

2020 Management Review

Grand Mesa, Uncompahgre and Gunnison (GMUG) National Forest Spruce Beetle Epidemic and Sudden Aspen Decline Management Response (SBEADMR)

May 2020

Purpose: Annually the Forest Leadership Team of the GMUG NF will complete a Management Review of the SBEADMR to ensure that the Record of Decision and accompanying Final Environmental Impact Statement (FEIS) is being implemented as planned and is adequate, suitable and effective in achieving desired outcomes. The management review is central to the adaptive management process. The review ensures leadership is aware of environmental and economic performance of the project and takes actions for continual improvement.

The Adaptive Management Group (AMG) assist in development of recommendations for changes to SBEADMR. The Science Team interprets the latest science and/or monitoring related to the project for consideration by Forest leadership. Changes to the SBEADMR is the sole responsibility of the Forest Leadership Team and will be applied to all treatments planned from the date of the decision. Changes will also be posted to the SBEADMR Implementation Website.

ACCOMPLISHMENTS THROUGH DECEMBER 31, 2019.

Table 1. GMUG National Forests SBEADMR Treatments; Sales awarded from FY 2016 through FY 2019

Treatment Name	FY Awarded	Resource Zone*	Treatment Type	Acres Treated	Timber Volume Produced (CCF)	Miles of Temporary Road constructed	Treatment Status
Horse Mountain	2016	North	Resiliency	110	1,449	0	Complete
Cathedral	2017	East	Salvage	640	13,497	10	Complete
Nutras	2017	East	Salvage	210	5,835	1.8	Complete
Pauline	2017	East	Salvage	1,874	18,615	9.7	Complete
Skeleton	2017	East	Salvage	610	12,777	8.4	Complete
Willow Mesa	2017	East	Salvage	440	5,800	6.4	Complete
Little Cone	2017	West	Resiliency	86	1,775	0	Complete
Cooler	2018	East	Salvage	244	2,167	0.8	Complete
Divide Salvage	2018	East	Salvage	160	2,545	1	Complete
Last Tree	2018	East	Salvage	466	6,270	3.7	Active
Millswitch	2018	East	Salvage	885	18,516	2.6	Active
Quill	2018	East	Salvage	569	6,708	0	Active
Sargents Mesa	2018	East	Salvage	1,468	14,195	9.7	Active
Crane	2018	North	Resiliency	475	8,552	1.6	Active

High Mesa	2018	West	Salvage	320	13,178	3	Complete
Big Willow-GNA	2019	East	Salvage	2177	41,224	13	Active
Buffalo Forks - NWTF	2019	East	Salvage/Resiliency	100	1,441	2	Sold
Ridgestock - GNA	2019	East	Salvage	1,300	28,858	3	Active
Sage Park	2019	East	Salvage	14	130	0	Sold
Jackson	2019	West	Salvage/Resiliency	321	10,789	3	Active
Ore Cart	2019	West	Salvage	16	75	0	Sold
Pay Load	2019	West	Salvage	13	50	0	Sold
Telski	2019	West	Resiliency	50	500	0	Sold
West Drain	2019	West	Salvage	23	100	0	Sold
Sage small sales (2018)	2019	East	Salvage	25	130	0	Complete
Taylor Park Poles	2019	East	Salvage	25	250	0	Active
Moore Knots	2019	North	Sanitation	150	59	0	Complete
Totals				12,771	215,485	76.7	

ROD Cap Acres: The Record of Decision (ROD) authorized 60,000 acres of commercial treatment and 60,000 acres of non-commercial treatment. Through December 31, 2019 approximately 12,771 (21% of the cap) of commercial treatment producing 215,485 CCF of timber. No non-commercial treatment has been completed but several projects are in the works. Of the commercial treatments, 12 treatments have been completed.

Temporary Road Mileage: The FEIS predicted 360 miles of new temporary road construction and/or reconditioning of an existing road template for temporary use. All temporary roads (new or reconditioned are to be decommissioned within 5-years of sale closure). To date 76.7 miles of temporary road has been constructed. Review of completed sales indicates all temporary roads (41.1 miles) have been decommissioned in accordance with Design Feature Requirements. A review of road decommissioning was completed by the AMG in 2019.

Since 21% of the total commercial acres have been completed to date, the FEIS predicted 76 miles of temporary road construction would be needed to those treatments which is line with miles actually constructed. However, for some sales (Big Willow and Ridgestock) all treatments have not been completed which will add additional road mileage to those treatments.

ENVIRONMENTAL PERFORMANCE

Are actions resulting in unacceptable outcomes that are outside those expected in the FEIS?

Have Triggers identified in the FEIS for Canada Lynx, Watershed Impacts, Habitat Structural Diversity, soil productivity, and bare soil resulting from burning of slash piles been exceeded?

1. Requirements under the Southern Rockies Lynx Amendment – SRLA

Table 2. VEG S5 and S6 Exceptions Used in Lynx Habitat (Requirements under Southern Rockies Lynx Amendment). Numbers reflect status of caps through December 31, 2019.

Number of Treatments	A	B	C	D	E	F	G
	Acres of Lynx Habitat Treated Under Exceptions 1-4 in VEG S5 and Exceptions 1-3 in VEG S6 (0.5% of Lynx Habitat)	Forest Acreage Allocation (0.5%) per SRLA Incidental Take Statement	Current Balance of Forest Allocation ¹ (0.5%) (acres)	Acres of Lynx Habitat Treated Under Exception 5 in VEG S5 (1% of Lynx Habitat)	Forest Acreage Allocation (1%) per SRLA Incidental Take Statement (ITS) {1%}	Current Balance of Forest Allocation ¹ (1%) (acres)	Combined Allocation per ITS (1.5%) (B + E)
15	4,498	7,071	2,573	100	14,142	14,042	21,213

2. Requirements under SBEADMR Biological Opinion

- a. **Canada Lynx** – VEG S1 states that no more than 30% of lynx habitat converted to Stand Initiation Structural Stage – SISS as a result of management actions and natural disturbances within an individual Lynx Analysis Unit (LAU).

Findings: All affected Lynx Analysis Area (LAU) are being tracked annually. No LAU has reached the 25% (yellow light trigger). The need to discontinue or modify management actions to avoid exceeding the 30% threshold is not needed at this time.

Change Detection update: All vegetation polygons (FS-VEG spatial) composed of spruce-fir, spruce-fir aspen lodgepole pine and mixed conifer were updated in May 2020. Both overstory and understory vegetation changes are being assessed. The FS-VEG-Spatial will now be used to 1) update the amount of lynx habitat converted to stand initiation structural stage (SISS) – unsuitable as a result of beetle mortality and 2) working with the Science Team model lynx habitat to reflect changes in what constitutes high quality lynx habitat (Squires et. al 2019). The Forest projects both products will be completed by May 2021.

Motion: The need to discontinue or modify actions to avoid the 25% threshold is not needed at this time.

- b. **Canada Lynx** – VEG S2 states that no more than 15% of the lynx habitat converted to SISS as a result of management actions can occur within an individual LAU.

Findings: No LAU has reached the 10% (yellow light trigger). The need to discontinue or modify management actions to avoid exceeding the 15% threshold is not needed at this

time. Most of the management treatments in a LAU heavily impacted by spruce beetle are complete. In these areas, minimal active vegetation management will occur for decades to come.

Motion: The need to discontinue or modify actions to avoid the 10% threshold is not needed at this time.

- c. **Canada Lynx** – VEG S5 states that no more than 3% of the lynx habitat on the Forest will be thinned within 200 feet of structures; research projects; or for conifer removal in aspen.

Findings: Forest has 42,293 acres to be used under VEG S5. Little or no thinning is anticipated under SBEADMR treatments.

Motion: No need to modify actions at this time.

3. Other SBEADMR Requirements

- a. **Watershed** – Wildfire and cumulative management activities will not exceed 25% of HUC12 watershed as determined by weighted acres of mechanical harvest, roads and severe fire.

Findings: No HUC 12 watershed has reached the 20% (yellow light trigger). The need to discontinue or modify management actions to avoid exceeding the 20% threshold is not needed at this time. One major fire did occur on the West-side of the Uncompahgre Plateau with light to moderate burning in 2018. The affected watershed is out-side Priority Treatment Areas identified in SBEADMR.

Motion: There is no need to discontinue or modify actions to avoid exceeding the 20% threshold at this time.

- b. **Habitat Structural Diversity** – Maintain 5-15% of vegetation at the HUC 12 watershed scale in structural stages 4A, 4B and 4C where biologically feasible. In areas with high mortality of older mature trees, maintain live trees to the greatest extent practicable.

Findings: Nearly all the commercial treatments completed to date have occurred in salvage areas with 90-100% overstory mortality. No mature green trees in these affected stands are expected to persist into the future. Watersheds and LAUs that have predominately live spruce and fir are still dominated by structural stages 4A, 4B and 4C. Resiliency treatments are being planned in 2020 and beyond with the goal of creating openings to regenerate. All watersheds not heavily affected by spruce beetles are expected to maintain structural stages 4A, 4B, and 4C above the 15% threshold. No changes are needed at this time.

Motion: No changes at this time.

- c. **Soil Productivity** – maintain soil productivity by limiting adverse soil disturbance to 15% or less. The treatment design checklist is to be used to determine if this requirement is being met.

Findings: To date, treatment design checklist have been completed for twenty-seven commercial treatments. All checklists indicate treatments are designed commensurate with this requirement. No changes are needed at this time.

Motion: No changes at this time.

- d. **Soil damage from machine pile burning** – within 3 years of pile burning have no more than 200 sq. ft. of adverse soil impacts on a burn scare (bare soil, multiple rills, and deep gullies). Appendix D (Annual Treatment Review) of the FEIS will be used to monitor this indicator.

Findings: Numerous slash piles have been burned but most have not been rehabilitated. Once rehabilitation of the burn pits have been completed, a design feature review will be scheduled to determine effectiveness.

Motion: No changes at this time.

PROPOSED ADMINISTRATIVE CHANGES TO THE PROJECT

Are there changes to SBEADMR that would result in increased efficiency and/or changes to design features to make them more implementable or effective to achieve the desired environmental outcome?

PRE-TREATMENT CHECKLIST (APPENDIX C OF FEIS)

Step 3: Surveys—Range and Invasive Species Surveys

Recommendation 1:

Invasive plant species surveys description update.

Current Wording: Pre-treatment invasive plant species surveys: Within high risk areas for invasive plant species, complete inventories to identify invasive plant populations. Treat and document at least 50% efficacy rate prior to treatment and/or road-building.

Suggested Wording: Identify harvest units that contain weed populations and include them on a sale area map. Prioritize those populations for treatment utilizing IPM (Integrated Pest Management) and adaptive management strategies. For example: forego/postpone treating Canada thistle in treatment areas and instead focus on treating oxeye daisy populations outside of treatment areas; stage treatments in weed-free areas first allowing weed treatments to occur where needed, then clean equipment moves to the area just treated for weeds; etc. Document at least a 50% efficacy rate for herbicide treatments.

Motion: Accept Recommended Changes.

Step 4: Design Features

Recommendation 2:

IW-5. Along with recommendation 1, it seems that with this large requirement and the decreasing of funds, we are putting ourselves in a position where we have to treat areas with infestations of lesser concerns (Canada thistle) because they are tied to SBEADMR and potentially abandon or lose ground on areas with infestations of higher concern (oxeye daisy, toadflax...) because they are not associated with SBEADMR. Suggest modifying in a manner that it is more flexible.

Additionally, other design features do protect against the spread of weeds and the control/treatment of weeds.

Current Wording: Within high risk areas for invasive weed species, complete inventories to identify invasive weed populations. Treat and document at least 50% efficacy rate prior to treatment and/or road-building.

Suggested Wording: Coordinate operations by staging planned activities to avoid spreading invasive weed species from "infested" areas that contain invasive weeds to areas void of invasive weeds by treatment. When staging of operations is not feasible, equipment cleaning is required prior to entering National Forest lands and before moving from a "weed area" to a "non-weed area."

Motion: Accept Recommended Changes.

Recommendation 3:

REC-4 B and REC-6 are word-for-word repetitive: "coordinate with District recreation staff to address treatment-related impacts to special use permit holders in the treatment area"

Motion: Eliminate one of the DF since they are redundant.

Recommendation 4:

SV-1. Add "within 5 years of harvest" to SV-1 to clarify the required timeframe.

Current Wording: SV-1: All regeneration cutting will meet stocking standards as defined in the Forest Plan.

Suggested Wording: SV-1: All regeneration cutting will meet stocking standards as defined in the Forest Plan within 5 years of harvest.

Motion: Accept Recommended Changes.

Recommendation 5:

SP-4. As we move into more non-commercial treatments smaller piles may be needed due to restrictions in capabilities of smaller machinery and hand crews.

Current Wording:

To facilitate complete burning, piles shall be compact in size and shape, and free of soil. Piles will not be less than 12 (twelve) feet in height. Piles shall not be constructed as windrows, rather the size of each pile's footprint shall be minimized. The size of each pile's footprint shall not exceed 50 feet in any dimension. Piles shall be of a size and location which will not impair road use or result in damage to residual timber. Piles shall be located at least 50 feet from residual timber.

Suggested Wording: To facilitate complete burning, piles shall be compact in size and shape, and free of soil. Piles shall not be constructed as windrows; rather the size of each pile's footprint shall be minimized. Piles shall be of a size and location that will not impair road use or result in damage to residual timber. Piles shall be located at least 50 feet from residual timber.

- Piles associated with large sales or as determined by the Timber Sale Contractor will not be less than 12 feet in height. The size of each pile's footprint shall not exceed 50 feet in any dimension.
- Piles constructed by hand crew or small machinery (e.g., dozers), typical of non-commercial project, will not be less than 6 feet in height. The size of each piles footprint shall not exceed 20 feet in any dimension.

Motion: Accept Recommended Changes.

Recommendation 6:

SP-7.

Current Wording: Slash piles should not be located within 2 tree lengths of the tallest residual snags or groups of snags in salvage treatments or within 2 tree lengths of the perimeters of salvage units.

Suggested Change: SP-4 has been expanded to include distance requirements from residual stands for placement of slash piles. Implementation monitoring indicates placement of slash piles 2 tree lengths or greater has proven difficult and is not needed to maintain adjacent stands. This is especially the case when implementing resiliency treatments where cut units a relatively small. Therefore, recommend eliminating SP-7.

Motion: Accepted Recommended Changes.

Recommendation 7:

The following clarification should be added to TSHR-2 (Transportation System and Haul Routes). The clarification is needed to better align timber sale contract clauses to NEPA requirements and to accelerate recovery of temporary roads.

TSHR-2 addition: Entrances of temporary and temporary designed roads from all NFS roads will be closed by large water bars, logs, rocks, slash and/or brush that would prevent motorized access to the area to a minimum of 200 feet or to end of seen area, whichever is greater. The entire width and length temporary road should be obliterated. Obliteration includes ripping to a depth of 3 to 8 inches to provide a seedbed for grass, forbs and shrubs. Pull available wood (coarse woody debris (greater than 3 inches in diameter) and fine woody (less than 3 inches in diameter)), sod clumps, litter, duff, and top soil over disturbed surface to provide immediate ground cover. Obliterated roads should have water bars and broad based dips along the length of the road to provide cross drainage.

Motion: Accepted Recommended Changes

Recommendation 8:

Design Feature Table/s: Through the process of review for the Taylor Park EA, it was brought up that the tables (same as used for SBEADMR) were not 508 compliant. There was quite a bit of work done (mainly un-nesting tables and getting rid of merged cells) to make it 508 Compliant. We should also do this for the SBEADMR design feature tables.

Mainly where this is a problem is with the headers of the sections with objectives (figure 1) and the watershed nested tables (figure 2)

Silviculture Objectives: 1. For spruce beetle-affected stands: a. Provide for salvage of dead or dying stands b. Maintenance of green stands where they exist c. Regenerate stands where needed. 2. For stands to be treated for aspen decline: a. Regeneration of aspen before advanced decline, by either fire or mechanical removal b. Increase landscape resilience of aspen by ensuring that there are significant patches of young aspen c. Provide for aspen establishment 3. Shift toward drought tolerant early seral species where appropriate.	All regeneration cutting will meet stocking standards as defined in the Forest Plan.	GMUG	Equally/better protected
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Figure 1: Example of header and objective merged cell.

Feature	Outside Edge of WIZ	No Harvest or Mechanical Travel Zone	and treatment-specific design	Modified)	for how the resource is equally/better protected
Fens and their associated wetlands	100 ft minimum from edge of fen	100 ft from edge of fen			
Perennial Streams	100 ft from stream bank	50 ft from stream bank			
Intermittent Streams, Reservoirs and Ponds	50 ft. from bank or high water line	25 ft from bank or high water line			
Wetlands ≥ ¼ acre	100 ft. from edge of wetland	50 ft from edge of wetland			
Springs/Seeps/Wetlands/depression recharge areas < ¼ acre	50 ft. from the source or edge of associated wetland, whichever is greater	25 ft from the source of edge of associated wetland, whichever is greater			
Ephemeral Streams and Swales	25 ft from the channel or topographic low				
Ditch	Edge of Right of Way				

B. Keep heavy equipment out of streams, swales, and lakes, except to cross at designated points, build crossings, or do restoration work, or if protected by at least 1 foot of packed snow or 4 inches of frozen

Figure 2: Example of nested table.

Motion: Accept Recommendation Changes – Ask PAO staff to assist.

Steps 9. Contract Review and 10. District Ranger Approval

Recommendation 9:

Switch steps 9 and 10: In practice the District Ranger approve the checklist, then checklist and the contract go to the Contract Officer for review and signature.

Motion: Accepted Recommended Changes

ADAPTIVE IMPLEMENTATION PROCESS (APPENDIX E OF FEIS)

Recommendation 10:

Step 6 of the Public Engagement in Adaptive Implementation process (Appendix E of the FEIS) needs to be clarified to better reflect the type of public input that is most constructive to plan treatments. Over the past year, some members of the public are providing have provided comments that were addressed in the FEIS and reflected in the ROD for the project. To assist the public in providing better treatment specific input the following criteria should be clarified.

- A. Selection and scheduling of priority treatments;
- B. Types and locations of planned treatments;
- C. Monitoring topics, questions, and priorities;
- D. Application and adequacy of design features;

- E. Treatment conformance to scope of FEIS/ROD, disclosure of environmental effects, and adherence to decision parameters.

Suggested changes:

- A. Resource information that could prove useful to treatment planning (e.g. presence of species that could affect treatment layout, cultural resource information, etc.).
- B. Operational considerations – logging truck traffic and the need for dust abatement, potential conflicts with other user groups such as snowmobile use when winter logging is considered, etc.
- C. Monitoring topics, questions, and priorities;
- D. Application and adequacy of design features;
- E. Treatment conformance to scope of FEIS/ROD, disclosure of environmental effects, and adherence to decision parameters.

Motion: Accepted Recommended Changes

PUBLIC COMMENTS

Recommendation 11:

Step 6 of Appendix E of the FEIS requires publishing of a public notice of opportunity to comment on proposed treatments. Generally, received public comments are addressed at the mid-winter meeting only. Some members of the public believe an additional step of providing written responses that are sent to the commenter and posted on the SBEADMR Implementation website should be the standard practice. Public comments that are general in nature or were addressed in the FEIS will be addressed through a set of Questions and Public Comment Responses document. The document will be updated annually and provided at the mid-winter meeting and on the SBEADMR website.

Motion: Accept Recommendation Changes

CONTRACT PROVISIONS CROSSWALK

Recommendation 12:

In order to better link design features from the SBEADMR Checklist to Timber sale Contract provisions, GMUG staff assembled a cross-walk for use by District staff (attached). The cross-walk will aid in timber sale contract preparation and reduce confusion between NEPA requirements and contract provisions.

Motion: Adopt cross-walk and make it available in Pinyon and on the SBEADMR website.

BEST AVAILABLE SCIENCE INFORMATION

Are there changes in Best Available Science Information (BASI) that affect how treatments are designed or implemented? If so, what changes are needed to better align treated design or implementation with BASI?

The Science Team established a tracking form to address monitoring questions, results and interpretations of their work. A brief synopsis is provided below:

TITLE: IMPACTS OF SPRUCE BARK BEETLE AND SUBSEQUENT SALVAGE IN ENGELMANN SPRUCE AND ENGELMANN SPRUCE-ASPEN FORESTS OF THE GUNNISON NATIONAL FOREST ON FOREST STRUCTURE AND TREE REGENERATION

Lead Scientist: Dr. Mike Battaglia

Monitoring Question: Did unmanaged and previously managed stands respond differently to the spruce beetle epidemic?

Science Team Interpretation from findings:

In spruce dominated stands, both unmanaged and previously managed areas had similar high rates of overstory mortality. This suggests that the shelterwood cuts in the 1990s didn't help the trees resist the beetle outbreak. However, these earlier treatments did aid in establishing spruce regeneration in the 1990s, allowing for these areas to be ahead in stand development and now are closer to reproductive age. The unmanaged stands also responded with an increase in seedling establishment during the beetle outbreak. Furthermore, both areas had a multi-cohort forest structure (i.e. multiple tree sizes). The beetles targeted spruce trees > 4 inch dbh. This suggests that diversity in tree sizes is important to enhance resilience to spruce bark beetle.

In the spruce-aspen mixed stands had similar trends that we observed in the spruce dominated stands. However, there is more living basal area in these forests due to the aspen not being impacted by the spruce bark beetle. These forests are now dominated by aspen in the overstory. Areas that were previously managed in the 1990s have twice as many live trees per acre with a mix of spruce and aspen. Both areas had a multi-cohort forest structure (i.e. multiple tree sizes). The beetles targeted spruce trees > 4 inch dbh. This suggests that diversity in tree sizes is important to enhance resilience to spruce bark beetle. Furthermore, the diversity in tree species increased this stand type's resilience.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

Monitoring Question: To what extent did salvage impact forest structure?

Science Team Interpretation from findings:

In spruce-dominated stands, salvage reduced dead tree density substantially, reducing the amount of future coarse wood inputs. Some live trees were lost to windthrow. While density is lower than in the unmanaged and previously managed stands, salvage stands still have saplings and new regeneration densities that exceed stocking guidelines. Salvage

logging activities did a good job protecting the advanced regeneration that will contribute to future stand structure. These activities should continue to protect any live trees in the stand to facilitate stand recovery.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

Monitoring Question: Do unmanaged, previously managed, and salvaged stands have different survival and growth rates of the advanced regeneration after the spruce beetle epidemic and salvage?

Science Team Interpretation from findings:

In spruce dominated stands, spruce trees had high survival post-beetle. However, there was a decrease in survival (to 64%) for spruce in the salvage treatment, due to some windthrow and other agents. Spruce Seedling survival also remained high for the different treatments surveyed. Aspen survival across size classes remained high as well.

Preliminary results from the spruce-aspen mixed stands indicate survival is high for both spruce and aspens. However, sample sizes are still low and we will be sampling summer 2020 to increase our ability for inference.

Growth of surviving trees has not been assessed yet since we need several years of post-beetle/salvage response to fully understand the impacts.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

Monitoring Question: Do unmanaged, previously managed, and salvaged stands have different seed production rates after the spruce beetle epidemic and salvage?

Science Team Interpretation from findings:

Whereas 2017 seed production (collected in spring 2018) was very low at this time it is not cause for concern because: 1) spruce seedlings are not lacking on the landscape, 2) seed production is highly variable in space and time, 3) the 2018 collection (2017 seed production) was from a limited sample size, and 4) 2018 seed production (collected in spring 2019) was larger than 2017, suggesting that 2017 was perhaps an anomalously low year for seed production.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

Monitoring Question: Do unmanaged, previously managed, and salvaged stands impact snowshoe hare use after the spruce beetle epidemic and salvage?

Science Team Interpretation from findings:

Explore options to mitigate impacts to dense horizontal cover during salvage. It is critical to continue to steer salvage away from high-quality Canada lynx habitat. A significant outstanding question at this time is the longevity of salvage impacts on hare density.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS. During treatment layout, District Staffs will

continue to avoid areas of high quality advanced regeneration and utilize design features WFRP-11, WFRP-12 and WFRP-17 to minimize impacts to the understory.

Monitoring Question: Do unmanaged, previously managed, and salvaged stands have different air and soil temperature after the spruce beetle epidemic and salvage?

Science Team Interpretation from findings:

There are too few sample points at this time to have confidence that a recommendation is needed. However, if the relationship between salvage and higher temperatures is further established, exploring options to use patch attributes (e.g. shape, orientation) to mitigate impacts on temperature would be recommended.

Recommendations: No changes are needed at this time. The science team is exploring additional monitoring through silvicultural manipulation to begin to address these concerns.

Monitoring Question: Do unmanaged, previously managed, and salvaged stands have different surface fuel loads after the spruce beetle epidemic and salvage?

Science Team Interpretation from findings:

Current Coarse wood fuel loads aren't different and are within normal ranges among the treatments. However, as dead trees begin to fall the areas that were not salvaged will have significant amounts of heavy fuel loads.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

TITLE: LANDSCAPE-SCALE IMPACTS OF SPRUCE BARK BEETLE AND CLIMATE CHANGE ON FORESTS

Lead Scientist: Dr. Jason Sibold

Monitoring Question: How are topographic influences on weather shaping patterns of forest change in Engelmann spruce-dominated forests of the Gunnison Basin?

Science Team Interpretation from findings:

No results to base recommendation at this time. Forty temperature sensors were installed in 2019.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

Monitoring Question: How are spruce-dominated forests changing in response to the spruce beetle outbreak?

Science Team Interpretation from findings

These results are just from a very small sample size, with the larger sample size being analyzed in 2020. Nonetheless, the considerable decline in subalpine fir reinforces what is evident on the broader landscape. Although subalpine fir is of relatively low value in the context of timber, it does provide highly valuable habitat for species including Canada lynx.

No results yet from plot measured in 2019.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

Monitoring Question: Is the spruce beetle outbreak changing the extent or location of high-quality lynx habitat in the Gunnison Basin?

Science Team Interpretation from findings

In April 2020, USFS GTAC finalized change detection work which will be a critical resource for this work. The GMUG staff will complete the update to their spatial vegetation database by May 2020. These data can then be used to examine changes in lynx habitat across the Gunnison Basin as well as the remainder of the GMUG National Forests. Expect results in summer/Fall 2020.

Recommendations: No changes are needed at this time. Monitoring results are in-line with assumptions and analysis completed in the FEIS.

Monitoring Question: How is the spruce beetle outbreak influencing Engelmann spruce and aspen regeneration?

- Elevation is a poor guide to predicting the future of spruce on the GUMG landscape in the context of the combined impacts of spruce beetle and climate change.
- Identifying the influence of salvage on spruce is more difficult than just taking into account elevational influences on temperature.
- Identifying species to replant following salvage should take into account other topographic variables instead of elevation. Specifically, replanting spruce on lower-elevation sites with moderately steep north-facing aspects is likely to be successful and help maintain spruce on the landscape in an era in which it is projected to see significant declines in extent.
- Short-term outcomes of salvage treatments demonstrated an increased in the amount of fine fuels and decreased total vegetation cover. The decrease in vegetative cover was a result of lower shrub cover. Exotic species cover was low and similar among salvaged and non-salvaged areas. Increases in fine fuels were evident in the salvage units, but values still are within normal ranges.
- We expect over the long-term, vegetation will recover due to increased light availability and other resources. However, we do not know how understory plant cover and composition will shift. Longer-term monitoring of these sites will help understand this change.

TITLE: ASSESSING SOCIOECONOMIC IMPACTS OF SBEADMR

Lead Scientist: Dr. Tony Cheng

Science Team Interpretation from findings:

This monitoring was launched in 2019. No results are available at this point in time.