

## **APPENDIX R - Fire and Aviation Management Best Management Practices**

Fire is currently the primary management activity affecting natural resources in Lassen Volcanic National Park. Following wildfires, burned areas are assessed by special teams to determine if emergency rehabilitation measures are required to restore watershed function and minimize damage to soil resources. The objective of burned area emergency rehabilitation (BAER) treatments is to restore watershed condition and reduce losses from erosion on slopes, in channels, and on road surfaces and peripheral areas such as ditches.

Fuels management activities (i.e., mechanical and prescribed fire treatments) are intended to reduce the size, cost, and damage from wildfire, increase resilience to disturbance, or reintroduce fire into an ecosystem. Plant biomass is altered by changing fuel type, creating fuel breaks, or by reducing/altering fuels over large areas. At Lassen Volcanic NP, fuels management activities are also intended to restore the natural range of variation in fuels loadings and forest structure. Other elements of overall ecosystem health that may be affected by fuels treatments include:

- The presence and amount snags and large down woody debris that provide habitat
- The ability to prevent the range expansion of exotic plant species following burns
- The stability of water sources and wetlands that are within areas identified for prescribed fire and manual/mechanical treatment areas.
- The survivorship of ‘monarch’ trees after reintroducing fire to the ecosystem. These trees are hundreds of years old, indicating a hardy genetic makeup that has allowed them to survive decades of fire, disease, and/or drought
- A low level of forest disease and insects.

In the case of planned ignitions and other fuels reduction projects such as mechanical or hand thinning, BAER and BAR (Burned Area Rehabilitation) resources are generally not available once the treatment is complete. In these situations, it is especially important that natural resource issues be considered during the development of fuel reduction implementation plans. Without good planning, thorough surveys, and mitigation, the potential for damage to natural resources could outweigh the benefits of fuels reduction.

The following BMPs are intended to achieve the highest degree of resource protection possible during suppression and fuel management activities. The superintendent is responsible for fully implementing any directives regarding these BMPs during fire suppression and fuels management activities.

## Pre-fire, Pre-incident Training

### **Goal 1. Improve effectiveness of fire management practices through natural resource assistance, awareness, and education.**

Fire managers will invite the resources division chief to assign a resource advisor (READ) to be present during prescribed fire, wildfire, mechanical, or hand treatments. Resources staff will be given the opportunity to attend pre-burn briefings. The resources chief will choose to send a staff person if he/she feels there is a valuable resource at risk. **Fire 1.** Provide comprehensive education for fire managers and their staffs by integrating weed and sensitive species information into normal operations, e.g. annual preseason training, annual fire fighter refreshers, seasonal orientation, incident briefings, tailgate discussions. Prevention awareness information and operational practices should be incorporated into the Incident Action Plan (IAP)

**Roadblock(s):** Incomplete information including maps for many parks. Insufficient number of knowledgeable resource advisors to support BAER and incident teams. The field season for natural resource specialists overlaps and thus conflicts with fire season, decreasing READ availability. Fire staff is often too busy. Fire management and resource management are often culturally distinct. Too much information can lead to people ignoring the message of resource protection.

**Solution(s):** Emphasize the incorporation of this information into fire management practices such that it becomes routine. Possible methods of incorporation could include the following: Fireline handbook could use a section on invasive plants and sensitive species. Make sure natural resource specialists are red-carded. Make sure a local resource advisor is onsite prior to the location of initial attack camp, helispots, etc. Train the trainer, train crew bosses on local invasive and sensitive species issues and prevention practices so they can train their crews. Create resource advisor kits which contain resource specific information and maps identifying areas with sensitive resources, cultural resource hot spots as well as wildlife habitat. Provide maps of weed and sensitive species locations to project and crew bosses. Include education strategy and plan in the fire management plan, which identifies specifically who is responsible—as well as the timing—for each proposed activity. Expand cadre of people who can provide education. Ensure invasive plant and sensitive species information is inserted into interagency training requirements and policy documents (e.g., BLM training, RM-18 and DO-18). Choose a resource advisor responsible for weed training—this activity also needs to be included in this person’s performance plan. Provide opportunities for cross training and cross experience between natural resource weed crews and fire crews. Integrate resource and fire management divisions by having as many fire management employees as possible working in resource management, e.g. fire ecologists, GIS specialists, and monitors are a good place to start. Include briefings for off-park resources. Consider using the model of six minutes for safety, and create XX minutes for weeds and sensitive species. Talk about the resources differently every time; keep the information current so the audience knows they are privy to the “latest” information.

## Wildfires – General

All wildfire natural resource protection goals apply except in instances where human life or property is at risk.

### **Goal 2. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.**

**Fire 1.** Include weed risk factors and weed prevention practices in Resource Advisor duties on all Incident Management Teams and Burn Rehabilitation Teams.

**Fire 2.** Clean machinery and material that is being moved from an infested area before it arrives at an uninfested area. Work with Resources Management to flag, control, or remove weeds from ICP, spike camps, helispots, caches, and other staging areas.

### **Goal 3. Avoid creating soil conditions that promote weed germination and establishment.**

**Fire 3.** Use appropriate suppression tactics to reduce suppression-induced disturbances (e.g., fertilizer in retardant, control lines) to soil and vegetation while minimizing seedbed creation due to disturbance from fire effects.

**Fire 4.** Avoid moving water buckets from infested lakes to lakes that are not infested prior to inspection and cleaning. There is no hazard in using water infested with aquatic weeds on terrestrial sites. Where possible, shift suppression equipment and activities from uninfested to infested areas.

### **Goal 4. Avoid impacts to sensitive species and habitats.**

**Fire 5.** Consult with a resource advisor to understand where sensitive species and habitats occur or might occur in areas to be affected by handline, bulldozer lines, or retardant drops. Use maps of sensitive species/habitats if available. Avoid areas flagged as containing sensitive features if at all possible. Preserve snags and down logs as much as possible.

## Prescribed Fire and Mechanical Treatment

### **Goal 5. To prevent new weed infestations and the spread of existing weeds, avoid or remove sources of weed seed and propagules or manage fire as an aid in control of weeds.**

**Fire 6.** Environmental analysis for prescribed fire projects shall include noxious weed risk assessment and spread prevention practices. This analysis would pre-inventory the project area and evaluate weeds present with regard to the effects on the weed spread relative to the treatment prescription.

**Roadblock(s):** Planning process is long, compliance from burn bosses is sometimes difficult; time and money are both constraints.

**Solution(s):** Create a template to add to burn plans to facilitate utilization. Ask for more fire funds for compliance. Look for opportunities for inter-divisional cooperation or support from regional staff or upper management.

**Fire 7.** Avoid burning or manipulating fuels in areas at high risk for weed establishment or spread due to fire effects. Treat weeds that establish or spread because of unplanned burning of weed infestations.

**Goal 6. Avoid creating soil conditions that promote weed germination and establishment.**

**Fire 8.** Use appropriate Minimum Impact Suppression Tactics during project preparation and suppression tactics to reduce disturbances to soil and vegetation.

**Goal 7. Retain sufficient down wood and snags for wildlife benefit.**

**Fire 9 .** Determine retention levels of down woody material on an individual project basis. Within westside vegetation types, generally retain an average over the treatment unit of 10-15 tons of large down wood per acre. Within eastside vegetation types, generally retain an average of three large down logs per acre. Emphasize retention of wood that is in the earliest stages of decay. Consider the effects of follow-up prescribed fire in achieving desired retention levels of down wood.

**Fire 10.** Determine snag retention levels on an individual project basis. Design projects to sustain across a landscape a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife. Retain some mid and large diameter live trees that are currently in decline, have substantial wood defect, or have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future snags and to provide nesting structure. When determining snag retention levels, consider land allocation, desired condition, landscape position, and site conditions (such as riparian areas and ridge tops).

Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Avoid uniform distribution across large areas. While some snags will be lost due to hazard removal or ignition, consider these potential losses during project planning to achieve desired snag retention levels.

**Goal 8. Manage prescribed burns, mechanical, and hand treatments to protect or enhance sensitive species and habitats.**

**Fire 11.** Work with READ to identify sensitive species and habitats (e.g., aspen, wetlands, riparian areas, nest trees) during the planning stages. Make sure surveys are complete and any sensitive resource issues have been clearly identified before proceeding with project. Instruct contractors and fire crews to respect and avoid any areas flagged to protect sensitive features.

## Plans

**Goal 9. Improve effectiveness of prevention practices in all areas of fire management (i.e., mechanical, wildland and prescribed fire) through natural resource assistance, awareness, and education.**

**Fire 12.** Consult with resources staff sufficiently in advance to allow for the identification of important/unique resources. Resources staff will identify resources in need of protection and suggest a plan to mitigate damage to them. These mitigation measures will be discussed with fire staff and specifically included in the burn or treatment plans. Fire and resources staff will agree on cost effective means of implementation but that implementation will fall primarily to fire staff. Resources staff will also identify target post-treatment resource conditions in addition to those in table 3.2. Mitigation actions will be determined on a burn by burn basis.

**Fire 13.** Environmental analysis for fire management plan shall include noxious weed and sensitive species risk assessments and best management practices.

**Roadblock(s):** Planning process is long, compliance from FMOs is sometimes difficult; time and money are both constraints.

**Solution(s):** Include risk assessments in FMP updates. Create a template to add to burn plans to facilitate utilization. Ask for more fire funds for compliance. Look for opportunities for inter-divisional cooperation or support from regional staff or upper management. Conduct at least two joint meetings between resource and fire management per year.

**Fire 14:** Provide Plans Section and Field Observer with an advisor familiar with noxious weeds and sensitive species in the fire area. Obtain noxious weed and sensitive species identification aids and maps to help avoid populations in fire line location. (Do NOT compromise safety or holding ability when relocating firelines to avoid weeds or sensitive species.)

**Fire 15:** Development of WFDSS should include noxious weed prevention, control, and containment. Needed action would be incorporated into letter of delegation to incident team.

**Fire 16.** Include invasive plant issues in the After Action Review (AAR) process.

**Goal 9a. During project-level planning, consider the following guidelines for large-snag retention:**

- In westside mixed conifer and ponderosa pine types, four of the largest snags per acre.
- In the red fir forest type, six of the largest snags per acre.
- In eastside pine and eastside mixed conifer forest types, three of the largest snags per acre.
- In westside hardwood ecosystems, four of the largest snags per acre (hardwood or conifer).

- Where standing live hardwood trees lack dead branches, six of the largest snags per acre to supplement wildlife needs for dead material.

## Logistics

### **Goal 10. Mitigate and reduce noxious weed spread from Operations activities.**

**Fire 17:** Avoid use of water (dust abatement, compaction, excavation, seeding, fire suppression, etc.) that is potentially infected or treat water to disinfect.

**Fire 18:** Establish a network of areas appropriate for camps, staging, drop points and parking areas maintained in a noxious weed-free condition. Periodically survey these areas and control weeds.

**Roadblock(s):** Fire management typically does not pre-establish these areas. There are only a limited number of people who have experience in weed control.

**Solution(s):** Maintain a dynamic list of these areas, (i.e. location database), which lists preferred sites maintained as weed-free. Create a list of criteria to identify sites that would be appropriate for a range of uses from routine use to sites used for emergencies only. Expand the number of people who can perform weed control.

**Fire 19:** For areas without a network of sites appropriate for camps, staging, drop points and parking areas must be maintained in a noxious weed-free condition. Minimize noxious weed spread by incorporating noxious weed prevention and containment practices such as mowing, flagging or fencing noxious weed patches, designating noxious weed free travel routes and washing equipment.

**Fire 20:** Fire vehicles, PPE and other gear should be regularly inspected and cleaned as necessary to assure equipment is kept noxious weed seed free.

**Fire 21:** Pressure wash all vehicles and equipment of all mud, dirt, and plant parts. If possible, schedule work in disease and weed free areas first. Utilize vehicle BMPs.

## Air operations

### **Goal 11. Mitigate and reduce noxious weed spread in Air Operations**

**Note:** For each BMP make sure there is a checklist of things to consider.

**Fire 22:** Provide comprehensive education for helicopter managers and their staffs by integrating weed information into normal operations, e.g. annual weed specific training, incident briefings, tailgate discussions.

**Roadblock(s):** Education does not always lead to changes in behavior.

**Solution(s):** Train the trainer, e.g., provide helibase managers and assistants with the training material, and encourage them to train their staff. Be persistent.

Make sure it is part of regular operations. Provide all education/training in advance during non-emergencies, e.g., preseason, post-event debriefing.

**Fire 23:** Establish a network of helibases, landing zones and water sources maintained in a noxious weed-free condition. Periodically survey these areas and control weeds.

**Roadblock(s):** SAR or fire don't have pre-established landing zones. There are only a limited number of people who have experience in weed control.

**Solution(s):** Maintain a dynamic list of helispots, landing zones and water sources, e.g., location database, which lists preferred sites maintained as weed-free. Include a range of criteria for when you can use it from routine use is acceptable to only use in emergencies. Expand the number of people who can perform weed control.

**Fire 24:** For areas without a network of helispots, landing zones and water sources maintained in a noxious weed-free condition, minimize noxious weed spread by incorporating noxious weed prevention and containment practices such as mowing, flagging or fencing noxious weed patches, designating noxious weed free travel routes, tarping areas where sling loads are staged, and washing equipment.

**Fire 25:** Provide for data exchange between the aviation manager and resource management.

**Fire 26:** Inspect and remove noxious weed seed and plant parts from all cargo and nets.

**Roadblock(s):** What to do with dirty nets? How to clean the nets? No expertise or time. This is a big roadblock, which needs a lot more work.

**Solution(s):** Due to the difficulty of doing this, there seemed to be little possibility of a solution. Some thoughts included having the resource advisor work with aviation assets, periodic pressure washing of net materials, or hope that new materials or designs of cargo nets may lead to some solutions.

**Fire 27:** Make sure flight and helispot plans include invasive plant issues, e.g., schedule drops and pick-ups in pristine areas first, then weedy last.

## **Post Burn/Treatment Monitoring and Cleanup**

**Goal 12. Ensure that each treatment, mechanical, Wildfire, or prescribed burn, met the natural resource objectives identified in the burn plan.**

**Fire 28.** Resources staff will monitor the burned area for one growing season post burn/treatment to determine if the targeted resource conditions (e.g., # of snags/acre, no new weed species, monarch trees survived, etc) were met. Resources staff will provide a 1-page post burn assessment detailing to what extent ecosystem health conditions were achieved. If these conditions are not met (exotic population explode, new gullies develop) fire will help resources division staff to mitigate the adverse condition. The post-treatment resources

assessment will provide suggestions to improve pre-burn and operational mitigations during the next treatment. In rare cases, mitigation actions might also be needed to be during the second or third summer post treatment. Cleanup includes removal of fire lines so they do not unnaturally channel water, encourage weeds, become social trails, or leave a lasting eyesore.

Fire staff will factor the resources post burn/treatment assessment into future burn plans as part of their adaptive management strategy.

## **Fire Rehabilitation**

**Goal 14. Incorporate weed prevention into project layout, design, alternative evaluation, and decisions. When appropriate, apply for Burned Area Emergency Rehabilitation and restoration funding.**

**Fire 29.** Evaluate weed status and risks in Burned Area Emergency Rehabilitation plans. When appropriate, apply for Burned Area Emergency Rehabilitation and restoration funding.

**Goal 15. To prevent conditions favoring weed establishment, re-establish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques as appropriate to the site objectives.**

**Fire 30.** To prevent weed spread, detect and treat weeds in burned areas as part of the Burned Area Emergency Rehabilitation plan. For known infestations that will likely increase, the first preference is prevention, such as planting species to compete with unwanted plants.

**Roadblock(s):** Current fire funding does not cover detection and control following mechanical thinning, wildland fire use or prescribed fire. Most Inventory and Monitoring detection programs do not include a post fire management component and current fire management monitoring efforts are not designed for early detection of invasive species; further, in most parks these monitoring efforts are not coordinated.

**Solution(s):** Use lapse or year-end funding to facilitate invasive plant projects. Create flexibility in the types of people who do this work, e.g., fire, resource management, EPMT, inmates, volunteer groups.

**Fire 31.** Inspect and document weed establishment at fire access roads, cleaning sites, all disturbed staging areas, and within burned areas; control infestations to prevent spread within burned areas. If you suspect the presence of noxious weeds, request BAER funds to inspect and document for emergence in the spring. Request BAER funds for control if noxious weeds are present and NEPA has already been approved.

**Roadblock(s):** Most parks do not have the baseline data. Time and money is once again a constraint. Treatment thresholds need to be established to assess the practicality of these actions as well as the probability of success.



**Solution(s):** Where available, ask Fire GIS Specialists for help. Become familiar with the BAER/BAR process. Include an invasive plant/fire risk analysis in planning documents.

**Fire 32.** Seed and straw mulch often used for burn rehabilitation (for wattles, straw bales, dams, etc.) are significant sources of weed propagules, even if they are certified weed-free. Their use within burned areas should be minimized or eliminated in favor of engineered or sterilized materials.

**Fire 33.** Regulate human, pack animal, and livestock entry into burned areas at risk for weed invasion until desirable site vegetation has recovered sufficiently to resist weed invasion.

**Fire 34.** Discourage weed infestation of hand line by pulling first the soil berm, then the duff / litter over the top of the dug line.

**Fire 35.** Establish responsibility for early detection monitoring to provide for rapid response post incident and to evaluate success of revegetation in relation to project plan.