

**Spruce Beetle Epidemic Aspen Decline Management Response (SBEADMR)
Project on the Grand Mesa, Uncompahgre, and Gunnison National Forest
(GMUG)**



Adaptive Implementation Annual Report for 2022

Spruce Beetle Epidemic-Aspen Decline Management Response project on the Grand Mesa, Uncompahgre, and Gunnison National Forest

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Introduction and background

The Record of Decision (ROD) accompanying the Final Environmental Impact Statement (FEIS) for the Spruce Beetle Epidemic-Aspen Decline Management Response (SBEADMR) project commits the US Forest Service's Grand Mesa, Uncompahgre, and Gunnison National Forest (GMUG) to utilize an adaptive implementation process through continuous public involvement:

"The Forest Service cannot significantly alter the current infestation or rate of decline in spruce stands, but management of associated hazards, economic opportunities, and resilience, as detailed in the purpose and need, are the core of this project. Nor can it accurately project the ultimate location and scale of eventual beetle activity. To achieve the purpose and need in the context of rapidly changing conditions in spruce and aspen stands across the landscape, SBEADMR relies on an adaptive implementation framework to prioritize the sequence and determine precise layout of successive treatments within the analyzed PTAs. Treatment design, incorporating additional monitoring questions, reviewing the effects of previous treatments, and adjusting management towards desired conditions and away from undesirable conditions would also be conducted via the adaptive implementation approach" (SBEADMR FEIS, Chapter 2, pp. 36-37).

Why this document?

The purpose of this report is to serve as a public record of the annual adaptive management decisions for the SBEADMR project pursuant to the FEIS and ROD. The document explicitly defines the linkages between monitoring and other applied research results, the public engagement process, and the adaptive management decisions made by the GMUG National Forest.

Who is involved?

The adaptive implementation approach involves three groups: 1) the Adaptive Management Group (AMG) originally convened by the Public Lands Partnership; 2) a "Science Team" composed of researchers from Colorado Parks and Wildlife, Colorado State University, the US Forest Service's Rocky Mountain Research Station, and Western Colorado University; and 3) the GMUG Forest Leadership Team (FLT) composed of US Forest Service line officers vested with decision authority (e.g., forest supervisor, deputy forest supervisor, district rangers) and resource specialists.

The AMG's purpose is to assist the GMUG National Forest in applying the adaptive management framework over a multi-year timeframe in accordance with the SBEADMR FEIS and ROD (SBEADMR Adaptive Management Group Operations Manual, version 1, June 2017). The AMG is composed of individuals representing a broad diversity of local and regional interests and perspectives regarding the SBEADMR project's effects on ecological, economic, and social values. The AMG serves as the primary convener and coordinator of continuous public engagement.

The Science Team's activities are supported by funds from the SBEADMR project through cooperative agreements between the GMUG and the team member's institutions. The Science Team's monitoring

and applied research activities are based on: SBEADMR goals and desired conditions described in the FEIS and ROD, “Decision Triggers” described in Table 6, p. 44-48 in the FEIS, and additional objectives and questions defined by public stakeholders. Data collection, analysis, and reporting occurs annually.

GMUG FLT makes final decisions about changes in SBEADMR implementation utilizing a “Management Review” process. The Management Review draws on annual AMG field reviews, annual FLT field reviews with and input from GMUG resource specialists, results from the Science Team and other relevant research, and input from the AMG based on results from the Science Team and other relevant research.

What happened this year?

This table displays linkages between Goals or Decision Triggers identified in the SBEADMR Record of Decision (ROD) or Final Environmental Impact Statement (FEIS), Science Team and GMUG staff monitoring activities and results, the SBEADMR Adaptive Management Group’s (AMG) interpretations and recommendations, and the GMUG Forest Leadership Team’s Management Review conclusions for 2022

Table 1. Goals and Decision Triggers from the SBEADMR Final Environmental Impact Statement and Record of Decision

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<p>More locations from which firefighters can safely and effectively manage fires (Public Safety goal #1, ROD, p. 4)</p>	<p>Science Team conduct pre- and post-treatment surveys of fuel loading. (1g.,4a) GMUG fire/fuels staff GIS data on locations of burned slash piles.</p>	<p>In the short term, salvage increased fine surface fuel, decreased litter and duff fuel load. In 2015 sampling, coarse wood fuel loads weren’t different between treatments and non-treated areas 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 coarse fuel. (This monitoring was completed in 2017)</p>	<p>Recommend GMUG staff provide update to AMG on where SBEADMR PTAs and PODS boundaries/treatment opportunities overlap</p>	<p>The Forest is working through prioritizing PODS with watersheds and will share that work when completed. The GMUG will share information on PTAs/PODs overlap at Fall AMG meeting.</p>	<p>In 2021 GMUG staff & partners developed Potential Operational Delineations (PODS) to help guide placement of treatments on the landscape and to facilitate fire management efforts.</p>
<p>Achieve a balance of habitat structural stages, tree species composition, and seral stage distributions appropriate for each vegetation type across the GMUG (ROD Purpose & Need Desired Condition, p. 3)</p>	<p>Science Team field surveys of tree regeneration in unmanaged vs previously managed stands impacted by spruce beetle (1a-d, 1f, 3d.)</p>	<p>Spruce saplings, advanced regeneration, and new regeneration are above stocking standards in salvaged, unmanaged and previously managed areas impacted by the spruce beetle outbreak. Seed production has varied from 2018 through 2020. This annual variability is to be expected as Engelmann spruce seed production is known to vary in space and time. While one year (2018 seed production year) is higher than the other two years, it is important to recognize that the treatments (unmanaged, previously harvested, and salvaged) had similar seeds per plot found. This suggests that Engelmann spruce seeds are still present and dispersing on the landscape. A final resample of these monitoring plots will take place in summer 2023.</p>	<p>No changes in SBEADMR are needed at this time.</p>	<p>Accept AMG recommendation</p>	<p>It was noted the Science Team has stopped collecting seeds annually based on results from 2018 – 2020 collections and on the current shift in focus to resiliency and regeneration treatments. A final resample of the monitoring plots will take place in summer, 2023</p>
<p>Maintain 5-15% of vegetation at the HUC 12 watershed scale in structural stages 4A, 4B and 4C where biological feasible. (Decision Trigger, FEIS, Table 6, p. 44)</p>	<p>GMUG Forest Bio updates annually based on FSVegSpatial data</p>	<p>Eleven watersheds have 20% or less mature spruce-fir (4A, 4B, 4C). Of those, three watersheds range between 5 – 15%. Six watersheds are less than 5%. Two are 17 and 20%, respectively. There are no pending SBEADMR treatments in the 3-year plan in any of these watersheds. Appendix A1 is a 2022 updated summary table of the HUC12 watersheds referenced above. Appendix A2 is a map of the HUC12 watersheds.</p>	<p>No changes in SBEADMR are needed at this time.</p>	<p>Accept AMG recommendation</p>	<p>In areas with extensive overstory mortality, Design Feature WFRP-10 requires live tree retention if they are believed to survive, and if removal is not needed to achieve public safety or silvicultural objectives.</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<p>In healthier spruce-fir stands, promote regeneration and create multiple age classes (Resilience Goal 1.a., ROD, p. 4)</p>	<p>Science Team pre- and post-harvest surveys of forest stand structure, tree regeneration, and species composition in green treatments. (2a.)</p>	<p>No monitoring results to date. Pre-treatment data was collected in the Rainbow TS area in summer 2020. Silvicultural prescriptions for the Bald TS were developed in conjunction with the Science Team with a focus on different methods to increase post-harvest regeneration. Pre-treatment plots for Bald were established in summer 2021.</p>	<p>No changes in SBEADMR are needed at this time.</p>	<p><i>Accept AMG recommendation</i></p>	
<p>Promote aspen regeneration in live stands, with emphasis on those affected by Sudden Aspen Decline (Resilience Goal 1.c., ROD, p. 4)</p>	<p>Science Team conduct pre- and post- treatment surveys of forest stand structure, tree regeneration, and species composition in aspen treatments</p>	<p>No monitoring results from the Science Team to date. However, biologists from the GMUG have reported aspen regeneration in areas containing remnant aspen stands following salvage logging. Science Team will resample the Terror Creek Sudden Aspen Decline (SAD) monitoring plots in summer 2022; this data will help describe longer-term SAD impacts on aspen regeneration in stands with and without treatments.</p>	<p>No changes in SBEADMR are needed at this time.</p>	<p><i>Accept AMG recommendation.</i></p>	
<p>Provide commercial forest products to local dependent industries at a level commensurate with the GMUG Land and Resource Management Plan direction and in harmony with other Plan goals (Recovery Goal #1, ROD, p. 4)</p>	<p>Science Team & GMUG staff compile and summarize timber production outputs and associated costs and revenue (5a-d)</p>	<p>The GMUG has ramped up timber out-puts in recent years to facilitate removal of salvage material from the landscape. Timber volume sold by fiscal year: 2017 - 69,952 CCF; 2018 - 95,377 CCF; 2019 - 93,152 CCF; 2020 – 76,302 CCF. Commercial Revenue per volume (\$/CCF): 2017 \$9.16; 2018 \$11.14 (2019 and 2020 revenue TBD)</p> <p>It is not clear at this point how administrative costs have changed over the course of the project. Personnel costs have been identified as the largest issue affecting cost with pre-sale activities being the largest component of cost.</p> <p>There are few small-scale producers utilizing timber from SBEADMR project. Majority of timber utilization is through sawlogs processed by Montrose Forest Products. SBEADMR has not had a significant impact on local producers' employment, but is noted as important for local mill supply chain.</p> <p>Fiscal years 2017 – 2020 met or exceeded assigned targets and were consistent with GMUG Land Management Plan and the SBEADMR EIS. Pre-treatment Design Checklists were completed for all treatments, design features were identified and assigned the appropriate timber sale contract clauses and provisions and implemented on the ground in accordance with the contract.</p>	<p>Recommend continued monitoring in terms of meeting the stated goal and assessing impacts on administrative costs and local economies.</p>	<p><i>The science team is continuing to collect data to address this question in FY2022. Updated results will be presented at the 2023 Annual Meeting</i></p>	<p>The fifth year (2021) was the first year timber targets were not met.</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<p>Subsequent to salvage, treat fuels, prepare sites, and re-establish and maintain forest cover via replanting where seed sources are lacking (Recovery Goal #2, ROD, p. 4)</p>	<p>GMUG timber staff perform stocking surveys at 1, 3, and 5 years post-harvest.</p> <p>Science Team surveys of post-salvage, unmanaged, and previously managed forest structure, tree regeneration, and species composition; seed trap collection (1b-d,1f)</p>	<p>The first SBEADMR treatments were completed on the Gunnison Ranger District in 2019 and replanting was initiated in several areas. Stocking surveys will continue to ensure stands are fully stocked within 5 years of sale closure.</p> <p>Science team monitoring indicates that seedling density in salvaged units is similar to unmanaged and previously managed stands, and seed production is highly variable in both time and space.</p>	<p>Recommend the GMUG provide numbers from stocking surveys at the required intervals.</p>	<p><i>Accept recommendation from AMG to provide stocking survey results at 5 years post-harvest.</i></p>	<p>By law, stocking surveys are required at 1, 3 and 5 years post-harvest. Within 5 years stands must be fully stocked in accordance with the Forest Plan. Stocking survey data will be reported at 5 years; any notable observations will be shared prior to that as applicable.</p> <p>Anticipate seeing the first meaningful regeneration results in 2023; these will be included in the SBEADMR 2023 Community Report</p>
<p>Maintain soil productivity, minimize human-caused erosion, eliminate or minimize soil damage from machine pile burning, and maintain integrity of associated ecosystems (Decision Trigger, FEIS, Table 6, pp. 44-45)</p>	<p>GMUG resource specialist conduct spot inspections and post-treatment monitoring</p>	<p>To date, treatment design checklists have been completed for thirty-nine treatments. All checklists indicate treatments are designed commensurate with this requirement.</p> <p>A total of 17 treatment units in 5 SBEADMR timber sales were monitored for post-harvest soil disturbance in 2021 to determine detrimental soil disturbance associated with management activities. Results show that 3 out of the 17 SBEADMR sale units exceed the 15% disturbance limitations. Two additional units are at 15%. This suggests that over a quarter of the randomly picked SBEADMR treatment units are at or surpass required soil quality disturbance standards. <i>See Appendix B for additional details and summary table and chart.</i></p> <p>Future monitoring will be conducted to determine how soils and vegetation recovers.</p>	<p>Recommend additional design criteria or other means to ensure treatment impacts remain below the 15% disturbance limitations</p>	<p><i>GMUG Soil scientist and Admin team will review the units with soil disturbance over 15% to better understand the issue. Review findings will be reported at Spring 2023 AMG meeting.</i></p>	<p>GMUG Forest Plan and Regional direction requires that detrimental soil disturbance does not exceed 15% of an activity area (e.g. timber sale unit).</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<p>No more than 30% of lynx habitat in a Lynx Analysis Unit (LAU) is converted to a stand initiation structural stage (>90% loss of tree overstory) due to natural or human-caused disturbance (Southern Rockies Lynx Amendment Standard VEG S1; Decision Trigger, FEIS, Table 6, pp. 44-45)</p>	<p>GMUG Forest Biologist track structural stages in LAU annually based on FS databases (FACTs, FSVegSpatial)</p>	<p>The following LAUs have exceeded the threshold, almost entirely due to habitat converted to unsuitable from natural disturbance (tree mortality from spruce beetle and other pathogens). Cathedral is at 41%; Stewart Creek LAU is currently at 40%. From 1996 to 2021, management activities contributed 0.15 and 0.51% to habitat conversion to unsuitable in these two LAUs, respectively. There have been four SBEADMR timber sales in these two LAUs, all salvage sales that were awarded in FY2017, prior to the 2020 change detection update. Salvage harvest occurs in stands already converted to unsuitable lynx habitat due to beetle activity, so does not contribute to further habitat conversion.</p> <p>No management activities that could convert lynx habitat are planned in these LAUs. Other than these LAUs, no other LAUs have reached the 30% threshold. There is no need to discontinue or modify management actions to avoid exceeding the 30% threshold at this time. <i>Appendix C reflects current lynx habitat status by LAU (updated March 25, 2022).</i></p>	<p>Recommend presale analyses of LAU to determine proximity to 30% threshold <u>before</u> the sale rather than after the fact.</p>	<p><i>GMUG has and will continue to determine proximity to 30% lynx habitat threshold prior to timber sale.</i></p>	<p>The 2020 change detection update to FSVeg, which updated the GMUG's lynx habitat mapping in 2021, reset lynx habitat acres and resulted in identifying LAUs with more than 30% of lynx habitat in an unsuitable condition. These LAUs will not have future vegetation management that would convert additional habitat to an unsuitable condition while they remain above the 30% threshold.</p>
<p>No more than 15% of lynx habitat in a Lynx Analysis Unit (LAU) would be regenerated via forest vegetation management over a 10-year period starting in 2009 (Southern Rockies Lynx Amendment Standard VEG S2; Decision Trigger, FEIS, Table 6, pp. 44-45)</p>	<p>GMUG Forest Biologist tracks annually based on FACTs</p>	<p>All statistics related to lynx habitat were updated for the last 25-year period (1996 – 2021). To accurately determine the amount lynx habitat converted to unsuitable, an analysis of all management actions from 1996-2021 was completed. The SBEADMR EIS assumed a 25 percent incidental loss to lynx habitat resulting from salvage treatments and a 15 percent loss from resiliency treatments. All new road construction in lynx habitat was considered a 100 percent loss.</p> <p>There are 5 LAUs at or exceeding 15% unsuitable. Those exceeding 15% unsuitable is due to the tree mortality from the spruce-beetle epidemic. When analyzing acres converted to unsuitable only from forest management actions, no LAUs are at 15% unsuitable. See GMUG Lynx Analysis Units Statistics spreadsheet for details (Appendix B).</p>	<p>Recommend presale analyses of LAU to determine proximity to 15% threshold <u>before</u> the sale rather than after the fact.</p>	<p><i>GMUG has and will continue to determine proximity to 15% threshold before the sale.</i></p>	<p>Unlike SRLA Standard Veg S1, Standard Veg S2 is measured <i>only</i> from impacts due to forest vegetation management.</p> <p>We estimate that it takes 25 years for a spruce-fir stand to recover following treatment, such that understory trees grow above average snow-depth, then becoming suitable habitat for snowshoe hares and lynx again.</p> <p>In places, treatments occur in habitat considered unsuitable for lynx due to tree mortality from beetles (especially where beetle-induced tree mortality affected single-storied stands). In those instances, timber harvesting does not change the habitat status.</p>
<p>No more than 3% of lynx habitat on the GMUG NF will be thinned. Pre-commercial thinning and similar practices intended to reduce seedling/sapling density is limited to stipulations</p>	<p>GMUG Forest Biologist track thinning activities annually in FACTs.</p>	<p>We do not anticipate much thinning in lynx habitat under SBEADMR treatments. SBEADMR activities in lynx habitat are mostly salvage and resiliency harvest. Prior to SBEADMR, 131 acres have been treated in lynx habitat under the WUI exemption to SRLA Standard Veg S5. Under Veg S5, up to 37,840 acres of lynx habitat on the GMUG can be treated under the WUI exemption. The current Forest balance is 37,709 acres. We do not expect to approach this threshold with the SBEADMR project.</p>	<p>No changes in SBEADMR are needed at this time.</p>	<p><i>Accept AMG recommendation</i></p>	

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
described in SRLA Veg S5. (Southern Rockies Lynx Amendment Standard VEG S5, Decision Trigger, FEIS, Table 6, pp. 44-45)					
Wildfire and cumulative management activities will not exceed 25% of HUC12 watershed as determined by weighted acres of mechanical harvest, roads, and severe fire. (Decision Trigger, FEIS, Table 6, pp. 44-45)	GMUG staff track acres of management in FACTS and INFRA	<p>In 2021, a total of 3,318 acres of additional disturbance occurred in 21 watersheds across the GMUG. Watersheds with active timber management received the highest level of disturbance. No thresholds were exceeded.</p> <p>Since 2020, two watersheds were identified with a red and yellow flag: Little Blue Creek; (27%) on the Alpine Plateau exceeds the 25% threshold. However, the Forest Service only administers 2,479 acres of the 22,327-acre watershed (11%) with the remainder being managed by Bureau of Land Management (BLM) or as private land. Willow Creek (23%) exceeded the 20% yellow trigger in the EIS but again, the Forest Service only administers 13 percent of the 14,784-acre watershed with the remainder largely in BLM ownership. No additional treatments have occurred in either watershed after 2020.</p>	No changes in SBEADMR are needed at this time.	<i>Accept AMG recommendation</i>	Watershed impacts are tracked annually through the Forest Service Activities Database – FACTS. All activities, not just those associated with SBEADMR are tracked, including natural disturbances such as wildfire. The Equivalent Roaded Acre methodology was used – 1 acre of road impact is one acre of watershed impact; 4 acres of vegetation treatment or wildfire equals 1-acre of watershed impact (25 percent).
Document that treatments are being implemented as planned; identify relevant improvements to procedures or exemplary practices to benefit future treatments (Annual IDT Treatment Review, Appendix D. FEIS)	<p>Biannual treatment review field trip with GMUG staff, subject matter specialists, and stakeholders.</p> <p>Annual review of administrative processes and procedures (including SBEADMR checklist) by GMUG staff.</p>	<p>GMUG staff and SBEADMR AMG members completed a BMP treatment review for the Cathedral TS on the Gunnison Ranger District in summer 2021. The full review and conclusions can be found here.</p> <p>GMUG staff and AMG members agreed that ensuring that there is no illegal use of closed roads will be a challenge in this project area. Due to high OHV use in the area and relatively open terrain, a locked gate is unlikely to deter all use. GMUG staff will work on more robust closures/blockages of former roads at Cathedral and will consider that need for future sales and associated road closures.</p>	<p>No changes in SBEADMR are needed at this time.</p> <p>Clarify what is/are the “legal” use(s) of a closed road.</p>	<i>Accept AMG recommendation; GMUG staff will provide road classification on closed roads at the Fall 2022 AMG meeting.</i>	Note the highlighted link to the full reviews and conclusions provided for the 2021 summer field trips.

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
Continue the public participation and collaborative learning that occurred during the planning phase, encourage and support the continuation of collaborative workgroup efforts throughout implementation (FEIS Appendix E, Public Engagement in Adaptive Implementation, Goal p. 2)	Science team questionnaire and AMG participation tracking (6a-b)	The SBEADMR process is generally meeting its goals of diverse participation, collaborative learning, developing shared understanding and agreement, transparency, responsiveness, trust- and relationship-building, and a participatory collaborative process. Refer to <i>Appendix D</i> . for an in-depth summary of survey results and opportunities for improvement.	Recommend AMG review and prioritize the recommendations for improvement. Recommend additional outreach from AMG to groups identified in survey responses.	<i>Approve AMG recommendation. FLT supports increased involvement with recommended groups.</i>	Paonia District Ranger Levi Broyles announced in 2022 Annual Stakeholder breakout session that more detailed treatment plans for the Bald Timber Sale are available; this is an opportunity for interested stakeholders to connect with Ranger District staff for review and more specific information on treatments.
Ensure implementation of treatments is responsive to...new scientific information. (FEIS Appendix E, Public Engagement in Adaptive Implementation, Goal p. 2)	Science team questions not specifically linked to in earlier goals – lynx focus (1e, 3b-c)	<p>(1e) From 2018-2020, monitoring of hare pellets in the Engelmann spruce dominated stands has demonstrated that snowshoe hares continue to utilize areas that were impacted by the spruce beetle. However, in 2020, field data suggested that salvage areas had lower hare density. Hare pellet counts in the salvage areas were always lower in the previous years, but not statistically significant.</p> <p>In contrast to the Engelmann spruce dominated stands, areas that had a mix of Engelmann spruce and aspen showed that initially hares favored the unmanaged and previously managed stands. However, in 2020, salvaged stands had higher hare pellet counts (i.e. higher hare use), although the variability did not detect significant differences among treatments.</p> <p>Based on these variable results, exploration of options to mitigate impacts to dense horizontal cover during salvage should be considered. 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 and why it varies from year to year.</p> <p>(3b) 53 of 68 plots in Elks/West Elks study area from 2019 were revisited in 2020 to change temperature sensors and count hare pellets. Based on data from 2019 and 2020:</p> <ul style="list-style-type: none"> As expected, hare pellet densities in spruce-fir dominated forests that have not been impacted by spruce beetle, tend to increase with increasing DHC. However, pellet counts do not increase linearly but instead increase rapidly at 20% DHC and stay high. The 20% threshold is lower than expected. DHC is extremely heterogeneous on the landscape, with close plots (200m) 	No recommendation from AMG required – this is FYI to keep AMG apprised of Science Team’s research efforts.	<i>Accept AMG recommendation, no changes needed</i>	This question is not specifically linked to the earlier goal (lynx focus) but is a question posed specifically to the Science Team in response to public concerns expressed during the NEPA process. It represents a higher level of research and conversation conducted at a broader landscape scale. The results of this level of research may help inform SBEADMR design and implementation.

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
		<p>with similar slope, aspect, elevation and fire history often having large differences in DHC measurements. This is hypothesized to reflect fine scale variability in soils, soil water availability and canopy closure.</p> <ul style="list-style-type: none"> DHC and hare pellet densities are heterogeneous at fine scales (100-200m). <p>The increase in pellet counts at 20% suggests that lower levels of DHC could provide valuable hare habitat in spruce-fir forests that have not been impacted by spruce beetle. The heterogeneous nature of DHC at relatively fine scales (<100-200m) stresses the challenges of quantifying DHC within treatment areas. Fine-scale heterogeneity in DHC and hare pellet counts means that it is challenging to identify large areas that are key for Canada lynx conservation.</p>			
<p>Ensure implementation of treatments is responsive to...new scientific information. (FEIS Appendix E, Public Engagement in Adaptive Implementation, Goal p. 2)</p>	<p>Science team questions not specifically linked to in earlier goals – climate focus (3a, 3c)</p>	<p>(3c) Results of modeling future patterns of spruce forest distribution under different climate scenarios show that there is a very large range of potential future spruce cover scenarios – from a rapid decline to almost no spruce cover by 2060 and basically no cover in 2090 in the A1 climate scenario to relatively modest declines in the B1/B2 scenario. These models also show where on the landscape efforts to maintain spruce forests for habitat for Canada lynx and other subalpine species will most likely be successful.</p> <p>Models of landscape connectivity for Canada lynx for the A1, and B1/B2 models for 2060 and 2090 continue to identify the eastern portion of the Gunnison basin as a critical area for connectivity for Canada lynx between the San Juan Mountains and northern Ranges in Colorado.</p> <p>These model results could be used to identify locations on the landscape where spruce would be anticipated to persist into the future or where management should focus on maintaining spruce on the landscape (corridors). This information can be used to identify appropriate treatments, exclusion of treatment or post-treatment management including reforestation.</p>	<p>No recommendation from AMG required – this is FYI to keep AMG apprised of Science Team’s research efforts</p>	<p><i>Accept recommendation, no changes needed</i></p>	<p>This question is not specifically linked to the earlier goal (climate focus) but is a question posed specifically to the Science Team in response to the increased awareness and concern for impacts of climate change. It represents a higher level of research and conversation conducted at a boarder landscape scale. The results of this level of research may help inform the SBEADMR design and implementation.</p>
<p>Ensure implementation of treatments is responsive to... public input. (FEIS Appendix E, Public Engagement in Adaptive Implementation, Goal p. 2)</p>	<p>Public comments from stakeholders & GMUG response</p>	<p>The following represent the main themes of comments received during the 30-day comment period on out-year treatment plans presented at the 2022 Annual Stakeholder meeting:</p> <ul style="list-style-type: none"> Interest in more winter logging being available in treatments, reduce impact and maintain product going to industry year-round. Erosion concerns around East Beaver creek A need to have Silviculture prescriptions factor in dry climates and increasing temperatures. 	<p>No changes in SBEADMR are needed at this time.</p>	<p><i>Accept recommendation, no changes needed</i></p>	

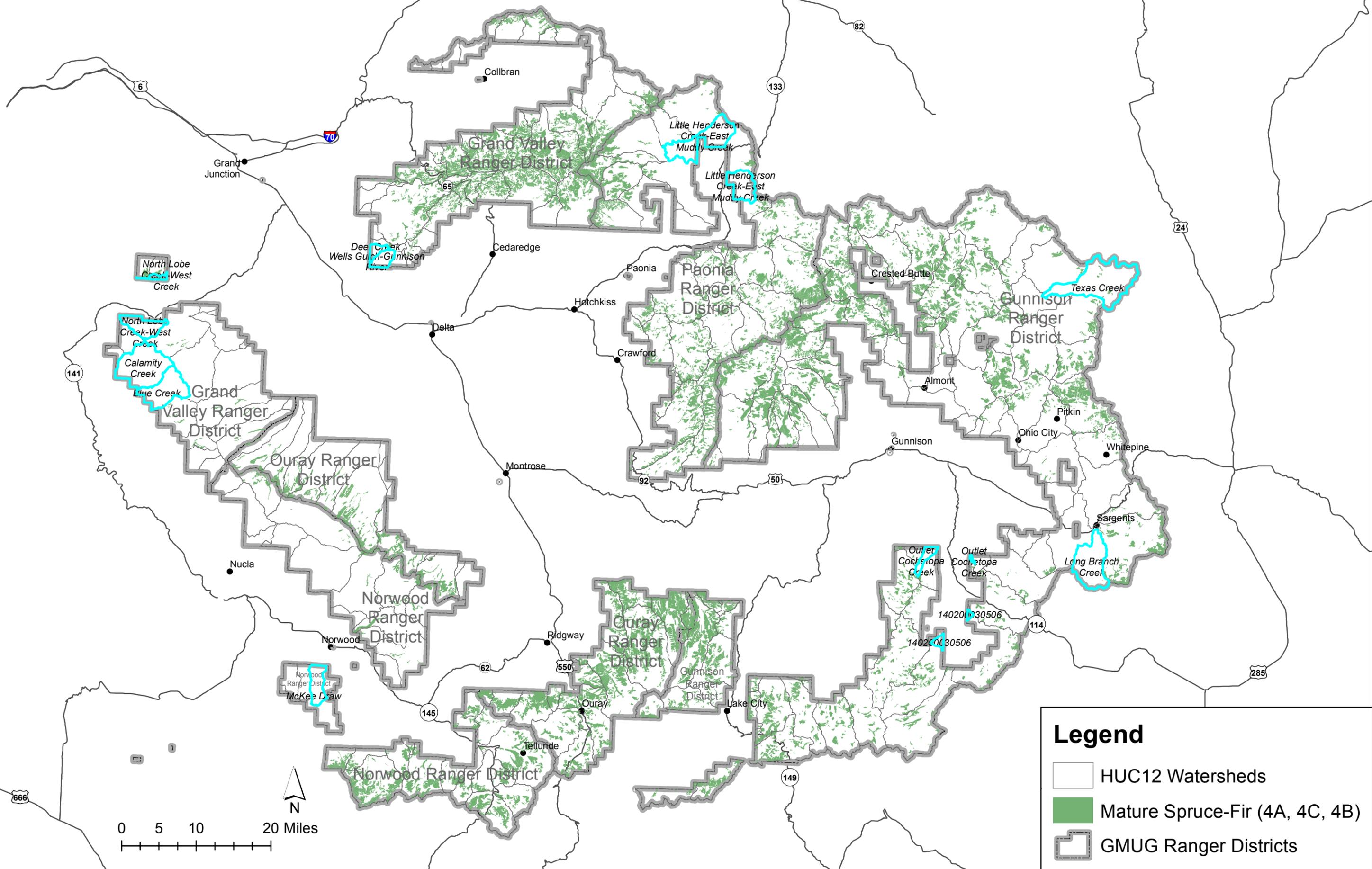
Appendix A1 – HUC 12 Watersheds and Spruce-Fir Forest

Table 2. HUC12 Watersheds on the GMUG with 20% or less of Spruce-fir (Local Type = TSF) forest area in habitat structural stage 4A, 4B, or 4C

HUC 12 Name	Spruce-fir Total Acres (TSF)	Spruce Fir Acres 4A/B/C (TSF)	Percent of Spruce-fir in 4A/B/C
140200030506	0	0	0
McKee Draw	38	0	0
Calamity Creek	38	0	0
Blue Creek	354	0	0
Little Henderson Creek-East Muddy Creek	3,144	4	<1
Wells Gulch-Gunnison River	112	0	0
Texas Creek	5,538	362	7
Outlet Cochetopa Creek	137	13	10
Long Branch Creek	196	30	15
<i>Spring Creek*</i>	<i>3,449</i>	<i>1,229</i>	<i>36</i>
North Lobe Creek-West Creek	47	8	17
Deer Creek	113	23	20

**Spring Creek was included in last year's report as having 7,513 total spruce-fir acres, and 16% of spruce-fir in 4A, 4B, 4C. From an analysis completed on 03/28/2022, FSVeg Spatial indicates that there are 3,449 total spruce-fir acres, but the same amount of 4A, 4B, and 4C spruce-fir acres as reported last year (1,229). This was retained in this table to correct and clarify this difference from last year's analysis.*

Appendix A2: **HUC12 Watersheds with 20% or less of spruce-fir forest area in habitat structural stages 4A, 4B, or 4C**



Appendix B: 2021 Soil Disturbance Monitoring Results

A total of 34 treatment units in 11 timber sales were monitored for GMUG post-harvest soil disturbance in 2021 to determine detrimental soil disturbance associated with management activities (Table 3). This included 5 SBEADMR timber sales and associated 17 representative units (Fig. 1). Assessments followed the National Soil Disturbance Monitoring Protocol (Page-Dumroese et al. 2009) to determine if treatment impacts remain below 15% as required by the GMUG Forest Plan and Regional Forest Service direction.

Results show that 3 out of the 17 SBEADMR sale units exceed 15% detrimental soil disturbance. Two additional units barely meet disturbance limitations at 15%. This suggests that over a quarter of the randomly picked SBEADMR treatment units are at or surpass required soil quality standards. When considering the entire 2021 monitoring pool (SBEADMR and non-SBEADMR timber sales), ~13% of units exceeded soil disturbance limits (Table 3).

Primary disturbance reasons are associated with rutting on skid trails, compaction, untreated burn piles (not scarified/seeded), too many burn piles, and isolated erosion due to lack of ground cover or waterbars. Roads, either temporary or non-system, also contribute to lingering impacts, especially when only closed but not scarified.

Streams and wetlands were properly buffered, and stream crossings were recontoured. Most units display adequate levels of coarse woody debris and recovering vegetation that provides valuable ground cover. Regeneration is variable and windthrow is excessive in some of the units, resulting in increased fuel loads.

Table 3: Summary of 2021 post-treatment soil disturbance monitoring.

Timber Sale	Year Accomplished/Closed	Treatment Units Soil Disturbance %	
		≤15%	>15%
SBEADMR			
Cooler	3/2020	3	1
High Mesa	4/2019	1*	1
Horse Mountain	11/2019	1*	0
Skeleton	7/2020	7	0
Willow	11/2020	2	1
Subtotal		14	3
Non-SBEADMR (6 sales)	2018 - 2021	18	1
Total		32	4

*at 15%

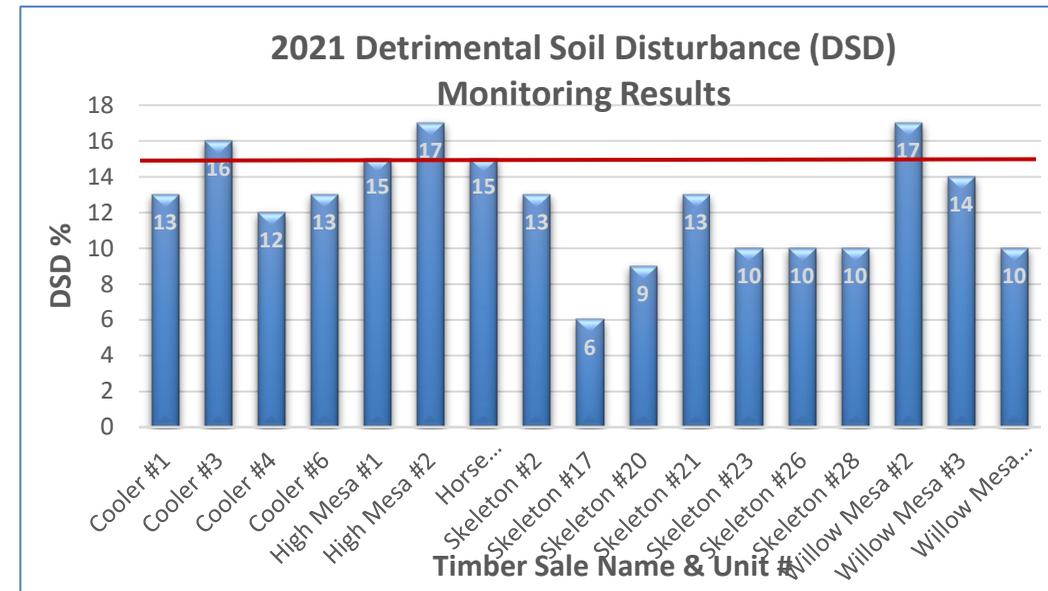


Figure 1: Summary of detrimental soils disturbance monitoring for 17 units in 5 SBEADMR timber sales

Appendix C – Lynx Habitat Status by Lynx Analysis Unit

Table 4. Lynx Analysis Unit Habitat Tracking from 1996 - 2021

LAU	Total Acres of Lynx Habitat	Lynx habitat affected from recovery harvest from 1996-2021	Lynx habitat converted to unsuitable from recovery harvests 1996-2021 (25% incidental loss)	Lynx habitat affected from resiliency harvest from 1996-2021	Lynx habitat converted to unsuitable from resiliency harvests 1996-2021 (15% incidental loss)	Total lynx habitat affected from harvests	Total Unsuitable Lynx Habitat (harvest + beetle mortality)	Percent of lynx habitat affected from harvests	Percent of lynx habitat converted to unsuitable from harvest	Percent Unsuitable from combined harvest and beetle-killed trees
Alpine	33,843	1,116	279	599	90	1,994	1,900	6	1.09	5.61
Amphitheater	26,066	0	0	6	1	6	1,342	0	0.00	5.15
Anthracite	19,027	0	0	0	0	0	111	0	0.00	0.59
Bald Mountain	30,788	0	0	0	0	0	1,201	0	0.00	3.90
Beckwith Mountain	49,536	0	0	0	0	0	254	0	0.00	0.51
Black Mesa	27,461	18	5	0	0	23	3,306	0	0.02	12.04
Brush Creek	37,135	0	0	0	0	0	485	0	0.00	1.30
Castle Pass	29,401	0	0	23	3	23	834	0	0.01	2.84
Cathedral	21,078	82	21	74	11	177	8,582	1	0.15	40.72
Cebolla	41,846	253	63	0	0	316	6,384	1	0.15	15.26
Chalk Mountain	22,210	8	2	404	61	414	14	2	0.28	0.06
Chester	22,945	513	128	40	6	681	1,277	3	0.59	5.57
Chimney Rock	22,475	0	0	0	0	0	46	0	0.00	0.20
Cochetopa	18,708	176	44	243	36	463	3,576	2	0.43	19.12
Cottonwood Lakes	24,309	222	56	232	35	510	262	2	0.37	1.08
Crater Lake	32,895	0	0	1,207	181	1,207	298	4	0.55	0.91
Dallas Creek	17,505	0	0	0	0	0	771	0	0.00	4.41
Fossil Ridge	26,900	0	0	6	1	6	1,577	0	0.00	5.86
Gothic	29,774	0	0	0	0	0	1,603	0	0.00	5.38
Green Mountain	24,793	42	11	42	6	95	87	0	0.07	0.35
Grizzly Peak	15,824	0	0	0	0	0	465	0	0.00	2.94
Huntsman Mountain	30,636	0	0	0	0	0	290	0	0.00	0.95

LAU	Total Acres of Lynx Habitat	Lynx habitat affected from recovery harvest from 1996-2021	Lynx habitat converted to unsuitable from recovery harvests 1996-2021 (25% incidental loss)	Lynx habitat affected from resiliency harvest from 1996-2021	Lynx habitat converted to unsuitable from resiliency harvests 1996-2021 (15% incidental loss)	Total lynx habitat affected from harvests	Total Unsuitable Lynx Habitat (harvest + beetle mortality)	Percent of lynx habitat affected from harvests	Percent of lynx habitat converted to unsuitable from harvest	Percent Unsuitable from combined harvest and beetle-killed trees
Iron Mountain	22,444	117	29	20	3	166	1,498	1	0.14	6.68
Island Lake	17,724	60	15	13	2	88	503	0	0.10	2.84
Kannah Creek	11,474	339	85	1,029	154	1,453	255	13	2.08	2.22
Lake City	23,789	394	99	144	22	637	1,410	3	0.50	5.93
Little Cone	20,320	2	1	0	0	3	1,380	0	0.00	6.79
Lone Cone	23,452	110	28	290	44	428	608	2	0.30	2.59
Los Pinos Creek	21,750	849	212	34	5	1,095	4,217	5	1.00	19.39
Matterhorn	22,994	3	1	0	0	3	459	0	0.00	2.00
Mesa Lakes	17,424	30	8	357	54	395	361	2	0.35	2.07
Mount Gunnison	20,695	0	0	0	0	0	233	0	0.00	1.12
Needle-Razor	6,010	218	55	59	9	332	570	6	1.05	9.48
Peeler Lakes (Kebler	23,430	0	0	0	0	0	0	0	0.00	0.00
Pitkin	26,075	0	0	0	0	0	2,101	0	0.00	8.06
Ragged Mountain	9,862	0	0	0	0	0	61	0	0.00	0.61
Red Creek	38,219	0	0	1,468	220	1,468	4,008	4	0.58	10.49
Rocky Brook	37,910	0	0	0	0	0	1,099	0	0.00	2.90
Sawtooth Mountain	24,196	0	0	0	0	0	1,583	0	0.00	6.54
Soap Creek	34,402	0	0	0	0	0	2,855	0	0.00	8.30
South Mamm Peak	6,507	0	0	0	0	0	60	0	0.00	0.92
Spring Creek	27,448	211	53	232	35	496	246	2	0.32	0.90
Stewart Creek	30,874	635	159	0	0	794	12,296	3	0.51	39.83
The Flat Tops	31,559	1	0	0	0	1	428	0	0.00	1.36
Tincup	34,925	5	1	0	0	6	1,463	0	0.00	4.19
Traver Mesa NEW	27,305	375	94	1,570	236	2,039	516	7	1.21	1.89
Turret Ridge	28,369	0	0	0	0	0	744	0	0.00	2.62

LAU	Total Acres of Lynx Habitat	Lynx habitat affected from recovery harvest from 1996-2021	Lynx habitat converted to unsuitable from recovery harvests 1996-2021 (25% incidental loss)	Lynx habitat affected from resiliency harvest from 1996-2021	Lynx habitat converted to unsuitable from resiliency harvests 1996-2021 (15% incidental loss)	Total lynx habitat affected from harvests	Total Unsuitable Lynx Habitat (harvest + beetle mortality)	Percent of lynx habitat affected from harvests	Percent of lynx habitat converted to unsuitable from harvest	Percent Unsuitable from combined harvest and beetle-killed trees
Upper Taylor	26,143	0	0	0	0	0	888	0	0.00	3.40
Upper Tomichi	18,043	0	0	0	0	0	1,741	0	0.00	9.65
Whetstone Peak	15,985	0	0	0	0	0	244	0	0.00	1.53
Whitecross Mtn	6,836	0	0	0	0	0	181	0	0.00	2.65
Total	1,261,319	5,779	1,445	8,092	1,214	15,315	76,671	1	0.21	6.08

Appendix D – CFRI Socioeconomic Survey Results Summary

The SBEADMR process is generally meeting its goals of diverse participation, collaborative learning, developing shared understanding and agreement, transparency, responsiveness, trust- and relationship-building, and a participatory collaborative process. Yet, participants identified some areas that need improvement. For example:

- Participants suggested a number of individuals/organizations to invite or consult with on projects
- Learning and understanding of socio-economic forest management context
- Shared understanding and agreement around the priorities for achieving goals, and the “why” of the SBEADMR project. This may be due to turnover, shifts to resiliency treatments, among others.
- More opportunities to understand and inform annual implementation cycle – particularly treatment design and annual adjustments or adaptations that are made.

Recommendations:

- Increased involvement and/or consultation with the following groups: Colorado Parks and Wildlife, Tribes, the West Region Wildfire Council, water resources and water districts, WUI community groups, fisheries and aquatic resources groups, and other NGOs (e.g., the Great Old Broads, sierra club, western Colorado alliance). CO DNR; CO Fire Commission; CO Forest Health Council
- Enhance opportunities for public outreach and engagement: Continue to invest and/or enhance new (e.g., Story map) and continue traditional modes of communicating SBEADMR updates (e.g., newspapers, radio, website, press releases, additional community engagement/public forums with district rangers/staff); hire a communication specialist.
- Opportunities for learning and shared understanding: Conduct pre- and post-treatment field trips in same location when applicable; Provide field-trip de-briefs with GMUG staff, AMG, and interested participants; Identify a common definition and understanding of resilience among the group, especially as move into green tree “resiliency” treatments
- Turnover can be a challenge to shared understanding, institutional knowledge, trust-building, etc. There is a need to periodically review the why of SBEADMR to maintain institutional knowledge. Also, there may be a need to develop onboarding processes for new personnel.
- Transparency and responsiveness: Make explicit connections between what design features are being used to mitigate the impacts to snowshoe hare, how science has informed that decision, and the outcomes of treatment in areas lynx and snowshoe hare may be impacted; Consider how to integrate/absorb new scientific information brought to the group that may be of concern to local participants but may be outside the scope of SBEADMR; Continue investing in note-taking during field trips.
- Collaboration throughout the process: Consider opportunities to provide more detail on planned treatments during out-year planning so that participants can more meaningfully contribute to and inform treatment design and implementation; Increase opportunities for dialogue among AMG and FLT regarding what recommendations were considered, what adaptations were made, and why or why not; Enhance communication internally with GMUG staff so that all resource specialists are aware of new projects prior to public meetings.

Outputs to work towards in next two years:

- Evaluate the successes and challenges of the process and recommendations for improvement and publish in reports, blogs, publications.
- Be ready to go after increased stand and federal funding to support wildfire mitigation.

Change in participation over time in AMG:

- A Core group of ‘doers’ has remained invested and committed to the collaborative adaptive management process. Some vacancies in key positions and intermittent participation in the AMG were observed. The AMG witnessed an early change in the environmental/conservation seat. A change in the forest processor representative occurred in early 2020. A change in Hinsdale County representation occurred in May 2020. The logistical challenges of a large project spread out across a large geography, unpaid volunteers supporting efforts, and time required to fully engage in all annual activities was prohibiting. Further, there are currently several forest restoration initiatives in the region that compete for participants’ time and energy (CFLRP, RMRI, Taylor AMG).