

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



**Adaptive Implementation Annual Report for 2023**

# **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 2023

*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>No changes to SBEADMR needed at this time.</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 &amp; 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 to SBEADMR needed at this time.</p>		
<p>Maintain 5-15% of vegetation at the HUC 12 watershed scale in structural stages 4A, 4B and 4C where biologically feasible. (Decision Trigger, FEIS, Table 6, p. 44)</p>	<p>GMUG Forest Bio updates annually based on FSVegSpatial data</p>	<p>Ten 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 A is a 2023 updated summary table of the HUC12 watersheds referenced above.</p>	<p>No changes to SBEADMR needed at this time.</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. Rainbow TS treatment was completed in 2023. Bald TS has not yet been treated.</p>	<p>No changes to SBEADMR needed at this time.</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 (7a,b)</p>	<p>The Science Team resampled the Terror Creek Adaptive Silviculture Assessment Timber Sale in Summer 2022 (12 years post-harvest) in an effort to learn more about management’s role in promoting aspen regeneration. Science Team interpretation of the new results are:</p> <p>Overall, based on the sprouting density metric alone, early identification of aspen stands that are starting to show symptoms of SAD and clearfelling them would provide opportunities to get substantial initial sprouting AND maintain high levels of sapling density (9500 stems/acre) at least 12 years post treatment. Those stands that had moderate SAD mortality (20-60% SAD mortality) did initially produce substantial higher initial sprouting after clearfelling than the uncut stands, but that difference narrowed through time. In these stands, clearfelling could be used to initiate a high amount of sprouting to offset browsing pressure and reduce future woody fuel loads. In areas that had high SAD mortality (&gt;60% mortality), clearfelling didn’t appreciatively increase the sprouting initially or 12 years post. Clearfelling would be appropriate if attempting to reduce surface fuel loads.</p> <p>Overall, clearfelling in the low and moderate SAD impacted stands allowed faster growth of the sprouts than that observed in the uncut stands. This faster growth initially and 12 years post-harvest and the increase in sprout density ensures sufficient recruitment into the overstory and reduces the impact of browsing.</p> <p>A similar trend of fast height growth was observed in the high mortality SAD stands whether they were cut or not. It seems that removing the overstory via harvesting or through high levels of SAD mortality provides more resources (I.e. more light) for sprout growth.</p> <p>More detailed findings can be found in the 2023 SBEADMR Science Matrix.</p>	<p>Recommend that treatments to regenerate aspen focus on low to medium SAD-impacted stands. AMG recognizes that some aspen treatments have goals beyond/in addition to spurring regeneration so other considerations will factor into treatment prioritization.</p>		<p>Science team (Sibold) raised the question of higher sprouting density is necessarily better in the context of climate change? Perhaps SAD-impacted stands are adapting to climate conditions through lower regeneration density.</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<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 &amp; GMUG staff compile and summarize timber production outputs and associated costs and revenue (5a-d)</p>	<p>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: \$4; 2020: \$7</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>SBEADMR timber sales 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>No changes to SBEADMR needed at this time.</p>		
<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.  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>No changes to SBEADMR needed at this time.</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.  Anticipate seeing the first meaningful regeneration results in 2023; these will be included in the SBEADMR 2023 Community Report</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<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>All SBEADMR treatment checklists indicate treatments are designed commensurate with this requirement.</p> <p>Due to staff vacancies, no post-harvest soil disturbance monitoring was conducted in 2022. The GMUG plans to conduct soil disturbance monitoring in timber sales in 2023. Results of monitoring in SBEADMR units will be reported in the 2024 SBEADMR AMG Adaptive Implementation Report.</p>	<p>TBD</p>		<p>Draft recommendation based on Gina's presentation at May 17 meeting.</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>
<p>No more than 30% of lynx habitat in a Lynx Analysis Unit (LAU) is converted to a stand initiation structural stage (&gt;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. Appendix B reflects current lynx habitat status by LAU (updated March 22, 2023).</p>	<p>No changes to SBEADMR needed at this time.</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. <b>When analyzing acres converted to unsuitable only from forest management actions, no LAUs are at 15% unsuitable.</b> See GMUG Lynx Analysis Units Statistics spreadsheet for details (Appendix B).</p>	<p>No changes to SBEADMR needed at this time.</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,</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
					timber harvesting does not change the habitat status.
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 described in SRLA Veg S5. (Southern Rockies Lynx Amendment Standard VEG S5, Decision Trigger, FEIS, Table 6, pp. 44-45)	GMUG Forest Biologist track thinning activities annually in FACTS.	We do not anticipate 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. up to 37,840 acres of lynx habitat on the GMUG can be treated under the WUI exemption. The current Forest balance is 37,668 acres. We do not expect to approach this threshold with the SBEADMR project.	No changes to SBEADMR needed at this time.		
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 2022, a total of 1,977 acres of additional disturbance occurred in 11 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 to SBEADMR needed at this time.		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).

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<p>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>	<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 will complete a BMP treatment review for a sale on the Gunnison RD in summer of 2023. Results from that review will be included in next year's AMG Adaptive Implementation Report.</p> <p>The SBEADMR treatment checklist was updated in 2022 to add a section for project description on the first page, per GMUG staff request. This is intended to streamline specialist review by providing a centralized location for all information on a SBEADMR project.</p>	<p><i>No changes to SBEADMR needed at this time.</i></p>		
<p>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)</p>	<p>Science team questionnaire and AMG participation tracking (6a-b)</p>	<p>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.</p> <p>The AMG reviewed, refined, and prioritized several recommendations to improve the collaborative process at the October 2022 AMG meeting. We suggest the AMG periodically review and revise these recommendations as they address them or as new recommendations arise. It will be important to develop methods and metrics (and roles, expectations) to track progress towards addressing the recommendations.</p> <p>See Appendix C for the current priority recommendations.</p>	<p><b>TBD</b></p>		<p>Draft recommendation in full AMG meeting</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
<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 – lynx focus (1e,3b-c)</p>	<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"> <li>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.</li> <li>DHC is extremely heterogeneous on the landscape, with close plots (200m) 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.</li> <li>DHC and hare pellet densities are heterogeneous at fine scales (100-200m).</li> </ul> <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 (&lt;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>Per Science Team interpretation, recommend that the GMUG explore options to mitigate impacts to dense horizontal cover during salvage.</p>		<p>This question is not specifically linked to the earlier goal 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.</p>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
		<p>CPW lynx monitoring update at 2023 meeting:  The statewide lynx population appears to be relatively stable. Snowshoe hares continue to use habitat impacted by bark beetles, and favor areas with high dense horizontal cover (especially subalpine fir DHC). Red squirrel population sizes show a negative response to spruce beetle outbreaks (and outbreak severity).</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, 3e)</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>(3e) Temperature sensor data indicates that overall, salvage sites have later snowmelt and cooler temperatures (surface and 2m) compared to non-harvested control sites. The overall influence is a shorter growing season. Moreover, the combination of later snowmelt and cooler conditions would be expected to decrease soil moisture stress on seedlings. These conditions would be expected to mitigate recent and projected warmer temperatures and decreased precipitation, and facilitate spruce establishment. However, spruce establishment is a complicated process with more influences than summer season weather conditions.</p> <p><i>More detailed findings can be found in the 2023 SBEADMR Science Matrix</i></p>	<p><i>No changes to SBEADMR needed at this time.</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>

Goal or Decision Trigger	Monitoring Actors and Activities	Results and Interpretation to Date	AMG Recommendation	FLT Management Review Conclusion	Comments
Ensure implementation of treatments is responsive to... public input. (FEIS Appendix E, Public Engagement in Adaptive Implementation, Goal p. 2)	Public comments from stakeholders & GMUG response	The following represent the main themes of comments received during the 30-day comment period on out-year treatment plans presented at the 2023 Annual Stakeholder meeting:	TBD		<i>Story map publication delayed due to RO review – potentially address this via email?</i>

**Appendix A – 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

<b>HUC 12 Name</b>	<b>Spruce-fir Total Acres (TSF)</b>	<b>Spruce Fir Acres 4A/B/C (TSF)</b>	<b>Percent of Spruce-fir in 4A/B/C</b>
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
North Lobe Creek-West Creek	47	8	17
Deer Creek	113	23	20

**Appendix B – Lynx Habitat Status by Lynx Analysis Unit**

**Table 3. Lynx Analysis Unit Habitat Tracking from 1997 – 2022**

Lynx Analysis Unit	Lynx Habitat Acres	Lynx habitat affected from harvests 1997-2022	Lynx habitat converted to unsuitable from harvests 1997-2022	Total Unsuitable Lynx Habitat (vegetation management and natural disturbance)	Percent of lynx habitat affected from harvests	Percent of lynx habitat converted to unsuitable from harvest	Total Percent Unsuitable
Alpine	33,843	1,727	372	1,903	5	1	6
Amphitheater	26,066	6	1	1,342	0.02	0.003	5
Anthracite	19,027	0	0	111	0	0	1
Bald Mountain	30,788	0	0	1,201	0	0	4
Beckwith Mountain	49,536	0	0	254	0	0	1
Black Mesa	27,461	18	5	3,306	0.07	0.02	12
Brush Creek	37,135	0	0	485	0	0	1
Castle Pass	29,401	23	3	834	0.08	0.01	3
Cathedral	21,078	156	32	8,582	0.7	0.1	41
Cebolla	41,846	253	63	6,384	0.6	0.2	15
Chalk Mountain	22,210	412	63	14	2	0.3	0.06
Chester	22,945	553	134	1,277	2	0.6	6
Chimney Rock	22,475	0	0	46	0	0	0.2
Cochetopa	18,708	425	82	3,578	2	0.4	19
Cottonwood Lakes	24,309	454	90	262	2	0.4	1
Crater Lake	32,895	1,207	181	298	4	0.6	1
Dallas Creek	17,505	0	0	771	0	0	4
Fossil Ridge	26,900	6	1	1,577	0.02	0.003	6
Gothic	29,774	0	0	1,603	0	0	5
Green Mountain	24,793	84	17	87	0.3	0.07	0.3
Grizzly Peak	15,824	0	0	465	0	0	3
Huntsman Mountain	30,636	0	0	290	0	0	1
Iron Mountain	22,444	137	32	1,498	0.6	0.1	7
Island Lake	17,724	73	17	503	0.4	0.10	3
Kannah Creek	11,474	1,368	239	255	12	2	2
Lake City	23,789	539	120	1,410	2	0.5	6
Little Cone	20,320	2	0.5	1,380	0.01	0.002	7

<b>Lone Cone</b>	23,452	369	66	633	2	0.3	3
<b>Los Pinos Creek</b>	21,750	883	217	4,217	4	1.0	19
<b>Matterhorn</b>	22,994	41	10	468	0.2	0.04	2
<b>Mesa Lakes</b>	17,424	387	61	361	2	0.4	2
<b>Mount Gunnison</b>	20,695	0	0	233	0	0	1
<b>Needle-Razor</b>	6,010	277	63	570	5	1	9
<b>Peeler Lakes (Kebler)</b>	23,430	0	0	0	0	0	0
<b>Pitkin</b>	26,075	0	0	2,101	0	0	8
<b>Ragged Mountain</b>	9,862	0	0	61	0	0	1
<b>Red Creek</b>	38,219	1,468	220	4,008	4	0.6	10
<b>Rocky Brook</b>	37,910	847	128	1,227	2	0.3	3
<b>Sawtooth Mountain</b>	24,196	0	0	1,583	0	0	7
<b>Soap Creek</b>	34,402	0	0	2,855	0	0	8
<b>South Mamm Peak</b>	6,507	0	0	60	0	0	1
<b>Spring Creek</b>	27,448	443	88	246	2	0.3	1
<b>Stewart Creek</b>	30,874	635	159	12,296	2	0.5	40
<b>The Flat Tops</b>	31,559	1	0.25	428	0.003	0.0008	1
<b>Tincup</b>	34,925	177	30	1,491	0.5	0.08	4
<b>Traver Mesa NEW</b>	27,305	1,945	329	516	7	1	2
<b>Turret Ridge</b>	28,369	0	0	744	0	0	3
<b>Upper Taylor</b>	26,143	0	0	888	0	0	3
<b>Upper Tomichi</b>	18,043	0	0	1,741	0	0	10
<b>Whetstone Peak</b>	15,985	0	0	244	0	0	2
<b>Whitecross Mtn</b>	6,836	0	0	181	0	0	3

### ***Appendix C – AMG Priority Recommendations for Improved Collaboration***

At the AMG meeting in October 2022, we facilitated a discussion on recommendations to improve the collaborative process. We highlighted the many steps that had already been taken or were being considered to improve the process, and we assessed which, if any, additional recommendations from the collaborative adaptive management process evaluation should be prioritized in the short-term. Suggestions for improvement included:

- Increase communication and outreach to groups and develop methods to track communication channels. In this vein, developing a list of definitions and acronyms may support external communication;
- Increase the number and type of designated seats to increase opportunities for collaboration, including but not limited to recreation interests, and community wildfire mitigation collaboratives, for example;
- Coordinate collaborative discussions and dialog on what is meant by resiliency in the context of SBEADMR and the GMUG;
- Increase transparency about how science informs lynx management and mitigation;
- Allow AMG to attend annual FLT meeting where AMG recommendations for adaptation are considered; and
- Create an inventory of community wildfire collaboratives and forest health initiatives in the GMUG.