MANAGING WILDLAND FIRE

1 Introduction

This chapter provides direction for the management of wildland fire. Primary operational guidance for managing wildland fire is found in the *Interagency Standards for Fire and Fire Aviation Operations*.

Wildland fire is a general term describing any non-structure fire that occurs in vegetation and/or natural fuels. Wildland fire can be planned (prescribed fire) or unplanned (wildfire); see Figure 1. A prescribed fire is any fire intentionally ignited by management under an approved plan to meet specific objectives. A wildfire is an unplanned ignition or a prescribed fire that has been declared a wildfire.

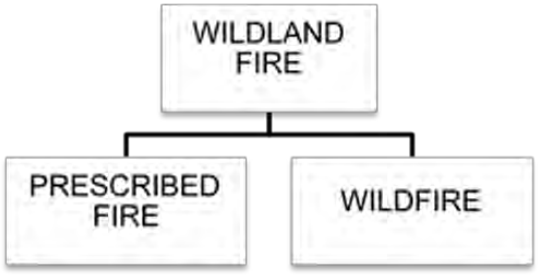

Figure 1 Types of Wildland Fire

Federal fire policy allows wildland fires to be managed concurrently for one or more objectives (See Figure 2). When managing any wildland fire, the following should be considered:

- The protection of human life is the single, overriding priority
- Management actions that are applied to wildland fires are based on the social, political, and environmental considerations and the conditions of the fire, fuels, weather, and topography in order to accomplish specific objectives for the individual fire
- Management of wildland fires is based on objectives established in applicable management plans that will take into account federal fire cohesive strategic goals:

    - **Restore and Maintain Landscapes:** *Landscapes across all jurisdictions are resilient to fire-related disturbances in accordance with management objectives.*

  - **Create Fire-Adapted Communities:** *Human populations and infrastructure can withstand a wildfire without loss of life and property.*
  - **Respond to Wildfire:** *All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.*

- Wildland fire is a desired natural process and provides opportunities for the accomplishment of resource management objectives.
- Wildland fires cannot be managed to accomplish resource objectives until there is an approved and current fire management plan.
- Management objectives can change as the fire spreads across the landscape (Figure 2).
- All wildfires will receive an initial response as identified in the fire management plan. Initial response is defined as the assessment of the current fire situation taking into account ongoing events and additional factors, developing, and implementing an initial plan of action.
- Any wildfire that exceeds the initial response, escapes initial attack, or includes objectives with both protection and resource benefit elements consistent with land management planning documents will use the Wildland Fire Decision Support System to guide the development and evaluation of fire management strategies. Managers should reference the *Interagency Standards for Fire and Fire Aviation Operations*, for further direction
- As much as practicable, Minimum Impact Strategy and Tactics (MIST) is the policy of the National Park Service (See Exhibit 1). Minimum impact strategy and tactics are defined as the application of those techniques which effectively accomplish wildland fire management objectives with the least cultural and environmental impact, commensurate with public and firefighter safety
- Wildland fires should be managed with input from resource management staff in order to reasonably protect or mitigate damages to critical natural and cultural resources. Post-fire impacts and necessary restoration will be a consideration in developing management actions.
- A wildfire resulting from a prescribed fire may be managed like any other wildfire, according to direction provided in the fire management plan.

Further guidance for management of wildland fires is provided in the *Guidance for Implementation of Federal Wildland Fire Management Policy*.

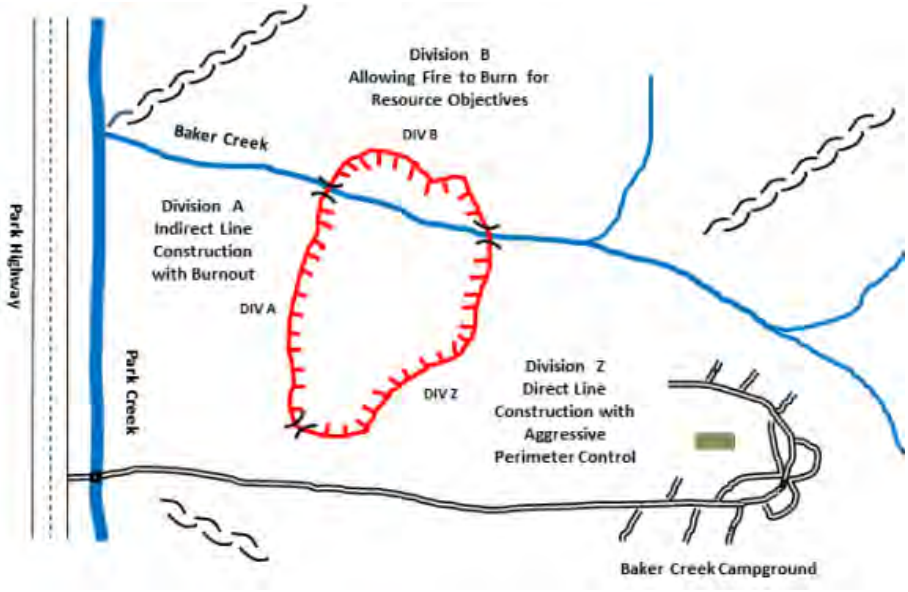

Figure 2:
Managing a Wildfire Using the Full Range of Strategic and Tactical Objectives

2 Responsibilities

Every National Park Service employee has a responsibility to support wildland fire operational activities as the situation demands. Personnel involved in fire management activities must meet the current wildland fire qualification standards including any associated medical and fitness standards.

2.1 National Level

The Branch of Wildland Fire is responsible for the policy, direction, and content of the wildland fire program. This responsibility includes maintenance of interagency commitments via the National Multi-Agency Coordinating Group (NMAC) and National Wildland Fire Coordinating Group (NWCG). The Branch of Wildland Fire will:

- Develop, and update as needed, policies that enable mission accomplishment.
- Provide technical assistance to Region and to parks.
- Allocate funding to accomplish Servicewide priorities.
- Facilitate reviews of regional office programs, significant wildland fire reviews, individual fire reviews, and assist with park program reviews, and/or escaped fire reviews

2.2 Regional Level

It is the responsibility of the regions to ensure all parks with burnable vegetation are prepared for managing wildland fire.

- Regional offices will maintain interagency contacts, including but not limited to Multi-Agency Coordinating Groups (MAC) and Geographic Area Coordinating Groups, and provide for interagency, state, and geographic area agreements.
- Conduct program reviews of park fire management programs.
- Stay apprised of all wildland fire activity within their region.
- When circumstances or situations warrant, the Regional Director may intervene in the wildland management decision process.
- Ensure that decisions are made based off current Fire Management Plans.

2.3 Park Level

Each park with burnable vegetation will:

- Maintain an approved and current fire management plan compliant with policy, guidance, and regulations
- Conduct annual preparedness reviews using approved preparedness checklists
- Ensure that a cache of supplies, materials, and equipment is maintained and available in the park or local area
- Ensure that fully qualified personnel are available in the park or local area to respond to wildland fires
- Ensure that the performance requirements of the Park Superintendent (or their designee) and the Fire Management Officer as defined in the *Interagency Standards for Fire and Fire Aviation Operations* are met
- Parks will keep regional fire management officers (or designee, such as Regional Duty Officer) informed of their respective wildland fire activity, situation, costs and fire potential

3 Program Requirements

Before implementing a wildland fire management program, an NPS unit must have the following:

1. An approved and current fire management plan, as outlined in *Reference Manual 18, Chapter 4; Director's Order 18 (DO 18)*; and *Departmental Manual Part 620*. A fire management plan is required for all parks with vegetation capable of sustaining wildland fire. Until a fire

management plan is approved, parks must respond to wildfires using aggressive initial attack with the goal of full suppression to achieve human safety and wildland fire protection objectives.

2. Preparedness Plan: Preparedness plans provide management direction given identified levels of burning conditions, fire activity, and resource commitment for fire management personnel and equipment. For additional information refer to the *Interagency Standards for Fire and Fire Aviation Operations* and Chapter 5 of *RM 18*.

4 Operational Requirements

There are several operational aspects that must be addressed when managing any wildland fire:

1. Decision Process: A process, as defined in the fire management plan, to evaluate, document, and identify decisions for both planned and unplanned ignitions as well as ongoing activity in the park. The park superintendent working with the fire management officer and park staff must carefully consider the short and long-term benefits of wildland fire in relation to risks based upon on-site information, and management objectives. Detailed information on use of the Wildland Fire Decision Support System (WFDSS) is found in the *Interagency Standards for Fire and Fire Aviation Operations*. The decision process must include:

    - Incident objectives and requirements with strategic direction from the Fire Management Plan
    - A risk assessment that includes immediate and projected threats to life and property
    - Determination of the affected fire management unit(s) and neighboring fire/land management objectives
    - Safety or other concerns such as air quality or smoke impacts
    - Necessary qualified personnel and fire management resources availability, including resources that are reasonably anticipated to be needed in the future.
    - Immediate and potential impacts to visitors and local communities
    - Projected fire growth under normal and severe conditions

2. Interagency Agreements and Commitment: Parks with wildland fire programs on lands that adjoin neighboring jurisdictions will develop mutually agreeable fire management plans (or agreements). Common management responses to unplanned ignitions, clear understanding and implementation of funding procedures, and policies for managing

wildland fires that cross or threaten to cross agency boundaries must be included.

The park will follow the strategic approach, outlined in the Fire Management Plan, to prevent wildland fires from leaving or entering the park and causing unwanted impacts when the NPS fire management unit and adjoining jurisdictions have conflicting fire management objectives and cannot agree on management actions.

3. Incident Status Reporting: The status of new and ongoing incidents must be reported in accordance with local, geographical area, and national interagency mobilization guide standards. Incident status is reported on the Incident Status Summary (ICS-209).

4. Fire Reporting: As described in *RM 18 Chapter 11, Wildland Fire Reporting*, all wildland fire incidents must be documented in the Wildland Fire Management Information System fire reporting module. The completed report must be entered within 10 working days after the fire has been declared out.

   In addition, the full record retained at the park will include the following:

   - Wildland fire report
   - Written narrative description of the incident
   - Decision Support Documentation
   - Complexity analysis
   - Daily weather forecasts and spot weather forecasts
   - Cumulative fire map showing acreage increase by day (if available)
   - Total cost summary
   - Monitoring data

   There will be conformance to federal policy for records management and direction found in *Reference Manual 18 Chapter 11, Wildland Fire Reporting. Reference Manual 18 Chapter 19, Information and Technology Management*, provides guidance on data stewardship, standards, documentation, sharing, and archiving.

5. Air Operations: Air operations during wildland fire incidents will comply with the provisions of *DO 60, Aviation Management*.

6. Fire Chemicals: Use of suppression chemicals must be in alignment with the park Fire Management Plan and Land Management Plan. General policies for fire suppression chemicals such as retardant are described in the *Interagency Standards for Fire and Fire Aviation*. The

Interagency Wildland Fire Chemicals Policy and Guidance is a useful reference website.

Parks should develop standards for retardant use and identify more restrictive local requirements relative to resource values and describe them in the fire management plan and decision support documents such as the Wildland Fire Decision Support System (WFDSS). Spatial representation (i.e. maps) of retardant restriction zones should also be included in the fire management plan, WFDSS, and in Resource Advisor documentation such as READ guides, kits, databases, etc.

7. Wildland Fire Planning Area: All wildland fires will be managed within a planning area. This is to ensure that there is a clear and common understanding among NPS managers and cooperators of the projected fire extent and location. This planning area should be identified in WFDSS, which is a requirement before publishing an Incident Decision.

8. Geospatial Information: All wildland fires will have GIS polygons captured using standard geographic information conventions and be provided to regional fire GIS specialist and uploaded to the *NPS Fire Geodatabase* (*RM 18, Chapter 19, Information and Technology Management*). Minimum mapping size is determined by the park unit in consultation with the regional fire management office.

   Each park should develop geospatial layers of archaeological, cultural and natural resource locations within the park that are of concern to fire management operations.

   Additionally, parks should develop files (complete with pictures, characteristics, and habitat types/possible locations) of natural and cultural resources of concern that could be used for transfer of command briefings and incident action plan inputs. See Chapter 5, Preparedness.

9. Resource Management: Wildfires should be managed with resource input using resource advisors in order to reasonably protect or mitigate damages to critical natural and cultural resources. Fire and resource managers will consider post-fire impacts when managing wildland fire and document those considerations during the decision support process (e.g. WFDSS).

   - Integrate natural, cultural and wilderness resource management with park fire management operations. Advance planning, cooperation, and coordination are key elements in ensuring that

cultural resources are fully considered when planning and implementing wildland and structural fire-related activities.

- Multiple disciplines should be involved each year when fire management plans are reviewed and updated to keep the document current with policy and ensure the fire management program includes a process of adaptive management as the process is intended to be interdisciplinary in nature and incorporate affected disciplines across the park. Therefore, cultural, and natural resource managers, and facilities managers should be involved in the annual review process. Historic structures within parks should be addressed to meet fire protection standards. (Refer to Chapter 7, Fuels Management for information on International Code Council International Wildland Urban Interface Code standards.)
- Each park unit should develop a call list of resource advisors consisting of qualified technical specialists to be notified upon the outbreak of a fire or before a planned ignition.
- Each park should develop geospatial layers of wilderness, archaeological, cultural and natural resource locations within the park that are of concern to fire management operations.
- Additionally, parks should develop files (complete with pictures, characteristics, and habitat types/possible locations) of wilderness, natural and cultural resources of concern that could be used for transfer of command briefings and incident action plan inputs.

10. Information and Education: Every wildland fire response must include an information and education component which provides for timely and accurate communication of:

    - Specific fire management objectives of the NPS and the park
    - Information on wildland fire location, behavior, and growth
    - Information on the effects of the wildland fire
    - Management actions taken on the wildland fire
    - Impacts including smoke and anticipated post-fire impacts, inside and outside of the park, on public and private facilities and services
    - Restrictions and closures within the park
    - Wildland fire conditions within the park

    For additional information see:

    - *RM 18 Chapter 4, Fire Management Plans*
    - *RM 18 Chapter 20, Communication and Education*
    - *Interagency Standards for Fire and Fire Aviation Operations*

11. Monitoring: All wildland fire events must be monitored. Qualified personnel will be utilized. Information gathered during wildland fire monitoring is needed to:

    - Provide managers with information essential for decision making
    - Determine whether fire management program objectives are being met
    - Ensure protection of human life, property, and natural and cultural resources
    - Identify long-term planning needs and alternative management options
    - Determine the effectiveness of the planned strategy both for the immediate time-frame and potential long-term planning
    - Assist with contingency planning
    - Increase knowledge of fire behavior and effects on park ecosystems
    - Provide long-term documentation for actions taken on a wildland fire
    - Identify human health and safety concerns from wildland fire

    Refer to RM 18, Chapter 8, Fire Ecology and Monitoring for additional information on monitoring.

12. Fire Management Activity Damage Repair: Activities that repair or rehabilitate impacts associated with direct fire management actions, such as removing refuse, flush cutting stumps, or obliterating hand line is a normal part of wildfire activity, and can be charged to the fire suppression account. For further information see the *National Park Service's NPS Wildland Fire Budget Rules*.

13. Cause Determination: The National Park Service is required to determine the cause of all wildfires that occur on lands under its jurisdiction. If needed, the services of a trained wildland fire investigator will be obtained. Costs associated with these services are legitimate charges to the fire account. All potential scenes must be preserved for the sake of an investigation. Parks should seek to develop their workforce to include fire investigators.

14. Post-Fire Programs: The management of the post-fire landscape is described in *RM 18 Chapter 18, Post-Wildfire Programs*.

5 Trespass and Human-Caused Wildfires

Initial action on trespass and human-caused wildfires will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety. If the initial action is not successful and an updated decision is made to manage the fire, that decision will be documented as part of the official record. The updated strategy will be commensurate with firefighter and public safety, risk management, and values to be protected, with consideration for cost efficiency.

The National Park Service is required to determine the cause of all wildland fires that occur on lands under its jurisdiction. If needed, the services of a trained wildland fire investigator will be obtained. Costs associated with these services are legitimate charges to the fire account. Refer to *Chapter 6, Wildfire Prevention*, for further information.

If necessary, rewards for information leading to the arrest and conviction of persons responsible for starting wildfires may be offered. These rewards may be funded from the suppression account for the fire. The offering of any rewards must first be coordinated with the regional fire management officer, the park unit's chief ranger, and then with the U.S. attorney having jurisdiction for the area. Any offered reward must be commensurate with the rewards offered by the surrounding jurisdictions and applied in the same manner.

When the cause of a fire can be traced to the act, or failure to act, of an individual, the National Park Service appropriate civil and criminal action can be taken against that individual. The National Park Service will work with the U.S. Attorney's Office to recover the costs of suppression and rehabilitation from the responsible party(s).

As stated in *RM 18 Chapter 15, Incident Business Management*: Public Law 94-579, the Federal Land Policy and Management Act of 1976, section 305, authorizes the collection of fire trespass funds. This allows the NPS to collect for the federal costs of the fire, including the costs of rehabilitation rendered necessary by the incident. The 1999 Interior Appropriation (Department of the Interior and Related Agencies Appropriations Act, 1999, as included in Public Law 105-277) allows the NPS to credit the funds to the Wildland Fire Appropriation.

6 Wildland Fire Decision Support

Parks will use a decision support process to guide and document wildfire management decisions. Incidents on NPS lands must use the current decision

support process (e.g. Wildland Fire Decision Support System, WFDSS) to publish a decision. For decision requirements see Chapter 11 in the *Interagency Standards for Fire and Fire Aviation Operations*. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions. Parks requiring an Incident Decision will use the Spatial Fire Planning Process in WFDSS. Refer to Chapters 3 and 11 of the *Interagency Standards for Fire and Fire Aviation Operations* for further guidance.

When a wildfire is burning on NPS lands and adjoining jurisdictions, a single interagency decision support document should be prepared with input from all jurisdictional agencies.

Approval of the decision to manage a wildfire and the resulting course of actions to be taken to achieve management goals is the responsibility of the park superintendent and will be published in a decision support document. Approval of each successive decision is based on current approval requirement guidelines and thresholds as defined in the *Interagency Standards for Fire and Fire Aviation Operations*.

6.1 Organization Needs Assessment or Incident Complexity Analysis

In addition to specifying the acceptable size of the wildfire, its behavior, and effects, decision support documents must identify the type of organization needed to effectively manage the fire. The Organizational Needs Assessment is incorporated into online wildland fire decision support tools

As organizational requirements escalate in response to increasing fire complexity and values to be protected, park units are expected to commit staff accordingly.

For additional information on the Organizational Needs Assessment and Complexity Analysis process refer to the *Interagency Standards for Fire and Fire Aviation Operations*.

7 Incident Management Teams (IMT)

Once the decision has been made to mobilize an IMT, the following must be accomplished to assist the transition of fire management responsibilities to the incoming IMT.

- A decision support document including a published decision with established incident objectives, a course of action and rationale will be prepared or updated.

- Prepare a written delegation of authority containing specific, measurable objectives to be accomplished by the IMT, as well as any limitations to that authority will be prepared. If the fire is on multiple jurisdictions, a single delegation of authority should be jointly prepared.
- Schedule the agency administrator briefing time and location.
- Obtain the necessary information for the agency administrator briefing (land/resource and fire management plans, unit Resource Advisor Guide or other applicable guidance documents, maps with critical geospatial data, suppression guidelines, etc.).

MINIMUM IMPACT STRATEGY AND TACTICS

The change from fire control to fire management has added a new perspective to the roles of fire managers and firefighters. Traditional thinking that “the only safe fire is a fire without a trace of smoke” is no longer valid. Fire management now means managing fire "with time" as opposed to "against time." The objective of putting the fire dead out by a certain time has been replaced by the need to make unique decisions with each fire start to consider the land, resource, and incident objectives, and to decide management actions that result in minimum cost and minimum resource damage while considering firefighter and public safety.

This change in thinking and way of doing business involves not just firefighters—it involves all levels of management. Fire management requires the fire manager and firefighter to select management tactics commensurate with the fire’s existing or potential behavior while causing the least possible impact on the resource being protected. The term used to describe these tactics is *Minimum Impact Strategy and Tactics*, commonly called MIST. Simply put, MIST is a “do least damage” philosophy.

MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a framework for identifying ways to manage a wildfire while minimizing the long-term effects of the management action. MIST is the concept of using the minimum tool to safely and effectively accomplish the task. MIST should be considered for application on all fires in all types of land management areas.

While MIST emphasizes managing wildfire with the least impact to the land, actual fire conditions and good judgment will dictate the actions taken. Consider what is necessary to halt fire spread and containment within the fire line or designated perimeter boundary while safely managing the incident.

Use of MIST must not compromise firefighter safety or the effectiveness of management efforts. Safety zones and escape routes must continue to be a factor in determining fire line location.

Effective minimum impact fire management techniques originate with instructions that are understandable, stated in measurable terms, and communicated both orally and in writing. Once the techniques have been implemented, on-the-ground monitoring helps ensure that minimum impact objectives are being met. Evaluating the tactics both during and after implementation furthers the understanding and achievement of good land stewardship during fire management activities.

Guidelines

The intent of this guide is to serve as a checklist for all fire management personnel.

1 Incident Management Considerations

Fire managers and firefighters select tactics that have minimal impact on values-at-risk. These values are identified in approved land or resource management plans. Standards and guidelines are then tied to implementation practices that result from approved fire management plans. In implementing MIST, follow these recommendations:

- Emphasize firefighter and public safety (safety cannot be compromised)
- Evaluate management tactics during planning and strategy sessions to ensure they meet agency administrator objectives and MIST. Include the agency resource advisor and/or designated representative
- Emphasize firefighter and public safety (safety cannot be compromised).
- Evaluate management tactics during planning and strategy sessions to ensure they meet agency administrator objectives and MIST. Include the agency resource advisor and/or designated representative.
- Communicate MIST where applicable during briefings, and implement during all phases of operations.
- Evaluate the feasibility of managing fire for achieving resource objectives in conjunction with MIST when appropriate.

2 Responsibilities

Agency Administrator or Designee

Ensures agency personnel are provided with appropriate MIST training and informational/educational materials at all levels

- Communicates the land and fire management objectives to the incident commander
- Ensures agency personnel are provided with appropriate MIST training and informational/educational materials at all levels.
- Communicates the land and fire management objectives to the incident commander.
- Periodically monitors the incident to ensure resource objectives are met.

- Participates in the incident debriefing and assists in the evaluation of performance related to MIST.

Incident Commander

- Communicates the land and fire management objectives to the general staff
- Evaluates management tactics during planning and strategy sessions to see that they meet the agency administrator's objectives and MIST guidelines.
- Monitors operations to ensure MIST is implemented during line construction as well as during other resource-disturbing activities.
- Includes the agency resource advisor and/or local representative during planning, strategy, and debriefing sessions.

Resource Advisor

- Ensures that interpretation and implementation of Wildland Fire Decision Support System decisions and other oral or written line officer direction is adequately carried out.
- Participates in planning/strategy sessions and attends daily briefings to communicate resource concerns and management expectations.
- Reviews Incident Action Plans (IAP) and provides specific direction and guidelines as needed.
- Monitors on-the-ground applications of MIST.
- Provides assistance in updating decision support documentation when necessary.
- Participates in debriefing and assists in evaluation of performance related to MIST.

Planning Section

- Uses the information provided by the resource advisor to help assess whether management tactics are commensurate with land/resource and incident objectives.
- Ensures that instructions and specifications for MIST are communicated clearly in the IAP.
- Anticipates fire behavior and ensures all instructions can be implemented safely.

Logistics Section

- Ensures actions performed around Incident Command Posts (ICP), staging areas, camps, helibases, helispots, drop points, etc. result in minimum impact on the environment.

Operations Section

- Evaluates MIST objectives to incorporate into daily operations and the IAP

- Collaborates with Resource Advisers and Safety Officer to ensure that MIST applications do not compromise firefighter safety
- Monitors effectiveness of management tactics in minimizing impacts to resources and recommends necessary changes during planning/strategy sessions.
- Communicates MIST to division supervisors and air operations/support during each operational period briefing. Explains expectations for instructions listed in the IAP.
- Participates in incident debriefing and assists in evaluation of performance related to MIST.

Division/Group Supervisor and Strike Team/Task Force Leader

- Communicates MIST objectives and tactics to single resource bosses.
- Recommends specific tasks to divisions to implement MIST.
- Monitors the effectiveness of management tactics in minimizing impacts to resources and recommends necessary changes to the operations section chief.

Single Resource Bosses

- Communicates MIST objectives to crew members.
- Monitors work to ensure that crews are adhering to MIST guidelines and specific incident objectives.
- Provides feedback to supervisor on implementation of MIST.

3 Implementation

Keep this question in mind: What creates the greater impact, the fire management effort or the fire?

Safety

- Apply principles of Lookouts, Communications, Escape Routes, and Safety Zones (LCES) to all planned actions.
- *Constantly review and apply the "18 Watch-Out Situations" and "10 Standard Fire Orders."*
- Be particularly cautious about the following:
    - Burning snags allowed to burn
    - Burning or partially burned live and dead trees
    - Unburned fuel between you and the fire
- Designate Escape Routes and Safety Zones.
- In any situation, the best escape routes and safety zones are those that already exist. Identifying natural openings, existing roads and trails, and taking advantage of "safe black" will always be a preferred tactic compatible

with MIST. If safety zones must be created, follow guidelines similar to those for helispot construction.
- Constructed escape routes and safety zones in heavier fuels will have a greater impact, be more time consuming and labor intensive, and ultimately will be less safe.

General Considerations
- Consider the potential for introduction of noxious weeds and mitigate by removing weed seed from vehicles, personal gear, cargo nets, etc.
- Consider impacts to riparian areas when locating water handling operations.
- Use longer draft hoses to place pumps out of sensitive riparian areas.
- Plan travel routes for filling bladder bags to avoid sensitive riparian areas.
- Ensure adequate spill containment at fuel transfer sites and pump locations. Stage spill containment kits at the incident.
- Integrate cultural resource management with park fire management operations. Advance planning, cooperation, and coordination are key elements in ensuring that cultural resources are fully considered when planning and implementing wildland and structural fire-related activities.

Fire Lining Phase
- Select tactics, tools, and equipment that have the least impact on the environment.
- Give serious consideration to the use of water or foam as a fire lining tactic.
- Use alternative mechanized equipment such as excavators and rubber-tired skidders rather than bulldozers when constructing mechanical line.
- Utilize firing techniques and/or allow fire to burn to natural barriers and existing roads and trails.
- Monitor and patrol fire lines to ensure continued effectiveness.

Ground Fuels
- Use cold trail, wet line or a combination when appropriate. If a constructed fire line is necessary, use minimum width and depth to stop fire spread.
- Consider the use of fire line explosives (FLE) for line construction and snag falling to create more natural-appearing fire lines and stumps.
- Burn out and use low impact tools like swatters and gunny sacks.
- Minimize bucking to establish fire lines. It is preferable to move or roll downed material out of the intended constructed fire line area. If moving or rolling out is not possible, or the downed log/bole is already on fire, build line around it and let the material be consumed.

Aerial Fuels (brush, trees, and snags)

- If the fuels are adjacent to the fire line, limb only enough to prevent additional fire spread.
- If the fuels are inside the fire line, remove or limb only those fuels which would have potential to spread fire outside the fire line.
- Cut brush or small trees necessary for fire line construction flush to the ground.
- Follow these guidelines for trees, burned trees, and snags:
    - Minimize cutting of trees, burned trees, and snags.
    - Do not cut live trees unless it is determined they will cause fire spread across the fire line or seriously endanger workers. Cut stumps flush with the ground.
    - Scrape around tree bases near the fire line if the base is hot and likely to cause fire spread.
    - Identify hazard trees with flagging, glow-sticks, or a lookout.
- Follow these guidelines when using indirect attack
    - Do not fall snags on the intended unburned side of the constructed fire line unless they are an obvious safety hazard to crews.
    - Fall only those snags on the intended burn-out side of the line that would reach the fire line should they burn and fall over.

Mop-up Phase

- Consider using “hot-spot” detection devices along the perimeter (aerial or hand-held).
- Use extensive cold trailing to detect hot areas.
- Cold trail charred logs near fire line. Do minimal scraping or tool scarring. Restrict spading to hot areas near the fire line.
- Minimize bucking of logs to check for hot spots or extinguish fire. It is preferable to roll the logs and extinguish the fire.
- When the ground is cool, return logs to their original position after checking.
- Refrain from piling. Burned/partially burned fuels that were moved should be arranged in natural positions as much as possible.
- Consider allowing larger logs near the fire line to burn out instead of bucking into manageable lengths. Use a lever, etc., to move large logs.
- Use gravity socks in stream sources and/or a combination of water blivets and fold-a-tanks to minimize impacts to streams.
- Avoid using rehabilitated fire lines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehabilitation work.
- Avoid use of non-native materials for sediment traps in streams.

Aerial Fuels (brush, small trees, and limbs)

- Remove or limb only those fuels which if ignited have the potential to spread the fire outside the fire line.
- Follow these guidelines regarding burning trees and snags:
    - *Be particularly cautious when working near snags (*ensure adequate safety measures are communicated).
    - The first consideration is to allow a burning tree/snag to burn itself out or down.
    - Identify hazard trees with flagging, glow-sticks, or a lookout.
    - If there is a serious threat of spreading firebrands, extinguish them with water or dirt.
    - Consider felling by blasting, if available.

Aviation Management

- Minimize the impacts of air operations by incorporating MIST in conjunction with the standard aviation risk assessment process.
- Keep in mind these possible aviation related impacts:
    - Damage to soils and vegetation resulting from heavy vehicle traffic, noxious weed transport, and/or extensive modification of landing sites
    - Impacts to soil, fish and wildlife habitat, and water quality from hazardous material spills
    - Chemical contamination from use of retardant and foam agents
    - Biological contamination to water sources, e.g., whirling disease
    - Safety and noise issues associated with operations in proximity to populated areas, livestock interests, urban interface, and incident camps and staging areas
    - Balance aircraft size and efficiency against the impacts of helispot construction.
    - Use natural openings as much as possible. If tree felling is necessary, avoid high visitor use locations unless the modifications can be rehabilitated. Fall, buck, and limb only what is necessary to achieve a safe and practical operating space.

Helispot Planning

- When planning for helispots, determine the primary function of each helispot, e.g., crew transport or logistical support.
- Consider using a long-line remote hook in lieu of constructing a helispot.
- Consult resource advisors in the selection and construction of helispots during incident planning.
- Estimate the amount and type of use a helispot will receive and adapt features as needed.

Retardant, Foam, and Water Bucket Use

- Also refer to Suppression Chemicals & Delivery Systems Chapter in the Interagency Standards for Fire and Fire Aviation Operations (commonly referred to as the Red Book)
- Assess risks to sensitive watersheds from chemical retardants and foam. Communicate specific drop zones to air attack and pilots, including areas to be avoided.
- Weigh use of retardant with the probability of success by unsupported ground force. Retardant may be considered for sensitive areas when benefits will exceed the overall impact. This decision must take into account values-at-risk and consequences of expanded fire response and impact on the land.
- Consider biological and/or chemical contamination impacts when transporting water.
- Replace limited water sources expended during aerial fire management efforts. Consult resource advisors prior to extended water use beyond initial response.

Logistics, Camp Sites, and Leave No Trace Conduct

- Minimize camping, cooking and human waste impacts on present and future visitors.
- Provide portable toilets at areas where crews are staged or camping.
- Good campsites are found, not made. If existing campsites are not available, select campsites which are not likely to be observed by visitors.
- Select impact-resistant sites such as those with rocky or sandy soil or openings within heavy timber. Avoid camping in meadows and along streams, rivers, or lakeshores.
- When there is a small group, try to disperse use. In the case of larger camps, concentrate, mitigate, and rehabilitate.
- Lay out camp components carefully from the start. Define cooking, sleeping, latrine, and supply areas. Cooking and supply areas tend to receive the most impact so site them on the most durable ground available.
- Prepare sleeping areas with minimal disturbance to vegetation and ground.
- Follow the following guidelines for personal sanitation:
    - Designate a common area for personnel to wash up. Provide fresh water and biodegradable soap. This are should be located 200 feet from any water source.
    - Do not introduce soap, shampoo, or other chemicals into waterways.
    - Dispose of wastewater at least 200 feet from water sources.
    - Keep urine out of water by going 200 feet from any water source.
    - Locate toilet sites a minimum of 200 feet from water sources. Dig holes 6 to 8 inches deep.

  - If more than one crew is camped at a site, strongly consider portable toilets and remove waste. If portable toilets are not an option, consider digging a long, shallow latrine, 6-8” deep and as long as necessary. Do not dig a deep hole for human waste as it significantly retards decomposition.
- Store food so that it is away from camp, not accessible to wildlife, and in animal-resistant containers.
- Do not let garbage and food scraps accumulate in camp. These and other items should be stored in animal-proof containers.
- All trash, litter and leftover food should be packed out.
- Monitor travel routes for damage and mitigate by dispersing travel on alternate routes or by concentrating travel on one route and rehabilitating the route when it is no longer being used.
- If a campfire is built, leave no trace of it. Use an existing fire ring if one exists where available. Do not build a rock fire ring. Use dead and down wood no larger than your wrist for the fire and scatter any unused firewood. Do not burn plastics, metal, or other trash.
- Before leaving an area used for camping, cooking, or staging equipment, minimize any sign that your crew was there. Consider replacing leaf litter or other organic material to naturalize the site and encourage recovery. Impacts to a site that occur in as little as a few nights can take decades to recover.

Restoration and Rehabilitation

Fire Lines

- After fire spread has stopped and lines are secured, fill in deep and wide fire lines and cup trenches. Obliterate any berms.
- Ensure stumps are cut flush with the ground. Camouflage cut stumps by flush-cutting, chopping, covering, or using FLE to create more natural appearing stumps.
- Scatter any trees or large brush cut during fire line construction to create a natural appearance.
- Discourage the use of newly created fire lines and trails by blocking them with brush, limbs, poles, and logs in a naturally appearing arrangement.
- Use water bars to prevent erosion, or use woody material to act as sediment dams.
- Consider maximum water bar spacing for erosion control; however, take advantage of natural slope breaks, grade dips, natural drainage features and diversions.

Maximum Water Bar Spacing

Percent Grade	Maximum Spacing, Feet
< 9	400
10–15	200
15–25	100
25 +	50

Camps

- Restore campsites to natural conditions prior to departure.
- Scatter fire rings and ash from fires, cover fire ring with soil, and blend the area with natural cover.
- Pack out all garbage - including any leftover food.

General Guidelines

- Remove all signs of human activity.
- Restore helicopter landing sites.
- Fill in and cover latrine sites if used.
- Walk through adjacent undisturbed areas and take a look at your rehabilitation efforts to determine your success at returning the area to as natural a state as possible.