

# Portugal BAER Summary Report



Photo courtesy of Joao Pinho, ICNF

Prepared by Liz Schnackenberg, Fulbright Specialist  
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## Introduction

Fulbright specialist Liz Schnackenberg travelled to Portugal February 16 to March 2, 2019 to participate in a project hosted by Instituto da Conservação de Natureza e das Florestas (ICNF). The purpose was to help Portugal develop a Burned Area Emergency Response (BAER) program similar to that in the United States, given Portugal's social, political, and economic climate. The visit focused on the current efforts regarding post-fire response on a variety of fires, and identification of opportunities for improvement.

## Keys to Success

Observations and information obtained during the visit were used to develop the following seven recommendations for a successful Portuguese BAER program:

1. Written direction/legal guidance: Develop clear direction on the objective of the BAER program, responsibilities, and what is considered emergency response BAER work vs long-term restoration.
2. Standard process and report: Develop a standard process for conducting a BAER assessment including a report format. This ensures consistency between assessments and documentation to support implementation needs and funding.
3. Trained specialists: Train a team of specialists that have a basic understanding of post-fire effects on soils and the hydrologic response:
  - a. It is recommended that the specialists travel to the United States to work with experienced BAER teams to understand how the process;
  - b. Following the initial development of a Portuguese program, have a team of US specialists travel to Portugal to work and provide feedback on the newly developed program;
  - c. Include specialists that understand road engineering needs including adequacy of drainage and culvert capacity. It is possible the road engineering work could be conducted by the hydrologist.
4. Community involvement: Develop a communication plan for community education, outreach, and involvement in the BAER process.
  - a. Local community members are the best source of information to identify concerns, and problems that have occurred from past fires.
  - b. Community involvement and understanding will be critical to the success of the program given the high percent of private land.
5. Rapid funding approval: Develop a process to rapidly approve actions identified as emergency work; this is critical to implementing actions in a timely manner. Include a cost-benefit analysis to ensure that treatments are warranted.
6. Prompt implementation: Conduct pre-work to identify available equipment and materials that may be needed for implementation. Where possible, train equipment operators on road stabilization measures to ensure proper implementation
7. Priority work: The success of the BAER program depends on it being identified as the highest priority work immediately after the fire.

The following provides background information on post-fire effects, and observations and recommendations used to develop the keys to success.

## Background

BAER assessments in the United States focus on imminent post-fire threats to critical values categorized as life/safety, property, natural and cultural resources. Threats include increased runoff and flooding, erosion and sediment delivery, debris flows, and high risk areas for the spread of invasive plants. While the assessment focuses on Forest Service lands, the soil burn severity mapping and modelling covers the entire fire and provides information useful to other agencies and land-owners.

Post-fire effects are driven by changes in soil properties including loss of groundcover, soil structure, and development of water repellency. These changes are reflected in soil burn severity (SBS) which represents the fire's effects on the ground surface and soil condition that may affect infiltration, runoff, and erosion potential (Parsons et al, 2010). Determining SBS starts with an initial Burned Area Reflectance Classification (BARC) map similar to that used in Portugal. The BARC map is derived from satellite imagery that compares pre and post fire images to give an estimate of soil burn severity. The BAER team uses field reconnaissance (Photos 1 and 2) to validate the estimated SBS indicated by the BARC map following the procedure outlined in Parsons et al., 2010. Results of the field reconnaissance are used to adjust the BARC to create a final soil burn severity (SBS) map. Soil properties assessed include char depth, organic matter loss, altered color and structure, and reduced infiltration.



*Photos 1 and 2: Field assessment of soil burn severity*

The final SBS map spatially represents where changes in soil and ground surface properties are most likely to affect infiltration, runoff, and erosion potential. Areas of low and unburned SBS have minimal effects to soil properties, and therefore little to no post-fire effects. Moderate SBS indicates that some soil properties have been affected and loss of the duff and litter layer that acts as a sponge to absorb precipitation. High SBS areas have significant alterations to soil properties and often have substantial watershed response including increased erosion and runoff following precipitation events, and slower recovery rates.

Using the SBS map, soils/geology, and precipitation, the BAER team uses models to predict increases in erosion, flood flows, and debris flow potential. The models compare pre-fire conditions to predicted post-fire conditions to determine relative changes resulting from the fire. These changes are then used to determine the risk to different critical values, and recommendations to address those risks.

## Observations

The visit February 16-March 2, 2019 allowed for observations of the current 'BAER' process and opportunities for improvement. Observations are summarized below.

1. While the Portuguese have competent technicians that understand post-fire effects, they do not currently have a process to assess the risk, and prioritize where treatments would be most effective.
2. A comparison of pre and post fire satellite images (similar to BARC) provide initial soil burn severity (SBS) maps. However, there is no field validation of the accuracy of these maps, nor consideration of the potential differences by vegetation community (shrub vs forest), or geology/soils.
  - a. A review of multiple fires in various locations found that fire effects vary. Validation is critical to determining the magnitude of post-fire effects.
3. Post-fire recovery plans are based on the initial SBS map, and identify all post-fire response and rehabilitation needs without prioritizing projects that address imminent post-fire threats.
4. Many of the practices implemented are in response to post-fire effects that have already occurred. Implementation often occurs several months to years after the fire when the risk has declined substantially with vegetative recovery. Consequently there is little benefit in these practices resulting in a low cost-benefit ratio.
5. The implementation of post-fire projects is based largely on what the local community chooses; however, the communities have little information to inform their decisions. A BAER program should include community outreach and education to promote informed decisions. Educating the local villages on why post-fire effects occur (fire effects on soils which alter watershed processes) will help them to understand and identify the highest priority response actions.
6. The University of Aveiro erosion control research team is currently studying effective post-fire treatments to reduce erosion, and developing an erosion model specific to Portugal. Their continued research will provide important information to help the Portuguese to identify effective treatments and determine priority areas.
7. *BAER specific observations:*
  - a. Life/safety: The greatest threat to life/safety is where roads and villages are located in the valley floor or lower slope from debris flows and floods. There is also a threat to life/safety from fire weakened hazard trees along roads and adjacent to areas of concentrated use.
  - b. Roads: Local forest roads are constructed without basic best management practices (BMPs) to minimize erosion and accommodate post-fire erosion and flood flows.
    - i. There is a high potential for diversion at some road-waterway crossings. This could be easily remedied by adding rolling dips on the downhill side of the crossing so that water is diverted back into the waterway versus down the road.
    - ii. Road ditches often have too long of a distance between drainage features resulting in excessive erosion and gullyng where water is finally diverted off of

the road and down the hillslope (Photo 3). In several locations crossings are not provided at ephemeral road-stream crossings (waterway crossings) to allow the water to pass downstream resulting in water diversion down the road.



*Photo 3: Road diversion with excess flow*

- iii. One practice commonly used in the United States to ensure that drainage structures continue to function is storm Patrol. Following rain events, increased erosion often fills drainage structures. Including a plan to monitor and immediately maintain the drainage structures will ensure their continued effectiveness.
  - c. Natural resources:
    - i. Long-term soil productivity appears to be at risk. Past land-uses have resulted in degraded soils which may be further degraded by erosion in high SBS areas.
    - ii. There is a threat to water quality from ash and sediment, although that is highly dependent on the location of burned areas relative to water supplies.
    - iii. Invasive species such as acacia may be increasing the threat of wildfire and increasing the scale due to the ability to transmit wildfire. This in turn may increase the threat to long-term soil productivity.
  - d. Cultural resources: No specific concerns identified, although areas of high cultural resource value should be identified and assessed for post-fire threats.
8. Erosion barriers constructed of wood or other native materials are the most common treatments (Photo 4). While these structures can be effective as controlling erosion, if they are not properly aligned and/or there are large gaps between materials, they are not effective. Effectiveness of the erosion barriers installed after the 2017 fires was highly variable due to difficulties with proper installation.



*Photo 4: Erosion barrier installed post-fire*

Groundcover, either natural needle cast (Photo 5), leaf fall, or applied mulch is the most effective treatment for reducing erosion and protecting long-term soil productivity. Where natural needle cast or other natural mulch occurs, other treatments are generally not warranted.



*Photo 5: Natural needle cast acts as groundcover/mulch to reduce erosion*

## Challenges

Portugal faces several challenges in implementing a BAER program. These challenges are based largely on the high percent of private land, and the limited personnel at ICNF.

1. Most of the land is privately owned. Consequently treatments can only be implemented if the land-owner is interested and submits a project proposal for funding.
2. The small communities have an aging population that may be resistant to change, and the implementation of new processes and procedures. Engagement with local communities will be critical with an understanding that change will take time.
3. ICNF personnel are largely foresters with little experience in soils/hydrology or unpaved roads; they do not currently have personnel to focus on these resources
4. ICNF personnel wear many hats and do many jobs. As a result they are constantly pulled in many directions and may not have the time to focus on BAER work including assessment and implementation.

## Recommendations

The following recommendations for a successful BAER program were developed with consideration of the challenges identified above.

1. Establish a team of specialists to focus on BAER.
  - a. Have the team of specialists travel to the US to work with experienced BAER teams and see how the process works. This would allow for technology transfer of both field and modelling techniques.
  - b. Have two US BAER specialists come to Portugal to work with the Portuguese team to monitor the newly developed program and provide feedback/recommendations.
  - c. Include training on road management
  - d. Have duties include both assessment and implementation as well as coordination between different agencies and communities.
2. Develop a defined BAER process to make post-fire assessments consistent, informative, and efficient. This includes direction on what is and is not BAER, who is responsible, timeframes, and implementation. This should also include a report format so that all assessments provide similar information, and that BAER specialists know what information is needed.
3. Validate soil burn severity maps to ensure accurate information is being used to prioritize and focus BAER assessments
4. Work with entities such as the University of Aveiro erosion control research team to develop a simple erosion risk model
5. Work with local researchers and interested parties to develop a community outreach and communication plan.
6. Start working with local agencies such as the water board to find out available data, and what modelling procedures they currently have in place for pre-fire conditions. Determine what adaptation may be needed to make the model applicable to post-fire flood flows.
7. Start collecting geospatial data on residences and other values of concern that could be affected by post-fire effects. This data could then be used to identify the values at greatest risk from post-fire effects, and prioritizing emergency treatments.
8. Consult with the US Geological Survey on the potential to develop a debris flow risk model for Portugal.

9. Monitor post-fire treatments to improve effectiveness and economic efficiency. Monitoring should be considered on a small scale for individual treatments, and on a larger scale by University or other institutions to provide input on the most effective measures given the vegetation and soil type in different locations.

## Additional Resources

The following resources were developed to support the BAER program in the United States. These resources provide example documents and soil/hydrology models that could assist in developing a BAER program in Portugal.

Written direction/legal guidance: Forest Service Manual 2523 (Appendix A) provides clear written direction on the purpose of the BAER program, responsibilities, and how to determine appropriate treatments.

### Websites:

- <https://forest.moscowfsl.wsu.edu/BAERTOOLS/> This website provides links the erosion and hydrologic models, as well as a field guide on determining soil burn severity, the BAER treatment catalogue, and research on the effectiveness of BAER treatments.
- [https://landslides.usgs.gov/hazards/postfire\\_debrisflow/](https://landslides.usgs.gov/hazards/postfire_debrisflow/) This website provides information on the USGS debris flow model. There is potential for the USGS to assist with debris flow modelling in Portugal. For more information contact Dennis Staley at [dstaley@usgs.gov](mailto:dstaley@usgs.gov)

## Conclusion

ICNF, AGIF, and other agencies have competent technicians, but they lack an organized process to identify post-fire threats and prioritize treatments to minimize post-fire effects. There is an opportunity through continued cooperation between the United States and Portugal to develop a BAER program appropriate for the landscape setting, as well as political and social climate.

## References

Parsons, Annette, Robichaud, Peter R.; Lewis, Sarah A.; Napper, Carolyn; Clark, Jess T, 2010: Field guide for mapping post-fire soil burn severity. General Technical Report RMRS-GTR-243. Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station. 49 p.



## Appendix A: FSM 2523—Legal Direction



### FSM 2500 - WATERSHED AND AIR MANAGEMENT

#### CHAPTER 2520 - WATERSHED PROTECTION AND MANAGEMENT

**Interim Directive No.:** 2520-2018-1

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**Approved:** JENNIFER EBERLIEN  
Acting Associate Deputy Chief, NFS

**Date Approved:** 09/28/2018

**Posting Instructions:** Interim directives are numbered consecutively by title and calendar year. Post by document at the end of the chapter. Retain this transmittal as the first page(s) of this document. The last interim directive was 2520-2017-1 to FSM 2520.

<b>New Document</b>	id_2520-2018-1	18 Pages
<b>Superseded Document(s) by Issuance Number and Effective Date</b>	id_2520-2017-1, 4/6/2018	18 Pages

**Digest:**

This interim directive (ID) reissues without change, the direction previously issued in id\_2520-2017-1.

Notice of issuance of this interim directive was published in the Federal Register on June 6, 2013 (78 FR 34031).

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## **2523 - EMERGENCY STABILIZATION - BURNED-AREA EMERGENCY RESPONSE (BAER)**

### **2523.01 - Authority**

Funding authority for the Forest Service to conduct emergency stabilization through Burned-Area Emergency Response (BAER) is contained in the annual Appropriation Act for the Department of the Interior and Related Agencies, which provides for the use of Wildland Fire Management funds for necessary expenses for “emergency rehabilitation of burned-over National Forest System lands and water.”

Public Law No. 105-277, Section 323(a) as amended by Public Law 109-54, Section 434 provides authority to enter into watershed restoration and enhancement agreements and expend appropriated funds on non-Federal lands, when there is a clear benefit to the National Forest System lands in the watershed.

Public Law No. 106-558, Section 2 provides authority to pay BAER assessment team personnel true overtime.

### **2523.02 - Objectives**

To identify imminent post-wildfire threats to human life and safety, property, and critical natural or cultural resources on National Forest System lands and take immediate actions, as appropriate, to manage unacceptable risks.

### **2523.03 - Policy**

1. Conduct assessments (sec. 2523.1) promptly on burned areas following wildfires larger than 500 acres to determine if a burned-area emergency (sec. 2523.05) exists. Assessments may also be conducted when potential threats to human life and safety, property, or critical natural or cultural resources exist as a result of a smaller wildfire. Critical values addressed by the BAER program are limited to those listed in section 2523.1, exhibit 01.
2. Undertake response actions or emergency stabilization only when an analysis shows that planned actions are likely to reduce risks substantially within the first year following containment of the fire and are compatible with land and resource management plans.
3. Employ measures that provide sufficient protection at the least cost while meeting risk management objectives.
4. Ensure that approved burned-area emergency stabilization measures are expeditiously accomplished before damages or losses are likely to occur and no later than 1 year after containment of the fire.
5. Monitor emergency stabilization measures for up to 3 years from containment of the fire to ensure they are functioning as planned and to evaluate if maintenance or

retreatment is necessary (sec. 2523.3). Invasive species treatment monitoring may occur for up to 1 year.

6. Maintain, repair, or replace emergency treatments for up to 3 years from containment of the fire where failure to do so would result in unacceptable risk to critical values (sec. 2523.1, ex. 01 and ex. 02). Invasive species treatment maintenance beyond the first year must be funded with regular program funds, not BAER funds (sec. 2523.22f).

7. Propose response actions in wilderness only if necessary to protect life or property (inside or outside wilderness), manage unacceptable risks to critical resource values outside wilderness, or to prevent an unnatural loss of the wilderness resource (sec. 2323.43b).

8. Use of BAER funds is not appropriate for non-emergency rehabilitation and restoration or to correct undesirable conditions that existed prior to the fire.

## **2523.04 - Responsibility**

### **2523.04a - Washington Office, Director of Watershed, Fish, Wildlife, Air, and Rare Plants**

The Washington Office, Director of Watershed, Fish, Wildlife, Air, and Rare Plants (WFW) has the responsibility to:

1. Ensure that safety requirements are included in BAER personnel qualifications and in other aspects of the BAER program.
2. Assign specific BAER funding approval authority to the Regional Foresters through annual budget program direction.
3. Within the required timeframe, take action on requests for BAER funds for emergency stabilization of burned areas for those projects above the Regional Forester's delegated funding authority (sec. 2523.06).
4. Establish guidelines for identifying appropriate emergency stabilization measures.
5. Develop BAER policy and technical training.
6. In conjunction with the Regional Foresters and Research Scientists, identify National (Level III) BAER monitoring needs (sec. 2523.3) and disseminate Level II monitoring results.
7. Provide program oversight including annual reporting and review of policy implementation. Monitor BAER planned costs and actual expenditures. Conduct periodic reviews to evaluate the consistency of program implementation among Regions and to identify needs for improved coordination and direction and conduct program reviews in coordination with the United States Department of the Interior.

8. Ensure the Forest Service is represented on the interagency BAER coordination group.

### **2523.04b - Regional Foresters**

Regional Foresters have the responsibility to:

1. Emphasize safety in all BAER planning and training activities.
2. Within the required timeframes (sec. 2523.06), review and take action on burned-area emergency funding requests within their delegated authority and transmit copies of approval information to the Washington Office, Director of WFW.
3. Within the required timeframes (sec 2523.06), review for appropriateness, make recommendations, and transmit, Burned-Area Reports to the Washington Office, Director of WFW, when funds requested are above the Regional Forester's delegated funding approval authority.
4. Provide regional level guidance for all BAER monitoring, identify regional (Level II) effectiveness monitoring needs, and assemble and disseminate Level II monitoring results (sec. 2523.3).
5. When requested and justified, consider granting extensions to the BAER report preparation timeline, if the proposed delay will not adversely affect opportunities to take actions before damage or loss is expected.
6. Upon receipt from Forest, Grassland, Prairie, and Area Supervisors, transmit final accomplishment reports on form FS-2500-8, Burned-Area Report, to the Washington Office, Director of WFW.
7. Provide BAER procedural and technical training consistent with national policy.
8. Monitor regional BAER planned costs and actual expenditures.
9. Conduct program and project reviews to evaluate consistency with National and Regional program direction and to identify needs for improved coordination and direction.

### **2523.04c - Forest, Grassland, Prairie, and Area Supervisors**

Forest, Grassland, Prairie, and Area Supervisors have the responsibility to:

1. Identify Forest BAER personnel before the start of each fire season and provide the appropriate fire, safety, and BAER training.
2. Designate a BAER team, staffed appropriately for the fire size and anticipated risks, to perform a BAER assessment on all wildfires larger than 500 acres, and on smaller fires when threats to life and safety, property, or critical natural or cultural resources are likely to exist.
3. Ensure appropriate coordination between the Incident Management Team and the BAER assessment team.
4. Ensure early and continued communication with appropriate Federal, Tribal, State, county, and local emergency response agencies regarding potential threats off National Forest System land and Forest Service authorities.
5. Determine if a burned-area emergency exists, consider action alternatives and recommend actions consistent with BAER policy.
6. Conduct a cost/benefit analysis commensurate with the scope and complexity of the stabilization plan to address whether planned actions will substantially reduce risks and be cost effective.
7. Submit initial and interim forms FS 2500-8, Burned-Area Report and monitoring plan, if applicable, to the Regional Forester within required timeframes (sec. 2523.06).
8. Report project accomplishments by transmitting the final form FS 2500-8, Burned-Area Report, and if appropriate, Level II monitoring reports to the Regional Forester within required timeframes (sec. 2523.06).

### **2523.04d - Forest, Grassland, Prairie, Area Supervisors and District Rangers**

Forest, Grassland, Prairie, or Area Supervisors and District Rangers have the additional responsibility to:

1. Ensure that safety considerations are the first priority in all BAER activities.
2. Ensure that BAER assessment teams are familiar with the objectives of the applicable land management plan for the area.

3. Promptly implement approved and funded emergency actions before damages or losses are likely to occur. Re-evaluate the continued need to complete any planned actions that were delayed, taking into account watershed recovery and the reduced probability or magnitude of risks.
4. Maintain emergency stabilization measures when necessary to keep them functioning as designed, using monitoring results to justify and plan any necessary follow-up action.
5. Monitor actions to determine if emergency measures have met the planned objectives or need adjustment (sec. 2523.3).
6. Report annual performance measures and monitoring results in applicable reporting systems.

### 2523.05 - Definitions

The following terms are used in this chapter:

Burned-Area Emergency. A situation when human life or safety, property, or critical natural or cultural resources are at an imminent and unacceptable risk due to post-wildfire related threats.

Burned-Area Rehabilitation. Efforts undertaken within 3 years of a wildfire to repair or improve fire-damaged lands unlikely to recover to management-approved conditions, or to repair or replace minor facilities damaged by fire. Rehabilitation is financed using non-emergency funding. (Wildland Fire Leadership Council, January, 2002).

Burned-Area Restoration. The continuation of rehabilitation activities beyond the initial 3 years or the repair or replacement of major facilities damaged by the fire. Restoration is financed using non-emergency funding. (Wildland Fire Leadership Council, January, 2002).

Emergency Stabilization. Planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life or property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. Emergency stabilization actions must be taken within 1 year of containment of the fire. (Wildland Fire Leadership Council, January, 2002).

Risk. Potential danger as measured by the probability of damages or losses and the magnitude of the consequences.

Wildfire: An unplanned ignition of a wildland fire (such as a fire caused by lightning, volcanoes, unauthorized, and accidental or human-caused fires), or and prescribed fire that has exceeded prescription parameters or otherwise meet the criteria for conversion to wildfires. (Guidance for Implementation of Federal Wildland Fire Management Policy. February, 2009).

## **2523.06 - Timeframes**

1. Initial requests for BAER funding should be submitted to the Regional Forester within 7 calendar days after total containment of the fire, unless special arrangements have been negotiated (sec. 2521.04b).
2. Regional responses to BAER funding requests (in the form of decisions or referral to Washington Office, Director of WFW) should be completed within 3 business days of receipt.
3. Washington Office responses to BAER funding requests should be completed within 3 business days of receipt.
4. Approved actions should be implemented before damage or loss is likely to occur and no later than 1 year after containment of the fire.
5. Monitoring approved emergency stabilization may occur for up to 3 years (sec. 2523.03).
6. Maintenance, repair, or replacement of eligible emergency stabilization actions may occur for up to 3 years (sec. 2523.03).
7. A final accomplishment report (form FS 2500-8) should be submitted within 60 days following completion of planned response actions.
8. Level II and III BAER monitoring reports should be submitted to the Regional Forester annually at the end of each monitoring season.

## **2523.1 - Burned-Area Emergency Assessment**

Burned-Area Emergency Assessments are rapid evaluations conducted to determine if critical values are at risk due to imminent post-fire threats and to develop appropriate actions to manage unacceptable risks. These assessments are not intended to provide a comprehensive evaluation of all fire or suppression damages, to evaluate post-fire damages after they occur, nor to identify long-term rehabilitation or restoration needs. See FSH 2509.13 for guidelines and procedures. The assessment process includes the following steps:

1. Critical Value Identification. Identify critical values on National Forest System lands (ex. 01). Consult with Tribes for assistance in identifying sensitive cultural resource values.



2. Threat Identification. Identify potential threats to critical values, the probability of their occurrence, and the magnitude or cost of the potential damages. Threats may be natural or human caused, but must be related to changed conditions caused by the fire.

3. Risk Evaluation and Emergency Determination. Risks are evaluated using the risk assessment matrix (ex. 02) to determine the level of risk to each critical value. Identify unacceptable risks that signify a burned-area emergency exists. Unacceptable risks are associated with risk assessment designations of very high or high. Unacceptable risks may also be associated with intermediate risks if human life or safety is threatened.

4. Response Action Prescription. When unacceptable risks are identified, prescribe actions that manage the risk either by reducing the probability of occurrence or lessening the anticipated consequences. The following anticipated levels of risk should be used to guide response action decisions:

- a. Very High and High Risk. Response actions should be considered.
- b. Intermediate Risk. Response actions may be needed if human life or safety is affected.
- c. Low and Very Low Risk. Response actions are rarely justified.

5. Response Action Proposals. Develop objectives that address the identified risks and design action plans that meet those objectives. Apply a cost/benefit analysis commensurate with the cost and complexity of planned actions to address whether they will likely substantially reduce risks and be cost effective. Actions should be evaluated based on their:

- a. Ability to be implemented in a timely manner;
- b. Effectiveness in reducing the risk;
- c. Practical and technical feasibility; and
- d. Cost.

6. Documentation and Funding Request. Complete form FS-2500-8, Burned-Area Report, which provides a summary of the burned area emergency assessment and documents the funding request.

**2523.1 – Exhibit 01****Critical Values to be Considered During Burned-Area Emergency Response**

<b>CRITICAL VALUES</b>
<b>HUMAN LIFE AND SAFETY</b>
Human life and safety on National Forest System (NFS) lands.
<b>PROPERTY</b>
Buildings, water systems, utility systems, road and trail prisms, dams, wells or other significant investments on NFS lands.
<b>NATURAL RESOURCES</b>
Water used for municipal, domestic, hydropower, or agricultural supply or waters with special Federal or State designations on NFS lands.
Soil productivity and hydrologic function on NFS lands.
Critical habitat or suitable occupied habitat for federally listed threatened or endangered terrestrial, aquatic animal, or plant species on NFS lands.
Native or naturalized communities on NFS lands where invasive species or noxious weeds are absent or present in only minor amounts.
<b>CULTURAL AND HERITAGE RESOURCES</b>
Cultural resources which are listed on or potentially eligible for the National Register of Historic Places, Traditional Cultural Properties, or Indian Sacred Sites on NFS lands.

**2523.1 - Exhibit 02****BAER Risk Assessment**

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	<b>RISK</b>		
Very Likely	<b>Very High</b>	<b>Very High</b>	<b>Low</b>
Likely	<b>Very High</b>	<b>High</b>	<b>Low</b>
Possible	<b>High</b>	<b>Intermediate</b>	<b>Low</b>
Unlikely	<b>Intermediate</b>	<b>Low</b>	<b>Very Low</b>

**Probability of Damage or Loss:** The following descriptions provide a framework to estimate the relative probability that damage or loss would occur within 1 to 3 years (depending on the resource):

- Very likely. Nearly certain occurrence (90% - 100%)
- Likely. Likely occurrence (50% - 89%)
- Possible. Possible occurrence (10% - 49%)
- Unlikely. Unlikely occurrence (0% - 9%)

**Magnitude of Consequences:**

- Major. Loss of life or injury to humans; substantial property damage; irreversible damage to critical natural or cultural resources.
- Moderate. Injury or illness to humans; moderate property damage; damage to critical natural or cultural resources resulting in considerable or long term effects.
- Minor. Property damage is limited in economic value and/or to few investments; damage to critical natural or cultural resources resulting in minimal, recoverable or localized effects.

## 2523.2 - Emergency Response Actions

Emergency response actions are response actions necessary to control the immediate impacts of a post-wildfire emergency and are subject to the provisions in 36 CFR 220.4 b(1) regarding National Environment Policy Act requirements. Response actions may be administrative or physical stabilization actions. They are normally short-term or temporary measures that generally do not require maintenance or can be discontinued after objectives have been met. When scheduling emergency response actions, those that protect life and safety should have highest priority.

When potential hazards to life or safety on NFS lands are identified, notification of hazardous or unsafe conditions should accompany any other contemplated actions. For potential flooding or other threats that may continue downstream of NFS lands, coordinate and cooperate with the appropriate response agencies.

1. Emergency Response Strategy. Observe the following order in prescribing BAER action strategies:
  - a. Natural recovery. In situations where no burned-area emergency exists or where practical or effective measures are not feasible, rely on natural recovery. Hazard notification to National Forest users may be appropriate in conjunction with this strategy.
  - b. Administrative closures. In situations where a burned-area emergency exists and it is possible to restrict access to protect life and safety, or where valid uses will significantly interfere with emergency stabilization objectives or delay critical recovery, administrative closures should be the first consideration. Other measures should only be considered in these situations where administrative closures are not possible or are not effective.
  - c. Other measures. For other emergency situations, demonstrated effective measures should be applied to manage unacceptable risks to human life, property, and critical natural, cultural and heritage resources.
2. Response Action Considerations.
  - a. Plant Materials. Natural recovery by native species is preferred. When practical, use seeds and plants in burned-area emergency stabilization projects that originate from genetically local sources of native species. When native materials are not available or suitable, give preference to non-native species that meet the stabilization objectives, are non-persistent, and are not likely to spread beyond the treated area (FSM 2070).

Comply with FSM 2081, Executive Order 13112, and applicable State noxious weed prevention requirements in setting standards for seed, straw, and other plant materials.

- b. Administrative closures and access control. When administrative closures are used, BAER funding is appropriate for preparing closure orders, posting the closed

area, and essential compliance actions. If administrative closures are not effective, consider patrolling or strategically placed barriers to control access. Any barriers funded with BAER should be the minimum necessary to reduce unacceptable risks.

c. Facility Replacement. Replacement of destroyed or damaged minor facilities, such as signs or guardrails, is an appropriate measure when the loss of those facilities causes a human safety risk and there are no other protection options.

d. Consultation. Consult with other Federal agencies, Tribal governments, and State and local governmental entities as appropriate to ensure that emergency response actions are compatible with the Endangered Species Act, National Historic Preservation Act, Clean Water Act, and other laws as applicable. Initiate any necessary supporting processes prior to ground-disturbing actions and only within areas considered for treatment.

e. Wilderness. Response actions in wilderness may be appropriate if there is an unacceptable risk to the wilderness resource or if conducting emergency stabilization in wilderness would provide the best option for protection of life, property, or other critical resources outside of wilderness (FSM 2323.43). Non-structural prevention and stabilization is always preferred over structural measures. See FSM 2326 for guidance on the use of motorized equipment in wilderness.

f. Invasive species. BAER funds may be used for invasive species detection surveys and, if warranted, invasive species rapid response actions within the first year following fire containment. Invasive species detection, monitoring, treatment, re-treatment, or maintenance beyond the first year must be funded with other program appropriations. See FSM 2900 for direction on invasive species management.

### **2523.3 - Monitoring**

There are two kinds of BAER monitoring:

1. Implementation, and
2. Effectiveness.

Implementation monitoring is done to verify that the response action was implemented as planned and to document the actual cost of the measure. The cost for BAER implementation monitoring should be included as part of the planned implementation cost for each measure and is not requested separately on form FS 2500-8.

Effectiveness monitoring is done to determine if actions are functioning as planned and are sufficiently meeting response objectives. There are three levels of BAER effectiveness monitoring.

1. Level I monitoring is the most common type of BAER monitoring and is conducted to determine if an implemented action is meeting its site-specific objective or if there is a need for follow-up or re-treatment. Level I monitoring usually uses qualitative techniques, is relatively brief in duration, and is intended only for a specific project.
2. Level II monitoring collects information to confirm overall effectiveness of certain regionally important response action in meeting BAER objectives. Level II monitoring utilizes more quantitative methodologies designed to address specific issues.
3. Level III monitoring collects information important at a national scale. Level III monitoring uses rigorous sampling designs, protocols, and analysis techniques to determine whether specific response actions are functioning as intended in meeting BAER objectives, and whether the techniques are suitable for application elsewhere. The need for this level of monitoring is identified and coordinated nationally.

Any planned effectiveness monitoring costs should be identified separately on form FS 2500-8 and must include a monitoring plan containing:

1. Monitoring questions;
2. Measurable indicators;
3. Data collection techniques consistent with appropriate protocols;
4. Analysis, evaluation, and reporting techniques; and
5. Monitoring report timeframes.

Funding for monitoring beyond the first year of containment of a wildfire is contingent upon submission of a monitoring report with results demonstrating that further monitoring is warranted. See FSH 2509.13 for guidelines and procedures.

### **2523.4 - Suppression-Damaged Areas**

Rehabilitation of suppression-caused damage is the responsibility of the fire incident commander and is charged to the incident. Suppression rehabilitation assessment, design, and implementation, including those delayed due to seasonal considerations, are charged to the incident (FSH 6509.11g, sec. 51.24).

### **2523.5 - Use of Funds**

Comply with the Service-wide Appropriation Use Handbook (FSH 6509.11g) and the following direction in determining the appropriate use of emergency fire suppression funds for burned area emergency stabilization based on jurisdiction of the burned lands.

#### **2523.51 - National Forest System Lands**

Following are the appropriate activities and limitations for use of BAER funding on National Forest System lands:

1. Salaries, travel, and expenses of personnel assigned to BAER teams, as well as costs associated with implementation, maintenance, and monitoring of approved response actions should be financed from an assigned BAER incident job code.
2. BAER funds may be used for monitoring, maintenance, repair, replacement, or removal of implemented emergency stabilization measures for up to 3 years post-fire, when appropriate (sec. 2523.22f). Submit an interim report to justify and request funding for eligible activities.
3. Prescribed fires do not qualify for BAER assessment or emergency response actions unless they have been converted to wildfires. In those cases, BAER action activities may occur only on the wildfire portion of the fire.
4. Any emergency stabilization or other emergency action not implemented within 1 year after containment of the fire and non-emergency rehabilitation or restoration must be financed using non-BAER funds.

#### **2523.52 - Other Federal Lands**

When appropriate, coordinate BAER assessment and implementation with other Federal agencies, Tribal governments, and State and local agencies. Clearly identify responsibilities of each entity and fiscal arrangements for coordination, assessment, and implementation.

The interagency agreement between the United States Department of the Interior, Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service, and the United States Department of Agriculture, Forest Service, effective May 6, 2010, (FS Agreement No. 10-1A-11130206-32) provides the basis for cooperation among the agencies on all aspects of wildland fire management, and governs the financial arrangements for cooperative BAER planning and implementation. Under this agreement, agencies shall not bill each other for emergency stabilization services rendered to the signatory agencies except under certain situations when internal agency funding has been exhausted.

### **2523.53 - Non-Federal Lands**

As appropriate, include consideration of non-Federal intermingled or adjacent, burned lands in burned-area surveys and reports to determine post-fire risks. Coordinate with other affected government agencies to identify shared risk management responsibilities.

When appropriate, inform the non-Federal landowner or manager of the existence of the Emergency Watershed Protection Program administered by the Natural Resource Conservation Service. Funds from this program may be used to help finance watershed protection work on State, Tribal and private lands.

Under the Wyden Watershed Restoration and Enhancement Agreement authority (Pub. L. No. 105-277), Forest Service funding may be used to accomplish work on non-NFS lands if the work is essential to protect NFS lands, NFS roads, or safety of NFS visitors. Use of BAER funding to implement emergency stabilization on non-Federal burned lands is appropriate when there is a clear benefit to safety or critical resources on NFS lands, when actions conducted on NFS lands would otherwise not be effective, and when appropriate Wyden authority agreements with the affected landowners are executed. See applicable provisions in FSM 1580 and FSH 1509.11 for specific guidance on provisions under these agreements.

### **2523.6 - Human Resources**

#### **2523.61 - Safety**

Health and Safety of BAER personnel and contractors is the highest priority. See FSH 6709.11, Health and Safety Code for General Policy on safety in the field, FSH 5109.17 (Fire and Aviation Qualification Handbook) and *Interagency Standards for Fire and Aviation Operations*, NFES 2427 (Redbook) for fitness, safety training, personal protective equipment, and other safety requirements related to BAER assessment work in uncontrolled fire situations. The Interagency Incident Business Management Handbook (FSH 5109.34) contains direction for work, driving, and rest requirements that apply to BAER personnel. In addition, supervisors should monitor employees for signs of fatigue and take immediate actions to minimize the effects of acute or cumulative fatigue.

#### **2523.62 - Pay Provisions**

The special overtime pay provisions of Public Law No. 106-558 (Fire Fighter Pay Equity Act) apply to employees involved in the preparation and approval of emergency stabilization plans. The overtime provisions apply only during the initial emergency assessment period, until the



emergency stabilization plan is submitted for approval (FSH 5109.34, ch. 10, sec. 12.11-2). These overtime pay provisions do not apply to employees involved with BAER implementation or monitoring.

Payment for hazardous duty differentials for BAER personnel must follow the regulations contained in 5 CFR 550, utilizing the established hazard and hardship categories identified in Appendix A of subpart I (5 CFR 550.901-907). The fire-fighting category applies only to personnel directly participating in fighting fires and does not apply to BAER personnel, regardless of the fire containment/control status in the area where the BAER assessment is being performed. Additionally, participation in helicopter or fixed-wing reconnaissance during normal weather and flight conditions does not qualify for hazard pay. If unusual or adverse conditions are present, BAER aerial reconnaissance should be delayed until conditions are safe. If it is determined that an allowable hazardous duty category applies to BAER assessment or implementation work, the determination for pay differential must be authorized in advance by the Forest Supervisor. Required documentation to support this determination includes a job hazard analysis, citation of the specific hazard involved (5 CFR part 550, Subpart I, Appendix A), names of the affected employees, and nature of the work performed under hazardous duties.

### **2523.7 - Reporting**

A final accomplishment report, form FS 2500-8, Burned-Area Report, documenting actions implemented and actual costs, must be submitted to the Washington Office, Director of WFW following the completion of BAER actions (FSM 2523.06). For late-season and/or complex BAER projects, interim accomplishment reports may be required.

BAER monitoring reports should be submitted to the Regional Forester annually at the end of each monitoring season.

Annual performance reporting must be accomplished using the applicable reporting system for each performance measure.

### **2523.8 - Controls**

Periodically conduct BAER program and activity reviews to ensure consistency with applicable policy and program efficiency (FSM 1410).

### **2523.9 - Coordination Between BAER and Other Post-Fire Recovery Programs**

The BAER program addresses only emergency stabilization following wildfires. Other post-wildfire programs address suppression damage, post-fire rehabilitation, restoration and recovery (FSM 2030), and non-fire emergency response.

The BAER program and these programs have different objectives, processes, reports, and timelines. Despite their differences, these programs have similar assessment needs. Every effort should be made to coordinate the BAER program with these other programs to the extent that they overlap, provided that the coordination maintains the integrity and timelines of the BAER program.