

Parcel Data and Wildland Fire Management

Prepared for the FGDC Cadastral Data Subcommittee

by

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Executive Summary

The Wildland Fire and Parcel Data Workshop was sponsored by the Federal Geographic Data Committee's (FGDC) Subcommittee for Cadastral Data in response to policies and guidance issued by the Western Governors' Association and to national homeland security needs for all agencies to be prepared and responsive in emergencies. The purpose of this workshop was to:

Examine the business requirements of wildland fire management and the related need for parcel data in a multi-jurisdictional environment.

This was a follow up to a 2004 workshop in Raleigh, North Carolina that explored the utility and issues of providing parcel data to emergency response operations in eastern states¹. One of the recommendations from this workshop was to "Determine the business requirements related to parcel data for the emergency responders in western states." As a result the Wildland Fire and Parcel Data Workshop focus was restricted to western states. Never-the-less we feel that the recommendations included in this document are applicable to both eastern and western states and follow up activities will include representation of parcel providers and the fire communities that are representative of all regions.

Wildland fire management was chosen because it provided an opportunity to assess the utility of the FGDC Cadastral Data Subcommittee's parcel publication standard in situations that would be common for emergency planning and response: 1) Information about the location of people and the characteristics of individual properties are required for critical decision making; 2) management issues transcend administrative and political boundaries, and 3) the business requirements demand cooperation and information sharing from multiple organizations.

Wildland fires are dynamic events that are affected by many things including but not limited to terrain, weather, and the availability of fuels. These events are different from other types of "regional" emergency response situations because intervention can reduce or eliminate the damage of a fire. When the western states were less populated the principle concern of wildland fire managers was the protection of the forest, but with a growing population in many western states there has been an increase in the number of residences and second homes in what is now known as the Wildland fire Urban Interface (WUI). This has complicated the wildland fire response because of the number of people and structures that may be in the path of a fire. Protecting these homes and communities requires that wildland fire planners and responders have ready access to information about all properties and structures in vicinity of a fire to help them determine where to best allocate their limited resources.

Representatives from various stakeholder groups were invited to attend the workshop. This multi-disciplinary group had a wide range of experiences and expertise with the business operations of wildland fire planning, response, and recovery as well as knowledge of cadastral information and its potential uses in emergencies. The three highest priorities identified by all groups during all phases of wildland fire response were the protection of life, structures, and the economic viability of a community. A list of information requirements were identified and analyzed by using the participant's experiences in planning for and responding to wildland fires.

¹ Parcel Data and Hurricane Isabel: A Case Study, David Stage and Nancy von Meyer, July 2004, p. 7, Internet, [http://www.nationalcad.org/data/documents/Hurricane Isabel Final.pdf](http://www.nationalcad.org/data/documents/Hurricane%20Isabel%20Final.pdf)

FGDC Cadastral Data Subcommittee

An assessment of the information needs from the workshop found that much of the critical information about property use and value came from local government. Workshop participants identified one-hundred and one (101) unique, information elements important to wildland fire management. Local governments were the sources of eighty-nine (89) elements and the only source for forty-one (41) elements, while federal agencies were the sources for forty-four (44) elements and the only source for twelve (12) elements. A further analysis of the sources found that federal agencies supply information about topography, vegetation, water sources, weather, access roads, and remote sensing data to spot and track the fires but it is the assessor's office and local governments that are the sources of the majority of information about the location of people, structures, and elements that are critical to the economic viability of a community.

There were two issues that were of concern in all phases of a wildland fire event, the availability and access to property information. Availability was defined as the conversion of parcel maps into a digital format. It has only been in the past ten years that the digital conversion has become reasonable for most communities. A 2003 study by the FGDC Cadastral Data Subcommittee found over sixty per cent of the parcels had been converted from paper to digital format in the U.S. Most urban areas had or were about to complete the conversion of their paper maps, but the more rural communities were not able to because they lacked the resources and expertise to take on a project of this nature. As a result digital parcel data is simply not available from most rural communities. The second issue is the haphazard availability of property information from the communities that do have digital parcel maps. There appears to be two reasons for this which are somewhat interrelated. First, local communities do not know what the wildland fire managers needs are and second, there is an absence of protocols or procedures for providing local data to emergency response teams.

Resolving these two issues and others identified in the report are not insurmountable as has been proven by some state programs such as Montana which has converted 99.5% of the parcels in the state which are available to wildland fire managers as regional or as a statewide coverage.

The following four recommendations with nineteen (19) specific tasks were developed to address the issues identified from the workshop. The details are described in Section 4 of this document.

Recommendation 1: Data Availability (Facilitate data conversion in rural communities.)

Recommendation 2: Data Access (Facilitate access to local parcel data.)

Recommendation 3: Ease of Use in Applications (Build an infrastructure that facilitates the development of regional parcel coverages.)

Recommendation 4: Awareness of the Value and Use of Cadastral Data (Promote the awareness of the value and utility of parcel data for wildland fire management.)

We recommend the FGDC Cadastral Data Subcommittee along with the Western Governors' Association Geographic Information Council and the wildland fire community work closely together to develop strategies to implement the recommendations of this report.

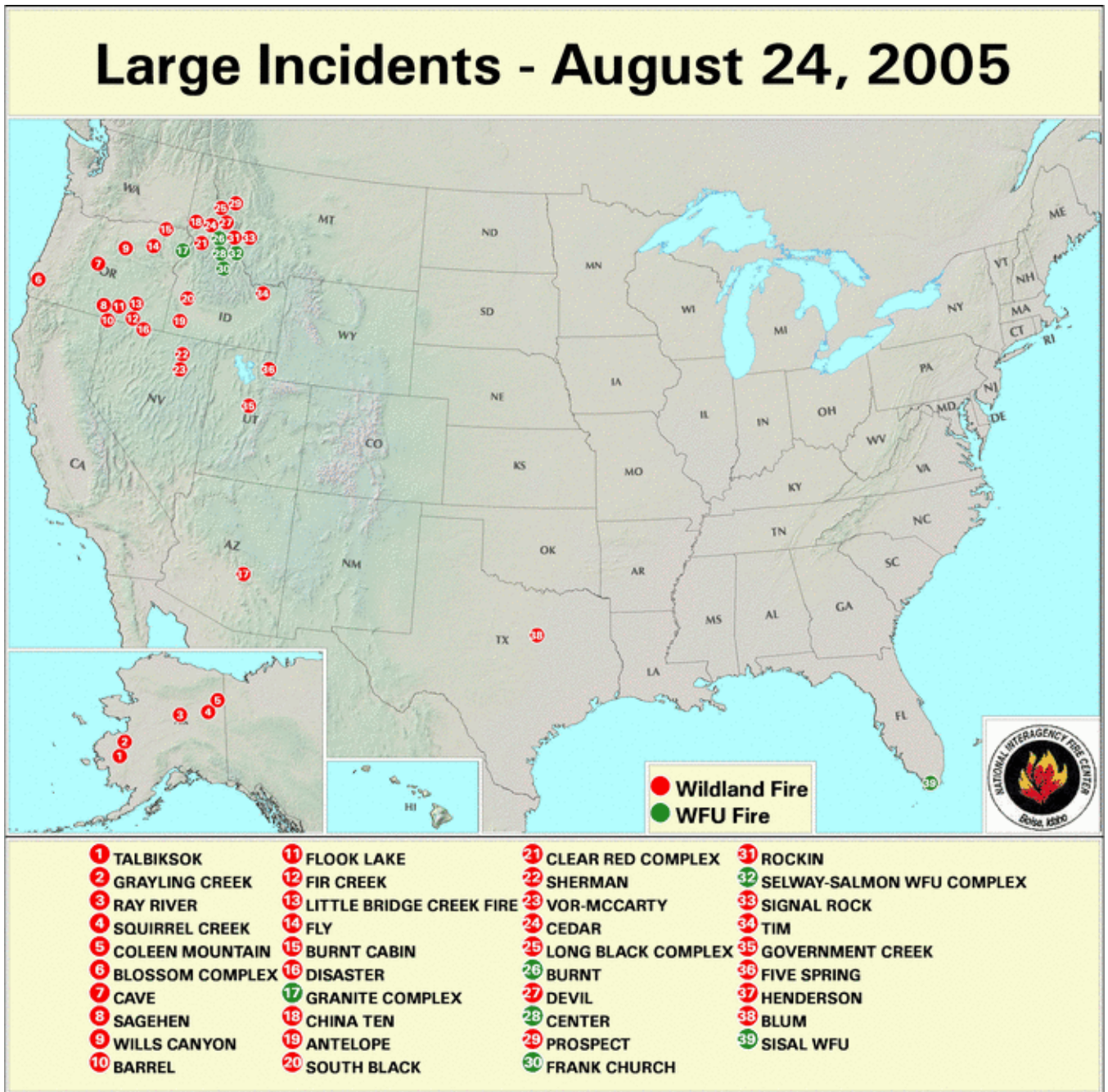


Figure 1 Wildland fire status for August 24, 2005. Follow link for today's status (http://activefiremaps.fs.fed.us/lg_fire2.php).

1. Introduction

Wildland fires are a common occurrence throughout the United States and the most frequent causes of fires are lightning strikes during the dry season and human activity. The following is a typical narrative of the beginning of a western wildland fire.

A fire was detected by a county fire spotter and the fire is about 50 miles from the edge of a small town ringed by scattered home developments. Local officials begin responding to the fire and contact the Interagency Fire Control Center. As the center the fire's location is determined, its ignition point is on land managed by the Bureau of Land Management (BLM) and it is moving along a ridge that is managed by the US Forest Service (USFS). Within the USFS-managed lands there are many "in holdings" which are pockets of privately held lands, some of which have been developed for private homes. Beyond the ridges are two mountain subdivisions on the edge of a small town.

The BLM-managed areas are open for recreational use and on this day there are many day hikers and several smaller groups of longer-stay hikers and climbers. Some of the hikers may be familiar with the area and understand the movements and dangers of a wildland fire while others may be wilderness novices and tourists that are in the area for the first time. In the USFS-managed areas there are scattered homes on the in holding lands and responders need to notify the residents of the threat, frequently going door-to-door.

As the fire moves towards more populated areas, radio and television announcements use subdivision names to identify evacuation areas and communities at risk. The wildland fire can eventually reach the fringe of larger urban areas where there are residences and businesses in small towns.

This relatively small wildland fire event has triggered a county government, two federal agencies, and put people, properties, and natural resources at risk.

This scenario is typical of the complicated interagency and multi-jurisdiction activity that is part of wildland fire response. The FGDC Cadastral Data Subcommittee chose to assess the wildland fire information requirements because of the need to share multi-jurisdictional information among multiple agencies under rapidly changing conditions.

The Wildland Fire and Parcel Data Workshop was sponsored by the FGDC Cadastral Data Subcommittee in response to policies and guidance issued by the Western Governors' Association² and in response to national homeland security needs for all

² Western Governors' Association's (WGA) Policy Resolution 03-05 – Public Lands Survey System and Ownership Database, Western Governors' Association, Internet <http://www.westgov.org/wga/policy/03/plss3-5.pdf>

agencies to be prepared and responsive during emergencies. The purpose of this workshop was:

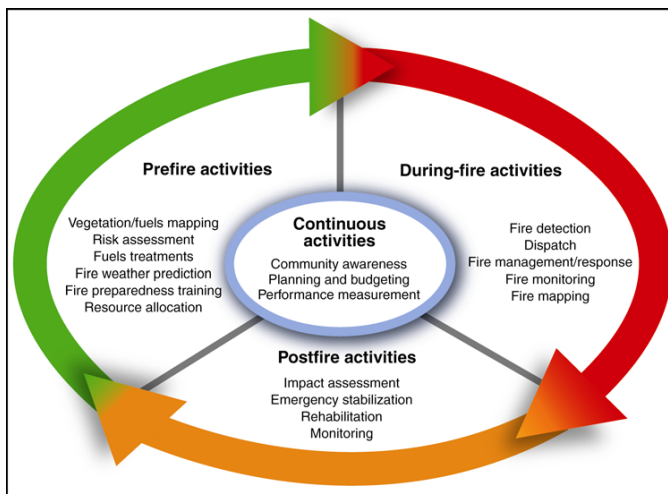
To examine the business requirements of wildland fire management and the related need for parcel data³ in a multi-jurisdictional environment.

Wildland fire management transcends administrative and political boundaries. The degree of confidence in the strategic and tactical decisions that must be made for planning, response and recovery is dependent on the inventory and description of all properties in the affected area. This requires information sharing between multiple organizations on critical property characteristics needed to meet the business needs of wildland fire managers. The workshop participant's identification of critical information requirements was used to pinpoint the parcel attributes that were in most need of sharing and standardization.

The workshop was held in Denver, Colorado in February 2005. The stated objectives of the Wildland Fire and Parcel Data Workshop were to:

1. *Identify what parcel information is needed to support wildland fire business requirements and sources of the data.*
2. *Identify the value and utility of parcel data in wildland fire management planning, response, and recovery operations.*
3. *Document issues facing the access and use of cadastral information in wildland fire management and identify actions and solutions.*

2. Workshop Methodology



Source: GAO.

Figure 2 The phases of wildland fire management.

Experiences with wildland fire situations in Colorado were used to focus the discussion on actual occurrences and needs as opposed to theoretical concepts or assumptions. Because there are so many elements to a wildland fire event, a chronology was used to provide structure to the workshop allowing the discussion to sequentially address the business and information needs as they would normally arise. For purpose of the workshop and this report three main phases of wildland fires were identified: *Preparation (Prefire Activities)*, *Response*

September 15, 2003.

³ Parcel data: Information about land use, value, structures on the property and other information needed to assess the value or potential use of the parcel.

(During-fire activities) and Recovery (Post-fire fire management were identified; Activities) (see Appendix A). These phases are the same phases identified by the General Accounting Office (GAO) in their September 2003 report *Geospatial Information Technologies Hold Promise for Wildland Fire Management, but Challenges Remain* (GAO-03-1047 Wildland Fires).

One of the major objectives of the workshop was to determine the information requirements of wildland fire management and to appraise the utility of parcel data in this context. A timeline was used during the workshop to focus the discussion on specific fire events encountered by the workshop attendees.

Representatives from various stakeholder groups were invited and attendees included representation from the county assessor’s office, local data providers, wildland fire mangers, and GIS support groups. This full range of disciplines ensured that both customers for the data (e.g., fire community) and producers of the data (e.g., county assessor) were represented (see Appendix D for a list of attendees). Facilitators were used to keep the group focused and to ensure that participants based information upon actual experiences. Facilitators encouraged discussions concerning issues related to accessing and using data and asked “what if” questions to help identify potential solutions. All information was recorded including information and issues not related to parcel data. The recorded information related to parcel data was synthesized and analyzed to formulate information requirements, recommendations, and necessary actions. Issues not related to parcel data were considered beyond the scope of this project and were not evaluated for recommendations. Following the meeting, summary notes were provided to the participants for review, clarification, and validation. Participants also completed a survey to identify the sources of data identified during the workshop (see Appendix B).

3. Wildland Fire Information Needs and Sources

Characteristics of wildland fire management and response: Wildland fires are dynamic events lasting from days to weeks and even months, growing and subsiding depending upon the weather, geography, availability of fuel, and the effectiveness of fire prevention and suppression activities. These characteristics along with the incremental nature of wildland fire management activities require a mobile and flexible organizational structure that crosses jurisdictional boundaries as a fire grows in intensity.

Phase	Activity
<i>Preparation</i>	Response Planning
	Fire Fuels Reduction Planning
<i>Response</i>	Fire Start
	Bitter Root fire
	Hayman Fire
	Overland Fire
	Wilderness fire use
<i>Recovery</i>	Suppression Cost Analysis
	Burned Area Emergency Rehabilitation (BAER) Teams
	Fire Damage Assessment
	Insurance Appraisals and
	Mitigation Grants

Figure 3 Titles of topics discussed during the workshop.

Wildland fire management extends over the entire year. For each phase (preparation,

response and recovery) the priorities of planners and responders are the protection of *life, structures, and the economic viability of the community*. Data that provides information about the characteristics of these priorities are essential for the management of wildland fire and the allocation of resources.

Participants described their experiences and information was gathered about *issues, land information needs, sources and uses of data, and ease of access*. The side bar lists the titles of the topics that were discussed. Detailed notes about these discussions can be found on the *FGDC Cadastral Data Subcommittee's* website (<http://nationalcad.org>).

The remainder of this section is a summary of the general business operations during each of the three phases, the information needs of wildland fire managers and response teams, and the sources of this information. For each phase there is a consolidated table that summarizes the information needs and sources as identified by the workshop participants. The complete list for all data, not just the parcel information, is found in *Appendix B, Assessment of Sources*.

Information Needs and Currency:

A common thread in all the tables in all phases of wildland fire management is that the information must be current and must have sufficient detail about individual property to support decision making. It is important to realize that the data listed in the tables (location of structures, property use, owner, value, etc.) barely represent the breadth and depth of the information that can be derived from the Assessor's database. The breadth is the fact that the database includes all assessed and taxable properties in the county and that it is often updated daily and reflects the most currently available information about parcels. The depth of the database is realized in the detail that can be provided. For example, property use codes that are found in most assessment databases (see sidebar for sample listing) may have as many as ninety-nine (99) categories and the counties themselves may have additional categories for each property type. Agriculture parcels are recorded as to the percentage of the parcel that is in pasture, the proportion used for crops, the type of crops, and the unusable land. Ownership information not only tells who the owner is but it also records whether a home is a primary or secondary residence which is important to assess the likelihood of occupancy. All the information is updated continuously and was characterized as "an information gold mine" by one of the workshop participants.

<p><u>Assessment Property Use Codes – Sample</u> R – Residential Single Family R2 – Multi-family residential R3 – seasonal home C – Commercial I – Industrial V – Vacant Land F – Forest land private FP – Public forest land S – Swamp or wetland</p>
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Figure 4 Examples of property use codes.

Preparation Phase

The Preparation Phase includes planning, prevention, and mitigation and is the responsibility of local governments and federal field offices. This phase takes place throughout the year but is conducted primarily during the non-fire season. Wildland fire management planners identify high risk areas and assess the life, structure, and economic

factors at risk. The planners use this information to develop and implement a plan to reduce the risk of fire and if a fire does occur, what resources can be allocated based on need. Mitigation activities are concerned with limiting the severity of a fire principally by fuels reduction treatments which are actions to reduce, remove, or replace fuels to modify fire behavior or stop a fire from spreading. Four different activities were identified; *fire management planning, value assessment, fuels reduction, and construction/location.*

Fire management planning: The identification of fire management units based on a characterization of its geography and historic fire regimes.⁴

Assess value of properties impacted by fire: Identify and weigh the values to be protected in each Fire Management Unit (FMU). The assessment process consists of valuing properties (homes, businesses, and agriculture) and community assets (infrastructure, utilities, and communication sites) in a given area.

Fuels reduction: The three factors that influence fire behavior, and hence fire severity, are weather, topography, and fuels. Fuel reduction treatments are actions to reduce, remove, or replace fuels to modify fire behavior or stop a fire from spreading. Treatments can be either prescribed fires in uninhabited areas or non-fire treatments such as mechanical or chemical treatments around structures.

Construction/Location: The three factors that influence the survivability of a structure or facility from a wildland fire are its location, construction materials, and landscaping around the structures. In addition to landscaping, risks to a community can be mitigated by regulations and/or educational measures promoting the proper location and construction of structures.

Information needs:

- Parcel information: The location of people and structures, subdivision boundaries, property descriptions, owner's name, and construction material.
- Other information: Landscape around structures, infrastructure, topographic and vegetation characterizations of given geographic areas, access routes (roads and trails), and the risk of fire for those regions.

⁴ Fire regime: Defined geographic area that is characterized as to the likelihood of fire based on its fire history and current vegetation.

Table 1 Preparation phase parcel and other information needs identified by the workshop participants.		
Preparation Phase Information Needs	Sources of Information ⁵	
	Assessor's Parcel Database	Other
Addresses of properties and persons within 911 areas	X	911
Building materials	X	Site Visits
Communication sites (cell and radio towers)	X	
Infrastructure (water, utilities, transportation, etc.)		County government
Location of structures (residential, commercial, public)	X	
Mailing addresses and homestead exemption (useful for determining if a residential home is a primary or seasonal residence)	X	
Number of structures on a property	X	
Owner name and contact.	X	
Owner types (Public, Private, Residential, Commercial)	X	
Property Values (residential, commercial and agriculture)	X	
Responder Risk (Access and Turn arounds)		Site visits
Roof type and other ignitable building material	X	Site Visits
Slope (this may be in parcel data land attribute data)	X	USGS Topography maps
Subdivision boundaries (public notification)	X	
Trails and recreation areas imply the presence of people.		US Forest Service, US Parks
Utilities (electric, propane, gas above and below ground)		Local governments,
Utility infrastructure (corridors)		Utility companies
Vegetation type		Federal agencies

Response Phase

The Response Phase begins with a fire start and the dispatch of fire fighting team(s) to the scene. Five different types of activities were identified in the response phase; *initial attack, extended attack, evacuation, sheltering, and reoccupation.*

The *initial attack* is the first response to a wildland fire (also called the first burn period, which is usually the first 24-hour period of a fire). Activities include the inspection and evaluation of the fire, determining the appropriate management response, developing and implementing suppression strategies, tactics for managing or suppressing the fire, ordering resources, and providing the logistical support to get people, equipment, and supplies to and from the fire.

⁵ Data from the assessor's database is the county's cadastre and is used to identify ownership, boundaries, and determine value. A public lands cadastre that is used to manage state or federal lands generally consists of large parcels that identify ownership, boundaries, and characterize the property but does not include value. There is considerably more information in a typical cadastre than is shown in the tables.

The *extended attack* is the response to a wildland fire after the first burn period or when the fire transitions to a more complex incident and is turned over to the appropriate Incident Command (IC) Management Team. Complexity levels include Type 1, Type 2, Type 3, and Type 4 (from the most severe to the least severe). The extended attack is characterized by a more complex organization to support planning, communications, logistics, and supply operations.

Evacuation occurs in threatened areas and includes notifying people of a possible evacuation through public announcements by listing endangered subdivisions, door-to-door contact, or through reverse 911-type phone systems.

Sheltering is the moving of people and animals to emergency evacuation shelters until they can be returned to their homes. This can include sheltering in place where people are advised of the fire hazards but are kept in their homes or moved to a safety zone near their homes.

Reoccupation is the returning of people and animals to their place of residence after a fire and the assessment of damaged properties by insurance companies and government aide offices.

Information needs:

- Parcel information:
 - The location of properties and their proximity of structures (hence people) to a fire as the fire progresses,
 - Subdivision names for public announcements alerts, and
 - Property use (residential, commercial, agriculture, government, etc.) and value to assess the economic impact to a community.
- Other information: The location and direction of the fire (satellite and aerial imagery), infrastructure, jurisdiction boundaries, water sources, topography, vegetation, access routes, and weather conditions and forecasts.

Table 2 Response phase parcel data and other information needs identified by the workshop participants.

Response Phase Information Needs	Sources of Information	
	Assessor's Parcel Database	Other
Aerial photography (existing)	X	Local governments, USGS, US Forest Service, BLM
Damaged and undamaged structures	X	Remote sensing data (aerial photography and satellite imagery)
Fire boundary		Remote sensing data, ground observations
Hazard ratings (building hazard checklist, drive way turnarounds)		Local governments and fire districts
Insured forests		US Forest Service, local government
Jurisdiction boundaries to determine authority	X	Public ownership agencies
Property use	X	BLM Cadastre
Major structure location	X	Agency structure inventory
Mountain communities and isolated residences	X	State and federal agencies for their own land.
People - location	X	Campgrounds
Property use (residential, commercial, agriculture, etc.)	X	
Property value and qualitative metrics	X	BLM, US Forest Service, US Park Service
Ranch land type and the owners	X	BLM, US Forest Service
Ranch land use	X	Owner
Roads (local and off road trails)		Local governments, US Forest Service, USGS
Satellite imagery and aerial photography (current)		Fire Teams
Subdivision boundaries for public notices	X	Local governments
Temporary structure locations	X	BLM, US Forest Service
Topography		USGS
USGS Quads maps for terrain		USGS
Utilities (communication towers)	X	Utilities
Utilities (electric and communication lines)		Local governments and private utilities
Vegetation type		Federal agencies
Water sources for dips		Local dispatchers

Recovery Phase

The Recovery Phase is concerned with the emergency stabilization and rehabilitation of the burned areas. Three general activities were identified.

Suppression-rehabilitation measures taken before or just after the fire ends to repair damages from fire suppression activities (i.e. repair fences and the re-vegetation of the fire lines). This is critical to prevent erosion and the protection of downstream communities from flooding.

Emergency stabilization measures are taken within 1-12 months after the fire to prevent further damage from post-fire events, such as flooding or rock slides. Recovery teams must deal with tree falls in stream beds, water bars on hillsides, and the replacement of culverts and dams. Priority is given to areas that are upstream of communities or critical habitat.

Rehabilitation consists of the measures taken 1-3 years after the fire to repair damages to stabilize the terrain (seeding/planting).

Information Needs:

- Parcel information: Property descriptions, structure location, property values, owner names, mailing and site addresses.
- Other information: Flood zones, vegetation, topography, and utilities.

Recovery	Sources of Information	
	Assessor's Parcel Database	Other Sources
Flood hazard areas		FEMA Flood maps
Growth trends	X	US Census Bureau
Mailing address	X	
Mitigation on property		Local government
Natural barriers		USGS quads
Owner name	X	
People	X ⁶	
Permitted structures	X	Local government
Property value	X	
Site address	X	
Structures (residential, commercial, public)	X	BLM, US Forest Service, Park Service (for federal lands)
Undeveloped subdivisions	X	
Utilities		Local government and private utilities
Value of properties downstream of burned areas	X	
Well and septic tank locations	X ⁷	Local governments

⁶ Residential properties imply aggregations of people.

Wildland Fire Information Needs and Sources Summary

The information needs to support the business of fire can be divided into two categories: Strategic and tactical. Strategic information is needed to determine where to best allocate available resources. The critical elements of strategic information are the location of people, structures, and community assets. Once the decision on whether to suppress or manage a fire has been made, the response teams are dispatched to a site. These teams need tactical information to tell them where the high risk areas are (people and structures and their proximity to the fire), the location of the fire and its direction, access routes to the site, water sources, vegetation type, fuels, topography, and weather conditions.

After the information needs from the workshop were compiled the attendees were sent a questionnaire to identify if their organization was a source for the data (Appendix B Assessment of Sources). The results of the survey found that the majority of the information that is the most important to wildland fire managers was the location of people, structures, and community assets, all of which came from local governments. Of the one-hundred and one (101) unique, information elements important to wildland fire management, more than twice as many data sources (89) came from local governments as opposed to federal agencies (44). The survey was further assessed to identify unique sources of information that can only be found from one provider. The majority of this information came from local governments (41) while only twelve (12) categories were uniquely acquired from federal agencies. A characterization of the information elements found that local governments provide the details about community assets (structures, building materials, and community assets) whereas the federal agencies provide the regional data such as topography, hydrography, vegetation, and regional demographics. The notable exceptions are federal agencies that manage site-specific information on federal lands such as camping areas in national forests and recreation areas on BLM-managed lands.

Government Level	# Created
Local Government	89
Unique to Local Governments	41
Federal Agencies	44
Unique to Federal Agencies	12

How is this information used?

Population de-concentration in the U.S. has resulted in rapid development in the outlying fringe of metropolitan areas and in rural areas with attractive recreational and aesthetic amenities, especially forests. This demographic change is increasing the size of the wildland-urban interface (WUI), generally described as the area where structures and other human development meet or intermingle with undeveloped wildland. The expansion of the WUI in recent decades has significant implications for wildland fire management and impact. The WUI creates an environment in which fire can move

⁷ Some counties have begun including the parcel identifier on permits allowing the records to be tied to the appraiser's database.

readily between structural and vegetation fuels. Its expansion has increased the likelihood that wildfires will threaten structures and people.⁸

- o In 1940, housing density was high in urban areas and very low in rural areas, with little area in mid-density classes.
- o By 2000, there were more low and middle density housing areas across the landscape.
- o Housing density growth in rural areas was rapid during the 1970s and again in the 1990s.
- o Throughout the period growth occurred in suburban and exurban areas, but there was also low density growth in rural areas with natural amenities, such as the upper Great Lakes region and the Ozarks.⁹

The encroachment of housing in the fire communities has changed wildland fire management practices, thereby greatly increasing the resource requirements which already are stretched thin. Census data provides good, general information about trends over a ten year period but it does not provide the specific data about the location and the value of structures, or commercial and

agriculture lands. Figure 5 is a comparison of cadastral and census data

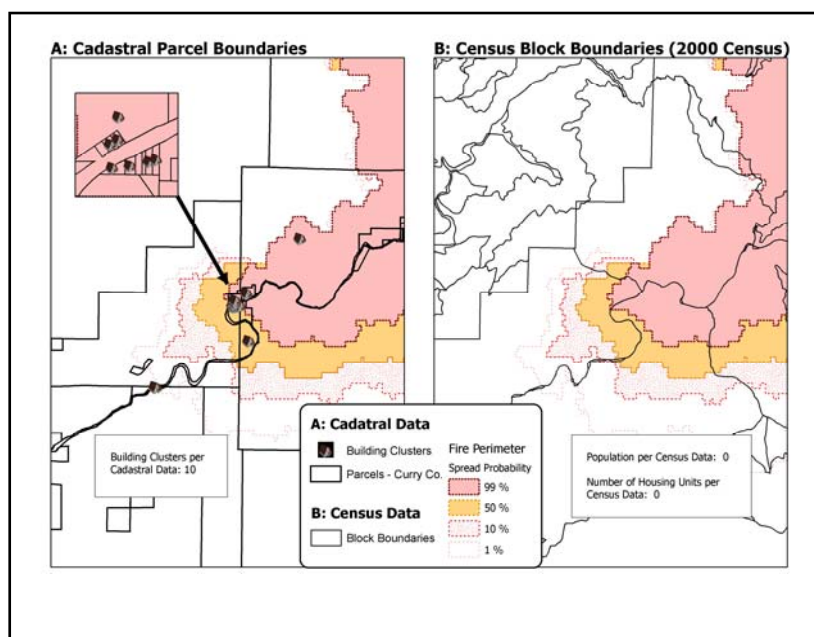


Figure 5 Rapid Assessment of Values-at-Risk from Wildland Fire: Comparing Cadastral to Census Data.

to identify values-at-risk from wildland fire, August 2005, Blossom Complex Fire, Curry County, Oregon. Cadastral data identified ten (10) building clusters at risk. Census data reported no population or housing units within the same area. These zero counts are probably because of three possible factors, development outpacing census in wildland areas, the likelihood that buildings are used seasonally and the occupants' legal residences are elsewhere consequently the housing units would not show up in the Census Block, or that the structures are commercial properties such as resorts which are

⁸ Spatial analysis for conservation and sustainability, Forest Ecology & Management University of Wisconsin - Madison, Internet, September 2005, http://silvis.forest.wisc.edu/projects/WUI_Main.asp.

⁹ Stewart, S. I., Hammer, R.B., Radeloff, V.C., Dwyer, J.F., & Voss P.R. 2003. Mapping Housing Density across the North Central U.S., 1940-2000 [Slide show]. Available: <http://www.ncrs.fs.fed.us/IntegratedPrograms/lc/pop/hd/title.htm>.

also not included in the census blocks. Economic census data is available but the lowest level or resolution is the county or zip code which can cover large areas in rural communities¹⁰.

Figure 6 demonstrates how parcel data was used to assess the impact of two large wildfires, Crazy Horse and Black Mountain fires, that occurred during the 2003 fire

season. This figure illustrates the type of information that local governments are able to provide about properties in the path of the fire. Here we see the location of structures, but what is also available is detailed information about the structures value and type (residential, commercial), whether lands are agricultural and their use (crop type, pasture, not used), whether a structure is a primary or secondary residence, and what from what materials the structure is made. This information is updated on an annual basis. Having this level of detail when making decisions as where to best allocate resources needs no elaboration. The issue that must be faced is how to ensure all communities have this data in a digital format and that the fire management community has access to it at the beginning of every fire season.

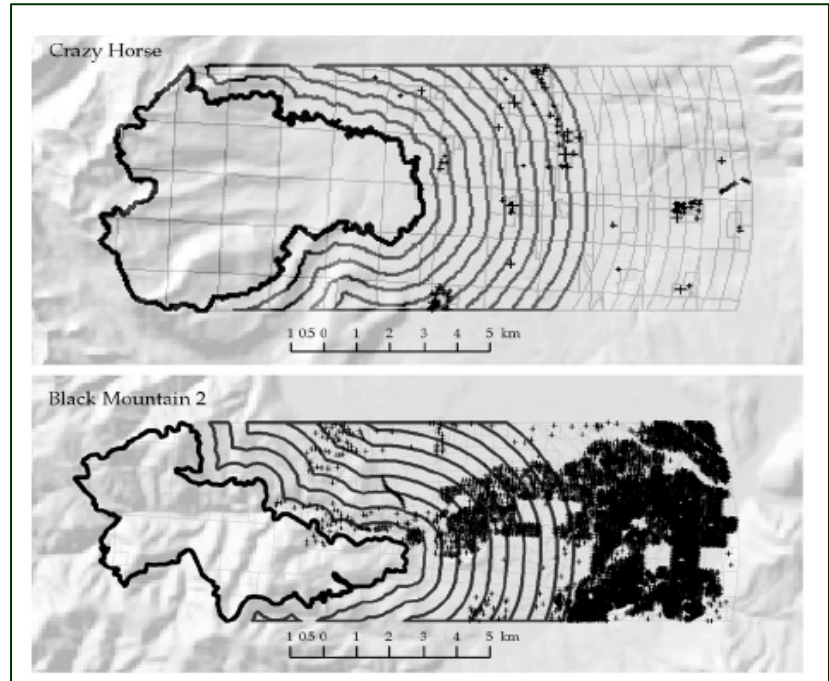


Figure 6 Crazy Horse and Black Mountain Fire 2003. Marks show the location of structures. An associated database (not shown) can value the structures, list building material, roof type, and land use.

4. Recommendations

Recommendations were made to address four specific issues: Data Availability, Data Access, Ease of Use in Applications, and the Awareness of Cadastral Data. The following section discusses each of these issues as well listing specific recommendations, tasks, and responsibilities to address these issues.

Recommendation 1: Data Availability (Facilitate data conversion in rural communities)

The local assessor's parcel data contains information about landownership and value as well as implied demographics through the description of structures (single family residential, multi-family rental, commercial, agriculture, etc.) and their location with an

¹⁰ Prepared by: Kevin Hyde, METI Corp. for USDA Forest Service, Rocky Mountain Research Station, Missoula, MT.

accuracy of six (6) to ten (10) ft. Therefore this data addresses the top three wildland fire fighting priorities by: 1) Implying the location of people through structure type, 2) identifying the location of structures and their value, and 3) characterizing the economic viability of a community through a description of the commercial and agriculture properties. The assessment data is able to provide a count and location of structures and property along with an accurate location and dimension. This is critical for both strategic and tactical decision-making.

Issues: Many local governments in the west have not automated their real estate tax maps or have not linked their maps to assessment data. Tax parcel automation is not a critical priority for many western counties because of increased pressure on limited resources and because, in many cases, the expertise and staff to develop and sustain automation programs does not exist in most rural western counties. This data availability issue was also noted in September 2003 GAO Report.

*Users of geospatial information have noted problems in acquiring compatible and comprehensive geospatial data. For example, GIS specialists involved in fighting fires reported that they did not have ready access to the geospatial data they needed. They noted that some local jurisdictions have geospatial data, but others do not.*¹¹

Task 1: Identify and publish the best practices for programs that will assist rural counties in the conversion of the parcel maps into a digital format.

Responsibility: FGDC Cadastral Data Subcommittee in association with the principle federal beneficiaries of automated rural parcel data (BLM, FEMA, Census).

Task 2: Identify high priority counties and evaluate their parcel automation status.

Responsibility: FGDC Cadastral Data Subcommittee will coordinate with the fire community to identify those counties and the NSDI inventory.

Task 3: Inventory which counties have automated cadastral data to support wildland fire management needs. Establish parcel automation base line.

Responsibility: FGDC Cadastral Data Subcommittee and the Western Governors' Association Geographic Information Council (Eastern States).

Task 4: Determine a methodology for targeting counties for data conversion.

Responsibility: Missoula, Montana Office of the US Forest Service and FGDC Cadastral Data Subcommittee.

¹¹ *Geospatial Information, Technologies Hold Promise for Wildland Fire Management, but Challenges Remain*, Government Accountability Office, GAO-03-1047, p 31, September 2003, Internet, <http://www.gao.gov/>.

Task 5: Develop budget strategies to help the counties to complete the parcel automation where needed.

Responsibility: FGDC Cadastral Data Subcommittee.

Recommendation 2: Data Access (Facilitate access to local parcel data)

Responses to wildland fires are dependent upon the size and threat of the fire and the jurisdiction in which it is located. Each jurisdiction (county, state, federal) has its own fire team that deals with planning, mitigation, and response. As the size and threat of the fire increases other jurisdictions are brought in to provide support.

Cadastral or property record information might be available but access to this information can be limited by a number of factors. Two of the most common limiting factors are data distribution agreements and data format.

1. Data Distribution Agreements – In some cases access to data is constrained because local units charge for the data or have data licensing agreements that constrict access to the information.
2. Data Format – The data might be in a format that is not recognized or useable by the fire response agencies. There may be multiple related tables in a relational database with codes embedded in lookup tables. Graphic files or maps might be in a local coordinate system.

Issues:

- Parcel data is managed for local business purposes and is often optimized to support local government operation and maintenance needs.
- When data is published it is not necessarily in a format that meets the needs of emergency responders.
- Access to essential local data may be constrained because of data distribution, data cost recovery, or data license agreements.

Task 6: Document the best practices and methods for parcel data distribution.

Responsibility: USGS National Map, National States Geographic Information Council (NSGIC), and the FGDC Cadastral Data Subcommittee.

Task 7: Document sample memoranda of agreement that can be used by all levels of government to assure the availability of data during wildland fires and emergencies.

Responsibility: National States Geographic Information Council (NSGIC), National Association of Counties (NACO), and the FGDC Cadastral Data Subcommittee.

Task 8: Work with WGA to develop a policy statement that reflects the need for data sharing for all phases of wildland fire management.

Responsibility: National States Geographic Information Council (NSGIC), National Association of Counties (NACO), and the FGDC Cadastral Data Subcommittee.

Recommendation 3: Ease of Use in Applications (Build an infrastructure that facilitates the development of regional parcel coverages)

Data: Geospatial data are not consistently available and are not compatible across different agencies, states, and local entities. As a result, decision makers often lack the timely, integrated information they need to make sound decisions in managing different aspects of wildland fire.¹²

The sharing of information is critical during a multi-jurisdictional response and agencies (federal, state, and local governments) are frequently criticized because they are unable to share information because of incompatibilities.

An example of the incompatibility discussed above is to compare the way local governments and federal agencies collect information about structures. Local government property assessors are concerned with the value of property and the structures on those properties because their responsibility to provide a property value assessment for the real estate tax system. Public agencies collect information about properties and structures based on criteria that do not include value because value is not relevant to these agencies except in the cases where there is a concern for leased lands. Public agencies principle business requirement is land management, so they collect information on vegetation, topography, hydrography, soils, etc. There is no business need to identify value because these are public lands. This difference in business requirements leads to data gaps in the western states. Vegetation and value provide good example of this issue. which is a high priority on public lands it is not very well inventoried by the local assessor. On the other hand property values are the principle business objective of the assessor's office but there is not a very good metric for values on public lands.

The creation of a seamless integrated statewide parcel database depends on the infrastructure that is available to centrally collect and organize this information. There are approximately 2,900 county and 1,500 municipal agencies responsible for managing and collecting parcel data for private lands in the U.S. Federal agencies and tribal nations are also a significant source of parcel data, particularly in the western states. The status and methods that different states use to centrally organize, manage, or compile parcel data is not well documented

Issues:

- Data can be collected about a single feature in many different ways making it difficult to combine data from different sources about the same feature.
- Organizations collect information to meet internal business needs and may not have the necessary metadata or standardized information to support external programs or applications
- There is no mandate to make systems interoperable.

¹² *Geospatial Information*, GAO-03-1047, p 2

Task 9: Finalize the wildland fire management business profile and integrate it into the parcel core data standard to define a data publication content standard for the nation. Incorporate the availability of the fire data and compliance standard identified in Task 1.

Responsibility: FGDC Cadastral Data Subcommittee and the Eastern and Western Cadastral Steering Committees.

Task 10: Complete a national inventory of how states centrally organize or manage statewide parcel data.

Responsibility: FGDC Cadastral Data Subcommittee and the National States Geographic Information Council (NSGIC).

Task 11: Document the data stewardship responsibilities for parcel data management. This task should include how state and federal agencies centrally manage their data.

Responsibility: FGDC Cadastral Data Subcommittee task force on the Evaluation of the Cadastral NSDI (Federal land management agencies.)

Task 12: Work with the wildland fire community to describe the physical format requirement that is needed so that the core data once published and be incorporated into databases.

Responsibility: Missoula, Montana Office of the US Forest Service and FGDC Cadastral Data Subcommittee.

Task 13: Add incentives for compliance with standards for those counties that have automated data but it needs to be made compliant.

Responsibility: NSGIC and Western Governors' Association Geographic Information Council.

Task 14: Work with responding agencies to have the cadastral data as a part of their response protocol check lists.

Responsibility: Fire Community and FGDC Cadastral Data Subcommittee.

Recommendation 4: Awareness of the Value and Use of Cadastral Data (Promote the awareness of the value and utility of parcel data for emergency response)

There are many wildland fire managers at all phases of the fire, who do not understand the content or value of the information contained in parcel record databases and parcel mapping projects because of limitations in the cadastral data availability and limitations on access to cadastral data (See Recommendations 1 and 2). One notable exception to this is in Montana where a statewide parcel database is centrally managed and made available to wildland fire managers. Likewise, the cadastral community is also unaware of what data or formats are needed by the wildland fire community.

In a report by David Calkin and Kevin Hyde¹³ the authors describe the sources of land value information.

In a situation that's unique to Montana, the full property tax record is available online in GIS format. The parcel polygon layer is attributed taxable land and building values. Given that the values are derived as the tax base, they represent conservative assessments of the full market value.

The investigators were able to estimate and model the values of resources at risk and saved from fire damage by applying the cadastral data to their study.

In another example in Colorado, the local assessor's database provided information on subdivision boundaries and the names of those subdivisions so the general public could be notified of evacuation areas accurately. This allows the emergency response personnel to deal with groups or clusters of parcels.

Issues:

- In times of emergencies responders rely on operational checklists to assure that all processes are followed and coordinated. If cadastral information is not on those checklists then it is often not considered in the response data set.
- Wildland fire managers may not be aware of the wealth of information that is collected and kept current by local assessors and may duplicate data collection.
- Subdivisions are needed to deal with groups or clusters of parcels or landowners. Many people did not know these were needed and some counties may need implementation plans to add subdivisions to their data sets.

Task 15: Work with the wildland fire community to update emergency response protocols (checklists) to incorporate parcel data for use in emergency response operations.

Responsibility: FEMA, FGDC Cadastral Data Subcommittee, and the Eastern and Western Cadastral Steering Committees.

Task 16: Develop demonstration and pilot projects to illustrate the use and value of cadastral information in wildland fire management.

Responsibility: FGDC Cadastral Data Subcommittee, and the Eastern and Western Cadastral Steering Committees.

Task 17: Develop information and educational outreach material to increase county elected official's knowledge about the value of cadastral data for wildfire management.

Responsibility: FGDC Cadastral Data Subcommittee and the Western Governors' Association Geographic Information Council.

¹³ Wildfire, September 1, 2004, http://wildfiremag.com/ar/breakeven_point/index.htm.

Task 18: Provide educational and demonstration materials to the parcel community to educate them on the value of their data to wildland fire management.

Responsibility: FGDC Cadastral Data Subcommittee.

Task 19: Outreach to the fire community to educate them about the value and availability of parcel data.

Responsibility: FGDC Cadastral Data Subcommittee, fire community, and Western Governors' Association Geographic Information Council.

5. Conclusion

The Wildland Fire and Parcel Data Workshop focused on discovering the cadastral information necessary to support all phases of wildland fire management. In assembling a diverse group of professionals the information needs were examined from many different perspectives. At the conclusion of the workshop there were five clear cadastral data directives that permeated all information needs.

1. Cadastral data is critical to support all phases of wildland fire management.

The content of the cadastral information varied from phase to phase as documented in Section 3 of this report, but there was a critical need for parcel level information at all phases of wildland fire management.

2. Cadastral data must be placed in context with other information.

While cadastral data provides essential information about land ownership, values, and structures it must be placed in context with other information, such as aerial photography, topography, and vegetation. This means that the parcel boundaries must be spatially integrated with other data themes so it can provide additional intelligence to the details of land information.

3. Cadastral data must be expressed in standard and consistent formats to be effectively utilized in wildland fire management.

To take advantage of the richness of cadastral information, data producers need to provide information in easy-to-use formats. The characteristics of the standards are:

Minimum attributes – There are a minimum set of attributes that must be included for the cadastral information to be applicable to wildland fire management. These are detailed in the cadastral profile developed from this workshop

Currency – The more current the cadastral data is, the more applicable it is to most business applications in wildland fire management. The currency is defined in the business process.

Attribute data format – The attribute data for the cadastral information has to be expressed in a consistent format (for example the field names, types, and lengths) to make integration with other themes as easy as possible.

Spatial data characteristics – The spatial aspects of the parcel data (parcel polygons, parcel centroids, and/or building outlines if provided) have to be expressed in standard, known spatial reference systems.

4. Local government agencies are the source of the vast majority of cadastral information needed for wildland fire management.

The assessor's database, which tracks the value of land and improvements as well as structural characteristics such as roof material and structure type (second residence or industrial for example), has a wealth of information that is updated regularly and is as close to the source as any other available information. In Montana, assessor's database information is organized and managed at the state level, but it is still local level information collected and maintained on a parcel-by-parcel basis. Although Florida does not manage the data, the Florida Department of Revenue collects a subset of count parcel data from the assessors to ensure uniformity and equity. Both states are able to provide statewide coverage of parcel data.

5. Cadastral data is under utilized in wildland fire management.

There are many instances in the past where cadastral information as described in this report would have been beneficial in wildland fire management. In those fire events where the cadastral information was available, fire management decisions were more easily finalized and acted upon.

To meet the needs in these directives we identified four recommendations with associated tasks and responsibilities to accomplish the tasks. The four recommendations are described in detail in Section 4 of this report. The recommendations are:

Recommendation 1: Data Availability (Facilitate data conversion in rural communities.)

Recommendation 2: Data Access (Facilitate access to local parcel data.)

Recommendation 3: Ease of Use in Applications (Build an infrastructure that facilitates the development of regional parcel coverages.)

Recommendation 4: Awareness of the Value and Use of Cadastral Data (Promote the awareness of the value and utility of parcel data for wildland fire management.)

The tasks and responsibilities to address these recommendations are described in this document. We recommend the Cadastral Subcommittee along with the Western

Governors' Association Geographic Information Council and the fire community work together to develop and implement the recommendations and strategies that came from this workshop.

Appendix A: Chronology of Wildland Fire Management

Experiences with wildland fire situations in Colorado were used to focus the discussion on actual occurrences and needs as opposed to theoretical concepts or assumptions. Because there are so many elements to a wildland fire event, a chronology was used to provide structure to the workshop allowing the discussion to sequentially address the business and information needs as they would normally arise. For purpose of the workshop and this report three main phases of wildland fires were identified: *Preparation (Prefire Activities)*, *Response (During-fire activities)* and *Recovery (Post-fire fire management were identified; Activities)*. These phases are the same phases identified by the General Accounting Office (GAO) in their September 2003 report *Geospatial Information Technologies Hold Promise for Wildland Fire Management, but Challenges Remain* (GAO-03-1047 Wildland Fires).

Chronology of a Fire Event

	A	B	C	D	E	F	G	H	I	J	
5	Conditions	<div style="display: flex; justify-content: space-between; align-items: center;"> Normal Conditions High Risk Fire Start Stabilization </div>									
6	Time Line	Preparation					Pre-event Anticipation	Incident Management			
	What's Going On?	Status quo	-----	-----	-----	Determine the probability of ignition and the intensity/severity of the fire.	Fire spotted	Fire exceeds local resources and additional resources are supplied by outside organizations.	Fire threatens populated places		
7						High winds and lightning make conditions favorable to a fire					
8											
9	Phases	Preparation					Emergency Response				
10		Planning		Mitigation		-----	Prevention				
11											
12	Title: Principle Operations	Fire Management Planning	Assess impact of values	Fuels Reduction	Construction Location Decisions	Risk Assessment	Initial Attack	Extended Attack	Evacuation		
	Principle Activities for each named phase	Identify fire management units based on common objectives of fire regimes.				<i>Red Flag Warning</i>	Determine Jurisdiction and appropriate response	Develop strategies and tactics for extended attack. Order additional resources as necessary.	Evacuation, Notification, Reverse 911 & door to door;		
13											
14		Identify and weight the values to be protected in each Fire Management Unit (FMU)				Multi-Agency Coordination Group (MAC) Established (possibly)	Determine Appropriate Management Response	<i>Transition Fire (Type III, II, I) based on the complexity of the fire. Incident management team called in.</i>			
15		Identify priorities.						<i>Daily Planning for resource allocation</i>			
16								Incident Action Plan (IAP)			
17								Financial Close Out			

Chronology of a Fire Event

	A	B	K	L	M	N	O
5	Conditions				-----] Post Event [-----]		
6	Time Line				1 - 3 months	1 - 12 months	1 - 3 years
7	What's Going On?	Evacuees require shelter.	Fire has stabilized (contained and controlled) doesn't pose a threat to homes.	Fire has been suppressed and repairs are made to damages caused by fire suppression	Environmental damage is mitigated.	Reforestation and restoration.	
8							
9	Phases			-----] Recovery			-----]
10				Suppression: (ESR)			
11							
12	Title: Principle Operations	Sheltering	Reoccupation	Suppression Rehabilitation	Emergency Stabilization	Rehabilitation	
13	Principle Activities for each named phase	Emergency Operation Centers (EOC) evaluate high risk areas and mobilize resources to support evacuation and sheltering.	Returning people to place or residences.	Repair Damage (cut fences, water bars) caused by fire suppression activities.	Prevent further damage from post fire event(flooding or rock slides)	Repair damages from fire (seeding, tree replanting)	
14		Provide logistical support to feed and clothe humans and live stock.			Minimize Future Damage:		
15							
16							
17							

Appendix B Assessment of Sources

Matrix:

The following spreadsheet is a wildfire data needs (rows) by data source (columns). A text analysis of the workshop notes produced a list of 106 data types. The matrix was sent to workshop participants after the meeting asking them to identify the data categories for which their organization is a source. There is some duplication in the list, but it was determined that if items were collapsed and categories were consolidated, the respondents might not recognize the terms uses. Items prefaced by CkList came from the Wildlands Hazard Severity Forms Checklist.

Analysis:

Sources Summary: The sources were grouped by local, state, and federal agencies. The rows were totaled by all sources, local government sources, and federal agency sources and a summary was provided. There was not enough information to total state agencies. A sum total was developed for the source type (local or federal).

Unique Sources: A unique source was developed by identifying sources that only came from either local or federal agencies. If values were greater than 1 for the total source column (Local Government Totals or Federal Agency Totals) and not for the other, the cell was coded True. If values for the local and federal government totals were either both 0 or both 1 the cell was coded as false.

Results:

It was found that the majority of information source came from local governments. Workshop participants identified one-hundred and one (101) unique, information elements important to wildland fire management. Local governments were the sources for eighty-nine (89) elements and the only source for forty-one (41) elements, while federal agencies were the sources for forty-four (44) elements and the only source for twelve (12) elements. Further examination of the data finds that local governments are providing the details on community assets (structures, building materials, and community assets) whereas the federal agencies are providing the regional data such as topography, hydrography, vegetation, and demographics. These regional views are more static with updated schedules typically on a five to ten year cycle, while local data is more dynamic with one and two year update cycles.

Business Requirements: Overlaps in data sources occurred where there were overlaps in business needs. For example there is a need to inventory properties and land use by both local governments and federal agencies which is reflected in items such as isolated structures (5,2); land use (4,2); the number of structures (4,2), and parcel geometry (4,2). It should be recognized that these are not overlapping inventories and each entity is inventorying their own assets.

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	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AC	AD	AE																											
1	Imagery (Is it used to create information)		Local Assessor		Local Parcel Mapping with Orthoimagery		Owner		Local Govt (Planning, Fire, Health)		Local Govt - Boulder (Planning, Fire, Health)		Site Visit		911 - First Responders		Fire Planners		State Wildlife		State Forest/Park/Lands		State Emergency Management		BLM		Forest Service *		Park Service		FWS		Census Bureau		FEMA		NASA		NOAA		USGS		NGO		Private Company		All		Local Government		Federal Agencies		Uniquely Local		Uniquely Federal	
2			Access Roads and Minor Roads			X		X							X	X	X										5	2	3	FALSE	FALSE																									
3	Access to property			X		X								X	X								X		4	2	2	FALSE	FALSE																											
4	Acreage - Animal Response (Name & Acreage)					X																		1	1	0	TRUE	FALSE																												
5	Addressing (Site)	X				X																		2	2	0	TRUE	FALSE																												
6	Administrative Boundaries	X				X						X	X	X	X								X		7	2	5	FALSE	FALSE																											
7	Grazing Allotment Boundaries													X	X	X								3	0	3	FALSE	TRUE																												
8	Animals - pets, horses,																							0	0	0	FALSE	FALSE																												
9	Aspect of Property (N,S, E, W)	X				X								X									X		4	2	2	FALSE	FALSE																											
10	Asset Insurance (Timber)																							0	0	0	FALSE	FALSE																												
11	Building Material	X				X	X						X		X	X								6	3	3	FALSE	FALSE																												
12	CkLst Building Construction	X				X	X																	3	3	0	TRUE	FALSE																												
13	CkLst Canyons						X															X		2	1	1	FALSE	FALSE																												
14	CkLst Fire Protection - Water Source				X	X	X																	3	3	0	TRUE	FALSE																												
15	CkLst History of Fire					X	X		X															3	3	0	TRUE	FALSE																												
16	CkLst Lot Size	X				X	X																	3	3	0	TRUE	FALSE																												
17	CkLst Road Accessibility (Roughness and Grade)						X															X		2	1	1	FALSE	FALSE																												
18	CkLst Roads				X	X	X																	3	3	0	TRUE	FALSE																												
19	CkLst Roof Material	X					X																	2	2	0	TRUE	FALSE																												
20	CkLst Secondary Road Terminus		X			X	X																	3	3	0	TRUE	FALSE																												
21	CkLst Severe Fire Weather and Strong Dry Winds						X		X															2	2	0	TRUE	FALSE																												
22	CkLst Street Signs				X	X	X																	3	3	0	TRUE	FALSE																												
23	CkLst Subdivision Design					X	X																	2	2	0	TRUE	FALSE																												
24	CkLst Subdivisions (Number of Houses)	X				X	X																	3	3	0	TRUE	FALSE																												

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	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AC	AD	AE	
1	Imagery (Is it used to create information)																													
	Local Assessor																													
	Local Parcel Mapping with Orthoimagery																													
	Owner																													
	Local Govt (Planning, Fire, Health)																													
	Local Govt - Boulder (Planning, Fire, Health)																													
	Site Visit																													
	911 - First Responders																													
	Fire Planners																													
	State Wildlife																													
	State Forest/Park/Lands																													
	State Emergency Management																													
	BLM																													
	Forest Service *																													
	Park Service																													
	FWIS																													
	Census Bureau																													
	FEMA																													
	NASA																													
	NOAA																													
	USGS																													
	NGO																													
	Private Company																													
	All																													
	Local Government																													
	Federal Agencies																													
	Uniquely Local																													
	Uniquely Federal																													
25	CKLst Subdivision Boundaries	X				X	X																		3	3	0	TRUE	FALSE	
26	CKLst Topography	X			X	X	X														X				5	4	1	FALSE	FALSE	
27	CKLst Utilities				X		X	L																	2	2	0	TRUE	FALSE	
28	CKLst Veg Defensible Space		X			X	X		X																4	4	0	TRUE	FALSE	
29	CKLst Veg Vegetation Type						X															X			2	1	1	FALSE	FALSE	
30	Communication Sites	X				X																			2	2	0	TRUE	FALSE	
31	Communication with Public (informing them of the status of their property)	X				X																	X	3	2	1	FALSE	FALSE		
32	Communities	X			X	X																			3	3	0	TRUE	FALSE	
33	Defensible Space and Landscape		X				X	X																	3	3	0	TRUE	FALSE	
34	Demographics (generalized)															X									1	0	1	FALSE	TRUE	
35	Dip Locations (Water)					X		X																	2	2	0	TRUE	FALSE	
36	Distance of Structures from Fire	X				X							X												3	2	1	FALSE	FALSE	
37	Driveways		X			X	X																		3	3	0	TRUE	FALSE	
38	Elevation				X	X								X								X			4	2	2	FALSE	FALSE	
39	Federal Recreational Facilities						X						X	X	X										4	1	3	FALSE	FALSE	
40	Fire Boundaries					X								X											2	1	1	FALSE	FALSE	
41	Fire History					X			X					X											3	2	1	FALSE	FALSE	
42	Fire Location					X								X											2	1	1	FALSE	FALSE	
43	Fire Proximity to Priority Areas	X	X			X																			3	3	0	TRUE	FALSE	
44	Fire Regime													X											1	0	1	FALSE	TRUE	
45	Flood Hazard Areas																X								1	0	1	FALSE	TRUE	
46	Flood Zone	X															X					X			3	1	2	FALSE	FALSE	
47	Fuel Type	X				X	X		X				X	X	X										7	4	3	FALSE	FALSE	
48	Gas Lines												X												1	0	1	FALSE	TRUE	

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	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AC	AD	AE	
1	Imagery (Is it used to create information)																													
		Local Assessor	Local Parcel Mapping with Orthoimagery	Owner	Local Govt (Planning, Fire, Health)	Local Govt (Planning, Fire, Health)	Site Visit	911 - First Responders	Fire Planners	State Wildlife	State Forest/Park/Lands	State Emergency Management	BLM	Forest Service Management	Park Service *	Park Service	FWIS	Census Bureau	FEMA	NASA	NOAA	USGS	NGO	Private Company	All	Local Government	Federal Agencies	Uniquely Local	Uniquely Federal	
49	Grazing Permits												X		X										2	0	2	FALSE	TRUE	
50	High risk area	X				X			X																3	3	0	TRUE	FALSE	
51	Historic and Cultural Sites	X			X	X								X	X										5	3	2	FALSE	FALSE	
52	Hydric Locations (Water Sources)					X							X	X	X							X			5	1	4	FALSE	FALSE	
53	Imagery: Large Scale (1 Meter or Greater)	X			X	X								X								X			5	3	2	FALSE	FALSE	
54	Imagery: Satellite													X											1	0	1	FALSE	TRUE	
55	Imagery: Small Scale (2 ft or less)	X			X	X							X		X							X			6	3	3	FALSE	FALSE	
56	Improvements on land	X	X			X																			3	3	0	TRUE	FALSE	
57	Insurance																								0	0	0	FALSE	FALSE	
58	Invasive Species					X								X											2	1	1	FALSE	FALSE	
59	Isolated Residences	X				X		L																	2	2	0	TRUE	FALSE	
60	Isolated Structures	X				X							X	X	X										5	2	3	FALSE	FALSE	
61	Jurisdiction	X			X	X							X	X	X	X	X								8	3	5	FALSE	FALSE	
62	Land Status (who owns it)	X				X							X												3	2	1	FALSE	FALSE	
63	Land Use	X				X					X			X											4	2	2	FALSE	FALSE	
64	Local Fire evaluation study							X																	1	1	0	TRUE	FALSE	
65	Location of People (populated areas)	X				X											X								3	2	1	FALSE	FALSE	
66	Mailing Address	X																							1	1	0	TRUE	FALSE	
67	Mountain Communities	X				X																			2	2	0	TRUE	FALSE	
68	Mutual Assists Routes					X																			1	1	0	TRUE	FALSE	
69	Natural Barriers					X																			1	1	0	TRUE	FALSE	
70	Number of structures	X				X							X		X										4	2	2	FALSE	FALSE	
71	Other Water Sources					X							X	X	X							X			5	1	4	FALSE	FALSE	
72	Owner Name	X																							1	1	0	TRUE	FALSE	
73	Owner Type	X																							1	1	0	TRUE	FALSE	
74	Paper Maps of Local Knowledge	X			X	X							X	X	X	X									7	3	4	FALSE	FALSE	
75	Parcel Geometry	X				X							X	X											4	2	2	FALSE	FALSE	

FGDC Cadastral Data Subcommittee

	A	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AC	AD	AE	
1	Imagery (Is it used to create information)																													
	Local Assessor																													
	Local Parcel Mapping with Orthoimagery																													
	Owner																													
	Local Govt (Planning, Fire, Health)																													
	Local Govt - Boulder (Planning, Fire, Health)																													
	Site Visit																													
	911 - First Responders																													
	Fire Planners																													
	State Wildlife																													
	State Forest/Park/Lands																													
	State Emergency Management																													
	BLM																													
	Forest Service *																													
	Park Service																													
	FWS																													
	Census Bureau																													
	FEMA																													
	NASA																													
	NOAA																													
	USGS																													
	NGO																													
	Private Company																													
	All																													
	Local Government																													
	Federal Agencies																													
	Uniquely Local																													
	Uniquely Federal																													
76	Permitted Structures	X			X	X																			3	3	0	TRUE	FALSE	
77	Press releases					X																			1	1	0	TRUE	FALSE	
78	Properties in Flood Hazard Areas	X				X																			2	2	0	TRUE	FALSE	
79	Property Access and Turn Arouds		X				X		X																3	3	0	TRUE	FALSE	
80	Property Fire Ratings	X					X		X																3	3	0	TRUE	FALSE	
81	Property Ownership	X				X																			2	2	0	TRUE	FALSE	
82	Property Type	X				X						X	X	X	X										6	2	4	FALSE	FALSE	
83	Quad Maps					X															X				2	1	1	FALSE	FALSE	
84	Rating for Fire					X																			1	1	0	TRUE	FALSE	
85	Recreation areas								X					X	X										3	1	2	FALSE	FALSE	
86	Routes/Roads			X	X									X											3	2	1	FALSE	FALSE	
87	Satellite Imagery													X				X					X		3	0	3	FALSE	TRUE	
88	Slope					X								X							X				3	1	2	FALSE	FALSE	
89	Structure Location Private	X				X	X																		3	3	0	TRUE	FALSE	
90	Structure Location State/Federal	X					X			X	X	X	X	X	X										7	2	5	FALSE	FALSE	
91	Subdivisions	X				X		L																	2	2	0	TRUE	FALSE	
92	Threatened and Endangered species locations					X	X			X				X	X							X			6	2	4	FALSE	FALSE	
93	Timber					X					X	X	X	X									X		6	1	5	FALSE	FALSE	
94	Topography	X			X	X								X								X			5	3	2	FALSE	FALSE	
95	Trails													X											1	0	1	FALSE	TRUE	
96	Utility Corridors										X	X										X			3	0	3	FALSE	TRUE	
97	Utility Lines				X																	X			2	1	1	FALSE	FALSE	
98	Values at Risk (Agriculture)	X				X						X													3	2	1	FALSE	FALSE	
99	Values at Risk (Environmental Assets)					X				X	X		X		X										5	1	4	FALSE	FALSE	
100	Values at Risk (Valued Property)	X				X							X	X											4	2	2	FALSE	FALSE	
101	Vegetation					X						X	X	X	X										5	1	4	FALSE	FALSE	

Appendix C: Example of Event Assessments

The following are some samples of the workshop session notes and discussions. These highlight a few of the examples from each phase and give a flavor of the breadth and range of discussions.

Response Planning:

Preparing plans for a potential fire. Dispatchers will need to stage resources in areas of high risk. The determination is dependent upon many dynamic variables. This is in preparation for a Red Flag Day (County Burn Ban) when:

- Resources will need to be staged.
- Areas of high risk need to be determined.

Issues:

1. Wildland fires and corresponding information is dynamic (Weather, developments, and direction).
2. Cost Accountability: There are huge landscapes and limited resources. Cost accountability mechanisms with access to appropriate information are needed to make decisions.
 - a. Access: Limited access cause risk to response team.
 - b. Knowing where isolated communities and structures are located.
 - c. Priorities: Conflicting values and the need to determine priorities.
 - i. Residential homes versus resort homes.
 - ii. Cost of suppressions versus isolated structures.
 - d. Value
 - i. Timber
 - a. For some counties in Montana the schools are funded by the harvesting of state-owned timber.
 - b. Some timber stands are insured.
3. Easement Tracking
 - a. Balance values at risk
 - b. Many counties do not have protection of subdivisions, water sheds, and utility corridors.
4. Complete coverage of parcel information is not available.
5. Mailing and geographic accuracy of points versus parcels.

Land Information Needs and Sources:

1. Addresses of properties and persons within a given 911 area.
2. Location of the highest risk areas (Loss of life first, property second)
 - a. Infrastructure
 - i. Utility infrastructure (Corridors).
 - ii. Communication sites (If you can't communicate you can't work effectively).
 - b. Mailing addresses and homestead exemption is useful for determining if a residential home is used as primary or seasonal residence.

- c. Trails and recreation areas imply the presence of people.
- d. Location of all structures.
- e. Responder risk (Access and urn arounds).
- f. Subdivision boundaries (Public notification).

Mitigation - Fire Fuels Reduction:

Reduce hazards by reducing natural and man made fuels. The objective of these efforts is to determine priorities and risk and the allocation of resources. The two most important priorities are human safety and the protection structures (assets). Water sheds and other values related to wild land and urban interface

Issues:

1. Weather and timing.
2. Knowing where structures are located is a key element for determining priorities. This is particularly important for controlled burns.
3. Cross jurisdictional planning. How do we get the most (changes to landscape) with the least expense and acquire the greatest benefit.
4. Decision makers need to balance hazards against risk to be able to make decisions.
5. Rural counties lack the money for data conversion consequently there data is not available.
6. Build bridges (coordination) in the community so it is important to know who will be impacted.
7. Knowing where controlled burn are possible vs. when suppress a fire.
8. Data continuity.
 - a. Inconsistency in the business requirements in different organizations results in inconsistencies in data sets.
 - b. Difficulty. Federal agencies and counties need to begin collecting a similar set of information for each of their areas but they have different business needs. Property assessment versus Ecosystem Management. Need to know the location of improvements (structures) on federal lands and the vegetation on county lands.
9. There is an effort underway to identify structures by the USGS but they are not looking at the parcel data.

Land Information:

1. Building materials.
2. Number of structures. (Currently census data is being used.)
3. Owner name and contact. Needed for partners.
4. Owner types. (Public and private.)
5. Roof type.
6. Slope. (This may be in parcel data land attribute data.)
7. Utility corridors.
8. Values.
9. Vegetation type.

Wilderness Fire Use (WFU): When wild fires occur in the wilderness it is necessary to determine if you can let them burn or if there are in holdings that need to be protected. Decision makers need to know what is there and what is not.

Issues:

In the lower US there is more intermix of public and private in-holdings that need to be protected.

Information Needs:

- Structures.
- Value.
- Property use.
- If there is agriculture, land owners may need to be contacted to determine best access, gates, etc.
- The Press wants to know the value of the property.
- Where are the natural barriers?
- Where is the maximum manageable area (MMA)?
- Where and how fast is it moving?
- Where are the roads and access so resources can be delivered?

Recovery: Fire Damage Assessment: Community Aid

There are numerous sources of grants for repairing and rebuilding, rehabilitation, and the creation of defensible space. This is a post event process and very similar to the types of activities that are addressed in hurricanes.

Users

- Red Cross
- Insurance adjusters
- Building inspectors
- Sheriff
- Environmental and Health agencies

Issues:

- There is a great deal of variability in the grants and what is being asked for.
- The Red Cross needs Assessor records for fire damage assessment to determine the support that is needed. They need to know who owns the house, its value and documentation of damage.
- Not all structures will be in the Assessor's database.
- Moonscapes: Assessors used GPS to locate where structures should have been. Colorado's Jefferson County was able to tell their residents within 24 hours which homes were damaged by superimposing the parcels over satellite imagery. Once the imagery was released, their Web site had a million hits on the first day.

Land Information needs:

- Owners name
- Address
- Structure
- Site address
- Value

Rehabilitation:

Burned Area Emergency Rehabilitation Team (BAER Teams). Determine what rehabilitation steps should be made. BAER Teams go into areas to determine what rehabilitation steps should be made. Rehabilitation can be very expensive so it is important to be able to justify the expense of rehabilitation against long term impact. Where rehabilitation should be implemented, BAER teams are planning the rehabilitation, not doing it.

Issues:

1. Value of down stream of burned areas.
2. Location of people and the structures.

Land information needs:

1. Flood hazard areas of potential impact.
2. People.
3. Structures and their taxable value.
4. Location in flood hazard area.
5. Distance weighted.
6. Owner name.
7. Site address.
8. Mailing address.

Appendix D: Attendees

Name		Organization	Position
Ader	Bob	BLM	Geographer
Baer	Lori	USGS/National Mapping Division	Technical coordinator with FEMA Region 8
Barraclough	Craig	Park County, CO	GIS Director
Carochi	John	CO State Office	Fire & Aviation Budget Analyst
Domenico	Cindy	Boulder County, CO	Assessor
Dorrell	Sheila	Colorado State	GIS Coordinator, Demographics and Emergency Management
Edel	Skip	Colorado State Forest Service	Colorado State Coordinator
Ferguson	Bill	Cadastral Subcommittee	Western Cadastral Coordinator
Gallaher	Dave	Jefferson Co, CO	Director of IT-Development
Goodman	Susan	National Science and Technology Center	Fire Management Specialist
Gottsegen	John	Colorado Governor's Office	GIS Coordinator for Colorado
Guthrie	John	USGS	Master Cartographer
Hyde	Kevin	Management & Engineering Technologies Intl USFS RMRS Forestry Sciences Lab	Landscape Modeling Hydrologist
Johnson	Bob	Big Laramie Valley Fire Dept #4	GIS Data Development/Mapping
Luckacovic	Paul	BLM	GDCB Manager/Office Section Chief
McCaffey	Maggie	Montrose, BLM	Fire Information & Education
Muller	Brian	University of Colorado	Associate Professor, College of Architecture and Planning
Schauer	Ken	BLM	Geographer
Stage	David	FGDC Cadastral Data Subcommittee	Eastern Cadastral Coordinator
von Meyer	Nancy	FGDC Cadastral Data Subcommittee	Secretary, Cadastral Subcommittee
Widlund	Heather	San Miguel County, CO	GIS Coordinator, San Miguel County
Ziebarth	Ken	Boulder County Land Use Department, CO	GIS Manager