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## INFORMATION AND TECHNOLOGY MANAGEMENT

### 1      Introduction

This chapter establishes and defines the policies, procedures, and guidance for all activities and tasks associated with information and technology management in support of all business areas of wildland fire.

As noted in *OMB Circular A-130*, "the Federal Government is the largest single producer, collector, consumer, and disseminator of information in the United States. Because of the extent of the government's information activities, and the dependence of those activities upon public cooperation, the management of Federal information resources is an issue of continuing importance to all Federal agencies, State and local governments, and the public." The majority of policies, practices, procedures, and standards are established by OMB, the Department of the Interior, the National Park Service Chief Information Office, and the interagency wildland fire community (Wildland Fire Information and Technology and the National Wildfire Coordinating Group). Throughout this chapter, there will be many references to external and internal websites and documents.

A significant portion of this chapter provides guidance for information management, including data relating to Geographic Information Systems (GIS). NPS staff uses mapping and other spatial information tools that support the management and planning activities necessary to carry out the mission of the National Park Service. Because the NPS is a land management agency, location-based information is the backbone for most NPS information systems. A geographic information system (GIS) consists of computer hardware, software, and georeferenced (or geospatial) data.

### 2      Responsibilities

### 2.1    National Level

### 2.1.1  Chief Information Officer (CIO) and Associate Director for Information Resources

The responsibility for oversight of NPS IT governance is the responsibility of the DOI Chief Information Officer (CIO) and delegated to the NPS Associate Director for Information Resources (ADIR). The CIO and ADIR provide strategic direction for information and technology management and activities. In addition, the CIO develops, maintains, and facilitates the implementation of sound and integrated information technology architecture and promotes the effective and efficient design and operation of all major information resources management processes.

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### 2.1.2 Deputy ADIRs for National Information Technology Center (NITC) and National Information Systems Center (NISC)

The Deputy ADIRs for the two Centers are responsible to the ADIR for development of specific enterprise-wide policies and standards. The NITC is located in the Washington, D.C., office and is responsible for the topology and technology of the NPS. The NISC is located in Denver, Colorado, and supports data and software activities. National level management of GIS in the NPS is coordinated through the National Information Systems Center (NISC) and reports to the NPS ADIR. The NPS also has Servicewide programs that use GIS to manage park resources, regional technical support centers, and park-based GIS specialists.

### 2.1.3 Superintendents, Center Directors, and Program Managers

Management of IT infrastructure occurs in the regions, parks, and programs. Certain authorities and responsibilities are delegated to superintendents and program managers, and they are responsible and accountable for the management of IT assets and systems within their respective areas.

### 2.1.4 Branch Chief of Information Technology

The Branch Chief of Information Technology is responsible for the information and technology management for the NPS Division of Fire and Aviation Management. Responsibilities include providing strategic direction and oversight for information and technology management and carrying out IT practices and information management following "best practices" to meet wildland fire, structural fire and aviation activities. The responsibilities of the Branch Chief include the following:

- Provides advice and assistance to the wildland fire senior management personnel and wildland fire community to ensure that information technology is acquired and information resources are managed in a manner that implements policies and procedures for this Division.
- Develops, maintains, and facilitates the implementation of sound and integrated wildland fire information technology architecture.
- Promotes the effective and efficient design and operation of wildland fire information management resources.
- Manages operational duties such as all IT assets and infrastructure components that are contained within the Division of Fire and Aviation Management.
- Is responsible for functions such as geographic information systems (GIS), security, information, reliable data, and technology for wildland fire.

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## 2.2 Regional Level

### 2.2.1 Regional and Associate Directors

Information Officers (IO), Technology Officers (TO), regional security managers (RITSM), and GIS coordinators are designated by the regional/associate directors for the purpose of managing the IT assets directly under their organizational area of responsibility and authority. The IO, TO, and Security Manager conform to *Director's Order 11A*, DOI IT standards and requirements, and all NPS standards and policies.

### 2.2.2 Regional Fire GIS Specialist

The Regional Fire GIS Specialist provides a variety of support functions, including geospatial expertise, data layers, and map products. Responsibilities of the GIS specialist vary throughout the program. Parks without a fire GIS specialist or regular GIS specialist may have more need for help with basic cartography and technical support. The responsibilities of the regional fire GIS specialist include the following:

- Supports the GIS needs of the wildland fire management program throughout the region; may provide GIS data layers, map products, and data analysis as requested.
- Ensures that fire management staffs at the parks in the region have access to current data, software, training, and assistance.
- Facilitates the wildland fire management program's park level utilization of existing GIS and GPS hardware, software, and data capabilities.
- Represents the wildland fire management program both regionally and nationally on NPS/interagency committees and task groups related to fire management and GIS, as appropriate.
- Serves as a member of the Fire Geospatial Systems Committee (FGSC) to help set national policy for fire GIS-related issues.
- Ensures that as the steward of fire GIS data, standards for collection/creation, naming, documentation, and storage are implemented as written in *RM 18 Chapter 20, Section 6, Information and Data*.
- Ensures guidelines are understood and followed with reference to *GIS Standard Operating Procedures on Incidents, chapter 2, File Naming and Directory Structure*.
- Aggregates local unit data and stores in a national, standard format approved by the Fire Geospatial Systems Committee  and provides this spatial data to the National Fire GIS Lead (or designee). https://sites.google.com/a/nps.gov/fire-gis/data-upload

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## 2.3    Park Level

### 2.3.1  Park Fire GIS Specialist

Responsibilities of the Fire GIS Specialist vary from park to park:

- Supports the GIS needs of the wildland fire management program at one or more area parks.
- Provides GIS data layers, map products, and data analysis as requested.
- Ensures that fire management staff has access to current data and software.
- Facilitates the wildland fire management program's utilization of existing GIS capability and data at the park, including training and support.
- Ensures that as the steward of fire GIS data, standards for collection/creation, naming, documentation, and storage are implemented as described later in this chapter in Section 6, Information and Data.
- Coordinates fire program efforts with the park GIS specialist
- Ensures that during an incident, GIS Standard Operating Procedures are understood and followed with reference to *GIS Standard Operating Procedures on Incidents*, Chapter 2, File Naming and Directory Structure.

### 2.3.2  Park GIS Specialist or Cartographer (non-fire)

The GIS Specialist provides a variety of support functions, such as geospatial expertise, data layers, and map products, to one or more divisions at a park. Responsibilities of the GIS specialist vary throughout the program and include the following:

- Supports the GIS needs of the park; may provide GIS data layers, map products, and data analysis as requested by fire management.
- Assists park staff with access to current data, software versions, training, and assistance.
- Facilitates all park staff's utilization of existing GIS capability and data at the park.
- Ensures that all GIS data follow NPS standards for collection, creation, naming, documentation, and storage as described later in this chapter in Section 6, Information and Data.

## 3    Information Management

Information is essential to properly execute the DOI and NPS mission. Because accurate information is integral to making responsible decisions, the NPS must ensure the quality and usefulness of its electronic information and IT systems. There is a growing body of federal statutes and regulations that govern IT in the federal sector that

require compliance. The following is a brief explanation of some of the information management and technology activities wildland fire management staff need to be aware of to ensure the quality and usefulness of wildland fire information and data.

## 3.1     Information Quality

The federal government is the largest single producer, collector, consumer, and disseminator of information in the United States. In order to improve public access and dissemination of government information, the information must be organized, categorized, and made searchable across agencies.

Information collection guidance states that agencies must collect or create only information necessary for the proper performance of agency functions and having practical utility. The wildland fire program is responsible for collecting, managing, and maintaining information and data essential to the performance and operations of wildland fire business. The wildland fire program also needs and uses information and data that is not subject to these maintenance and management guidelines.

## 3.2     Privacy and Security

Privacy and security of data are important elements of planning, acquisition, and management of federal information technology systems. The E-Government Act of 2002 and the Federal Information Security Management Act (FISMA) provide significant privacy and security responsibilities for federal information technology system operators. FISMA requires agencies to integrate IT security into their capital planning and enterprise architecture processes, to conduct annual IT security reviews of all programs and systems, and to report the results of those reviews to OMB. The Act provides the framework for securing the federal government's information technology. Specific privacy guidance information is maintained and updated in the NPS Privacy website at http://privacy.nps.gov.

There are numerous guidelines and policies issued by the Department of the Interior and the National Park Service in regard to safeguarding IT systems. All agencies are required to incorporate security into the architecture of their information systems. Security requirements must be built into the life-cycle budgets for information systems. The funding must be identified in wildland fire capital planning and investment control (CPIC) processes.

All wildland fire employees will complete and pass the current version of the Department's Federal Information System Security Awareness Training (FISSA) + Privacy and Records Management Training annually.  The FISSA+ training includes the NPS Responsibilities for Computer Use (RCU) training outlining responsibilities and guidelines for NPS employees in the use of information technology computers and resources.

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### 3.2.1  Personally Identifiable Information (PII)

Personally Identifiable Information is defined in OMB Memorandum M-07-16 as "information which can be used to distinguish or trace an individual's identity, such as their name, social security number, biometric records, etc. alone, or when combined with other personal or identifying information which is linked or linkable to a specific individual, such as date and place of birth, mother's maiden name, etc."

The Federal Information Security Management Act of 2002 requires all agencies to report security incidents to a federal incident response center, the United States Computer Emergency Readiness Team (US-CERT). In accordance with the Memorandum for Chief Information Officers (M-06-19), agencies are required to report Personally Identifiable Information (PII) Spillage incidents to US-CERT within one hour of discovery.

US-CERT has released PII reporting requirements and Spillage Incident Procedures that all wildland fire employees are required to follow.


## 4      Technology Management

*Information Technology* is defined in *DO 11A* as "the architecture and technology that supports information management. IT includes any activities relating to computers, equipment, software, firmware, voice communication systems, and similar procedures, services, and other resources."

### 4.1     Federal Information Technology Acquisition Reform Act (FITARA)

In December 2014, Congress enacted FITARA. The FITARA imposes new legal requirements that enhance Department-level CIO authorities across a broad scope of IT-related activities, including: (1) planning, programming, budget formulation, and execution; (2) management, governance, and oversight processes related to IT; (3) contracts or agreements for IT or
IT services; (4) decision making for major IT investments; and, (5) appointment of any bureau/office CIO or equivalent. In June 2015, OMB provided implementation guidance for FITARA and related IT management practices (OMB Circular M-15-14.

### 4.2     Capital Planning and Investment Control (CPIC)

The Clinger-Cohen Act requires federal agencies to view their investments in IT as a single portfolio of investments, similar to a portfolio of financial investments. All of the programs for the NPS develop capital plans and justifications for all capital asset acquisitions, including major IT systems.

Interagency wildland fire IT projects follow their bureau and department Capital Planning and Investment Control (CPIC) processes when managing a wildland fire IT project for the interagency wildland fire community.

## 4.3    Technology Acquisition

The Department is coordinating and consolidating the acquisition and management of commonly used IT hardware and software products and services across the Department to support the Department's key mission and programs. In an effort to promote technical standardization and cost efficiency consistent with enterprise architecture and IT security guidelines the Department established department-wide contract vehicles. The National Park Service is required to utilize Department-wide contracts for purchasing IT products and services. The DOI acquisition policies and contracts for hardware, software, and other IT products are updated on the Department's website at, https://sites.google.com/a/ios.doi.gov/imt-policy/mandatory-use-policies.

The Federal Information Technology Acquisition Reform Act (FITARA) requires the Department of the Interior (DOI) Chief information Officer (CIO) to certify to the Office of Management and Budget the accuracy of the Department's IT spending, including that of the bureaus. The DOI CIO has delegated approval authority to the National Park Service (NPS), Associate Director - Information Resources (ADIR) Spend Plan submission is an annual requirement until modified or rescinded by the DOI CIO or the NPS ADIR. In turn, the ADIR authorized Information Officers approval for spend plan items up to $100,000, with limitations.

Spend Plans should include all acquisitions, including credit card purchases, regardless of the amount. National Park Service Information Resources will collect and approve Spend Plans from all parks, regions, offices, and programs through the common portal; except where authority is provided to the Visitor and Resource Protection Information Officer. Spend Plan submission is an annual requirement until modified or rescinded by the DOI CIO or the NPS ADIR.

## 4.4   NPS Software

The NPS has a standard suite of software, which is purchased by the Department of the Interior or National Park Service under an Enterprise License Agreement (ELA).  The standard suite of software used by the NPS is funded through the general NPS IT software assessment approved by the NPS Information Technology Investment Council. NPS users across the NPS can install and utilize products from the ELA.

## 4.5   Geographic Information Systems (GIS)

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To request ESRI software or training, contact your Regional GIS Coordinator.  Fire specific GIS training can be found on this site:
https://sites.google.com/a/firenet.gov/gistraining/home

## 4.6   Wildland Fire IT Governance and Investments

In 2012, Senior Fire Leadership established the Wildland Fire Information and Technology (WFIT) management structure to assist with the ever-increasing need for an integrated interdepartmental and interagency method to manage the complex wildland fire investments. The program meets these needs through the development of a repeatable business process integrating the:

- WFIT portfolio management process represented by a strong governance structure and a series of IT and project management processes.
- Project approval and funding process. Under this governance and management structure, the underlying funding sources for new projects, ongoing investments, and supporting staffs and infrastructures does not change. Each agency continues to provide appropriate funding.
- WFIT budget management process.
- Success of the WFIT investment management process requires coordination and integration with the fire agencies, and the Department-level investment management and budget management processes. It maintains the integrity of the reporting relationships within the USDA Forest Service and Department of the Interior wildland fire management programs and personnel.

The WFIT governance structure provides a single mechanism for identifying and managing WFIT investments. It supports and implements strategic business program direction on behalf of entities such as the Wildland Fire Leadership Council (WFLC) and the Federal Fire Policy Council (FFPC) to establish business goals and requirements. It also allows for the introduction of new ideas from any other source including (but not limited to) NWCG Committees, project and investment managers, Fire management leadership, or Field users. In this way, the WFIT program makes its stakeholders participants in the process. The idea can be a new way to solve a business problem, an enhancement/revision to an existing product, or a design in response to a new requirement. The Investment Review Boards (IRBs)/ISTAT Executive Committee (IEC) and related governance and management groups have final approval authority over strategic direction and individual investments.

## 5      Services

## 5.1     File Transfer Protocol (FTP)

The following are recommended FTP servers:

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- Internal NPS, Denver FTP Site

  This site is an Anonymous FTP site. It can only be accessed internally, which means you must be on an NPS network or be logged in through a VPN client. It is meant to be a temporary storage place to transfer large electronic files rather than sending them as e-mail attachments. FTP is *not* meant for long-term storage. This FTP site is cleaned regularly, and files and folders are deleted. FTP should not be used as a back-up system or replacement for archiving files locally. The FTP instructions for the internal site are posted on the site.

  FTP Site Address: ftp://ftp.den.nps.gov

- NPS Kiteworks Secure File Transfer Site

  The NPS Kiteworks file transfer site allows internal and external users to transfer files securely. The Kiteworks service is meant for exchanging large or confidential files with external business partners and it is NOT meant to be use for long-term storage. The following policies apply:
  - Access with your PIV Card
  - Send files up to 25 GB
  - Files are deleted 1 to 30 days after upload
  - Inactive accounts are deleted after 30 days
  - ONLY send personally identifiable information in your attached files
  - Post copies of files only

  Site Address: https://secure.nps.gov

- Fire Interagency

  The National Interagency Fire Center (NIFC) Interagency FTP site been established as an *official* site for interagency wildland fire incident data and documents. This site provides access to incident personnel to download data when it is available; to upload incident-relevant data; such as remotely sensed images and incident GIS data. All information that is posted to ftp.nifc.gov must meet the following requirements:

  o Public data—Information that is non-sensitive, unclassified, not copyrighted, and viewable by everyone may be posted.
  o Official content – Only official information directly related to wildland fire may be posted. Restrictions include (1) no Individual Indian Trust Data may be posted, and (2) this site may not be used for distributing licensed software or any other licensed or copyrighted media. Posted files will be reviewed on a regular basis to ensure appropriate use of the FTP server. Inappropriate or unofficial postings will be removed and are subject to investigation.

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o No information subject to the Privacy Act may be stored on this site.

A password is necessary to upload information to the FTP site, but a password is not needed to download data. For more information, visit the NIFC FTP Server Information page at https://ftp.nifc.gov.

### 5.2   NPS Natural Resource Information Portal

The NPS Integrated Resource Management Applications Information Portal (IRMA) is a "one-stop" for data and information on park-related natural resources. From the portal you can search for, view, and download documents, reports, publications, data sets (geospatial and non-geospatial), park species lists, Fire management plans, Burned Area Emergency Response (BAER) plans, and links to additional data sources. No logins or passwords are needed.

### 5.3   SharePoint Sites and Google Sites

Many users share data and documents through either SharePoint sites or Google Sites. Sites can be open or inside firewalls. Users must adhere to all DOI and NPS policy and standard operating procedures. Current SharePoint sites of interest include Resource Information Management. The FGSC maintains a Google Site at: https://sites.google.com/a/nps.gov/fire-gis/. The Division of Fire and Aviation maintains a SharePoint at, http://famshare.inside.nps.gov/default.aspx.

### 6      Information and Data

To improve efficiency, promote data, and minimize system redundancy, OMB's Federal Enterprise Architecture (EA) will be used. The ability to improve the quality of, access to, and sharing of data is part of EA.

### 6.1    DOI Enterprise Architecture (EA)

The DOI Enterprise Architecture (EA) Program sets policy and direction for information and data. Enterprise Architecture is the explicit description and documentation of the current and desired relationships among business and management processes and information technology. The EA describes the logical dependencies and relationships among business activities. The EA must provide a strategy that will enable an agency to support its current state and provide a road map for transition to its target environment. In order for agencies to create and maintain the EA, the following framework needs to be identified and documented:

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- *Business processes:* identify the work performed to support mission, vision, and performance goals plus document change agents.
- *Information flow and relationships:* identify the information utilized and the movement of information.
- *Applications:* identify, define, and organize the activities that capture, manipulate, and manage the business information to support the business processes.
- *Data descriptions and relationships:* identify how data is created, maintained, accessed, and used.
- *Technology infrastructure*: Describe and identify the functional characteristics, capabilities, and interconnections of the hardware, software, and telecommunications.

OMB requires agencies to document and submit an Enterprise Architecture (EA). When significant changes occur to the EA, agencies must resubmit the document. For the wildland fire community, WFIT oversees EA management and implementation. Visit the WFIT EA page for more information.

## 6.2    Privacy and Security of Data

The E-Government Act of 2002 and the Federal Information Security Management Act (FISMA) provide significant privacy and security responsibilities for all federal technology systems. The FISMA requires agencies to integrate IT security into their capital planning and enterprise architecture processes. This Act provides the framework for security of the federal government's information and data.

## 6.3    Data Stewardship

Director's Order 11A states, "All information owners will maintain all official NPS data in a manner which meets the highest data integrity standards, including timeliness, accuracy and completeness. Each information owner will take whatever steps necessary to ensure that NPS systems have sufficient data quality reviews and audits from both an internal system perspective, as well as externally through control reviews."

Data stewardship is the process of managing information necessary to support program and financial managers, and ensuring that data captured and reported is accurate, accessible, timely, and usable for decision-making and activity monitoring. The goal of the data stewardship policy is to synchronize data collection processes, reduce data redundancy, and increase data accessibility, availability, and flexibility in a systematic manner.

One of the main areas of responsibility for any data steward is the enforcement of data integrity. Most data administration texts define data integrity as attention to the consistency, accuracy, and correctness of data stored in a database or other electronic

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file. Commonly, data integrity refers to the validity of data in all its incarnations (electronic, paper, etc.).

The wildland fire program is responsible for managing and maintaining data essential to the performance and operation of wildland fire business. This data is a valuable asset. The data the wildland fire program is responsible for may be classified for different types of use. Data may be for public use, internal use only, or it may be highly sensitive. All federal employees are responsible for the integrity, timeliness, accuracy, and completeness of federal data regardless of the use.

As data stewards, all federal employees are responsible for ensuring protection of data if it is highly sensitive, ensuring the accuracy and quality of all data within their area, and reporting any breach in security or illicit use of highly sensitive data.

### 6.3.1  Wildland Fire Program Core Data

There are several data layers that are national in scope, critical to multiple program areas of fire management and for which the fire program could be considered the steward. Those include but are not limited to:

- Fire Occurrence (ignition) Points
- Wildfire and Prescribed Fire Perimeter Polygons
- Non-Fire Fuels Treatment Polygons
- Fire Management Units
- Wildland Urban Interface
- Structure and Facility Risk Assessments

The National Park Service has approved data standards for each of the above datasets. These data standards will be used when collecting and storing the fire core datasets. Each unit is responsible for ensuring their data is created and managed in accordance with the requirements listed below.

Links to the data standards are provided on the Resource Information Management SharePoint site in the Standards Repository for fire.

Fire Occurrence Points

All wildland fire incidents are supported by a NPS Wildland Fire Report. The Wildland Fire Report that is retained by the park must document as accurately as possible the fire's point of origin (fire occurrence). This location along with other information from the completed report must be entered into the Wildland Fire Management Information (WFMI) fire reporting module within 10 working days after the fire has been declared out. A Global Positioning System (GPS) derived location should be collected whenever

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practicable and displayed in a Geographic Information System (GIS) to ensure that high levels of accuracy and precision are captured.

The fire occurrence location should be reported as latitude and longitude (usually degrees, minutes, seconds, to at least 1 decimal place or in UTM easting and northing (including UTM zone). Datum must also be recorded on the Wildland Fire Report and entered into WFMI. Whenever possible, attach hard copy maps to archived Wildland Fire Reports.

WFMI is the source for all Fire Occurrence data. Geospatial data is created periodically from the WFMI export file. Any dataset edits made outside of the WFMI system will not be saved or otherwise used to update the dataset.

Wildfire Polygons

The final wildfire or prescribed fire perimeter will be stored in a GIS polygon data layer using the NPS GIS Data Standard  and uploaded to the NPS Fire Geodatabase.  The final perimeter should be mapped by locally available staff using the best available method (GPS preferred) and include documenting the collection method. If fire office staff is unavailable to complete this work, contact the regional fire GIS specialist for help. As an alternative, final fire perimeters may be collected from remote sensing data (e.g., Monitoring Trends in Burn Severity). Any additional perimeters (progressions) mapped during the course of the fire should also be stored in a GIS polygon data layer and uploaded to the NPS Fire Geodatabase. Minimum mapping size is determined by the park unit in consultation with the regional fire management office.

Data will be loaded to the NPS Fire Geodatabase, following the naming and attribute guidance on the Fire GIS Data Upload Site within one month of the fire being declared out. Regional fire GIS specialists will QA/QC data within their regional version.

Prescribed Fire and Non-Fire Fuel Treatment Polygons

Perimeter polygon data for all planned treatment entered into the National Fire Plan Operations and Reporting System (NFPORS) will be stored as a GIS polygon data layer using the NPS GIS Data Standard and uploaded to the NPS Fire Geodatabase. If the final completed perimeter is different from the planned polygon, it will be mapped by locally available staff using the best available method (GPS preferred) to replace the planned perimeter. The data collection method used will be documented.

Perimeter data for all planned and completed treatments will be loaded to the NPS Fire Geodatabase, following the naming and attribute guidance on the Fire GIS Data Upload Site. Planned perimeters will be loaded prior to regional approval in NFPORS. Completed perimeters will be loaded within one month of the treatment being entered

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as completed in NFPORS. Regional fire GIS specialists will QA/QC data within their regional version.

Fire Management Unit (FMU)

As defined in their respective fire management plans, park units will create GIS polygon data layers for their Fire Management Units using the NPS GIS Data Standard and uploaded to the NPS Fire Geodatabase.

Fire Management Units will be provided to the regional fire GIS specialist and uploaded to the NPS Fire Geodatabase upon approval of the Fire Management Plan. Regional fire GIS specialists will QA/QC data within their regional version.

Wildland Urban Interface (WUI)

Units should create new or modify existing GIS polygon data layers representing the location and extent of Wildland Urban Interface areas within and adjacent to their unit boundaries. WUI is defined by the Federal Register Volume 66 No. 3 and is delineated by the park unit in consultation with the regional fire management office. The polygon data should follow the NPS GIS Data Standard and be uploaded to the NPS Fire Geodatabase.

Wildland urban interface data will be provided to the regional fire program offices and uploaded to the NPS Fire Geodatabase on a yearly basis. Regional fire GIS specialists will QA/QC data within their regional version.

There are other data layers in addition to the core data above that are created and maintained by the fire management program.  Examples include but are not limited to:

- Local Values at Risk
- Local Fuel Model Data (National Fire Behavior Prediction System with canopy characteristics)
- Preplanned identification of incident-related features (e.g., helispots, staging areas, dip sites)
- Direct Protection Areas
- Structure and Facility Risk Assessments

Local Fuel Layers and Local Fire Behavior Analysis

GIS layers that characterize fuel conditions typically include fire behavior fuel model, percent canopy cover, canopy height, canopy base height and canopy bulk density. These layers (along with topography inputs) are typically combined into a FARSITE landscape file for use in geospatial fire behavior models like FARSITE, FlamMap and FSPro.  These tools are used to predict the spread and intensity of fires, and they

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provide valuable information for fire managers.  The LANDFIRE project generates these data sets (both the individual fuels themes, as well as the landscape file) on a national scale.  LANDFIRE fuels datasets are available nationally, are not limited by administrative boundaries and are available for use for use for fire behavior modeling within the Wildland Fire Decision Support System.  LANDFIRE data is occasionally updated to reflect the effect of disturbances as well as succession on fuels across the landscape.  Parks should make every effort to assist the LANDFIRE project with these efforts by providing disturbance-related GIS data as well as any field plot data that could be used to enhance the accuracy of the updated LANDFIRE projects.

Fire behavior analyses are also completed using fuels inputs derived from local data sources.  Examples of this would include a landscape file generated for a park using a local vegetation or land cover data layer.  Oftentimes, geospatial fuel inputs derived from local data sources will be of higher accuracy than those available from LANDFIRE and may lead to more accurate fire behavior analyses.  When local fuels layers are used in lieu of LANDFIRE data, it is also important to keep these layers current by updating them to reflect for recent disturbances.  If locally derived fuels layers are used in lieu of LANDFIRE data, the local data should be kept current and should be made available to incoming incident management teams for fire modeling purposes.  Processes used to derive as well as update the local fuels layers should be documented as well.

The following are additional recommended Fire Behavior data guidelines:

- All FARSITE landscapes should be tested and calibrated (using past fires where possible) to ensure their viability for modeling fire behavior growth and spread.
- Criteria for fire-season-ending events should be determined and documented, and term files should be prepared for use in FireFamily Plus.
- Where wind interaction with terrain causes significant impact on wind speed and direction (areas with steep terrain and strong winds during fire season), winds of concern should be determined and run in the WindWizard program to prepare wind vector maps and gridded wind files for use in FARSITE and FlamMap.

### 6.3.2  GIS Directory Structures and Naming Conventions

All incident-created data should be named with GIS Standard Operating Procedures naming conventions and stored in appropriate folders. Standard names and directory structure can be found in *GIS Standard Operating Procedures on Incidents*, Chapter 2, *File Naming and Directory Structure*.

All data should be stored in the park GIS data library.  All data identified in section 6.3.1 should be provided to the regional Fire GIS lead within the timelines noted. Data created by fire staff must be incorporated into this data library for archiving.

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Coordination with the park GIS or resource specialist who manages the data library is crucial to ensure that fire data is named correctly and stored appropriately.

For parks without preexisting data libraries, suggestions for park directory structures can be found by referring to the NPS Inventory & Monitoring Recommended GIS File Folder/Directory Structure under GIS Standards.  Fire data must be maintained by the stakeholders (fire staff). Additional data layers that the fire program uses often and that the fire program is ultimately responsible for can be found in exhibit 1, GIS Data and Fire Management Matrix, and *GIS Standard Operating Procedures on Incidents, Chapter 4, Minimum Essential Datasets*.

## 6.4    Data Standards

The purpose of geospatial standards in wildland fire management is to facilitate data sharing and increase inter-operability among geospatial technologies. Standards increase the reliability and effectiveness of the GIS products we produce.

*Executive Order 12906, Agency Adherence to Standards*, states, "Federal agencies collecting or producing geospatial data, either directly or indirectly (e.g., through grants, partnerships, or contracts with other entities), shall ensure, prior to obligating funds for such activities, that data will be collected in a manner that meets all relevant standards adopted through the (Federal Geographic Data Committee) FGDC process."

*Director's Order 11A* states, "Geographic information must meet all Federal standards, DOI standards and NPS standards." *Director's Order 11B* states, "Information will be developed only from reliable data sources based on accepted practices and policies utilizing accepted methods for information collection and verification."

### 6.4.1  NPS GIS Standards

The NPS GIS standards process, a list of current standards and a standards repository can be found at the Resource Information Management SharePoint site in the Standards Manager Section:

https://ir.sharepoint.nps.gov/GIS/DataMgmt/SitePages/Home.aspx.

### 6.4.2  Interagency Fire Standards

The National Wildfire Coordinating Group (NWCG) Data Management Committee (DMC) approves and maintains data standards for the interagency wildland fire community.

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The NWCG Geospatial Subcommittee helps develop and recommends wildland fire geospatial data standards for approval by the NWCG DSTS. Proposed and approved interagency geospatial data standards are available at the NWCG web page

## 6.5    Data Documentation

*Metadata* is information about a database, or "data about the data." It describes several attributes about a particular database, including data quality, data content, and data condition. The Federal Geographic Data Committee (FGDC) identifies three major uses of metadata. First, metadata helps to organize and maintain an organization's investment in data. Second, it provides information to data clearinghouses. Finally, metadata aids in data transfer. The creation of metadata is a growing necessity as the amount of digital geospatial data and the number of producers of data increase. Because data development is the most expensive part of a GIS, metadata can help the user decide if an existing data set is useful for a particular GIS analysis.

## 7    GIS Training

Fire GIS Training for desktop, web, and mobile GIS can be found at:
https://sites.google.com/a/firenet.gov/gisstraining/home

## 8    Contracting

### 8.1    Data Creation, Cleaning, and Storage

*Director's Order 19* states, "Records and data that are collected, created or generated by other organizations working for the NPS under contracts, interagency agreements, cooperative agreements or other agreement instruments with the NPS, are considered NPS records unless the contract or agreement specifically states otherwise. All partnership agreements, contracts or other agreement instruments should clearly state this. Copies or originals of all project documents and data generated under these agreements should be obtained and retained by the NPS office managing the project."

### 8.2    Map Creation

Map standards for incidents can be found in *GIS Standard Operating Procedures on Incidents*.

**Fire Management Programs**

| GIS Data Layer | | Fire Management Plans | Preparedness | Education, Prevention, and Information | Wildland Fire Management | Fuels | Fire Ecology & Fire Effects | Burned Area Emergency Response (BAER) | Air Quality/ Smoke Management | FIREPRO/FPA Analysis |
|---|---|---|---|---|---|---|---|---|---|---|
| Base Cartographic Data Layers | Administrative Boundary | X | | | X | | X | | | |
| | Ownership Boundary | X | | X | X | X | X | X | X | X |
| | Roads | X | | | X | X | X | X | | X |
| | Trails | X | | | X | X | X | X | | |
| | Hydrology (rivers, streams, lakes) | X | X | | X | | X | X | | |
| | Communities (populated places) | X | X | X | X | | | | | |
| | Public Land Survey (PLSS) (Township, Range, Section) | | | | X | | | | | |
| | Quad Boundaries (7.5 minute) | | | | X | | | | | |
| | Digital Elevation Model Grids (DEM) (Elevation, Slope, Aspect) | X | X | X | X | X | X | X | X | X |
| | Digital Raster Graphics (DRGs) (digital USGS topo maps) | X | | X | X | X | X | | | |
| | Orthoimagery (usually DOQQ) | | | X | | X | X | | | |
| Fire | Fire Management Units (FMUs) | X | | | X | X | X | | | X |
| | Wildland Fire Management Options (full perimeter control, wildfire t | X | X | | X | | X | | | X |
| | Maximum Manageable Area (MMA) (pre-planned or historic) | X | | | X | | | | | |
| | Response Areas (Direct Protection Areas) | X | X | X | X | | | | | |
| | Dispatch Locations | X | X | | | | | | | X |
| | Helibase/Helispots | X | X | | | | | | | |
| | Prescribed Burn Units | X | | | | X | X | | | |
| | Wildland Urban Interface | X | X | X | X | X | X | | | X |
| | High-risk Ignition Areas (based on past occurrence, fuels, etc.) | X | X | X | X | X | | | | |
| | Fire Occurrence Points (ignitions) (wildfire & prescribed fire) | X | | | | X | X | | | X |
| | Fire Perimeter Polygons (final) (wildfire & prescribed fire) | X | X | | X | X | X | X | | X |
| | Fire Progression Polygons | | | | X | | X | | | |
| | Non-fire Treatment Areas | X | | | X | X | X | X | | X |
| | Fuel Models | X | X | X | X | X | X | X | | X |
| | Canopy Characteristics (tree ht., % canopy cov., canopy base ht.) | X | | | X | X | X | X | | X |
| | Historic Fire Regimes | X | | | X | X | X | X | | |
| | Fire Regime Condition Class | X | | | X | X | X | | | |
| | Fire Effects Monitoring Data (plots, georeferenced photos) | X | | | X | X | X | | | |
| | Other General and Research Plots | X | | | X | X | X | | | |
| | Burn Severity (imagery, grids, final perimeters) | | | | X | X | X | X | | |
| Facilities Data | Structures | X | X | X | X | X | | | | |
| | Signs | | | | X | | | | | |
| | Fences | | X | | X | X | | | | |
| | Bridges | | X | | X | | | | | |
| | Culverts | | | | X | X | | | | |
| Natural Resources Data | Vegetation | X | | | | X | X | X | | |
| | Watersheds | X | | X | X | X | X | X | X | |
| | Soils | | | | | | X | X | | |
| | Geology | | | | | | X | X | | |
| | Exotic Plants | X | | | | | X | X | | |
| | Wilderness Boundary | | | | | | X | X | | X |
| | Wetlands | | | | | | X | X | | |
| Sensitive Resources | Archeological Sites | X | X | | X | X | X | X | | X |
| | Cultural Sites | X | X | | X | X | X | X | | X |
| | Sensitive Riparian Areas | X | X | | X | X | X | X | | X |
| | Airsheds (Class 1) | X | | | X | X | | X | X | X |
| | Wildlife Breeding Habitat | X | | | X | X | X | X | | X |
| | Vistas | X | | | X | X | | X | X | X |
| | T&E Species and Critical Habitat | X | X | | X | X | X | X | | X |
| Safety Concerns (air, ground) | HAZMAT | | X | X | X | X | X | X | | |
| | Mine Sites | | X | X | X | X | X | X | | |
| | Flight Routes/Restrictions | | X | | X | | | | X | |
| | Power Lines | | X | | X | X | | X | X | |