

# **Spruce Beetle Epidemic Aspen Decline Management Response (SBEADMR) Community Report**



**Fiscal Year 2021**

## History of SBEADMR and Adaptive Management Group (AMG)

In the Grand Mesa, Uncompahgre and Gunnison (GMUG) National Forests, approximately 40 percent of Engelmann spruce and aspen forests have been affected by insects and disease over the past decade. The Spruce Beetle Aspen Decline Management Response (SBEADMR) Environmental Impact Statement (EIS) was created to address a decade of disturbance issues and improve forest health for roughly 120,000 acres on the GMUG.

The purpose of SBEADMR is three-fold: minimize threats from falling, dead trees and better manage wildfires (safety); improve the resiliency of stands at risk to insects and disease (resiliency); and treat affected stands via recovery of salvageable timber and re-establishment of desired forest conditions (recovery).

Launched by the GMUG in 2016, SBEADMR is designed to allow a more

nimble “adaptive management” response to rapidly changing forest conditions associated with insect and disease outbreaks than is typically possible under U.S. Forest Service’s (USFS) planning process. Conventional planning processes for forest treatments like timber harvesting can take years to complete. Although insect and disease outbreaks are part of natural disturbance cycles, the epidemic level outbreaks occurring over the last decade have produced significant mortality in the time it can take to complete the planning and analysis process for a forest treatment. Given the rapid rates of changes on forest landscapes, resiliency treatments frequently need to be redesigned into salvage treatments, a process that traditionally would require restarting the entire planning process. SBEADMR avoids this problem by using an adaptive management approach that allows the USFS to designate large swaths of land as priority treatment areas and then target specific stands of trees on an annual basis, based on current conditions.

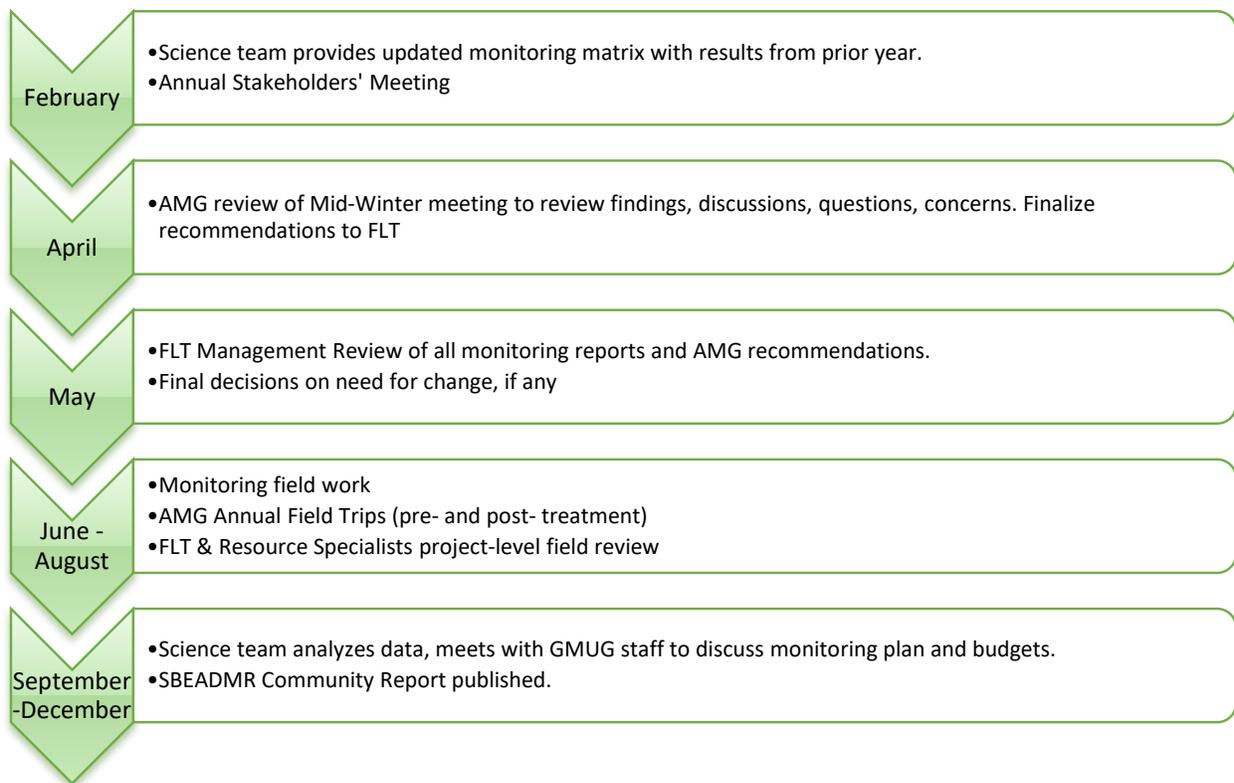
While this novel approach provided flexibility for management response, it also generated concerns from local stakeholders because of the lack of specificity about the proposed projects and the areas that would be treated. Moreover, stakeholders wanted to see more science-driven management decisions and had concerns about the impacts of temporary logging roads, disruption to recreational users, impacts on wildlife and lack of public input on specific projects. To address these concerns the USFS agreed to fund an independent science advisory team to help identify treatment



*The SBEADMR Adaptive Management Group circles up at a pre-treatment review field trip for the Big Park Timber sale, August 2019*

locations and inform the adaptive approach and management decision making. The GMUG also supported stakeholders' interest in convening a community based collaborative working group, which later evolved into the SBEADMR Adaptive Management Group (AMG).

The AMG is a citizen-based working group composed of individuals representing diverse local and regional interests and perspectives. Members are self-selected by stakeholder category except for the community at-large representatives, who are appointed by their respective county commissioners. Stakeholder categories include county commissioners, forestry processors, forestry loggers, conservation groups, water resources, recreation, wildlife and fish, education, Colorado State Forest Service and at-large members. The primary purpose of the AMG is to assist the GMUG in applying the adaptive management framework over a multi-year timeframe in accordance with the SBEADMR Record of Decision.



*An overview of a typical year of engagement in the SBEADMR adaptive management process*

The goals of the AMG are to:

- Provide comments on proposed treatment sites.
- Help with articulating monitoring questions.
- Participate in post-treatment evaluations.
- Review monitoring to make recommendations for adaptive management for future projects.
- Anticipate local roadblocks that may arise and work to resolve them.
- Strive for consensus of diverse interests on recommendations submitted to the GMUG.

In addition, the AMG appointed a Monitoring Committee to identify, organize, observe and monitor the following:

- Community understanding and engagement.
- Socio-economic data and impacts.
- Collaborative adaptive management process and outcomes.
- Tracking science studies and monitoring efforts.

The AMG also works directly with the SBEADMR Science Team to determine questions that need to be answered using the best available science. Comprised of researchers with expertise in forest ecology, silviculture, wildlife biology and natural resource socioeconomics, the Science Team designs rigorous studies and collects and analyzes data. The results of these scientific studies can then be used to guide management policies and projects on the ground.

## SBEADMR Science Team Updates

The Science Team presented the 2020 monitoring results at the February 2021 SBEADMR Annual Meeting. Presentation summaries are listed below by project title.

Impacts of spruce bark beetle and subsequent salvage in Engelmann spruce and Engelmann spruce-aspen forests in the GMUG on forest structure and tree regeneration.

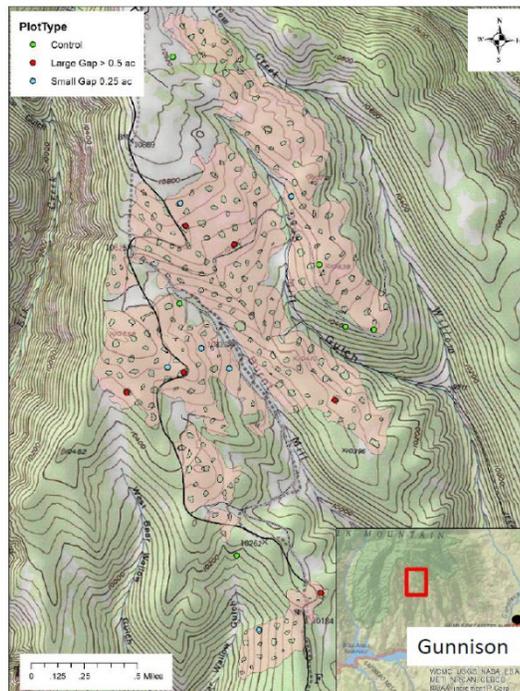
*Lead: Dr. Mike Battaglia, US Forest Service Rocky Mountain Research Station*

### Background

A major concern raised by stakeholders in the initial stages of SBEADMR was the impact of spruce beetle and salvage treatments on forest regeneration. Would salvage treatments have a detrimental impact on existing advanced regeneration (i.e. seedlings and saplings) in spruce-dominated stands? To address this concern and improve understanding of the legacies of previous management in spruce beetle-affected stands on current forests, in 2015 and 2020 the science team established 117 forest inventory plots in spruce and spruce-aspen forests in the Gunnison Basin on the GMUG National Forest. Forty-five plots are “intensive” plots and are sampled annually.

### 2020 Monitoring

Variables measured in 2020 include tree regeneration, regeneration survival, and seed production. In addition, field crews collected hare scat (feces) to measure snowshoe hare density in the monitoring plots, and collected temperature data from sensors placed below ground, ground-level and above-ground. Field crews also installed 18 new monitoring plots in the Rainbow TS project area to establish pre-treatment data for green tree timber sales.



*Pre-treatment monitoring plots were established in the Rainbow timber sale in 2020*

### Rainbow

**Group Selection,  
0.25 to 2 acre groups**

- ~10,000 – 11,000 feet elevation
- Slopes ~5 – 20%
- Aspect predominately SE

**18 Plots**

- 6 small gaps (~0.25 ac)
- 6 larger gaps (>0.5 ac)
- 6 control

### 2020 Results

Seed production in 2020 was much lower than in 2019 and comparable to 2018.

In spruce stands, previously managed sites averaged 7 seeds per plot, unmanaged 6 seeds per plot, and salvage 7 seeds per plot in 2020, with no statistically significant differences between

treatments. In spruce-aspen stands, previously managed sites averaged 15 seeds per plot, unmanaged 21 seeds per plot, and salvage 6 seeds per plot.

Similarly to 2018 and 2019 results for spruce stands, snowshoe hare density, an indicator of viable Canada lynx habitat was highest in unmanaged spruce and spruce-aspen stands, followed by previously managed stands and lowest in salvaged stands. Differences between salvaged and unmanaged and salvaged and previously managed sites were found to be statistically significant. However, 2020 results differed from previous years in spruce-aspen stands. Mean hare density was highest in salvaged stands (0.27 hares/ha), followed by unmanaged stands (0.16 hare/ha) and previously managed stands (0.12 hares/ha). However, these differences were not statistically significant.

#### *2020 Interpretation*

Over the past 3 years, seed production has varied. 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.

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, this past year, 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 did not show a statistically significant difference.

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 there was no statistically significant differences among treatments.

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.

Landscape-scale Impacts of Spruce Bark Beetle and Climate on Forest Change  
*Lead: Dr. Jason Sibold, Colorado State University*

*Background*

2017/2018 was an exceptional drought year, with Colorado experiencing the warmest annual temperatures on record, while average low temperatures continue to increase. Climate conditions are acting in concert with the ongoing spruce beetle outbreak to shape patterns of forest change in Engelmann-spruce-dominated landscapes on the GMUG.

Understanding how the Engelmann spruce is reacting to changing temperatures and snowpack conditions and identifying specific landscape features that may be suitable for more successful regeneration in the future will be critical to guide treatment site selection. This data can tell us which areas on our landscape are more resilient to climate change and where spruce forests are more likely to persist in the coming decades. It also has implications for wildlife, like the Canada lynx. This project utilizes LIDAR (Light Detection and Ranging), a remote-sensing technology to model how high-quality lynx habitat has changed due to spruce beetle outbreaks. This habitat model can then be used in conjunction with GPS data from radio collared lynx to see how lynx are using these new landscapes.



*Dr. Jason Sibold speaks to field trip participants at the Big Park pre-treatment review, August 2019*

*2020 Monitoring*

In the Elk/ West Elk study area 53 of 68 plots from 2019 were revisited in 2020 to change temperature sensors and count hare pellets. Temperature data are being cleaned winter 2020-21.

In addition to field work, I focused on modeling future patterns of spruce forest distributions under different climate scenarios (A1 = continued warming; B1/B2 not as rapid of warming) for different climate projections for the years 2060 and 2090. The range of future climate projections (different scenarios and models) should provide relatively robust end points for best- and worst-case scenarios for spruce, which is being used as a proxy for Canada lynx habitat. I also modeled landscape connectivity for Canada lynx for the A1, and B1/B2 models for 2060 and 2090.

*2020 Results*

Within the Elk/West Elk Study area, 2019 and 2020 data indicate:

(1) 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 stays high. The 20% threshold is lower than expected.

(2) 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.

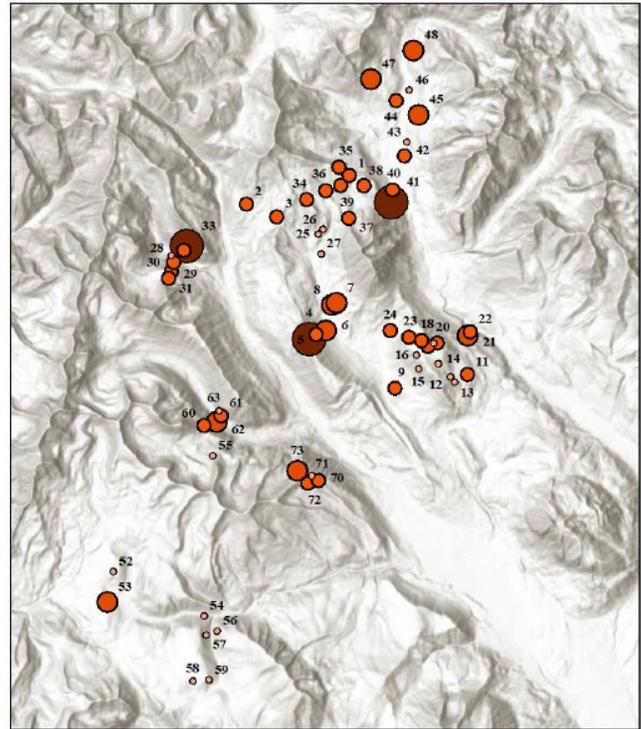
(3) DHC and hare pellet densities are heterogeneous at fine scales (100-200m). Results of the spruce forest distribution and future climate modeling show that there is a very large range of potential future spruce cover scenarios – from a rapid decline to almost no spruce cover by 2060 and basically 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. These models 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.

### *2020 Interpretation*

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 area. This fine-scale heterogeneity also contributes to challenges in identifying large areas that are key for Canada lynx conservation.

Spruce and connectivity modeling provides spatial information on where spruce habitat, critical for Canada lynx, and corridors will persist into the future under different warming scenarios. This information 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.

### **Elk/West Elk 2019 New Hare Pellets**



*Snowshoe hare pellet densities are heterogeneous at fine scales in Elk/West Elk monitoring plots*

Assessing the Socioeconomic Impacts of SBEADMR  
*Lead: Dr. Tony Cheng, Colorado Forest Restoration Institute*

*Background*

One of the goals described in the SBEADMR Record of Decision (ROD) is to “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). In order to evaluate achievement of this goal and potential increased efficiencies found in SBEADMR’s adaptive approach, the SBEADMR Science Team is looking at the following questions:

- To what extent do the USFS administrative costs change over the SBEADMR Project timeframe? What issues affect costs?
- To what extent does timber output and revenue change over the SBEADMR project timeframe?
- In what ways does the SBEADMR project contribute wood volume to the wood products industry that sustains the interdependence of producers?
- What are the direct non-governmental employment impacts on wood producers from the SBEADMR implementation?



*A skidder operating on the Big Willow Good Neighbor Authority Timber Sale*

*2020 Monitoring*

To approximate administrative costs to complete planning, contract preparation and on-the ground oversight the following data was compiled for salvage treatments:

- Percent time spent by Forest Service personnel by work category based upon a 261-day work year. The number days spent completing these tasks were then multiplied by each employee’s cost-to-government.
  - Planning – IDT meetings, coordination with partners, completion of resource surveys and require clearances, completion of treatment design checklist, contract preparation.
  - Pre-treatment layout – prescription development treatment unit layout, cruise, engineering support –road logs and design, etc.
  - Treatment implementation – Contract administration including inspections. Both vegetation management and road contract administration are included.

- Forest Service non-road related contract work – stand exams, treatment layout, resource surveys, tree planting, etc. Actual awarded contract costs were used.
- Forest Service road related costs – road work designed or completed through contract.
- Science Team costs – funds provided to the Science Team to complete monitoring and inform SBEADMR on use of best available science.
- Adaptive Management Group (AMG) - funds provided to pay a facilitator and other support to AMG.

Data was compiled for commercial timber harvest output and revenue for fiscal years 2017-2020 to capture how timber output and revenue have changed over the project timeframe. This information was used to calculate the amount of revenue collected per volume of timber harvested in CCF. The revenue collected for the project include stumpage collections, brush disposal deposits, surface rock deposits, road maintenance deposits, and deposits for reconstruction engineering services. Information on no bid timber sales and non-commercial treatments was also gathered.

One of the goals of the socioeconomic monitoring is to assess how producers are utilizing wood harvested from the project area, what firms are benefitting from these wood products, and how these producers vary over the project duration. Employment impacts of SBEADMR project implementation on non-government entities is also an area of interest. Data to address these goals was gathered from local producers to understand potential supply chain impacts of the project implementation.

### 2020 Results

To establish a common metric for measurement both cost per acre treated and volume of timber sold (CCF) were used. Table 1 displays costs for each metric adjusted for inflation.

*Table 1. Approximate costs in 2020 per acre treated and timber volume (CCF) sold on the Grand Mesa, Uncompahgre and Gunnison National Forests.*

<b>Salvage Treatment Summary Table</b> (adjusted for inflation at 3.1%)	<b>Cost per acre treated</b>	<b>Cost per CCF sold</b>
Treatment Planning, layout, prep, road design and oversight	\$327	\$19
Treatment Implementation - Contract administration	\$89	\$5
Forest Service contracts - non-roads	\$35	\$2
<b>Total Non-road</b>	<b>\$478</b>	<b>\$29</b>
Forest Service contracts - Roads	\$381	\$22
<b>Total Road</b>	<b>\$381</b>	<b>\$22</b>
Science Team (resiliency and salvage)	\$24	\$2
Adaptive Management Group	\$3	\$1
<b>Total Collaboration</b>	<b>\$27</b>	<b>\$3</b>
<b>Grand Total</b>	<b>\$859</b>	<b>\$52</b>

Timber revenue and volume was gathered to analyze how it has changed over the duration of the project. Revenue for FY 2019 and FY 2020 has not been fully collected so it is not reported here.

*Table 2. Commercial revenue collected per timber volume (CCF) sold for SBEADMR project for FYs 2017-2018.*

Fiscal Year	Stumpage Collected	Brush Disposal Deposit Collected	Surface Rock Deposits Collected	Road Maintenance Deposits Collected	DRES Deposits Collected	Total Collections	Total CCF	\$ per CCF
2017	\$413,497	\$78,052	\$36,993	\$10,679	\$8,709	\$547,930	<b>59,818</b>	<b>\$9.16</b>
2018	\$668,039	\$85,785	\$41,877	\$3,419	\$4,575	\$803,695	<b>72,131</b>	<b>\$11.14</b>

Over \$1.5 million in revenue has been collected over the SBEADMR project with Montrose Forest Products (MFP) being the largest purchaser. There have not been any non-commercial treatments implemented to date for SBEADMR. No bid timber sales are also monitored for the project. There has been only 1 no bid since the inception of SBEADMR, the Kannah Timber Sale in 2020. This was due to winter logging restrictions. Through collaboration with the Grand Mesa Nordic Club, these winter logging restrictions have been adjusted and industry is now supportive of the sale and it will be advertised in 2021.

Wood harvested from the SBEADMR project has been utilized primarily by MFP (60%), followed by the Colorado State Forest Service (CSFS) (26%), the Wild Turkey Federation (7%), and other small producers (7%). MFP has utilized the timber to produce various dimensional studs through its milling operations. The wood harvested by the CSFS was used for sawtimber. There were only 6 different producers for the project between FYs 2016-2020 dominated by MFP. Wood utilization has not had direct impacts on non-government employment for the local economy. Montrose Forest Products reports that no additional manpower has been added to sawmilling staff nor have they added loggers or log truckers as a direct result of SBEADMR timber but without SBEADMR timber sales it would be difficult to continue operating the sawmill at current capacity.

#### *2020 Interpretation*

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. There are few small-scale producers that are utilizing timber from the project area, with the overwhelming majority coming from MFP. SBEADMR has not had a significant impact on local producers' employment, but is noted as important for local mill supply chain (MFP). As harvest moves from salvage to resiliency or green treatments there will be opportunities to compare how personnel costs vary between the two types of treatment.

## Adaptive Management

The GMUG's Annual Management Reviews consider input from AMG recommendations, GMUG resource specialists, SBEADMR Science Team and other relevant research in order to make adaptive management decisions for the design and implementation of SBEADMR projects. Management Reviews are conducted by the GMUG Forest Leadership Team (FLT) who make final decisions on changes to SBEADMR implementation. The following changes were made in 2021.

### FY 2021 SBEADMR Treatment Checklist Changes

No checklist changes were made in 2021.

### Other Changes

The annual 30-day informal comment period was moved from late summer/early fall to be directly after the February stakeholder's meeting. This move was intended to make the commenting process easier for stakeholders, as they are now able to comment immediately after seeing the most current outyear project plans. The GMUG also introduced a new online map-based commenting platform to facilitate more site-specific feedback.

The AMG made several recommendations to GMUG FLT during the spring management review process. FLT concurred with recommendations to actively seek ways to incorporate the Public Safety goal of the SBEADMR ROD into treatments and to find ways to prioritize aspen resiliency treatments making use of all available instruments for funding and partnerships.

**SBEADMR Timber Treatments**  
**Sales awarded from Fiscal Year 2016 through Fiscal Year 2021**

<b>Sale Name</b>	<b>FY Awarded</b>	<b>Resource Zone*</b>	<b>Treatment Type</b>	<b>Acres Treated</b>	<b>Volume Produced (CCF)</b>	<b>Miles of Temporary Road</b>	<b>Treatment Status</b>
<i>Horse Mountain</i>	2016	North	Resiliency	110	1,449	0	Complete
<i>Cathedral</i>	2017	East	Salvage	640	13,497	10	Complete
<i>Nutras</i>	2017	East	Salvage	210	5,835	1.8	Complete
<i>Pauline</i>	2017	East	Salvage	1,874	18,615	9.7	Complete
<i>Skeleton</i>	2017	East	Salvage	610	12,777	8.4	Complete
<i>Willow Mesa</i>	2017	East	Salvage	440	5,800	6.4	Complete
<i>Moore Knots</i>	2017	North	Sanitation	15	70	0	Complete
<i>Little Cone</i>	2017	West	Resiliency	86	1,775	0	Complete
<i>Cooler</i>	2018	East	Salvage	244	2,167	0.8	Complete
<i>Divide Salvage</i>	2018	East	Salvage	160	2,545	1	Complete
<i>Last Tree</i>	2018	East	Salvage	466	6,270	3.7	Active
<i>Millswitch</i>	2018	East	Salvage	885	18,516	2.6	Active
<i>Quill</i>	2018	East	Salvage	569	6,708	0	Complete
<i>Sargents Mesa</i>	2018	East	Salvage	1,468	14,195	9.7	Active
<i>Crane</i>	2018	North	Resiliency	475	8,552	1.6	Active
<i>High Mesa</i>	2018	West	Salvage	320	13,178	3	Complete
<i>Big Willow</i>	2019	East	Salvage	2177	41,224	12	Active
<i>Buffalo Forks</i>	2019	East	Salvage/ Resiliency	100	1,441	2	Sold
<i>Ridgestock</i>	2019	East	Salvage	1,300	28,858	12	Active
<i>Sage Park</i>	2019	East	Salvage	14	130	0	Complete
<i>Jackson</i>	2019	West	Salvage/ Resiliency	321	10,789	2	Active
<i>Telski</i>	2019	West	Resiliency	50	500	0	Complete
<i>Overland</i>	2020	North	Resiliency	701	18,761	4	Sold
<i>Hubbard</i>	2020	North	Resiliency	896	16,114	7.2	Sold
<i>Rainbow</i>	2020	East	Resiliency	956	5,418	0	Sold
<i>Grouse Glade</i>	2020	West	Resiliency	20	111	0	Sold
<i>Big Park</i>	2020	West	Salvage/Re siliency	1,056	16,145	1	Sold
<i>Big Creek</i>	2021	North	Resiliency	309	2,902	3.72	Sold
<i>Kannah</i>	2021	North	Resiliency	345	2791	2.83	Sold

<i>Kitson</i>	2021	North	Salvage	21	228	0.7	Sold
<i>Lost 80</i>	2021	North	Salvage	22	103	0	Sold
<i>Rim</i>	2021	North	Resiliency	359	3,883	0	Sold
<i>Sweaty</i>	2021	North	Resiliency	184	1,832	0	Sold
<i>Antelope</i>	2021	East	Resiliency	1,258	7,680	0	Sold
<i>Little Cone</i>	2021	West	Resiliency	86	1,895	n/a	Sold
<i>GNA</i>							
<i>Lone Craver</i>	2021	West	Resiliency	545	14,142	0	Sold
<i>Telski Forest</i>	2021	West	Resiliency	12	746	0	Sold
<i>Health</i>							
<b>Totals</b>				<b>19,304</b>	<b>307,642</b>	<b>106.15</b>	

\*Resource Zones: East = Gunnison Ranger District, North = Grand Valley and Paonia Districts, West = Ouray and Norwood Ranger Districts

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West Zone (Norwood and Ouray Ranger Districts) – Joseph Gonzalez, [joseph.f.gonzales@usda.gov](mailto:joseph.f.gonzales@usda.gov)

SBEADMR websites

Overview, Current Meeting Information, and Archives:

<https://cfri.colostate.edu/projects/sbeadmr/>

GMUG SBEADMR Implementation (current FY only):

<https://www.fs.usda.gov/detail/gmug/landmanagement/resourcemanagement/?cid=fseprd497061>

[Story Map and Online Comment Platform](#)

SBEADMR Facilitator

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*Log deck on the Big Willow Good Neighbor Authority timber sale*

*Grand Mesa, Uncompahgre  
and Gunnison National Forests*

**SBEADMR Awarded Sales  
(2016 - 2021)**

