United States Department of Agriculture | Forest Service | Gallatin NF | PO 130 Bozeman, MT 59715

File Code: 5140 Prescribed Fire Date: 7/1/2005

Subject: **Karst Burn – Implementation Monitoring Review**

To: **Bozeman District Ranger**

On June 27, 2005 an Implementation Monitoring Review was was held for the Karst Prescribed Burn. In attendance were Lisa Stoeffler, Jodi Canfield, Teri Seth, Fred Jones, Mark Story from the Gallatin NF and Jerry Furtney from RY Lumber. The objective of the review was to compare burn results with burn objectives with specific emphasis on watershed BMP's and air quality mitigation measures. The Karst Burn was about a 450 acre burn on 4/16/2005 which was included in the Gallatin Canyon North Fuels Reduction EA. The burn was ignited on the same day as the Asbestos Creek burn to the south using a PSD machine (aerial ignition with a helicopter). Fire carried well through the target area with good consumption of smaller fuels and ground fuels. The Karst fire was bounded on the north ridge of Karst Creek and on the south by Karst Creek (see attached map).

Karst Burn on 4/16/2005

The objectives of the Karst Burn were to provide a fuel break on the west side of the Gallatin Canyon in conjunction with the Deer Creek and Asbestos Creek burns. The Karst burn is located near several homes at the mouth of Karst Creek and was accompanied by the WUI treatments in a strip west of the homesites. Specific objectives of the Karst burn were to blacken 40-60% of the treatment area in a mosaic fashion, with 50% mortality in mature trees in grass/shrub habitat and 60% or greater mortality in conifer seedling/sapling. The Karst Burn Plan included acceptable results of blacken 40% of aspen clone areas, and reduce decadent and/or nonproductive big sagebrush by 40-60%. The review team observed achievement of these specific objectives and results throughout the Karst burn. Five BMP's were reviewed using the Montana Forestry BMP audit criteria. These included 2 soil/water/aquatics and 3 air quality project specific mitigation measures from Table 2-2 (page 2-6) of the Gallatin Canyon North EA.

BMP application, BMP effectiveness, and BMP descriptive definitions include:

BMP Application
5- operation exceeds requirements of BMP
4- operation meets requirements of BMP
3- minor departure from BMP
2- major departure from BMP
1- gross neglect of BMP

BMP Effectiveness
5- improved protection of soil and water resources over pre-project condition
4- adequate protection of soil and water resources
3- minor and temporary impacts on soil and water resources
2- major and temporary or minor and prolonged impacts on soil and water resources
1- major and prolonged impacts on soil and water resources

BMP Definitions

Adequate - small amount of material eroded, does not reach draws, channels, or floodplain
Minor - erosion and delivery of material to draws but not stream
Major - erosion and subsequent delivery of sediment to stream or annual floodplain
Temporary - impacts lasting 1 year or less, no more than 1 runoff season
Prolonged - impacts lasting more than 1 year

Evaluation Items - BMP's	source	Applic	Effect	Comments
Prescribed Fire BMP's				
1. no burn buffer of 100' between burn treatment areas and perennial streams would be retained.	EA Table 2-2 Project Specific Measures	3/4	4	2 spots on west side of burn an 1 on east side had burn closer than 100'. No erosion or sediment occurred in these areas.
2. Natural terrain breaks, existing roads, and snow at higher elevations would be used to contain the burn area. No ground disturbing containment methods would be used. If ground disturbing fire suppression activities are needed in an escape situation, MIST would be used if possible.	EA Table 2-2 Project Specific Measures	4	4	East end of burn (near Karst subdivision) was monitored by a 3 person crew. No handline construction or other ground disturbing was needed.
Air Quality				
1. Place warning signs along Highway 191 to inform drivers of reduced visibility due to preseribed burns during adctive periods of Rx burning	EA Table 2-2 Project Specific Measures	4	4	Warning signs were placed along Highway 191.
2. Rx burning would occur during springtime when north slopes are still	EA Table 2-2 Project Specific	4	4	The Karst met all of the spring burn project

moist form snowmelt, wind dispersion is robust, and wildfire potential very low	Measures			specific measures for moist north slope confinement, good wind dispersion, and low wildfire potential
3. Coordinate all GCN burning activities with the Montana/Idaho State Airshed Group		4	4	The Karst and Asbestos Creek burns were posted on the airshed group RAZU 3 days in advance and dispersion forecast checked prior to burning. The state airshed group had no restrictions and smoke impacts were well within the levels and dispersion patterns anticipated in the EA.

Specific review findings will be illustrated in photos.

Much of the Karst burn occurred on 50-70% slopes and burned all surface vegetation, much of the surface fuel and lightly into duff. Burn intensity was generally low-moderate with very localized small pockets of high intensity. Between 4/28/05 and 6/27/05 the Shendango RAWS site (7.5 miles north at 5700 elevation) recorded 8.9" of precipitation. No RAW's precipitation data at the site is available from 4/17 – 4/27. Elevation of the Karst burn varies from 6100 to 8000 feet. Actual 4/17 to 6/27 precipitation on the Karst burn was at least 10 inches. The precipitation was largely frontal storm source with moderate precipitation intensity. No rill, sheet, or gully erosion was observed on any of the areas examined on the Karst burn.

On 15-30% slopes on the north side of the Karst Burn revegetation on 6/27 was robust with dense recovery of grass and forbs and resprouting of shrubs and aspen. No surface erosion was observed. In virtually all areas observed duff consumption was moderate. Needle cast was extensive which adds addition "mulch" in burned areas. The nutrient mobilization from the burn combined with a consistent supply of moderate rains has resulted in excellent understory growing conditions on much of the Karst burn. The re-vegetation will likely provide adequate surface erosion protection from July and August thunderstorms which can have higher rainfall intensity than the spring frontal storm rains.

On the western edge of the Karst burn the burn perimeter was within 100' of Karst Creek in 2 spots. Revegetation was robust and no erosion or sedimentation occurred. This is a minor departure of the project specific mitigation measure "BMP's". In helicopter ignitions where some downslope burning can occur retaining a 100' no burn buffer is difficult. In future Gallatin NF spring burns no burn buffers are recommended to be reduced to 25' to 50' which is more attainable and adequate for most burns.

All 3 of the air quality project specific measures ("BMP's") were fully implemented with adequate protection of air quality resources. The Gallatin Canyon North Fuels Reduction EA predicted the Karst burn would emit 11 tons of PM_{10} and produce a more centralized plume than pile burns. The EA anticipated that the smoke would disperse to the east along the north end of the Gallatin Range and south of Bozeman. Some localized visibility reduction from the plumes was anticipated along highway 191 with quick plume dispersion to insignificant visibility levels north of Gallatin Canyon. The actual Karst burn smoke plume was consistent with EA predictions. The Karst and Asbestos Creek burns were posted on the Montana/Idaho airshed group RAZU http://www.smokemu.org/home.php 3 days in advance and dispersion forecast checked prior to burning. No airshed restrictions in Airshed 8A were in place at the time of the Karst burn.

Conclusions

The Karst Creek burn achieved the EA objectives for mosaic burn pattern and mature tree mortality conifer seedling/sapling mortality. The burn results included aspen clone stimulation and reduction of decadent and/or nonproductive big sagebrush. Soil/water/aquatic protection was adequate. All air quality project specific measures were implemented with adequate air quality protection. The soil/water/aquatic protection was particularly notable since much of the burn was of moderate burn intensity on steep south facing slopes with 10+ inches of precipitation in the 9 weeks between the burn and review.

Recommendations

An important BMP for prescribed burns is retention of sediment filtration function. For future prescribed burn projects on the Gallatin NF a 100' no burn buffer strip is usually not necessary. For spring burns 25-50' is adequate for water quality protection. For fall burning a 50' to would be appropriate since fall prescribed burns typically have higher burn severity and a longer time before revegetation. More extensive burn buffer strips may be appropriate for prescribed burn areas which are subject to grazing. In relatively flat riparian areas, where project objectives may include conifer encroachment removal and/or riparian deciduous shrub stimulation, buffer strips are not appropriate.

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