United States Department of Agriculture | Forest Service | Gallatin NF | PO 130 Bozeman, MT 59771

File Code: 5140 Prescribed Fire **Date:** 8/7/06

Subject: Deer Creek Burn D6, Gallatin Canyon North– Implementation Monitoring Review

To: Bozeman District Ranger

On July 20, 2006 an Implementation Monitoring Review was held for the Deer Creek D6, Gallatin Canyon North Prescribed Burn Project. In attendance were Fred Jones, Teri Seth, Mark Story, David Callery, and Alex Phillips (Montana Wilderness Association). Bev Dixon reviewed the burn on July 25, 2006. The purpose of the review was to compare burn results with burn objectives, with specific emphasis on weed/watershed BMP's and air quality mitigation measures. The review focused on the 700-acre Deer Creek prescribed fire which was accomplished on 4/21, 4/22, 4/29, and 5/19 2006.

The Deer Creek burns were authorized in the Gallatin Canyon North Fuels Reduction Project Environmental Assessment (EA) of November 2003, and Decision Notice (DN) and Finding of No Significant Effect (FONSI) of March 2, 2004. The Deer Creek Prescribed Fire Plan (April 13, 2006) provided specific vegetation treatment objectives. The Gallatin Canyon North DN included prescribed burning of up to 2,700 acres, and reduction of conifer encroachment by mechanical means in other areas. The EA Appendix A (Best Management Practices) and Appendix B (Soil Protection Practices) did not specifically apply to the Deer Creek burn as they were included for the timber harvest/thinning areas of the Gallatin Canyon North project (Jack Smith North mechanical treatment unit, Tamphery, Swan, and Levinsky understory thinning units. Overall project objectives included the following:

1. Create a more defensible area in the WUI by reducing the fire severity risk and crown fire hazard, thus reducing the risk of damage to life and property.

2. Maintain and expand areas of low fire severity risk (condition class 1) by reducing conifer encroachment.

3. Begin the reduction of the risks and consequences of wildfire within the Lee Metlalf Wilderness to an acceptable level, including decreasing potential for wildfire escape to a WUI, and increase the safety and predictability of wilderness wildfire as a prescribed natural fire for ecosystem purposes.

The Range of Acceptable Results (Burn Plan page 6) included:

1. Hazard Reduction – 40% mortality rate in mature trees and 80% mortality rate in small trees are desired in the open forest (fuel model 8). A 80-100% mortality rate is desired for mature and small trees in the open areas with scattered trees (fuel model 2).

2. No site preparation.

3. Wildlife Habitat - 40% to 60% reduction of big sagebrush that has become decadent and/or non-productive.

Photo 1. The review team reviewed much of the Deer Creek burn unit on July 20, 2006.

The process for this review consisted of the following:

1. Identification and listing of the Prescribed Fire Plan objectives and the mitigation measures. Sources included the Gallatin Canyon North Fuels Reduction Project EA and DN, and the Deer Creek Prescribed Fire Plan.

2. Field review of the burn unit.

3. Team ratings (consensus) for application and effectiveness of BMP's observed at the reviewed units, using the Montana Forestry BMP audit format.

4. Team recommendations for future GNF prescribed burn projects

Objective or mitigtion measure and effectiveness definitions included the following:

Application
5- operation exceeds requirements of objective or measure
4- operation meets requirements of objective or measure
3- minor departure from measure, objective marginally met
2- major departure from measure, objective sporadically met
1- gross neglect of measure, objective not met

Effectiveness
5- improved conditions over pre-project condition
4- adequate protection of resources, effective
3- minor and temporary impacts on resources, moderately effective
2- major and temporary or minor and prolonged impacts on resources or only slightly effective
1- major and prolonged impacts on resources or not effective

Evaluation Items - BMP's	source	Applic	Effect	Comments
Deer Creek Prescribed Burn Plan Objectives				
1. Maintain and expand areas of low fire severity risk (condition class 1) by reducing conifer encroachment	Rx Fire Plan pg. 6	**4**	**4**	-the implication of this objective is that the area will require periodic treatment to maintain desired condition
2. Hazard Reduction – 40% mortality rate in mature trees and 80% mortality rate in small trees are desired in the open forest (fuel model 8). A 80-100% mortality rate is desired for mature and small trees in a the grassland with scattered trees (fuel model 2)	Rx Fire Plan pg. 6	**4**	**4**	- in many treated areas the burn exceeded objectives for tree mortality -achieved mosaic of burned and unburned stands
3. No site preparation	Rx Fire Plan pg. 6	**4**	**4**	-typically not required for a spring burn
4. Wildlife Habitat - 40% to 60% reduction of big sagebrush that has become decadent and/or non-productive	Rx Fire Plan pg. 6	**4**	**4**	-achieved mosaic burn pattern objective but the definition of decadence was ambiguous - difficult to discern between young heathy and decadent sage with aerial ignition -wildlife staff felt that porportions of young sage burned were equal or greater than decadent plants burned but that overall sage reduction were within the 40-60%. -wildlife concerns would prefer a modification of the objectives in future burn plans (discussed in recommendations)
Deer Creek Prescribed Burn Project Specific Mitigation Measures				
Air Quality				
1. Place warning signs along Hy 191 to inform drivers of reduced visibility during active burning periods	DN pg. 15 EA pg. 2-6	**5**	**4**	-also placed highway sign listing broadcast channel for additional information on burn

				-also posted personnel in parking areas
2. Smoke column density and direction of travel monitored. Ignition may be altered to minimize the smoke impact on HY 191	Rx Fire Plan pg. 13	**4**	**4**	-on 4/22, some smoke settled to valley bottom -smoke on 4/29 and 5/19 had robust plume height and dispersed with minimal impact to valley bottom
3. Coordinate burn with Montana/Idaho Airshed group	Rx Fire Plan pg. 13, DN pg. 17, EA pg. 2-6	**4**	**4**	-followed standard RAZU procedures, obtained MT/ID Smoke Unit approval
4. Prescribed burning in springtime	DN pg. 17, EA pg. 2-6	**4**	**4**	April 22, 29; May 19
Water Quality				
1. No-burn buffer of 100 feet between burn treatment areas and perennial streams	DN pg. 17, Rx Fire Plan pg. 11	**4**	**4**	-recommended buffer width changed to 50 feet (as for Karst burn), although actual buffer was well over 100 feet
2. Natural terrain breaks and snow used to contain burn area. No ground disturbing contaiment methods. MIST techniques if fire escape	EA pg. 2-7	**4**	**4**	-blacklining used to connect snowbanks -no fire escaped boundaries
Native Plants and Weeds				
1. Native range burned before the Idaho fescue greens up. May require several entries and burning at different elevational bands.	DN pg. 15 EA pg. 2-7	**4**	**4**	-three entries -vigorous Idaho fescue growth observed in burned areas
2. Hounds tounge treated for at least 5 years. Responsibility of weed program manager.	DN pg. 15 EA pg. 2-7	nr	nr	-not rated—ongoing -Pre-treatment removal effort consisted of a 30-person hand crew (summer 2003)
3. Staging areas for helicopter inspected to ensure weed free.	DN pg. 15 EA pg. 2-7	**4**	**4**	-helicopters did not land in wilderness area
4. Yellow toadflax below Deer Creek powerline flagged and avoided during burning.	DN pg. 15 EA pg. 2-7	**4**	**4**	
5. Previously unidentified weed populations mapped and weed specialist notified	Rx Fire Plan pg. 9	**4**	**4**	-no additional weed populations identified during project
6. Big sagebrush burned in a mosaic pattern with at 40 to 60% of non-productive sagebrush	DN pg. 17	**4**	**4**	- mosaic of burned and unburned sagebrush acceptable with DN

burned. Non-productive sagebrush is characterized by having conifer encroachment and is generally unhealty and losing viability.				and burn plan objectives but D6 Wildlife Biologist concerned that young, health sage was burned in equal or greater porportion than decadent sage. -overall reduction in sage did not exceed 40-60%
Wilderness				
1. Helicopter use mimimally as posisible. Access by foot unless cannot safely.	DN pg. 16	**4**	**4**	-helicopters did not land in wilderness area
Wildlife				
1. Helicopters for aerial ignitions use Gallatin Canyon corridor rather than high elevation cirque areas (avoids potential denning habitat for grizzly bears and wolverine).	DN pg. 16 EA pg. 2-9	**4**	**4**	
2. Low level helicopter flights <4 hrs day (grizzly bear denning)	DN pg. 16 EA pg. 2-9	**4**	**4**	-no more than three hours each day
3. One year between Dudley, Deer, and Asbestos Creek burns (bighorn sheep), unless area population recovered to specified levels	DN pg. 16 EA pg. 2-9	**4**	**4**	-sheep population had stabilized by date of burn -1 year interval adhered to anyway -Montana FWP satisfied with efforts
4. Helicopter pre-flight to ensure bighorn sheep not concentrated in a burn area	DN pg. 16 EA pg. 2-9	**4**	**4**	

Photo 2. View to the west in Deer Creek burn unit showing mosaic pattern of sagebrush burn, as well as burned aspen outliers. Darker green areas of slope are burned sagebrush, and lighter areas are unburned sagebrush.

Photo 3. Closeup showing sagebrush mosaic. The area in the immediate foreground and distant background is unburned. The burned area in upper half of photo shows blackened sagebrush skeletons with more vigorous grass/forb growth.

Photo 4. Overview of Deer Creek burn area looking northwest. Areas of fire-killed trees dominate the center of the area. The pattern suggests the expansion of low-fire-severity conditions through conifer mortality. This effect will become more apparent as dead trees shed needles and snags topple.

Photo 5. Closer view of mosaic of burned and unburned conifers.

Photo 6. Areas of burned conifers showed good vegetation recovery 2-3 months after the burn.

Photo 7. Open areas had no sign of overland flow/surface erosion. The duff layer was largely intact, with only surface burning. The unburned lower duff layer protects the soil from erosion and reflects a low burn intensity and severity.

Photo 8. The Deer Creek fire generally had excellent smoke dispersion. On April 22, some smoke settled to the valley bottom but on the primary burning days the robust plume height dispersed smoke with minimal impact to the valley bottom. No smoke impact problems with nearby residences, traffic on Highway 191, or residences in the Gallatin valley occurred.

Conclusions

1. The overall goals of the Deer Creek prescribed fire were met:
    a. Conifer encroachment was reduced
    b. Good mosaic pattern in burned conifer stands
    c. Sagebrush areas were treated in a mosaic pattern and mortality was limited to no more than 60%.
    d. The burn plan was clearly written and well-executed by the ground and air crews
2. Robust fire runs were observed in the lodgepole pine stands despite spring conditions
3. Air quality mitigation standards were exceeded
4. The large size and scope of this burn were major steps for the D6/D7 Gallatin NF Fuels team
5. Idaho fescue plan/mitigation worked well—burned fescue habitat showed particularly strong fescue growth at the time of the review
6. Soil and water resources were protected. In nearly all burned areas, ground vegetation recovery was vigorous. In areas where ground vegetation remained sparse, no signs of soil erosion were evident. The duff layer was minimally burned throughout the unit which greatly reduces the potential for increased runoff.
7. Multiple entries were a key to the successful implementation of the Deer Creek D6 burn. This was especially important for avoiding damage to Idaho fescue.
8. Sagebrush treatments, while limiting mortality to not more than 60%, were not precise (aerial ignition) in discerning between young and healthy and old, decadent, or dead sagebrush. The definition of decadent sagebrush is ambiguous and wildlife concerns were raised about burning of young and healthy sagebrush as a project wildlife objective. The Burn Plan (page 6) listed wildlife habitat as a reason for burning sagebrush but the sagebrush burning practice and design critera in the DN were listed under the Native Plants and Weed section (DN page 17) not in the wildlife section (DN page 16).
9. The Deer Creek burn is a good example of the successful partnership of the Forest Service and private non-governmental organizations (in this case, the Rocky Mountain Elk Foundation).

Recommendations

1. Multiple entries have been useful in minimizing damage to burn-sensitive plant species, as well as maximizing the use of natural fire breaks (e.g. snow banks) during spring burns. Future implementation of spring burns could benefit from using a multiple entry approach, especially for units with a variety of vegetation, aspect, and elevation.
2. Future burn plans and NEPA documents should more clearly disclose the wildlife science of sagebrush burns and not include sagebrush burning objectives as a wildlife objective – as in the Deer Creek burn plan. From a wildlife standpoint

spring burns can conflict with reproductive seasons where young and/or pregnant animals are more vulnerable to disturbance.

3. For the Dudley Creek burn, tentatively scheduled for 2007, the burn plan should not list sagebrush burning as a wildlife objective. Coordination between the D6 Wildlife Biologist in the ignition strategy and burn plan may be useful in reducing the burning of young, healty sagebrush and increasing the consumption of decadent sagebrush. Appropriate wording for the Dudley Creek burn plan (range of acceptable results) could be "Native Plants and Weeds – No more than 40% to 60% reduction of big sagbrush. Aim for dead or decadent sage plants where needed to carry fire into target forested areas."
4. For spring burns, including the Deer Creek burn, a buffer of 50 feet was judged to be sufficient between treated areas and perennial streams. No buffer is recommended for spring burns from ephemeral drainages.
5. GNF specialists would benefit from observing a prescribed fire during burning: a better understanding of the logistics and limitations could be useful in planning for future projects and would also help determine whether implementation mitigation measures are effective.
6. Local conservation/environmental organizations, such as the Montana Wilderness Association are willing to organize volunteer groups to assist in pre-project weed removal. Collaboration with these groups in funding and volunteer work is encouraged.

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