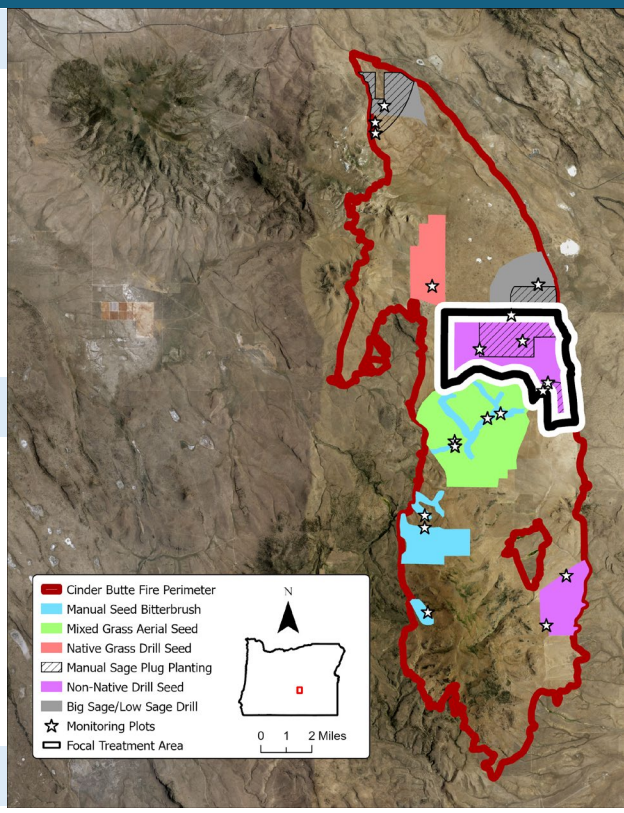
Cinder Butte Fire: Post-Fire Treatment Outcomes Monitoring

Location and Context

The Cinder Butte fire occurred in 2017, burning 52,000 acres of rangelands in Harney and Lake Counties, Oregon. Most of the burned area is managed by the Bureau of Land Management (BLM) and several post-fire treatments were implemented as shown in the map. The Institute for Natural Resources assisted the Burns BLM District with synthesizing treatment monitoring information for post-fire treatment reporting. Results for a ~4,800 acre non-native drill seeding are synthesized below.



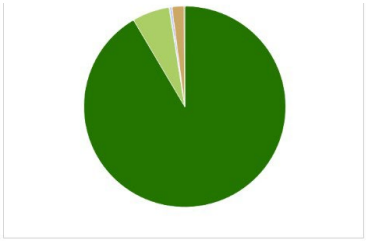
Data Sources

Data and information was drawn from:

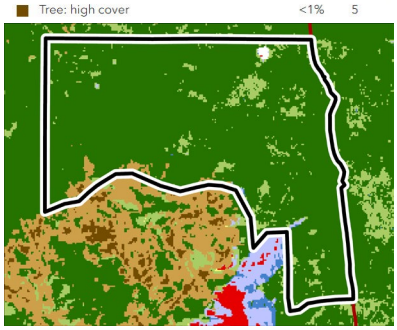
- **Remotely sensed maps** are described on the next page and shown below in charts, tables and maps pre-fire (left), immediately post-fire (middle), and 3-5 years post-fire (right).
- **Monitoring data** from Assessment Inventory and Monitoring (AIM) plots was collected at five locations within the treatment.
- A one-day **field visit** informally evaluated post-fire recovery, treatment effects, and overall map accuracy.

Data Synthesis

Pre-fire ecostate map (2014-2016)

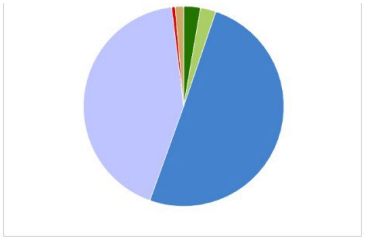


Category	% area	Acres
A: Good condition shrubland	92%	4366
A-C: Intermediate condition shrubland	6%	285
C: Poor condition shrubland		0
B: Good condition grassland	<1%	5
B-D: Intermediate condition grassland	<1%	17
D: Poor condition grassland	<1%	1
Tree: low-mid cover	2%	92
Tree: high cover	<1%	5

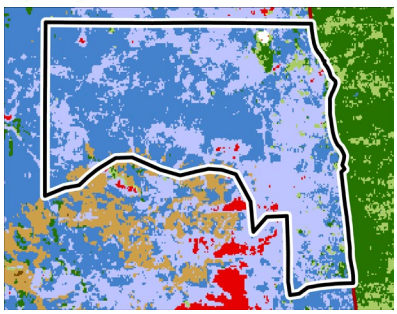


No pre-fire monitoring plots were available, but ecostate maps prior to the fire indicate condition was likely an intact sagebrush-bunchgrass community.

Post-fire ecostate map (2017-2019)

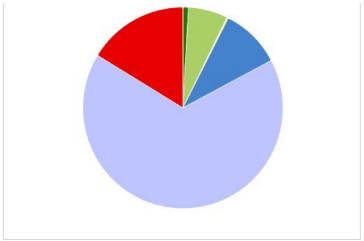


Category	% area	Acres
A: Good condition shrubland	3%	129
A-C: Intermediate condition shrubland	3%	120
C: Poor condition shrubland	<1%	1
B: Good condition grassland	50%	2397
B-D: Intermediate condition grassland	43%	2032
D: Poor condition grassland	1%	27
Tree: low-mid cover	1%	65
Tree: high cover		0

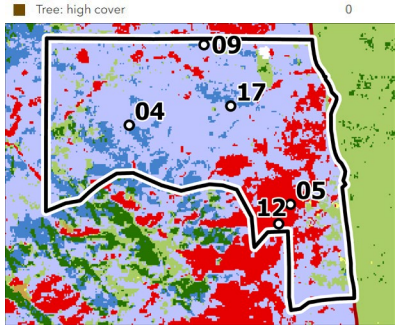


Immediately after the fire, condition shifted from shrubland to grassland due to burned sagebrush. Annual grasses started to spread from previously invaded sites.

Post-fire ecostate map (2020-2022)



Category	% area	Acres
A: Good condition shrubland	1%	42
A-C: Intermediate condition shrubland	6%	304
C: Poor condition shrubland	<1%	11
B: Good condition grassland	10%	464
B-D: Intermediate condition grassland	67%	3173
D: Poor condition grassland	16%	776
Tree: low-mid cover		0
Tree: high cover		0



Several years after the fire, maps show more widespread annual grass invasion with some areas returning to shrublands. Five monitoring plots were established (see next page).

This case study emphasizes **simple but powerful ways of visualizing and summarizing data** that require minimal technical skill (web tools and spreadsheets), and may be especially helpful where the **amount of plot data is limited**.

Remotely sensed vegetation maps were used to estimate vegetation conditions across the whole landscape before and after the fire. On the previous page we summarize **threat-based ecostate maps** (based on Rangeland Analysis Platform data) to characterize overall sagebrush rangeland condition based on threats from invasive annual grasses, conifer encroachment, and wildfire. Maps, charts and tables as shown on the previous page can be generated from the SageCon Landscape Planning Tool anywhere within the sagebrush biome. When using maps in a disturbed area be aware that maps generally do not capture shrub or sagebrush recovery well in the first several years after a fire.

Monitoring plot data from five AIM sites (locations shown on previous page) are presented in the tables below for four years of monitoring between 2019 and 2022 (not all plots were visited every year). Vegetation cover was estimated based on line point intercept. The first table provides snapshot of physical conditions and ecostates, including pre-fire ecostate based on maps, and field-calculated ecostate over four years based on measured cover values at each plot, using the same ruleset as the maps (see the link above for more details). The bottom table provides more information about herbaceous composition, including cover of deep-rooted perennial grass species that are most important for soil stabilization, and cover of common invasive grass species. Tables are color coded based on ecostates and 10% cover bins to more easily visualize patterns over time within and between plots.

Plot	Elevation	Aspect	Mapped ecostate (2014-2016)	Field-measured ecostate (calculated based on plot data) 2019	2020	2021	2022
Plot 04	4716	N	A	B	B	B	B
Plot 05	4722	E	A	D	D	B-D	B-D
Plot 09	4667	SE	A	B	B	B	B
Plot 12	4740	N	A	D	D	B-D	--
Plot 17	4685	NE	A	--	B	B	--

Plot	Deep-rooted perennial grass cover 2019	2020	2021	2022	Invasive annual grass cover 2019	2020	2021	2022
Plot 04	30	49	44	50	1	0	0	1
Plot 05	5	19	29	22	45	67	30	23
Plot 09	21	17	30	45	6	8	5	3
Plot 12	4	7	28	--	48	81	28	--
Plot 17	--	6	10	--	--	0	0	--

Plot summaries show that two monitoring sites are in good condition with high cover of deep-rooted perennial grasses and low annual grass cover, and two sites are degraded due to high levels of invasive grass (although both also have relatively abundant perennial grasses). One plot contains low overall herbaceous cover, which may indicate a concerning lack of plant cover, depending on site potential.

A **field visit** in 2024 (two years after plot and map data shown here) generally found that ecostate maps were accurately capturing conditions on the ground in most places. At that time, rabbitbrush was relatively common and small sagebrush were re-establishing in many areas. Note that shrub cover often appeared to be near the threshold between grassland/shrubland ecostates (10-15% cover), which may cause ecostate classifications to shift back and forth over time in upcoming years. The field visit also highlighted problems with tracking implemented treatments - it was clear that the entire polygon was not seeded with non-native grasses. Accurate information about the type and location of treatments is critical for reporting treatment outcomes.

Interpretation and Conclusions

Based on the available information, we draw the following conclusions:

- Although there is generally an abundance of perennial grasses throughout the treatment area, invasive annual grasses are a concern throughout, and are especially dominant in the southeast.
- Seeding was successful in establishing non-native grasses, but native species also established well in untreated areas, suggesting some areas may have recovered naturally without introducing non-native seeded species.
- Shrub recovery observed in the field was not yet detected in plot and map data with small plants at low cover.
- Map data and plot data generally showed agreement in drawing conclusions about vegetation change over time, and a field visit confirmed that maps were capturing overall conditions relatively well.
- Additional information from managers familiar with the area is needed to provide context regarding treatment planning, details of actual implementation, other post-fire management actions, etc.