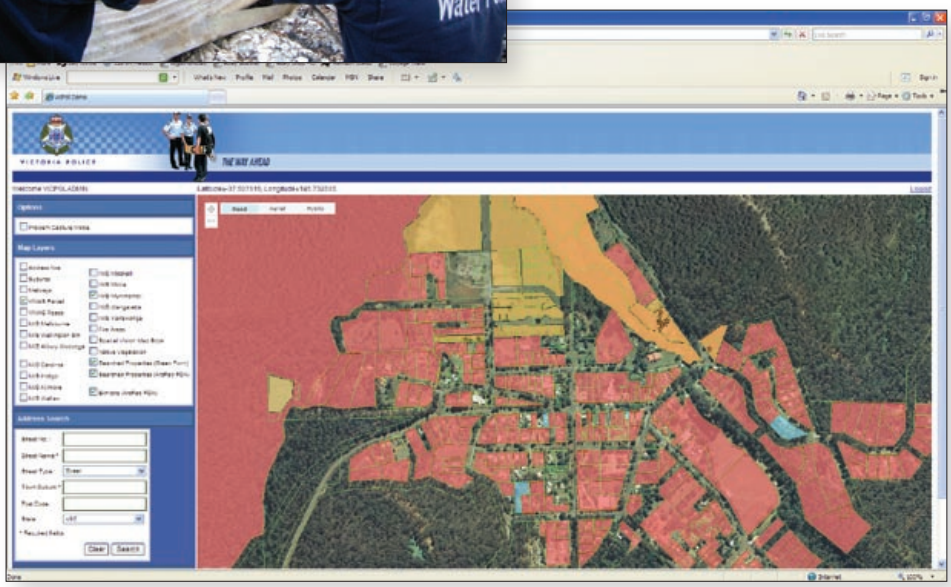
Recovery

GIS enables fire personnel to conduct rapid and accurate damage assessment and rehabilitation requirements after an emergency. Wildfire staff members use GIS integration platforms for the collection, analysis, and display of various types of postincident data. GIS and GPS-enabled laptops and PDAs can be used to collect accurate damage information from the field. This data is integrated into a central GIS database for comprehensive analysis and display.



ArcGIS Explorer illustrates information collected in the field identifying damaged structures and includes the terrain profile and site-specific photos.

PDA's and GPS enabled digital cameras were used to document properties searched after the Australia bush fires.



After the Australia bush fires of 2009, this Internet map viewer was used to identify parcels searched during recovery.

The GIS map provides an overall view of damage and recovery needs with location-specific photos and reports including

- Severity of damage to buildings
- Status of infrastructure and utilities
- Condition of landscapes
- Impact on natural resources

This data can be analyzed for recovery and rehabilitation funding requests. It can also be quickly shared with other agencies and organizations.

GIS Scalability for Public Safety Personnel

GIS technology supports all aspects of the wildland fire mission. ESRI's open, scalable architecture supports small, midsized, and large agencies. Four distinct user groups have been identified that benefit from GIS during a wildland fire incident:

First Responders

First responders, crew bosses, strike team leaders, and helitack personnel often rely on spatial information, as well as their knowledge of fire behavior, to predict fire spread and appropriate suppression tactics. GIS supports the need to assess the situation and determine actions that ensure safety of personnel and effective deployment.

Chief Officers

GIS provides command staff members with the intelligence they need to develop cost-effective incident objectives based on land management goals and values at risk. GIS also enables incident commanders to quickly gain an understanding of events on the ground and potential impacts to life, property, and resources. They can better track resources, assess changing fire behavior, and measure progress toward meeting established objectives.

Staff Officers

Fire management staff officers and agency administrators maintain situational awareness through a GIS-enabled common operating picture. The common operating picture offers a near real-time view of events including

- Location and status of incidents throughout the jurisdiction
- Location of personnel and apparatus
- Current weather conditions
- Planned incidents and events in adjoining jurisdictions

Adding to the power of the common operating picture is mobile GIS capability. Using ArcGIS® Server, personnel can access and view the common operation from any Web-enabled computing device as well as update information from the field.

GIS Analysts

GIS analysts are trained personnel who use ArcGIS software routinely to support planning efforts and create maps to support incident operations. Incident management teams assign fire GIS specialists who provide critical support for wildland fire management operations. These wildfire professionals use GIS to model fire behavior, analyze fire effects, produce maps to support the incident action plan, and support damage assessment and recovery.

Learn more about GIS for wildland fire suppression at **www.esri.com/publicsafety**.

About ESRI

For four decades, ESRI has been helping people make better decisions through management and analysis of geographic information. Our culturally diverse staff work with our business partners and hundreds of thousands of people who use GIS to make a difference in our world.

A full-service GIS company, ESRI offers support for implementing GIS technology from the desktop to enterprise-wide servers, online services, and mobile devices. GIS solutions are flexible and customizable to meet the needs of all our users.

Our Focus

At ESRI, we focus on promoting the value of GIS and its applications throughout the world and pay close attention to our users' needs. Our software development and services respond to our customers with products that are easy to use, flexible, and integrated. Our technology is multidisciplinary, productive, and valuable to our users.

We have a strong commitment to educating our customers through ESRI's various training programs. ESRI is a socially conscious business and invests heavily in issues regarding education, conservation, sustainable development, and humanitarian affairs.

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