Ocate A (CFRP 29.07) Post Fire Immediate Field Inventory Summary | 2022

New Mexico Forest and Watershed Restoration Institute

Photo by Meredith Prentice

Submitted by

Meredith Prentice, *Monitoring Technician*

Emily Yannayon, *Monitoring Specialist*

Kathryn Mahan, *Monitoring Program Manager*

Carmen Melendez, *Crew Logistics Support*

Table of Contents

Figure List

Table List

Introduction and Project Description

The Southwest Ecological Restoration Institutes (SWERI) includes three university-based restoration institutes: the New Mexico Forest and Watershed Restoration Institute (NMFWRI), the Colorado Forest Restoration Institute (CFRI), and the Ecological Restoration Institute (ERI) in Arizona. These institutes work together to develop a program of applied research and service to help create healthy forests, prevent wildfires, sustain the resiliency of water supplies to wildfires, and create jobs. NMFWRI is located at Highlands University (HU) in Las Vegas, NM. According to the Southwest Forest Health and Wildfire Prevention Act (P.L. 108-317), the authorizing legislation for the SWERI, the purpose of the institutes is to "promote the use of adaptive ecosystem management to reduce the risk of wildfires and restore the health of forest and woodland ecosystems in the Interior West." NMFWRI has partnered with USFS and other agencies to monitor more than 2,350 plots on Collaborative Forest Restoration Program (CFRP) and other restoration projects across the state since 2007. The FWRI's Ecological Monitoring Program maintains a professionally managed field crew to collect data on short and long-term ecosystem responses to restoration treatments.

This data provides a critical scientific basis for adaptive management decisions and improved treatment effectiveness. The field crew also provides hands-on internship and training opportunities for students and recent graduates to help build New Mexico's forestry workforce. One of our upland monitoring projects includes the re-measurement of selected CFRP projects at 5-year intervals.

CFRP is a forestry initiative managed by the US Forest Service in New Mexico since 2001. This unique program provides a framework for community groups to collaborate and propose restoration projects on public or tribal forested land. Projects are evaluated by a peer-led Technical Advisory Committee, and those that are selected can receive a grant of up to $360,000 for four years. CFRP projects fall into three broad categories: (1) planning (these grants support community outreach, initial data collection, NEPA clearance work, etc.), (2) utilization (these grants support local forest industry capacity) and, (3) implementation (on-the-ground treatment).

The Community Forest Restoration Act (Title VI, Public Law 106-393), which established CFRP, calls for monitoring of "the short- and long-term ecological effects of the restoration treatments" for at least 15 years. In 2008, 20 CFRP projects were identified for long term monitoring (criteria available here: https://nmfwri.org/wp-content/uploads/2020/07/wp5_-draft_2-1.pdf), and NMFWRI has been responsible for long-term vegetation monitoring of selected CFRP projects at 5, 10, and 15-years post-treatment since that time. Our involvement with CFRP has been supported with federal funds, typically through our congressional appropriations, and at times with additional support from US Forest Service supplemental funding.

During July 2007, June 2009, June 2013, May 2018, and July-October 2022, the NMFWRI inventory and monitoring crew measured 35 plots across approximately 103 acres on New Mexico Stand Land Office trust lands, 3 miles from the Village of Ocate, in Mora County, New Mexico. These plots were established to monitor the Collaborative Forest Restoration Program (CFRP) project 29-07, entitled "Ocate Community Protection, Restoration and Collaborative Management Project", hereafter referred to as "Ocate CFRP". Ocate CFRP consists of two units; Parcel A (103 acres) and Parcel B (123 acres). The 35 plots measured in 2022 comprise the entirety of Parcel A. NMFWRI plans to monitor Parcel B in the 2023 field season.

Ocate CFRP is accessible by NM Hwy 120 heading towards Wagon Mound. It is roughly southeast of Gallinas Mesa at around 7250 feet. Ocate CFRP Parcel A is primarily a ponderosa pine stand but includes one seed juniper, rocky mountain juniper, and oak.

The stated goals of the Ocate CFRP were to restore watershed and forest health, reduce the risk of catastrophic fire in an area of critical importance in addition to creating local opportunities for "employment, education, and collaborative forest management in the surrounding communities of Ocate, Ojo Feliz, Cañada Bonita, Los Febres, and Naranjos. Wildfire risk reduction was a priority as the community of Ocate is listed by the New Mexico Energy, Minerals and Natural Resources Department Forestry Division (NM EMNRD) as one of 649 Communities at Risk of danger from wildland fires. Removal of small diameter trees aimed to mitigate wildland fire risk.

Work on the thinning portion of the project began in 2008 and was completed between late 2009 and early 2010. In 2007 NMFWRI monitored 33 of the original 35 plots in Ocate Parcel A in a pretreatment assessment. NMFWRI conducted immediate post-treatment monitoring in June 2009 on 24 of the original 35 plots that had been treated to-date. This type of immediate-post treatment monitoring was not conducted on 11 plots treated later in 2009. Five-year post-treatment (post inventory) monitoring occurred in June 2011 on all 35 original plots. Ten-year post treatment monitoring occurred in May 2018. In 2018, plots 16 & 22 had to be moved due to recent road construction in the project area. For this reason, these plots are not directly comparable to their pre-2018 data. However, they are included in this dataset as they are still valuable for landscape-scale analyses.

In 2022 the Cooks Peak fire burned approximately 59,359 acres Northeast of Ocate, NM on both private and state trust land. The fire was reported on April 17 and was reported as 100% contained by May 13. The cause of the fire, likely human, is still under investigation. Within the boundary of the Ocate Parcel A project, the fire burned at low to moderate severity.

Following the Cooks Peak Fire, NMFWRI went out during the months of July, August, and October 2022 to conduct immediate postfire monitoring.

Other post-fire reports, and a map of all NMFWRI monitoring, is available here: https://nmfwri.org/monitoring/post-fire-monitoring-reports/

Monitoring Methods

The NMFWRI monitoring crew followed the protocols published in their Field Monitoring Manual, linked here: https://nmfwri.org/resources/upland-forests-monitoring-field-manual/

These protocols are based on the Department of Interior's FEAT/FIREMON Integrated (FFI) sampling protocols. They used 1/10th acre fixed plots to assess tree size (diameter and height) and density (trees/acre). A nested sub-plot of 1/100th acre was used to estimate understory and ground cover in all years. Photo points were taken at each plot. Surface fuels were measured using Brown's transects. The location of the plots was based on a stratified random sampling design. During the initial 2007 monitoring period, 1/20th acre fixed plots were used; during the 2009 monitoring period, a mix of 1/20th and 1/10th acre plots were utilized. All plots were 1/10th acre by 2013 for consistency across the project and other CFRP projects that NMFWRI monitors. All means and per acre measurements are calculated based on measured plot size.

All raw data and photo points will be provided to the managers of the project area; the goal of this report is to summarize this information in a concise manner.

All raw data and photo points will be provided to the managers of Ocate Parcel A; the goal of this report is to summarize this information in a concise manner. Note that in our summaries, basal area of piñon, 2 juniper, and oak was estimated from root collar diameters using equations developed by Chojnacky and Roger (1999). Plots presenting unverifiable outliers or inconsistencies, such as plot 16, which was reported as containing 111 ponderosa pines with 0.4 inch DBH and 6.5 feet of height in 2007, but 5 ponderosas with DBH >10 inches and height >37 feet in 2009, are not included in analysis. Results are typically reported to 2 significant digits, with exceptions for those metrics we know were measured with either more or less precision.

Disclaimer

NMFWRI provides this report and the data collected with the disclaimer that the information contained in these data is dynamic and may change over time. The data are not better than the original sources from which they were derived. It is the responsibility of the data user to use the data appropriately and within the limitations of monitoring data in general, and these data in particular. NMFWRI gives no warranty, expressed or implied, as to the accuracy, reliability, or completeness of these data. These data and related graphics are not legal documents and are not intended to be used as such. This includes but is not limited to using these data as the primary basis for the development of thinning prescriptions or timber sales. NMFWRI shall not be held liable for improper or incorrect use of the data described and/or contained in this report.

Analysis was also done according to our standard protocols. Note that the values reported in the tables are expressed on a per acre basis, but represent only area actually sampled. We do not scale up these values to calculate volume of wood over the project area, and warn readers of this report that they are not intended for that purpose. The accompanying tables show summaries of our data, and some differences are discussed below; however, differences that seem apparent here may not stand up to rigorous statistical tests. For some estimates, the standard deviation exceeds the mean (i.e., the coefficient of variation is greater than 100 percent), and sampling errors for some estimates exceed 100 percent. Therefore, data should be used and results interpreted with appropriate caution.

Summary

Data Summary

The field crew observed the dominant species in the Ocate A CFRP project area to be Ponderosa Pine, with oak and juniper species intermixed. Species composition remains relatively consistent after treatment and after the 2022 wildfire – 97.6% of growing stock trees survived the fire. Tree health concerns included fire scarring, bark char, or leaf scorching; as well as an increase in general insect damage. In the 2022 Cook's Peak fire, burn severity was majority low to moderate severity.

Growing stock basal are and tree density decreased following treatment, but stayed relatively constant from the post treatment period to after the wildfire. Also following the wildfire, snag density increased, but snag basal are decreased. These numbers remain well below growing stock density and basal area.

Although we do not have comparable surface fuels data for the 2007 pretreatment or 2009 immediate post-treatment periods, we see that total surface fuels increase from the 5-year post-treatment period to the 10-year post-treatment period. This is followed by a dramatic drop in fuels post-wildfire.

While live tree seedling and sapling densities decreased post-wildfire, oak species continued to dominant the seedling and sapling regeneration. Shrub densities also decreased immediately post-wildfire, with some variation in species composition.

Access to all plots remained possible via driving and hiking for the 2023 measurement period; however, road conditions were highly dependent on weather.

***Table 1**. Summary table: Ocate A, 2022 immediate postfire monitoring season. Species dominance is based on numeric density.*

29.07 Ocate A CFRP					
Metric	**2007 PreTreatment**	**2009 PostTreatmentImmediate**	**2013 PostTreatment5yr**	**2018 PostTreatment10yr**	**2022 PostFireImmediate**
Dominant Growing Stock Species	PIPO	PIPO	PIPO	PIPO	PIPO
Dominant Snag Species	UNK_TREE	QUERC	QUERC	QUERC	PIPO
Dominant Live Seedling	PIPO	QUERC	QUERC	QUERC	QUERC
Dominant Live Sapling				QUERC	QUERC
Dominant Live Shrub (Seedling Class)			RHTR	ARTR2	RHTR
Dominant Live Shrub (Sapling Class)				RHTR	RHTR
Average Aspect (degrees)			230	145	150
Trees per Acre (growing stock)	126	66.1	72.3	72.9	73.4
Basal Area (growing stock, sqft/acre)	56.2	42.1	54.2	54.8	57.8
QMD (growing stock, inches)	9.96	11.9	12.4	12.6	12.8
Average Tree Height (ft)	36.8	33.7	37.5	35.3	42
Average Live Crown Base Height (ft)	NaN	17.9	14.3	14	16.5
Height of Tallest Tree (ft)	75	75	74	68	89
Live Tree Seedlings Per Acre	588	5350	2570	5090	4150
Live Tree Saplings Per Acre				1160	62.9
Live Shrub Seedlings Per Acre			60	340	17.1
Live Shrub Saplings Per Acre				74.3	0
Tree Canopy Cover (%)				36	45
Grass & Forb Cover (%)				23.4	42
Total Tons Surface Fuels per Acre			9.4	28.2	3.86

Management Implications

Due to low burn severities and low post-wildfire tree mortality, the initial fire recovery outlook for this unit is good, and the data does not suggest any immediate regeneration or post-wildfire state transition concerns. However, an increase of bare soil ground cover from 5.2% 5 years post-treatment to 19% immediately post-wildfire does indicate an increased risk of soil erosion post-wildfire. The field crew did note an increase in herbaceous plant cover, this may play a role in soil stabilization during the initial post-wildfire recovery period. Tree and shrub regeneration decreased substantially post-fire.

The reported substantial decrease in surface fuel loads, ladder fuel loads, growing stock basal area and density, and snag density following treatments and wildfire all indicate a decreased risk of high-severity wildfire based on fuel load and stand structure. The noted increase in snag basal area following wildfire may pose a concern for increasing surface fuel loads in the future as snags fall and become surface fuels. Additional monitoring is needed to determine ongoing adaptive management strategies as the post-wildfire ecosystem develops.

Tree Component

Species Symbol	Scientific Name	Common Name
JUMO	*Juniperus monosperma*	one-seed juniper
JUSC2	*Juniperus scopulorum*	Rocky Mountain juniper
PIED	*Pinus edulis*	piñon
PIPO	*Pinus ponderosa*	ponderosa pine
QUERC	*Quercus sp.*	oak species
UNK_TREE		Unidentified tree species

Overstory Trees

The overstory measured on plots was dominated by ponderosa pine (PIPO) across all monitoring statuses for live and dead trees. Oak species were combined into *Quercus sp.* (QUERC) due to low confidence in species identification. Small proportions of the overstory across years was made up of piñon (PIED), Rocky Mountain juniper (JUSC2), and one-seed juniper (JUMO).

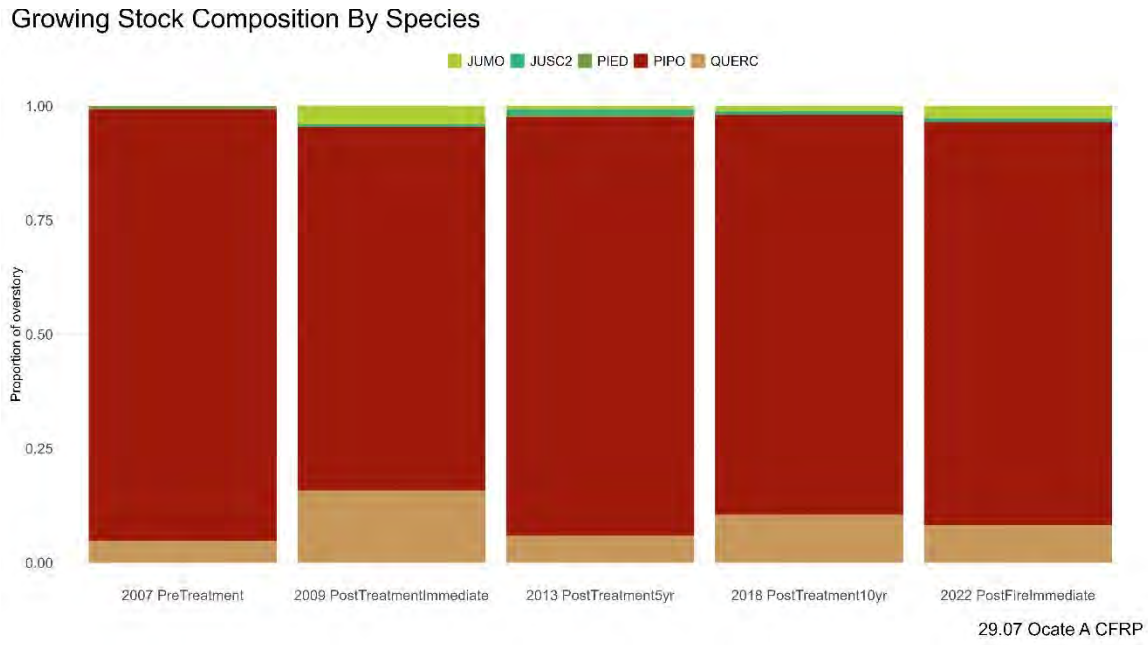

Figure 1. Growing stock species composition by status across all measurement periods for all trees (>1" DBH).

Pretreatment in 2007, species was not recorded for the majority of snags (UNK_TREE). Immediately post-treatment, 5 years post-treatment, and 10 years post-treatment, oak species were the dominant snags. Post-wildfire in 2022, ponderosa pine snags made up the majority of standing dead trees.

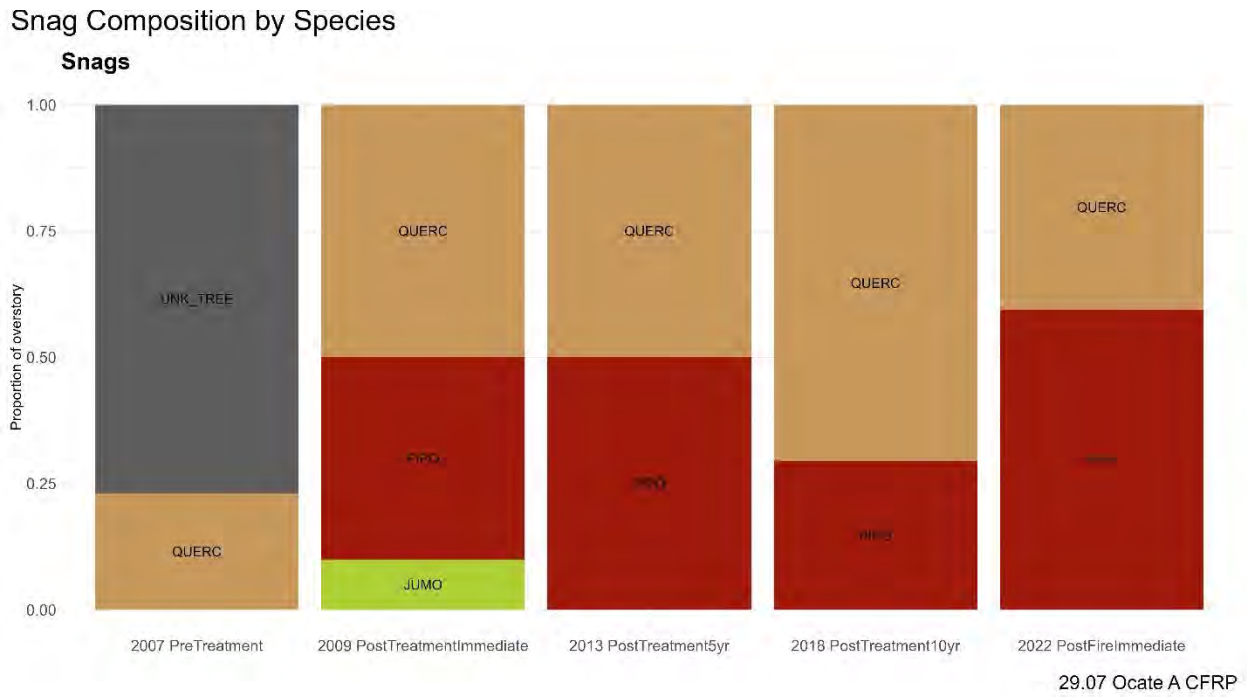

Figure 2. Snag species composition by status across all measurement periods for all trees (>1" DBH).

Growing Stock

Live crown base height was not recorded during 2007 Pre-Treatment monitoring. Growing stock mean height was generally consistent across the measurement periods, showing a slight increase from 39ft to 45ft immediately post-wildfire in 2022. The growing stock mean live crown base height dropped following 2009 Post-Treatment Immediate, and stayed around approximately 15 feet in subsequent monitoring periods.

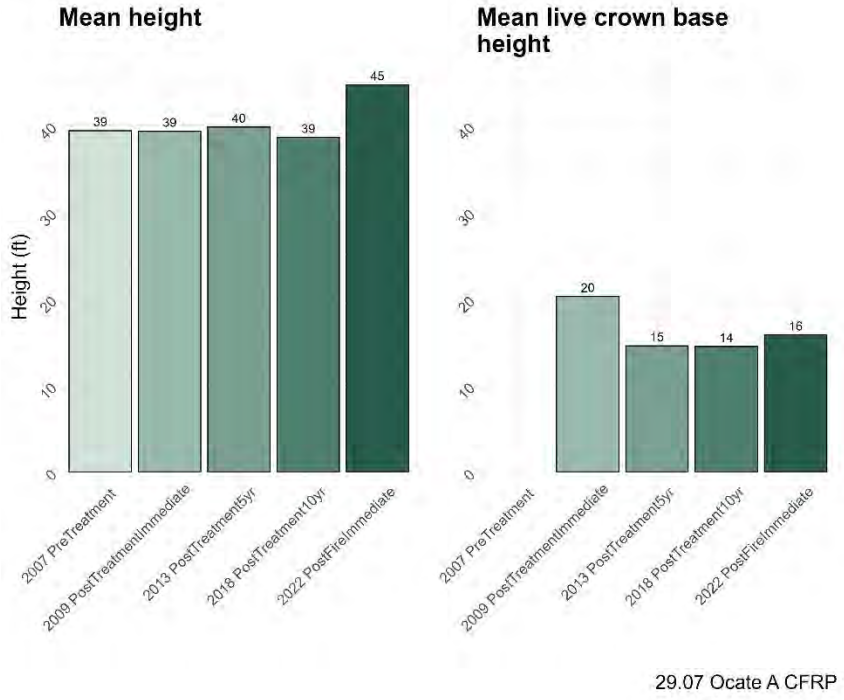

Figure 3. *Mean height and live crown base height for growing stock trees (>1" DBH, live + sick status). Live crown base height was not recorded in 2007.*

Following forest thinning treatments, mean basal area decreased from 110 square feet per acre to 50 square feet per acre, and trees per acre decreased from 240 to 78 trees per acre. Quadratic mean diameter increased from 9.96 inches to 11.9 immediately post-treatment; this indicates a preference towards removing smaller trees and preserving larger trees during treatments. This is also shown by the decreases in smaller diameter trees (Figure 5). In subsequent years following treatments, mean basal area and quadratic mean diameter increased slightly as tree growth continued. Trees per acre remained steady across monitoring periods, even immediately after the Cook's Peak wildfire – 96.7% of trees survived the fire. A breakdown of these metrics by species is available in the supplementary figures (Figures 20-29).

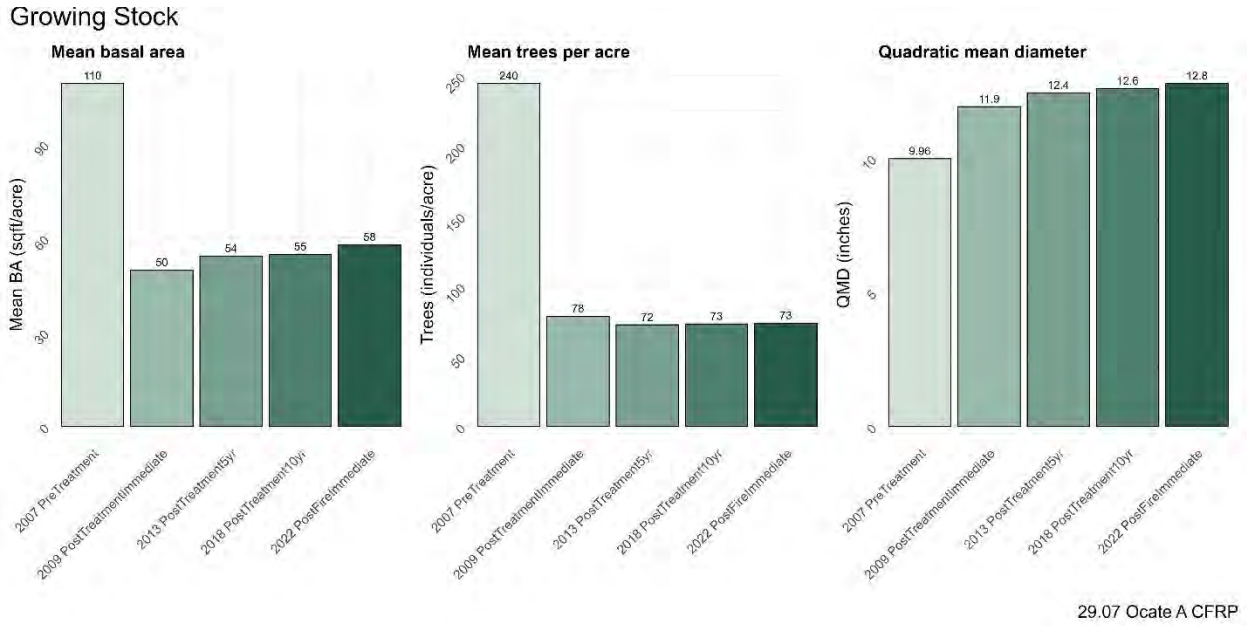

Figure 4. *Mean basal area, mean trees per acre, and quadratic mean diameter for growing stock trees across all measurement periods (>1" DBH, live + sick status)*

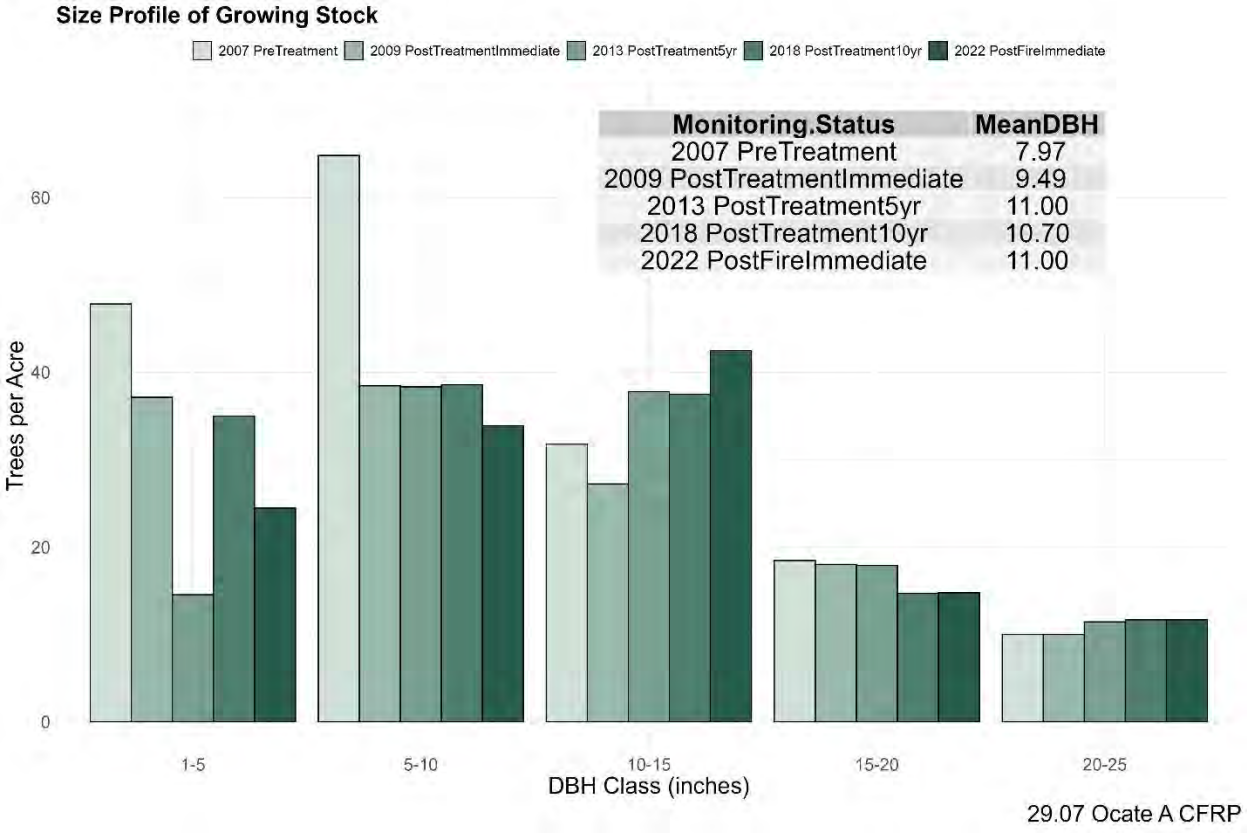

Figure 5*. Distribution of growing stock trees in trees per acre, by DBH across monitoring periods.*

Snags

DBH was not recorded on snags in 2007, so no mean basal area or quadratic mean diameter is available for this year. Mean basal area appears to change each year, but these changes are within the standard deviation and allowable error. Mean snags per acre follows a similar trend: steadily decreasing from the 2007 pretreatment measurement to the 2013 5-year post-treatment measurement, followed by an increase up to the most recent measurement in 2022. Quadratic mean diameter of snags increases following treatment, then begins to decrease starting in the 10-year post-treatment period. This trend continued in the 2022 measurement immediately post-wildfire. A breakdown of these metrics by species is available in the supplementary figures (Figures 20-29).

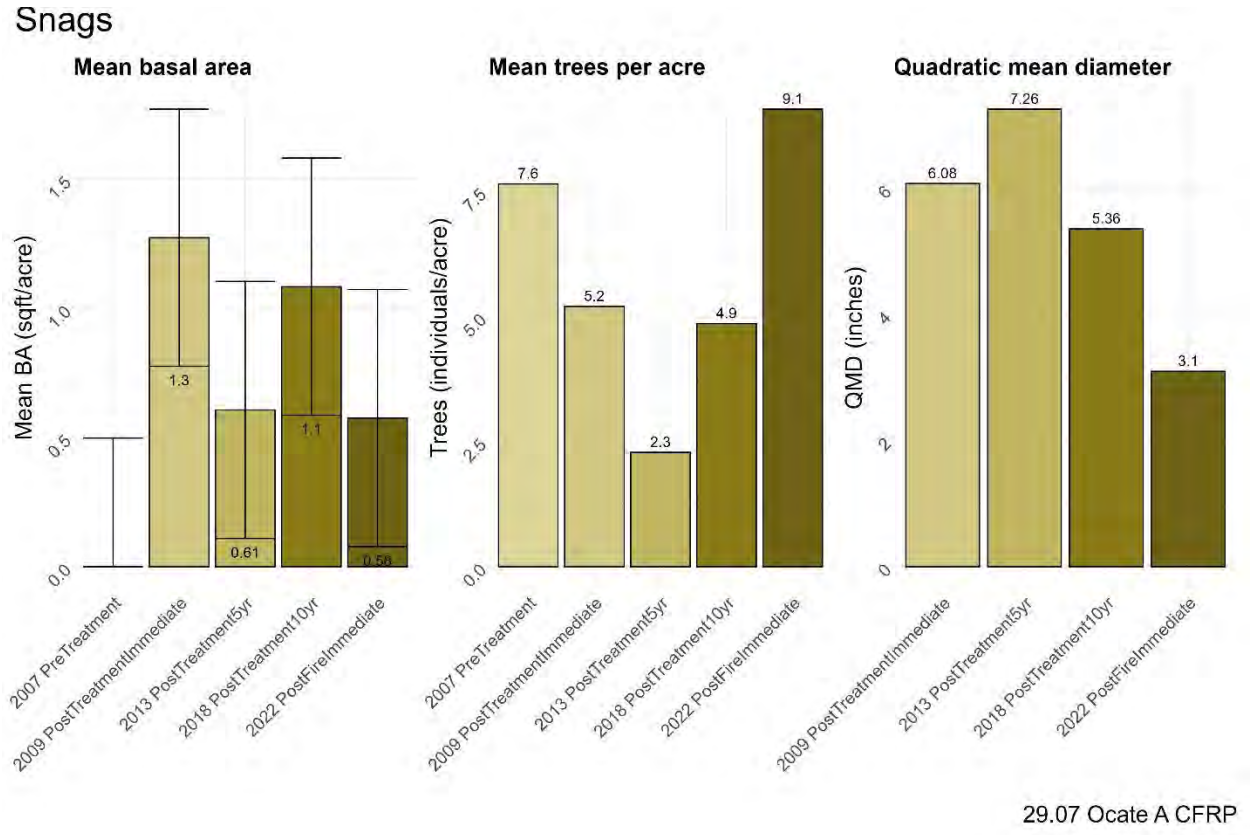

Figure 6. *Mean basal area, mean trees per acre, and quadratic mean diameter for snags across all measurement periods (>1" DBH). DBH and height were not recorded for snags in 2007.*

Damages

Damages to trees were not recorded during the 2007, 2009, and 2013 monitoring periods. Damages below listed for those monitoring periods were added recently based on crew comments.

In the 2009 Post-Treatment Immediate monitoring period, 2 instances of fire damage and 2 instances of uncharacteristic forked tops were recorded. The most common damages recorded in 2018 included witches' broom deformities as well as a dead or forked top. The count of damages increases dramatically in the 2022 monitoring period, immediately post-fire. This is in large part due to the number of trees showing fire damage (193), as well as further damage caused by fire, and fire causing trees to become more vulnerable to pests or parasites.

Please note that damage observations shown in Figure 7 does not necessarily equate to number of trees damaged; this is a tally of instances of damage, and one individual tree may have multiple categories of damage. Additionally, variability in damage data collection by crews contributes to some variation in damages recorded for each measurement period.

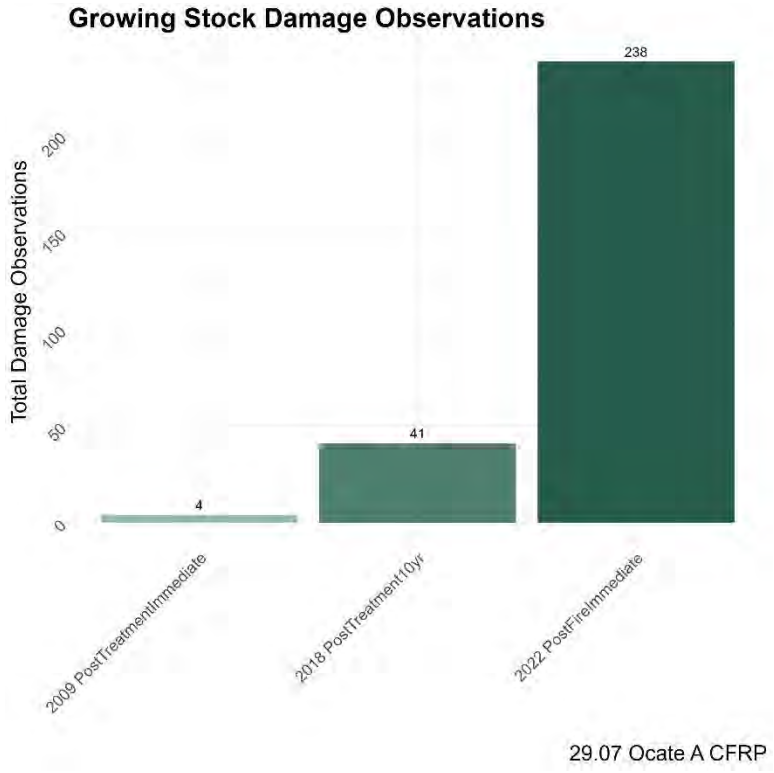

***Figure 7**. Counts of damages recorded to growing stock trees in each monitoring year.*

***Table 2**. List of damages observed on living trees across measurement periods by code and description. Count represents the number of observations of each damage type, individual trees may have more than one damage recorded.*

29.07 Ocate A CFRP : Growing Stock Trees by Damage Code			
Monitoring.Status	**Damage**	**Count**	**Description**
2009 PostTreatmentImmediate	30000	2	Fire scar, char and/or scorch
	99004	2	Uncharacteristic forked top, above or below DBH
2018 PostTreatment10yr	99002	9	Dead top
	25000	8	Witches' broom
	99004	7	Uncharacteristic forked top, above or below DBH
	99006	4	Uncharacteristic crooked or twisted bole
	99037	3	Leaning bole
	23001	2	Mistletoe
	50008	2	Lightning scar
	99000	2	Physical effects of damage
	10000	1	General insects
	30000	1	Fire scar, char and/or scorch
	70000	1	Human caused damage
	99016	1	Unusually sparse foliage
2022 PostFireImmediate	30000	193	Fire scar, char and/or scorch
	99000	10	Physical effects of damage
	10000	8	General insects
	99037	6	Leaning bole
	41010	5	Bird damage
	25000	4	Witches' broom
	99002	4	Dead top
	23000	2	Epiphytic/parasitic plants
	99004	2	Uncharacteristic forked top, above or below DBH
	99026	2	Wounds or cracks
	50008	1	Lightning scar
	99016	1	Unusually sparse foliage

We see a similar trend in damage counts from the post-treatment years 2013 and 2018 to 2022, with fire damage contributing to the majority of the increase in observations.

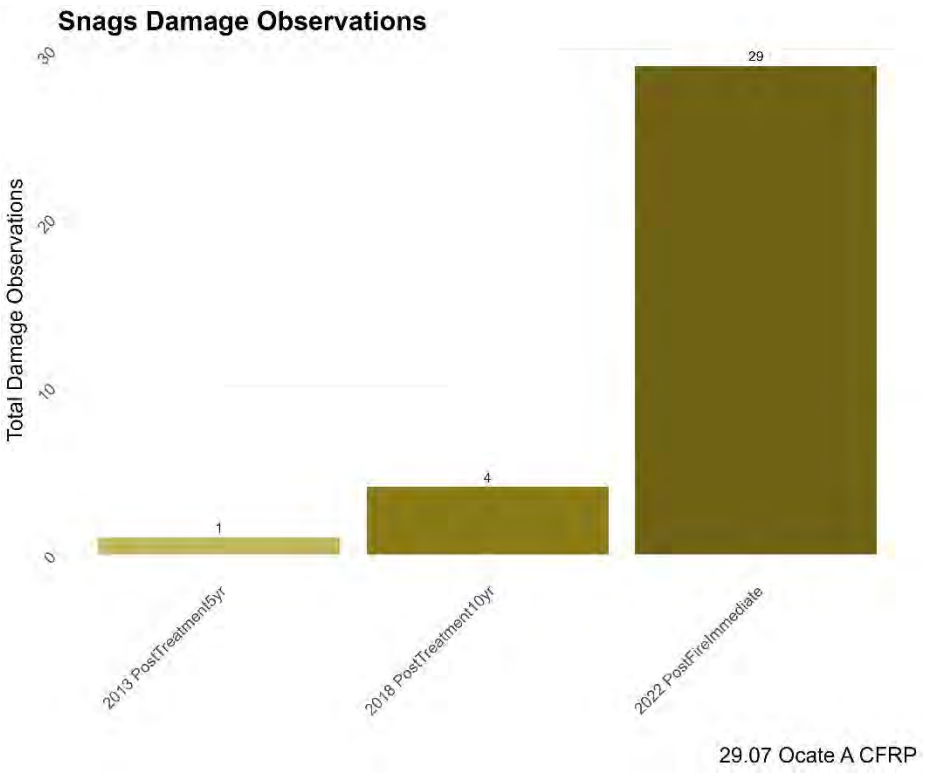

Figure 8. *Count of damages recorded to dead trees in each monitoring year.*

Table 3*. List of damages observed on dead trees across measurement periods by code and description. Count represents the number of observations of each damage type, individual trees may have more than one damage recorded.*

29.07 Ocate A CFRP : Snags by Damage Code			
Monitoring.Status	**Damage**	**Count**	**Description**
2013 PostTreatment5yr	99001	1	Broken top
2018 PostTreatment10yr	99001	3	Broken top
2022 PostFireImmediate	30000	22	Fire scar, char and/or scorch
	25000	1	Witches' broom
	99000	1	Physical effects of damage
	99001	1	Broken top

Char & Scorch

Immediately post-wildfire, char height (highest point of blackened bark) averaged 5.7 feet and scorch height (highest point of heat-killed foliage/needles) averaged 20 feet. Out of all trees, 66.4% were charred and 57.1% were scorched. This shows that flame length stayed low through much of the project area. Even where flame length was able to reach the tree crowns, the flames did not reach the full height of most trees (mean scorch height 20ft, mean tree height 39ft pre-fire).

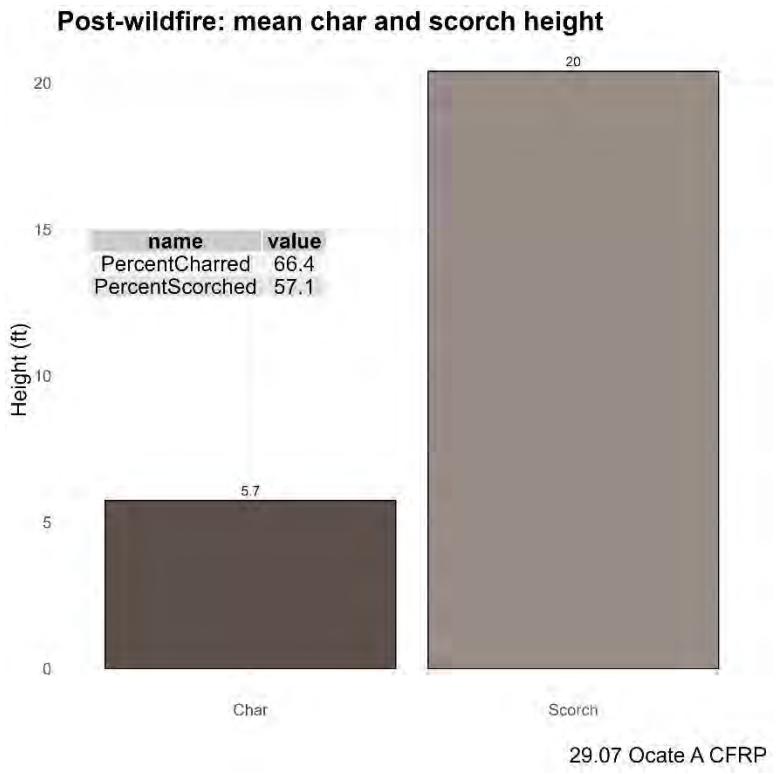

***Figure 9**. Mean char and scorch heights for trees measured immediately post-wildfire. Mean values represent averages of plot means.*

Seedling, Saplings, & Shrubs

Shrub seedlings and saplings were not recorded in 2007 or 2009 – only tree species were recorded. Crews did not differentiate between live and dead seedlings or saplings in 2007, 2009, or 2013.

Immediately post-treatment, tree seedling density shot up from 590 seedlings per acre to 5400 seedlings per acre – regeneration is known to increase when tree canopies are opened. This initial pulse of regeneration had slowed by 2013, then increased again in 2018. Shrub seedlings and saplings and tree saplings experienced a similar pattern – increasing in 2018. Densities of all living regeneration decreased immediately post-fire due to fire kill: dead seedlings and sapling densities increased in tandem. Future monitoring will show whether the fire encouraged or discouraged regeneration in following seasons. Figures showing regeneration densities by species are included in the Supplementary Figures (Figures 30-34).

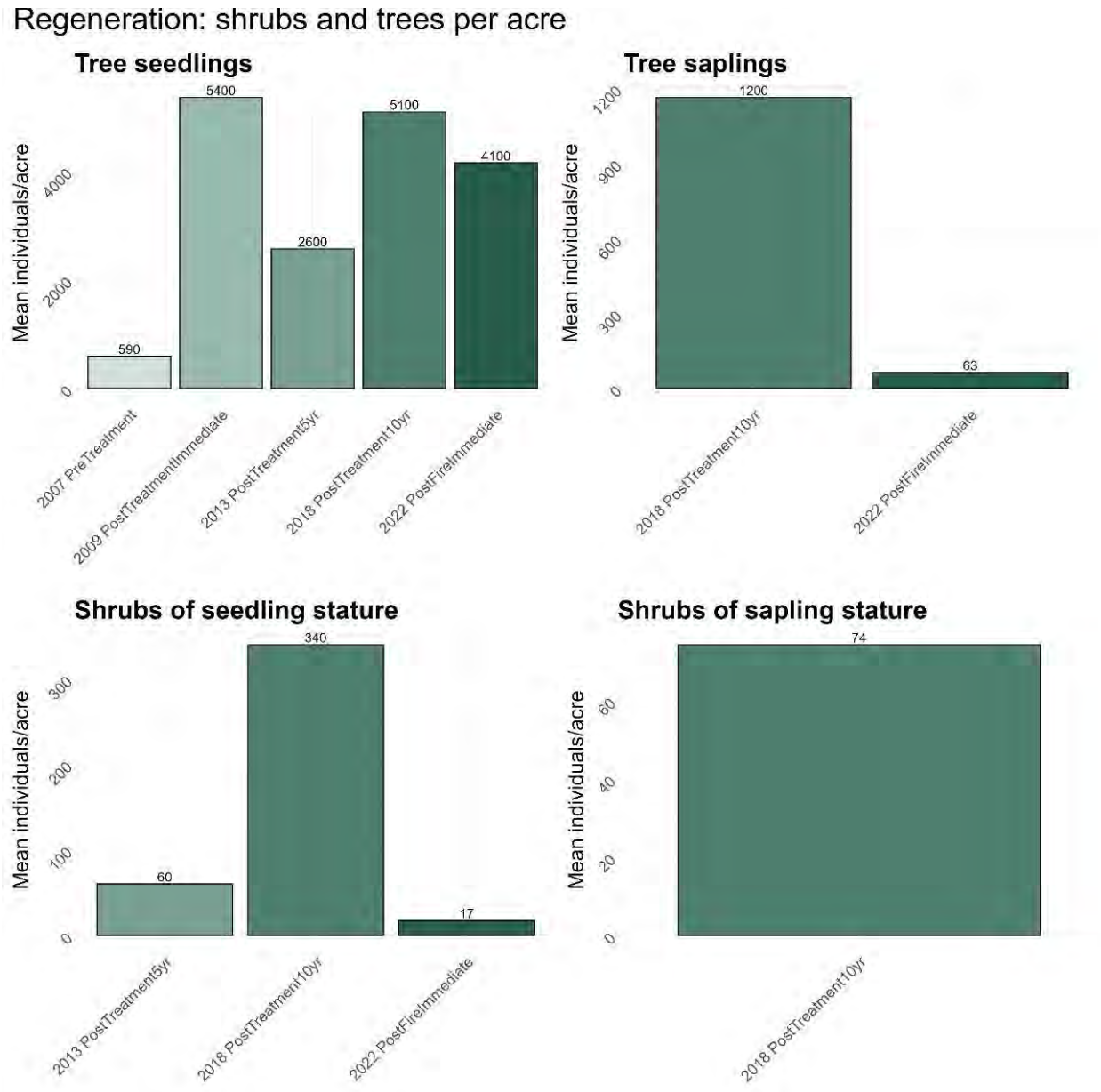

***Figure 10**. Mean densities of living seedlings and saplings of tree and shrub species. Shrub regeneration was not recorded in 2007 or 2009.*

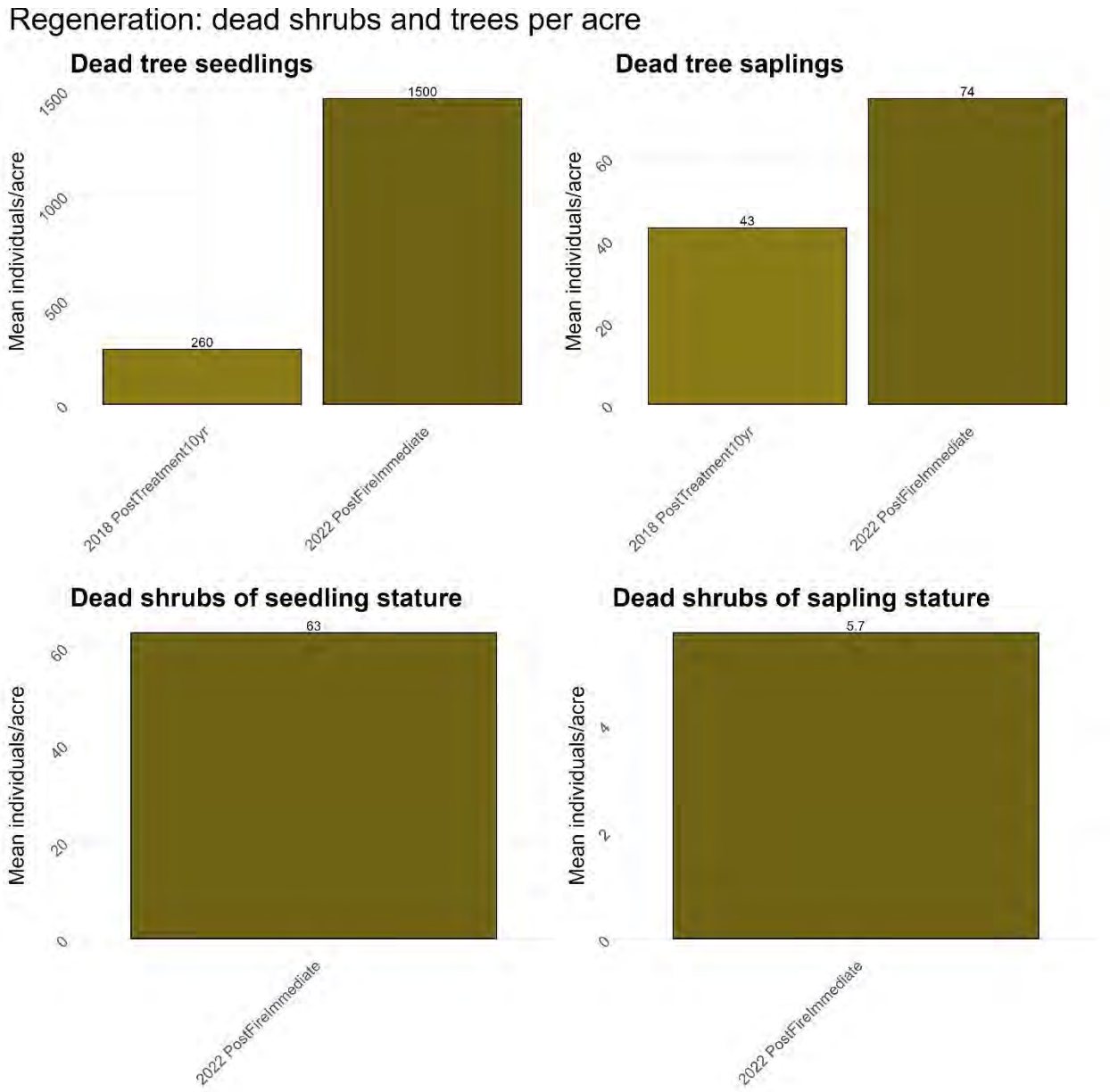

Figure 11. *Mean densities of dead seedlings and saplings of tree and shrub species. Dead regeneration was not recorded in 2007, 2009, or 2013.*

Stand Tables

Stand tables provide another way to visualize trees in an area. They represent the number of trees per acre in certain diameter classes and provide other summary values in a concise format.

***Table 4**. Stand table of forestland species metrics for the 2007 pretreatment measurement period*

Woodland Species		**Saplings**			**Pole**			**Mature Trees**											**Total by Species**	**%Species for all G-Stock**
Diameter Class		***0***	***2***	***4***	***6***	***8***	***10***	***12***	***14***	***16***	***18***	***20***	***22***	***24***	***26***	***28***	***30***	***32+***		
PIED	COUNT	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	***3.0***	
Pinon pine	TPA	0.0	1.1	0.0	0.0	0.0	0.0	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***1.7***	***0.72%***
	BA/AC	0.0	0.01	0.0	0.0	0.0	0.0	0.45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.46***	***0.43%***
	AVE HT. (HL)	0	6	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0		
QUGA	COUNT	0	12	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	***20.0***	
Gambel oak	TPA	0.0	6.9	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***11***	***4.8%***
	BA/AC	0.0	0.19	0.35	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.54***	***0.51%***
	AVE HT. (HL)	0	12	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Woodland Species	***COUNT***	***0***	***14***	***8***	***0***	***0***	***0***	***1***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***23***	
Sub-total	***TPA***	***0.0***	***8.0***	***4.6***	***0.0***	***0.0***	***0.0***	***0.57***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***13***	***5.5%***
	BA/AC	***0.0***	***0.19***	***0.35***	***0.0***	***0.0***	***0.0***	***0.45***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.99***	***0.94%***
	AVE HT. (HL)	***0***	***12***	***16***	***0***	***0***	***0***	***50***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***		
Summary by Size	***TPA***		***13***			***0.0***							***0.57***						***13***	
Class for	***TPA %***		***96%***			***0.0%***							***4.3%***						***100%***	
Woodland Species	***BA/AC***		***0.55***			***0.0***							***0.45***						***0.99***	
	BA/AC %		***55%***			***0.0%***							***45%***						***100%***	
	QUADRATIC MEAN DIA.		***2.82***			***0.0***							***12.0***						***3.73***	
	AVE HT. (HL)		***14***			***0***							***50***						***30***	

Forestland Species		Saplings			Pole			Mature Trees											Total by Species & Covertype	%Species for all G-Stock
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*		
PIPO Ponderosa pine	COUNT	1	21	67	80	76	62	35	23	7	8	10	2	1	0	0	0	0	393	
	TPA	0.57	12	38	46	43	35	20	13	4.0	4.6	5.7	1.1	0.57	0.0	0.0	0.0	0.0	225	94%
	BA/AC	0.0	0.33	3.3	8.5	15	19	15	14	5.5	7.7	12	3.1	1.7	0.0	0.0	0.0	0.0	105	99%
	AVE HT. (HL)	6.0	14	22	33	41	48	49	55	59	55	65	57	75	0.0	0.0	0.0	0.0		
Forestland	*COUNT*	*1*	*21*	*67*	*80*	*76*	*62*	*35*	*23*	*7*	*8*	*10*	*2*	*1*	*0*	*0*	*0*	*0*	393	
Species Sub-total	*TPA*	*0.57*	*12.0*	*38*	*46*	*43*	*35*	*20*	*13*	*4.0*	*4.6*	*5.7*	*1.1*	*0.57*	*0.0*	*0.0*	*0.0*	*0.0*	225	94%
	BA/AC	*0.0*	*0.33*	*3.3*	*8.5*	*15*	*19*	*15*	*14*	*5.5*	*7.7*	*12*	*3.1*	*1.7*	*0.0*	*0.0*	*0.0*	*0.0*	105	99%
	AVE HT. (HL)	*6*	*14*	*22*	*33*	*41*	*48*	*49*	*55*	*59*	*55*	*65*	*57*	*75*	*0*	*0*	*0*	*0*		
Summary by Size Class for Forestland Species	*TPA*		*51*			*125*							*49*						225	
	TPA %		*23%*			*55%*							*22%*						100%	
	BA/AC		*3.6*			*42*							*59*						105	
	BA/AC %		*3.5%*			*40%*							*56%*						100%	
	QUADRATIC MEAN DIA.		*3.62*			*7.90*							*14.8*						9.26	
	AVE HT. (HL)		*21*			*42*							*57*						49	

Stand Total		Saplings			Pole			Tree or Sawlog											Total by Class, Growing Stock & Dead	% by Class, Growing Stock vs Dead
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*		
Growing Stock (All living trees in woodland & forestland)	COUNT	1	35	75	80	76	62	36	23	7	8	10	2	1	0	0	0	0	416	
	TPA	0.57	20	43	46	43	35	21	13	4.0	4.6	5.7	1.1	0.57	0.0	0.0	0.0	0.0	238	100%
	BA/AC	0.0	0.53	3.7	8.5	15	19	16	14	5.5	7.7	12	3.1	1.7	0.0	0.0	0.0	0.0	106	100%
	AVE HT, HL	6	13	21	33	41	48	49	55	59	55	65	57	75	0	0	0	0		
Summary by Size Class (All living trees in woodland & forestland)	TPA		63			125							50						238	
	TPA %		27%			52%							21%						100%	
	BA/AC		4.2			42							59						106	
	BA/AC %		3.9%			40%							56%						100%	
	QMD MEAN DIA.		3.48			7.90							14.8						9.04	
	AVE HT, HL		20			42							57						49	
Dead (All dead trees in woodland & forestland)	COUNT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	
	TPA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
	BA/AC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
	AVE HT, HL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total for all sample trees including	COUNT	1	35	75	80	76	62	36	23	7	8	10	2	1	0	0	0	0	416	
	TPA	0.57	20	43	46	43	35	21	13	4.0	4.6	5.7	1.1	0.57	0.0	0.0	0.0	0.0	238	100%
	BA/AC	0.00	0.53	3.7	8.5	15	19	16	14	5.5	7.7	12	3.1	1.7	0.0	0.0	0.0	0.0	106	100%

Table 5. *Stand table of woodland and forestland species metrics for the 2013 post treatment 5year measurement period*

Woodland Species		Saplings			Pole			Mature Trees											Total by Species	%Species for all G-Stock
Diameter Class		***0***	***2***	***4***	***6***	***8***	***10***	***12***	***14***	***16***	***18***	***20***	***22***	***24***	***26***	***28***	***30***	***32+***		
JUMO	COUNT	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	***2.0***	
One-seed juniper	TPA	0.0	0.29	0.0	0.0	0.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.57***	***0.80%***
	BA/AC	0.0	0.0	0.0	0.0	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.08***	***0.16%***
	AVE HT. (HL)	0	5	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0		
JUSC2	COUNT	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	***3.0***	
Rocky Mnt juniper	TPA	0.29	0.0	0.0	0.0	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.86***	***1.2%***
	BA/AC	0.0	0.0	0.0	0.0	0.18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.18***	***0.34%***
	AVE HT. (HL)	6	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0		
QUGA	COUNT	0	4	6	3	2	0	0	0	0	0	0	0	0	0	0	0	0	***15***	
Gambel oak	TPA	0.0	1.1	1.7	0.86	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***4.3***	***6.0%***
	BA/AC	0.0	0.04	0.16	0.13	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.54***	***1.0%***
	AVE HT. (HL)	0	9	12	12	24	0	0	0	0	0	0	0	0	0	0	0	0		
Woodland Species	***COUNT***	***1***	***6***	***6***	***3***	***5***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***21***	
Sub-total	***TPA***	***0.29***	***1.7***	***1.7***	***0.86***	***1.4***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***6.0***	***8.4%***
	BA/AC	***0.0***	***0.05***	***0.16***	***0.13***	***0.47***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.81***	***1.5%***
	AVE HT. (HL)	***6***	***9***	***12***	***12***	***22***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***		
Summary by Size	***TPA***		***3.7***			***2.3***							***0.0***						***6.0***	
Class for	***TPA %***		***62%***			***38%***							***0.0%***						***100%***	
Woodland Species	***BA/AC***		***0.21***			***0.60***							***0.0***						***0.81***	
	BA/AC %		***26%***			***74%***							***0.0%***						***100%***	
	QUADRATIC MEAN DIA.		***3.23***			***6.94***							***0.00***						***4.98***	
	AVE HT. (HL)		***11***			***20***							***0***						***18***	

Forestland Species		Saplings			Pole			Mature Trees											Total by Species & Covertype	%Species for all G-Stock
Diameter Class		***0***	***2***	***4***	***6***	***8***	***10***	***12***	***14***	***16***	***18***	***20***	***22***	***24***	***26***	***28***	***30***	***32***		
PIPO	COUNT	0	1	2	11	33	70	46	23	17	10	9	5	1	0	0	0	0	***228***	
Ponderosa pine	TPA	0.0	0.29	0.57	3.1	9.4	20	13	6.6	4.9	2.9	2.6	1.4	0.29	0.0	0.0	0.0	0.0	***65***	***92%***
	BA/AC	0.0	0.0	0.06	0.66	3.2	11	10	6.8	6.4	4.8	5.5	3.7	0.85	0.0	0.0	0.0	0.0	***53***	***98%***
	AVE HT. (HL)	0.0	5.0	27	21	31	38	40	46	52	54	56	59	53	0.0	0.0	0.0	0.00		
Forestland	***COUNT***	***0***	***1***	***2***	***11***	***33***	***70***	***46***	***23***	***17***	***10***	***9***	***5***	***1***	***0***	***0***	***0***	***0***	***228***	
Species Sub-	***TPA***	***0.0***	***0.29***	***0.57***	***3.1***	***9.4***	***20***	***13***	***6.6***	***4.9***	***2.9***	***2.6***	***1.4***	***0.29***	***0.0***	***0.0***	***0.0***	***0.0***	***65***	***92%***
total	***BA/AC***	***0.0***	***0.0***	***0.06***	***0.66***	***3.2***	***11***	***10***	***6.8***	***6.4***	***4.8***	***5.5***	***3.7***	***0.85***	***0.0***	***0.0***	***0.0***	***0.0***	***53***	***98%***
	AVE HT. (HL)	***0***	***5***	***27***	***21***	***31***	***38***	***40***	***46***	***52***	***54***	***56***	***59***	***53***	***0***	***0***	***0***	***0***		
Summary by	***TPA***		***0.86***			***33***							***32***						***65***	
Size Class for	***TPA %***		***1.3%***			***50%***							***49%***						***100%***	
Forestland	***BA/AC***		***0.06***			***15***							***38***						***53***	
Species	***BA/AC %***		***0.11%***			***28%***							***72%***						***100%***	
	QUADRATIC MEAN DIA.		***3.57***			***9.12***							***14.9***						***12.2***	
	AVE HT. (HL)		***26***			***35***							***49***						***46***	

Stand Total		Saplings			Pole			Tree or Sawlog											Total by Class,Growing Stock & Dead	% by Class, Growing Stock vs Dead
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*		
Growing Stock (All living trees in woodland & forestland)	**COUNT**	1	7	8	14	38	70	46	23	17	10	9	5	1	0	0	0	0	***249***	
	TPA	0.29	2.0	2.3	4.0	11	20	13	6.6	4.9	2.9	2.6	1.4	0.29	0.0	0.0	0.0	0.0	***71***	***97%***
	BA/AC	0.0	0.05	0.22	0.79	3.7	11	10	6.8	6.4	4.8	5.5	3.7	0.85	0.0	0.0	0.0	0.0	***54***	***99%***
	AVE HT, HL	6	9	16	20	30	38	40	46	52	54	56	59	53	0	0	0	0		
Summary by Size Class (All living trees in woodland & forestland)	**TPA**		4.6			35							32						***71***	
	TPA %		6.4%			49%							45%						***100%***	
	BA/AC		0.27			15							38						***54***	
	BA/AC %		0.50%			29%							71%						***100%***	
	QMD MEAN DIA.		3.29			8.99							14.9						***11.8***	
	AVE HT, HL		15			35							49						***45***	
Dead (All dead trees in woodland & forestland)	**COUNT**	0	2	4	0	0	0	1	1	0	0	0	0	0	0	0	0	0	***8.0***	
	TPA	0.0	0.57	1.1	0.0	0.0	0.0	0.29	0.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***2.3***	***3.1%***
	BA/AC	0.0	0.02	0.09	0.0	0.0	0.0	0.20	0.30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.61***	***1.1%***
	AVE HT, HL	0	10	10	0	0	0	23	8	0	0	0	0	0	0	0	0	0	***13***	
Total for all sample trees including	**COUNT**	1	9	12	14	38	70	47	24	17	10	9	5	1	0	0	0	0	***257***	
	TPA	0.29	2.6	3.4	4.0	11	20	13	6.9	4.9	2.9	2.6	1.4	0.29	0.0	0.0	0.0	0.0	***73***	***100%***
	BA/AC	0.00	0.07	0.31	0.79	3.7	11	10	7.1	6.4	4.8	5.5	3.7	0.85	0.0	0.0	0.0	0.0	***54***	***100%***

Table 6. *Stand table of woodland and forestland species metrics for the 2018 post treatment 10yr measurement period*

Woodland Species		Saplings			Pole			Mature Trees											Total by Species	%Species for all G-Stock
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32+*		
JUMO	COUNT	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*3.0*	
One-seed juniper	TPA	0.0	0.57	0.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.86*	*1.2%*
	BA/AC	0.0	0.01	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.02*	*0.04%*
	AVE HT. (HL)	0.0	12	12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
JUSC2	COUNT	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	*2.0*	
Rocky Mnt juniper	TPA	0.0	0.0	0.0	0.0	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.57*	*0.77%*
	BA/AC	0.0	0.0	0.0	0.0	0.19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.19*	*0.35%*
	AVE HT. (HL)	0.0	0.0	0.0	0.0	29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
QUGA	COUNT	0	4	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	*10*	
Gambel oak	TPA	0.0	1.1	0.29	1.1	0.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*2.9*	*3.9%*
	BA/AC	0.0	0.03	0.01	0.22	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.35*	*0.63%*
	AVE HT. (HL)	0.0	13	18	18	15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
QUPA4	COUNT	0	12	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	*17*	
Wavy leaf oak	TPA	0.0	3.4	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*4.9*	*6.6%*
	BA/AC	0.0	0.04	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	*0.14*	*0.25%*
	AVE HT. (HL)	0.0	8	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Woodland	*COUNT*	*0*	*18*	*7*	*4*	*3*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	32	
Species Sub-total	*TPA*	*0.0*	*5.1*	*2.0*	*1.1*	*0.86*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*9.1*	*12%*
	BA/AC	*0.0*	*0.08*	*0.13*	*0.22*	*0.28*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.70*	*1.3%*
	AVE HT. (HL)	*0.0*	*10*	*10*	*18*	*24*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*		
Summary by Size	*TPA*		*7.1*			*2.0*							*0.0*						*9.1*	
Class for	*TPA %*		*78%*			*22%*							*0.0%*						*100%*	
Woodland	*BA/AC*		*0.21*			*0.50*							*0.0*						*0.70*	
Species	*BA/AC %*		*29%*			*71%*							*0.0%*						*100%*	
	QUADRATIC MEAN DIA.		*2.30*			*6.75*							*0.0*						*3.76*	
	AVE HT. (HL)		*10*			*22*							*0*						*18*	

Forestland Species		Saplings			Pole			Mature Trees											Total by Species & Covertype	%Species for all G-Stock
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*		
PIPO	COUNT	0	2	3	11	34	55	50	33	12	12	8	5	2	0	0	0	0	*227*	
Ponderosa pine	TPA	0.0	0.57	0.86	3.1	9.7	16	14	9.4	3.4	3.4	2.3	1.4	0.57	0.0	0.0	0.0	0.0	*65*	*88%*
	BA/AC	0.0	0.01	0.09	0.64	3.3	8.5	11	10	4.8	6.0	5.1	3.6	1.7	0.0	0.0	0.0	0.0	*55*	*99%*
	AVE HT. (HL)	0.0	9.3	21	27	29	34	39	44	54	48	54	63	51	0.0	0.0	0.0	0.0		
Forestland	*COUNT*	*0*	*2*	*3*	*11*	*34*	*55*	*50*	*33*	*12*	*12*	*8*	*5*	*2*	*0*	*0*	*0*	*0*	*227*	
Species Sub-total	*TPA*	*0.0*	*0.57*	*0.86*	*3.1*	*9.7*	*16*	*14*	*9.4*	*3.4*	*3.4*	*2.3*	*1.4*	*0.57*	*0.0*	*0.0*	*0.0*	*0.0*	*65*	*88%*
	BA/AC	*0.0*	*0.01*	*0.09*	*0.64*	*3.3*	*8.5*	*11*	*9.7*	*4.8*	*6.0*	*5.1*	*3.6*	*1.7*	*0.0*	*0.0*	*0.0*	*0.0*	*55*	*99%*
	AVE HT. (HL)	*0.0*	*9*	*21*	*27*	*29*	*34*	*39*	*44*	*54*	*48*	*54*	*63*	*51*	*0.0*	*0.0*	*0.0*	*0.0*		
Summary by	*TPA*		*1.4*			*29*							*35*						*65*	
Size Class for	*TPA %*		*2.2%*			*44%*							*54%*						*100%*	
Forestland	*BA/AC*		*0.10*			*12*							*42*						*55*	
Species	*BA/AC %*		*0.19%*			*23%*							*77%*						*100%*	
	QUADRATIC MEAN DIA.		*3.62*			*8.95*							*14.9*						*12.4*	
	AVE HT. (HL)		*20*			*32*							*48*						*44*	

Stand Total		Saplings			Pole			Tree or Sawlog											Total by Class,Growing Stock & Dead	% by Class, Growing Stock vs Dead
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*		
Growing Stock (All living trees in woodland & forestland)	**COUNT**	0	20	10	15	37	55	50	33	12	12	8	5	2	0	0	0	0	***259***	
	TPA	0.0	5.7	2.9	4.3	11	16	14	9.4	3.4	3.4	2.3	1.4	0.57	0.0	0.0	0.0	0.0	***74***	***94%***
	BA/AC	0.0	0.09	0.22	0.85	3.6	8.5	11	9.7	4.8	6.0	5.1	3.6	1.7	0.0	0.0	0.0	0.0	***55***	***98%***
	AVE HT, HL	0.0	10	15	25	29	34	39	44	54	48	54	63	51	0	0	0	0		
Summary by Size Class (All living trees in woodland & forestland)	**TPA**		8.6			31							35						***74***	
	TPA %		12%			41%							47%						***100%***	
	BA/AC		0.31			13							42						***55***	
	BA/AC %		0.56%			23%							76%						***100%***	
	QMD MEAN DIA.		2.57			8.82							14.86						***11.7***	
	AVE HT, HL		13			32							48						***44***	
Dead (All dead trees in woodland & forestland)	**COUNT**	0	10	2	0	1	1	1	0	0	1	0	0	0	0	0	0	0	***16***	
	TPA	0.0	2.9	0.57	0.0	0.29	0.29	0.29	0.0	0.0	0.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***4.6***	***5.8%***
	BA/AC	0.0	0.07	0.03	0.0	0.11	0.18	0.22	0.0	0.0	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***1.1***	***1.9%***
	AVE HT, HL	0	8	13	0	8	25	7	0	0	23	0	0	0	0	0	0	0	***17***	
Total for all sample trees including	**COUNT**	0	30	12	15	38	56	51	33	12	13	8	5	2	0	0	0	0	***275***	
	TPA	0.0	8.6	3.4	4.3	11	16	15	9.4	3.4	3.7	2.3	1.4	0.57	0.0	0.0	0.0	0.0	***79***	***100%***
	BA/AC	0.0	0.15	0.25	0.85	3.7	8.7	11	9.7	4.8	6.4	5.1	3.6	1.7	0.0	0.0	0.0	0.0	***56***	***100%***

***Table 7**. Stand table of forestland species metrics for the 2022 post-wildfire immediate measurement period*

Woodland Species		**Saplings**			**Pole**			**Mature Trees**											***Total by Species***	***%Species for all G-Stock***
Diameter Class		***0***	***2***	***4***	***6***	***8***	***10***	***12***	***14***	***16***	***18***	***20***	***22***	***24***	***26***	***28***	***30***	***32+***		
JUMO	COUNT	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	***7.0***	
One-seed juniper	TPA	0.0	1.4	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***2.0***	***0.0***
	BA/AC	0.0	0.01	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.05***	***0.09%***
	AVE HT. (HL)	0.0	16	16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
JUSC2	COUNT	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	***2.0***	
Rocky Mnt juniper	TPA	0.0	0.0	0.0	0.0	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.57***	***0.78%***
	BA/AC	0.0	0.0	0.0	0.0	0.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.21***	***0.36%***
	AVE HT. (HL)	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0		
QUGA	COUNT	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	***6.0***	
Gambel oak	TPA	0.0	0.0	0.0	1.1	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***1.7***	***2.3%***
	BA/AC	0.0	0.0	0.0	0.19	0.16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.35***	***0.60%***
	AVE HT. (HL)	0	0	0	16	16	0	0	0	0	0	0	0	0	0	0	0	0		
QUERC	COUNT	0	10	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	***15***	
Oak	TPA	0.0	2.9	0.86	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***4.3***	***5.9%***
	BA/AC	0.0	0.05	0.07	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.22***	***0.38%***
	AVE HT. (HL)	0	11	17	23	0	0	0	0	0	0	0	0	0	0	0	0	0		
Woodland Species	***COUNT***	***0***	***15***	***5***	***6***	***4***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***30***	
Sub-total	***TPA***	***0.0***	***4.29***	***1.43***	***1.71***	***1.14***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***8.6***	***12%***
	BA/AC	***0.0***	***0.06***	***0.11***	***0.29***	***0.37***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.82***	***1.4%***
	AVE HT. (HL)	***0***	***12***	***17***	***18***	***25***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***	***0***		
Summary by Size Class for Woodland Species	***TPA***		***5.7***			***2.9***							***0.0***						***8.6***	
	TPA %		***67%***			***33%***							***0.0%***						***100%***	
	BA/AC		***0.17***			***0.65***							***0.0***						***0.82***	
	BA/AC %		***21%***			***79%***							***0.0%***						***100%***	
	QUADRATIC MEAN DIA.		***2.35***			***6.47***							***0***						***4.20***	
	AVE HT. (HL)		***15***			***22***							***0***						***21***	

Forestland Species		Saplings			Pole			Mature Trees											Total by Species &	%Species for all G-Stock
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*		
PIPO Ponderosa pine	COUNT	0	7	4	7	31	45	55	32	17	10	9	7	2	0	0	0	0	**226**	
	TPA	0.0	2.0	1.1	2.0	8.9	13	16	9.1	4.9	2.9	2.6	2.0	0.6	0.0	0.0	0.0	0.0	**65**	**88%**
	BA/AC	0.0	0.04	0.11	0.45	3.2	7.1	12	9.5	6.7	4.9	5.6	5.2	1.8	0.0	0.0	0.0	0.0	**57**	**99%**
	AVE HT. (HL)	0.0	11	24	29	35	42	47	50	55	63	61	74	68	0.0	0.0	0.0	0.0		
Forestland Species Sub-total	***COUNT***	***0***	***7***	***4***	***7***	***31***	***45***	***55***	***32***	***17***	***10***	***9***	***7***	***2***	***0***	***0***	***0***	***0***	**226**	
	TPA	***0.0***	***2.0***	***1.1***	***2.0***	***8.9***	***12.9***	***15.7***	***9.1***	***4.9***	***2.9***	***2.6***	***2.0***	***0.6***	***0.0***	***0.0***	***0.0***	***0.0***	**65**	**88%**
	BA/AC	***0.0***	***0.04***	***0.11***	***0.5***	***3.2***	***7.1***	***12.1***	***9.5***	***6.7***	***4.9***	***5.6***	***5.2***	***1.8***	***0.0***	***0.0***	***0.0***	***0.0***	**57**	**99%**
	AVE HT. (HL)	***0***	***11***	***24***	***29***	***35***	***42***	***47***	***50***	***55***	***63***	***61***	***74***	***68***	***0.0***	***0.0***	***0.0***	***0.0***		
Summary by Size Class for Forestland Species	***TPA***		***3.1***			***24***							***38***						**65**	
	TPA %		***0.0***			***0.4***							***0.58***						***100%***	
	BA/AC		***0.16***			***11***							***46***						**57**	
	BA/AC %		***0.3%***			***0.2***							***0.81***						***100%***	
	QUADRATIC MEAN DIA.		***3.02***			***9.14***							***14.9***						**12.7**	
	AVE HT. (HL)		***21***			***40***							***56***						**53**	

Stand Total		Saplings			Pole			Tree or Sawlog											Total by Class, Growing Stock & Dead	% by Class, Growing Stock vs Dead
Diameter Class		*0*	*2*	*4*	*6*	*8*	*10*	*12*	*14*	*16*	*18*	*20*	*22*	*24*	*26*	*28*	*30*	*32*		
Growing Stock (All living trees in woodland & forestland)	**COUNT**	0	22	9	13	35	45	55	32	17	10	9	7	2	0	0	0	0	***256***	
	TPA	0.0	6.3	2.6	3.7	10	13	16	9.1	4.9	2.9	2.6	2.0	0.6	0.0	0.0	0.0	0.0	***73***	***89%***
	BA/AC	0.0	0.11	0.22	0.74	3.6	7.1	12	9.5	6.7	4.9	5.6	5.2	1.8	0.0	0.0	0.0	0.0	***58***	***99%***
	AVE HT, HL	0	12	21	25	34	42	47	50	55	63	61	74	68	0	0	0	0		
Summary by Size Class (All living trees in woodland & forestland)	**TPA**		8.9			27							38						***73***	
	TPA %		12%			36%							52%						***100%***	
	BA/AC		0.33			11							46						***58***	
	BA/AC %		0.57%			20%							80%						***100%***	
	QMD MEAN DIA.		2.61			8.89							14.9						***12.0***	
	AVE HT, HL		18			39							56						***52***	
Dead (All dead trees in woodland & forestland)	**COUNT**	0	27	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	***31***	
	TPA	0.0	7.7	0.86	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***8.9***	***11%***
	BA/AC	0.0	0.10	0.07	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***0.57***	***0.97%***
	AVE HT, HL	0	9	25	0	0	0	0	0	27	0	0	0	0	0	0	0	0	***24***	
Total for all sample trees including	**COUNT**	0	49	12	13	35	45	55	32	18	10	9	7	2	0	0	0	0	***287***	
	TPA	0.0	14.0	3.4	3.7	10.0	12.9	15.7	9.1	5.1	2.9	2.6	2.0	0.57	0.0	0.0	0.0	0.0	***82***	***100%***
	BA/AC	0.0	0.20	0.29	0.74	3.6	7.1	12.1	9.5	7.1	4.9	5.6	5.2	1.8	0.0	0.0	0.0	0.0	***58***	***100%***

Understory & Forest Floor Component

Ground & Aerial Cover

Cover data was taken under different protocols during the 2007, 2009, and 2013 monitoring periods. Therefore, values are not directly comparable to each category of cover data collected in the following measurements.

Ground cover of litter, bole, and rock decreased from 2018 PostTreatment10yr to 2022 PostTreatmentImmediate. Conversely, cover of bare soil, gravel, and plant basal increased. The fire consumed bole and litter and exposed bare soils and gravel. The increase in plant basal cover is due to growth of weedy herbaceous plants that colonize disturbed areas.

Immediately post-fire, aerial cover of tree regeneration, shrubs, and graminoids decreased, likely consumed by the fire. Forb cover increased more than four-fold, from 6.4% to 30%, due to the weedy growth described above.

***Table 8**. Mean percent ground cover by monitoring status and category*

* Not recorded **Combined with Graminoids in 2007 monitoring season ***Combined with Bare Soil in 2007 monitoring season

Monitoring Status	Seedlings/Saplings	Shrubs	Graminoids	Forbs	Litter	Bare Soil	Rock
2007 PreTreatment	--*	--*	22 %	--*	91 %	9.1 %	--***
2009 PostTreatment Immediate	--*	0.0 %	15 %	4.6 %	43 %	19 %	18 %
2013 PostTreatment5yr	1.2 %	8.3 %	6.8 %	0.1 %	62 %	12 %	14 %

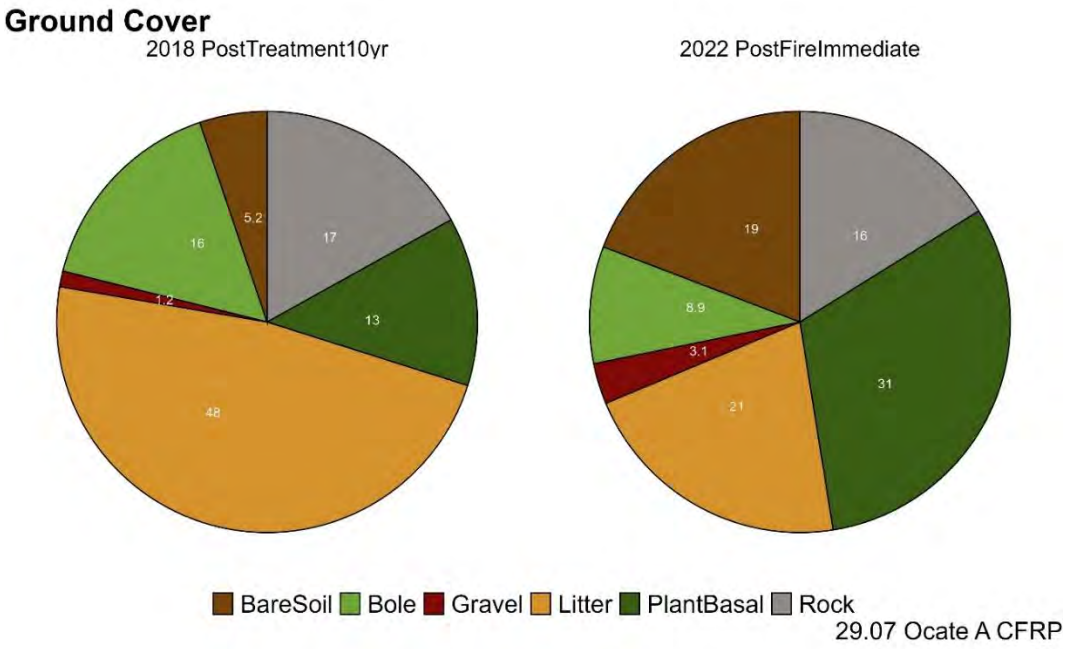

Figure 12. *Mean percent ground cover across plots by monitoring status.*

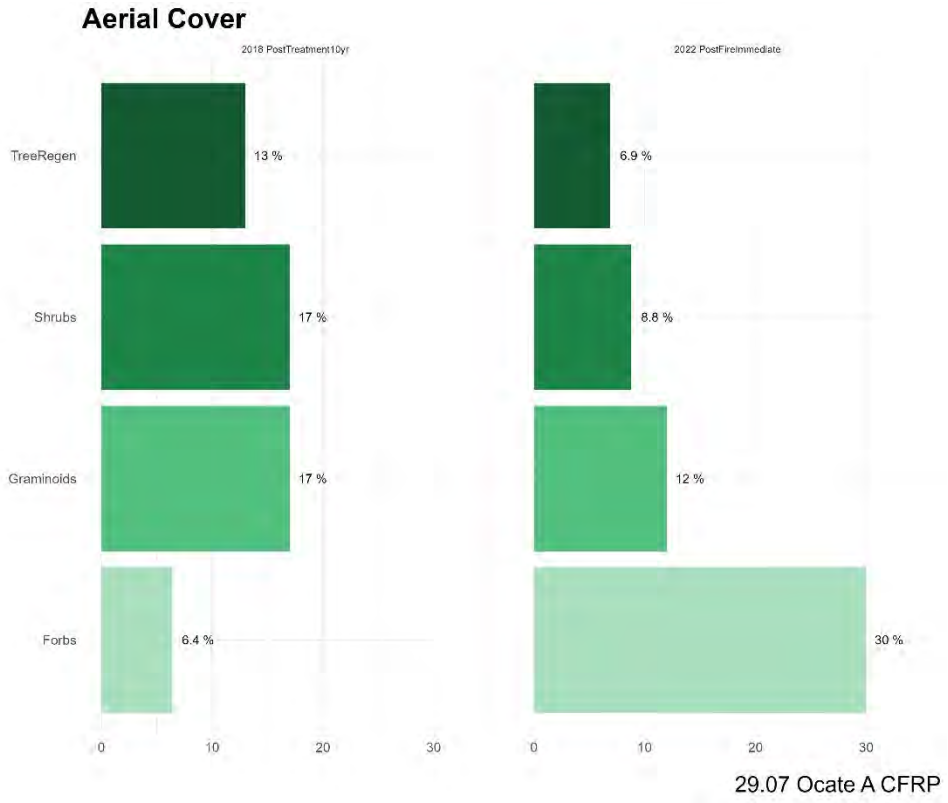

Figure 13*. Mean aerial cover across plots by monitoring status.*

Canopy Cover

Canopy cover was not recorded in 2007, pretreatment. As measured with a densiometer, canopy cover was observed to increased slightly from 31% immediately post-treatment to 36% 5 years post-treatment, decreased to 28% 10 years post-treatment, and finally increased to 45% immediately post-fire. Note that our understanding of the exact cause of the canopy cover variation is limited, and may be in part due to variation in data collection accuracy or technique between crews.

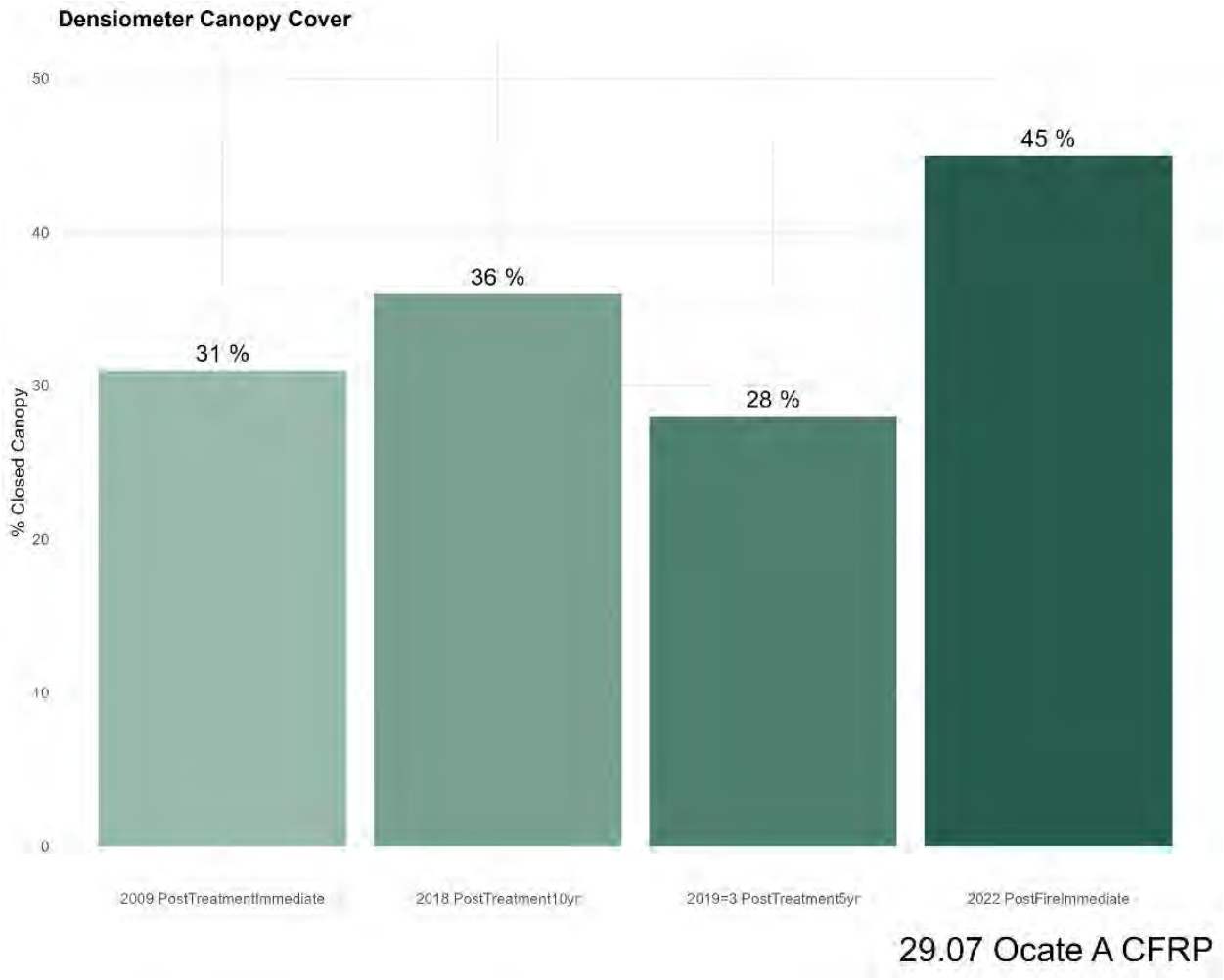

Figure 14. *Mean canopy cover as measured by densiometer across plots by monitoring status.*

Surface Fuels Vegetation (Ladder Fuels)

Ladder fuels were not recorded for the 2007 and 2009 measurement periods. Ladder fuels are recorded in 4 categories, dead herbaceous (HD), live herbaceous (HL), dead woody growth (SD), and live woody growth (SL).

Average biomass of ladder fuels increased from 46 tons per acre 5 years post-treatment to 180 tons per acre 10 years post-treatment. This change is due mostly to an increase in living woody vegetation. After the wildfire in 2022, total fuel biomass increases to 220 tons per acre. In this case, this is because there is less woody vegetation that was consumed or killed by the fire; as well as a substantial jump in live herbaceous cover and height. This is corroborated by photos and ground cover data.

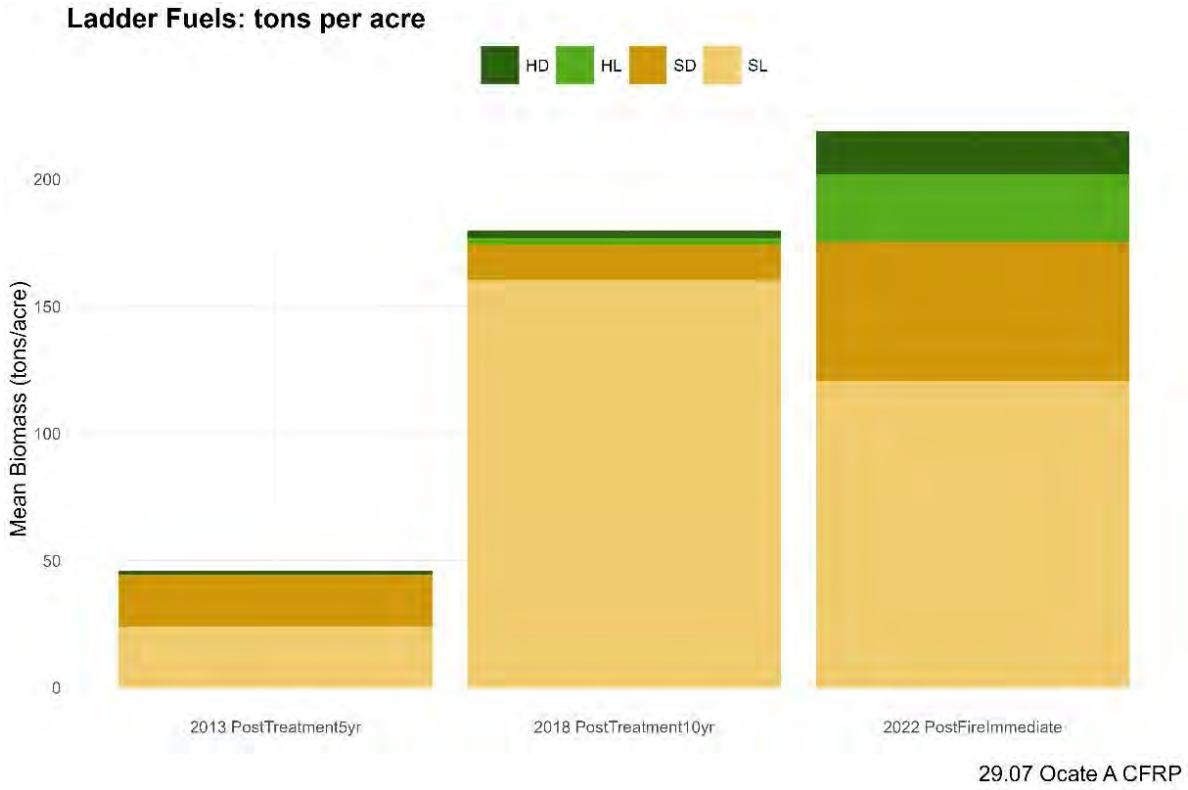

***Figure 15**. Mean biomass in tons per acre by fuel type, across monitoring periods.*

***Table 9**. Average cover, average height, and total biomass for ladder fuels across monitoring periods.*

29.07 Ocate A CFRP					
Monitoring Status	**Vegetation**	**Mean % Cover**	**Mean Height (ft)**	**Mean Biomass (tons/acre)**	**Total Biomass (tons/acre)**
2013 PostTreatment5yr	HD	3.8	0.26	1.4	
	HL	0.32	0.11	0.1	
	SD	3	0.82	20	
	SL	3.9	0.9	24	
					46
2018 PostTreatment10yr	HD	6	0.28	2.9	
	HL	5	0.32	2.5	
	SD	4	0.84	14	
	SL	12	2.2	160	
					180
2022 PostFireImmediate	HD	5.7	0.76	17	
	HL	24	0.79	27	
	SD	3.7	2.2	55	
	SL	9.1	2.3	120	
					220

Surface Fuels

Surface fuels were not recorded in the 2007 or 2009 monitoring periods. Total fine fuels, total wood fuels, and total surface fuels all increased from 5 years post-treatment to 10 years post-treatment, followed by a decrease in all three parameters immediately post-wildfire. This is consistent with how fuels naturally accumulate when ecosystems are undisturbed, then consumed by fires.

Table 10. *Fuel loads by type and monitoring status*

29.07 Ocate A CFRP										
Monitoring Status	**1-hr (tons/acre)**	**10-hr (tons/acre)**	**100-hr (tons/acre)**	**1000-hr sound (tons/acre)**	**1000-hr rotten (tons/acre)**	**Litter (tons/acre)**	**Duff (tons/acre)**	**Total Fine Fuels (tons/acre)**	**Total Wood Fuels (tons/acre)**	**Total Surface Fuels (tons/acre)**
2013 PostTreatment5yr	0.058	1.5	1.4	2.6		3.2	0.61	2.9	5.5	9.4
2018 PostTreatment10yr	0.075	1.9	2.1	4.5	1.8	6	12	4.1	10	28
2022 PostFireImmediate	0.019	0.3	0.32	0.9		1.3	1	0.64	1.5	3.9

Litter and Duff

Fuel measurements were not recorded for the 2007 or 2009 monitoring periods. Tons per acre for litter and duff measurements increased from 5-years post-treatment in 2013 to 10 years post-treatment in 2018; followed by a decrease immediately post-wildfire in 2022. Mean litter and duff depths follow a similar trend.

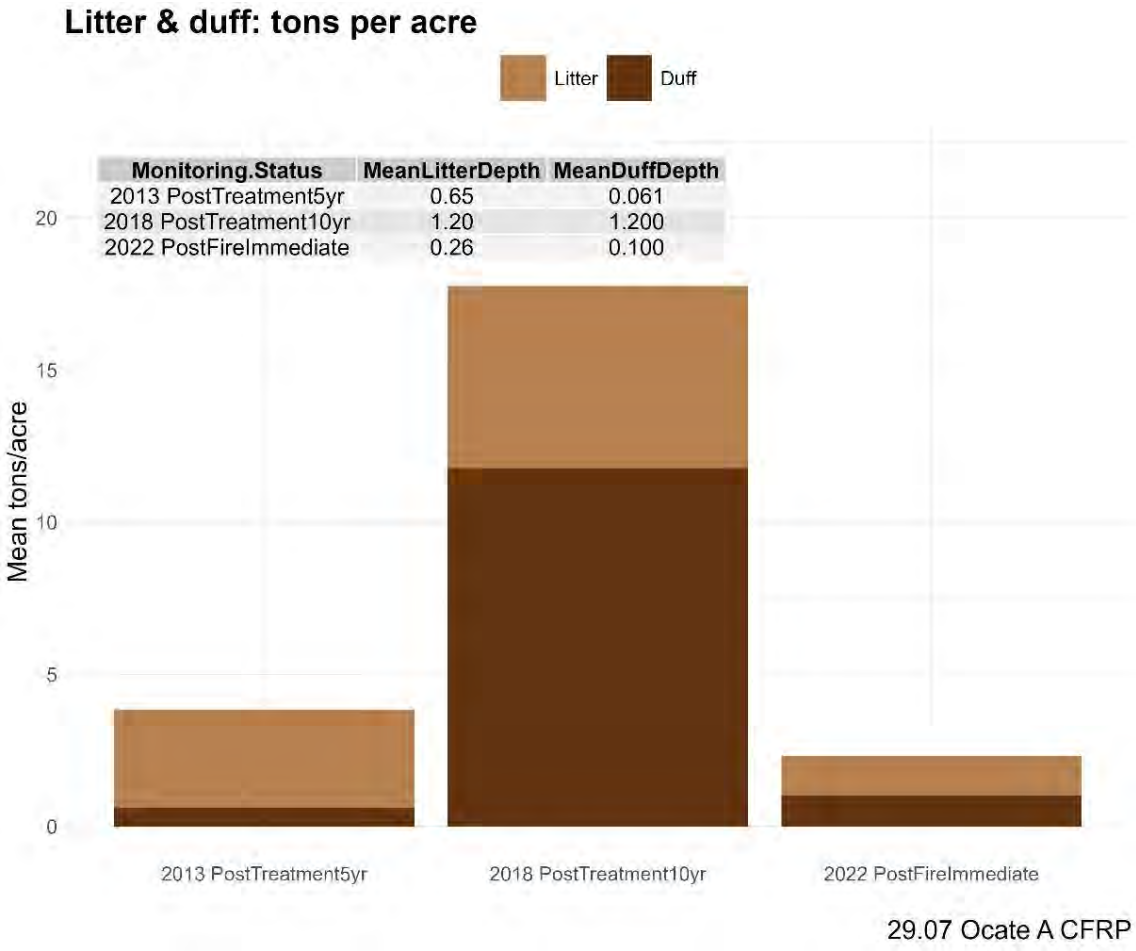

Figure 16. *Mean litter and duff loads by monitoring status*

Fine Fuels

Fuel measurements were not recorded for the 2007 or 2009 measurement periods. Tons per acre for fine fuels increased from 5-years post-treatment in 2013 to 10 years post-treatment in 2018; followed by a decrease immediately post-wildfire in 2022.

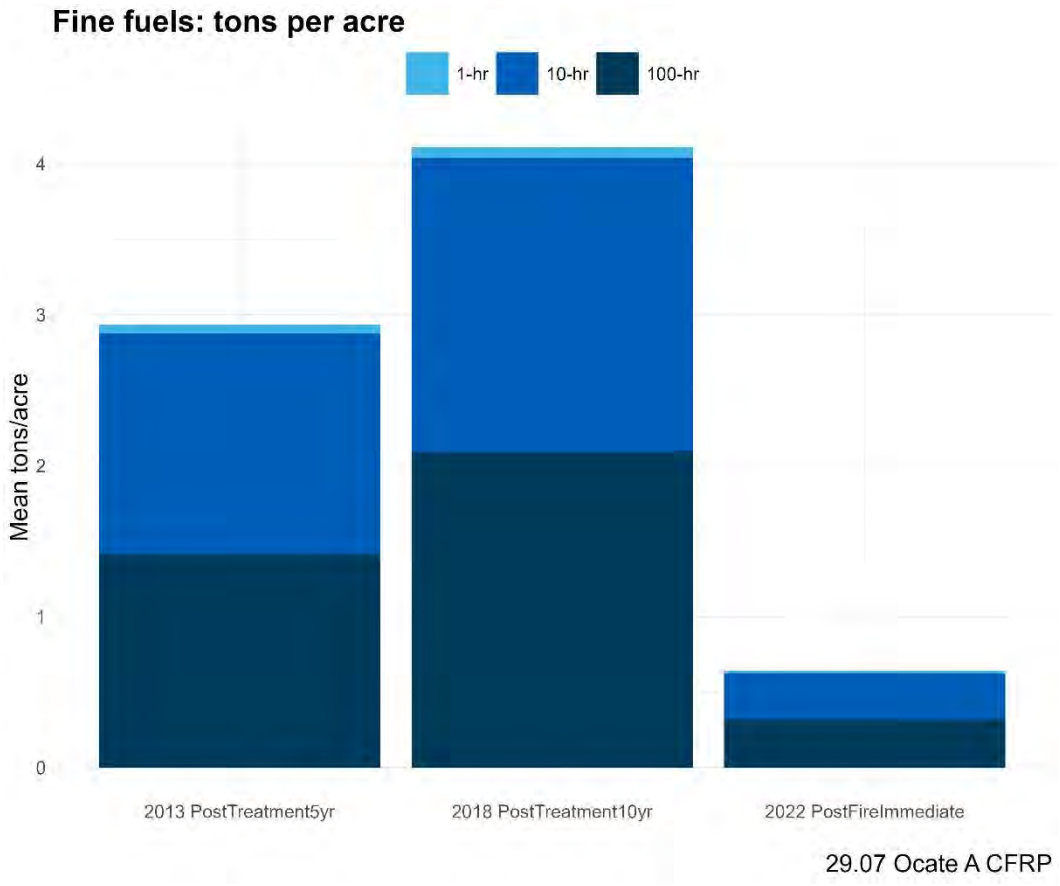

***Figure 17**. Mean fine fuel loads by monitoring status*

Thousand-Hour Fuels

Fuel measurements were not recorded for the 2007 or 2009 measurement periods. Decay classes refer to the state of decay, with class 1 being freshly fallen logs, and class 5 being well-rotten logs. Classes 1 through 3 are considered sound; classes 4 and 5 are considered rotten fuels.

Five years post-treatment, all 1000-hour fuels were sound, at 2.6 tons per acre. Ten years post treatment, sound fuels still made up a majority of fuels (4.5 tons per acre), but approximately 40% were rotten (1.8 tons per acre). Thousand-hour fuels dropped substantially immediately post-fire in 2022 to 0.9 tons per acre, made of all sound fuels. This decrease is due to fire consumption.

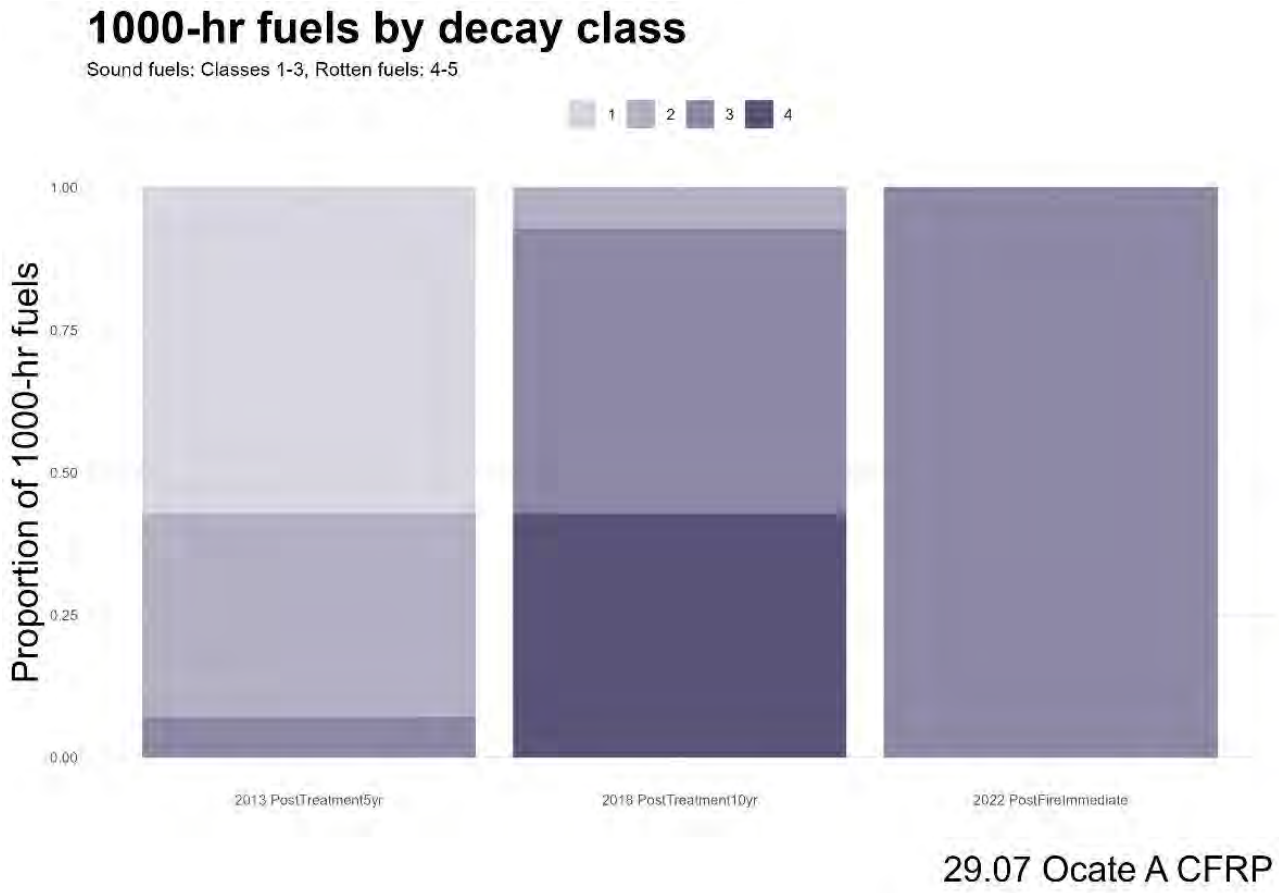

Figure 18. *Proportion of 1000-hr fuels by decay class and monitoring status*

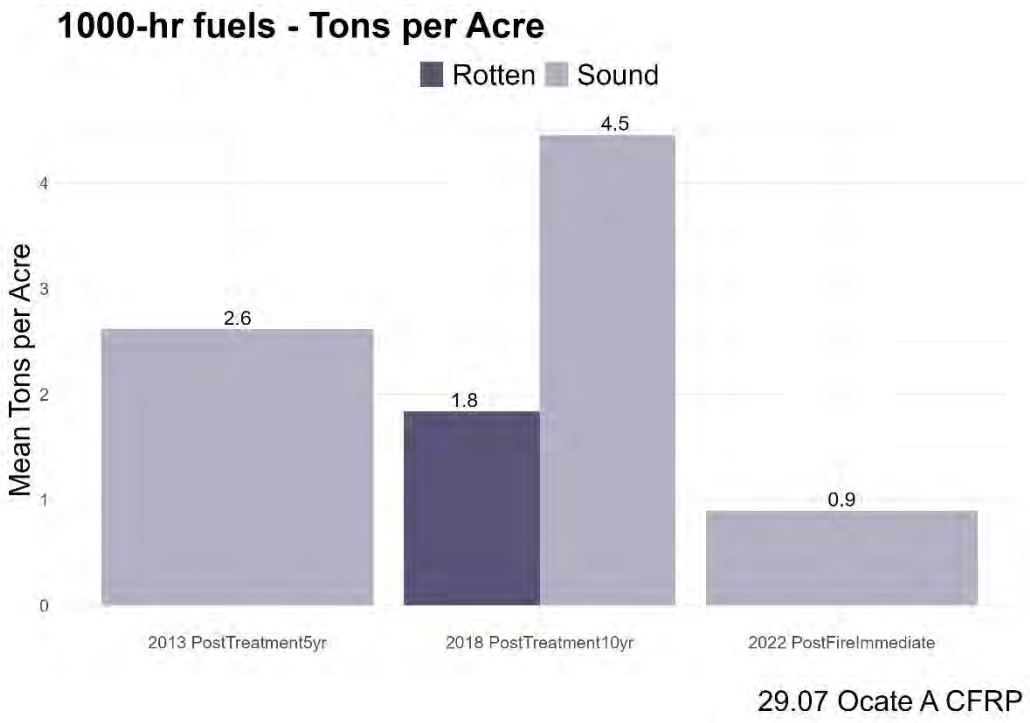

Figure 19. *Mean tons per acre of 1000-hour fuels by rotten and sound fuels.*

Photo Comparisons

OA_03 | 2007 pretreatment

2013 5 years post-treatment

2018 10 years post-treatment

2022 immediately post-fire

OA_11 2007 pretreatment

2013 5 years post-treatment

2018 10 years post-treatment

2022 immediately post-fire

OA_18 | 2007 pretreatment

2013 5 years post-treatment

2018 10 years post-treatment

2022 immediately post-fire

Additional Resources

In 2023, NMFWRI published their first version of a field manual: "Guidelines and Protocols for Monitoring Upland Forests – Field Manual." - https://nmfwri.org/resources/upland-forests-monitoring-field-manual/

For more information regarding monitoring criteria and methodology please contact NMFWRI or consult the 2008 document authored by Derr, et. al., *Monitoring the Long Term Ecological Impacts Of New Mexico's Collaborative Forest Restoration Program, New Mexico Forest Restoration Series Working Paper 5*, available on NMFWRI's website here: http://nmfwri.org/collaborative-forest-restoration-program/cfrp-long-term-monitoring.

For additional information on forest health, forest insects and disease, and non-native species management see resources from the New Mexico Forest and Watershed Health Office: https://www.emnrd.nm.gov/sfd/forest-and-watershed-health-office/

For additional information on post-wildfire community resources, events, and recovery action strategy see the Hermit's Peak/Calf Canyon Post-Fire Resource Hub: https://hermits-peak-calf-canyon-fire-resources-nmhu.hub.arcgis.com/

Works Cited

Brown, J. K. 1974. USDA Forest Service, Intermountain Forest & Range Experiment Station. *Handbook for Inventorying Downed Woody Material*. USDA Forest Service General Technical Report INT-16.

Chojnacky, D. C., and Rogers, P. 1999. USDA Forest Service, Rocky Mountain Research Station, Forestry Sciences Laboratory. *Converting Tree Diameter Measured at Root Collar to Diameter at Breast Height.*

Derr, T., McGrath, D., Estrada, V., Krasilovsky, E., & Evans, Z. (n.d.). *MONITORING THE LONG TERM ECOLOGICAL IMPACTS OF NEW MEXICO'S COLLABORATIVE FOREST RESTORATION PROGRAM*.

New Mexico Forest and Watershed Restoration Institute. (2024). *Guidelines and Protocols for Monitoring Upland Forests Field Manual, First Edition.*

Southwest Forest Health and Wildfire Prevention Act of 2004, no. 108–317, 108th Congress (2004). https://www.congress.gov/108/plaws/publ317/PLAW-108publ317.pdf

Supplementary Information

Species Lists

Table 11. *List of observed tree species by species symbol, scientific name, and common name*

Species Symbol	Scientific Name	Common Name
JUMO	*Juniperus monosperma*	oneseed juniper
JUSC2	*Juniperus scopulorum*	Rocky Mountain juniper
PIED	*Pinus edulis*	piñon
PIPO	*Pinus ponderosa*	ponderosa pine
POTR5	*Populus tremuloides*	quaking aspen
QUERC	*Quercus sp.*	oak species
UNK_TREE		Unknown tree species

Table 12. *List of observed shrub species by species symbol, scientific name, and common name*

Species Symbol	Scientific Name	Common Name
ARTR2	*Artemisia tridentata*	big sagebrush
CEMO2	*Cercocarpus montanus*	alderleaf mountain mahogany
ECHIN3	*Echinocereus sp.*	hedgehog cactus
ECHO	*Echinocactus horizonthalonius*	devilshead
GUSA2	*Gutierrezia sarothrae*	broom snakeweed
MAMMI	*Mammillaria sp.*	globe cactus
OPPH	*Opuntia phaeacantha*	tulip pricklypear
RHTR	*Rhus trilobata*	skunkbush sumac
ROWO	*Rosa woodsii*	Woods' rose
2SS		Unknown shrub species

Plot Center Coordinates

Table 13. *List of plot coordinates by plot name, latitude, and longitude.*

Plot Name	Latitude	Longitude
OA_01	36.18352238	-105.02564185
OA_02	36.18434599	-105.02555578
OA_03	36.18353324	-105.02668252
OA_04	36.18439347	-105.02692385
OA_05	36.18545466	-105.0268296
OA_06	36.18556208	-105.02579972
OA_07	36.18625338	-105.02666838
OA_08	36.18637897	-105.02572869

OA_09	36.18711127	-105.02671062
OA_10	36.18719345	-105.0256992
OA_11	36.18793651	-105.02671986
OA_12	36.18817434	-105.0257512
OA_13	36.18875953	-105.0267967
OA_14	36.18956062	-105.02673616
OA_15	36.18968006	-105.02776773
OA_16	36.19008825	-105.02775008
OA_17	36.19134058	-105.02753798
OA_18	36.19215814	-105.02762133
OA_19	36.19291456	-105.02774789
OA_20	36.19378229	-105.02770796
OA_21	36.19385274	-105.02871539
OA_22	36.194443	-105.028815
OA_23	36.19547771	-105.02868931
OA_24	36.19631399	-105.02878732
OA_25	36.19627051	-105.02980494
OA_26	36.1954846	-105.02980187
OA_27	36.18886176	-105.02760478
OA_28	36.18368329	-105.02768362
OA_29	36.18441109	-105.02793668
OA_30	36.18532354	-105.0278155
OA_31	36.18613399	-105.02786004
OA_32	36.18617905	-105.02887434
OA_33	36.18535787	-105.02898189
OA_34	36.18454317	-105.0290841
OA_35	36.18370915	-105.02909882

Abbreviations & Acronyms

Table 14. *Abbreviated terms used by NMFWRI in this report by term and definition.*

Acronym/Abbreviation/Term	Definition as used by NMFWRI
1-hr fuel	Woody surface debris < 0.25 inches in diameter
10-hr fuel	Woody surface debris 0.25 – 1 inch in diameter
100-hr fuel	Woody surface debris 1.0 – 3.0 inches in diameter
1000-hr fuel	Woody surface debris > 3.0 inches in diameter
CFRP	Collaborative Forest Restoration Program
DBH	Diameter at breast height (4.5 feet)
FFI	FEAT/FIREMON Integrated
FEAT	Fire Ecology Assessment Tool
FIREMON	Fire Effects Monitoring and Inventory System
HD	Herbaceous dead (dead non-woody species)

HL	Herbaceous live (live non-woody species)
HPCC Fire	Hermit's Peak Calf Canyon Fire
NMFWRI	New Mexico Forest and Watershed Restoration Institute
USFS	United States Forest Service
Sapling	Height > 4.5 feet & DBH < 1 inch
Seedling	Height <4.5 feet
SD	Standing dead (dead woody species)
SL	Standing live (live woody species)
"Sick"	Attribute given to trees/shrubs not expected to survive long term
SWERI	Southwest Ecological Restoration Institute
TPA	Trees per acre (trees/acre)
Tree	Height > 4.5 feet & DBH > 1 inch

Supplementary Figures

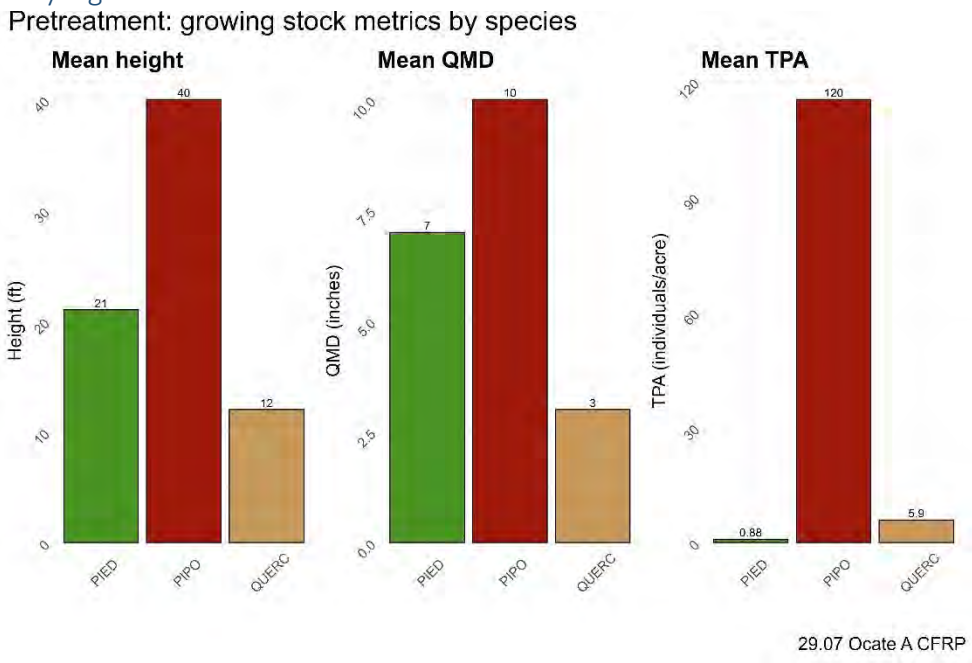

***Figure 20**. 2007 pretreatment growing stock metrics by species. Live crown height was not measured in 2007.*

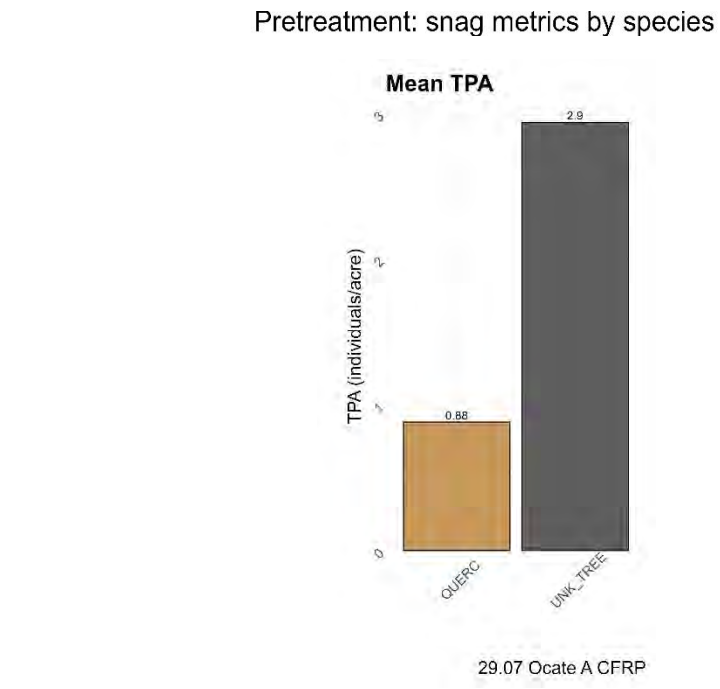

***Figure 21**. 2007 pretreatment snag metrics by species. Height and DBH were not recorded for snags in 2007, so mean basal area and quadratic mean diameter are not available metrics.*

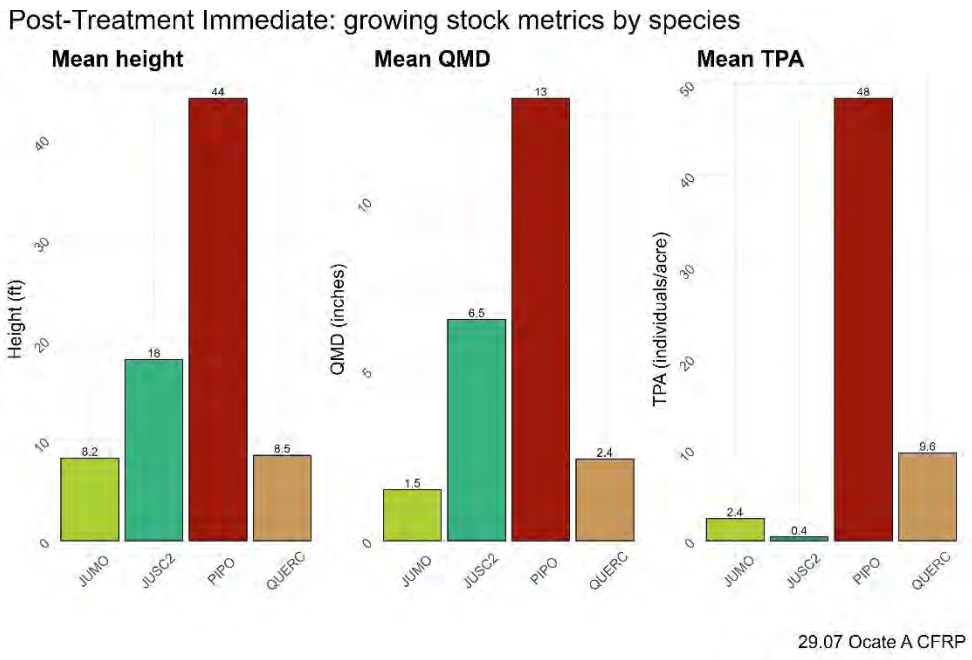

***Figure 22.** 2009 immediate post treatment growing stock metrics by species.*

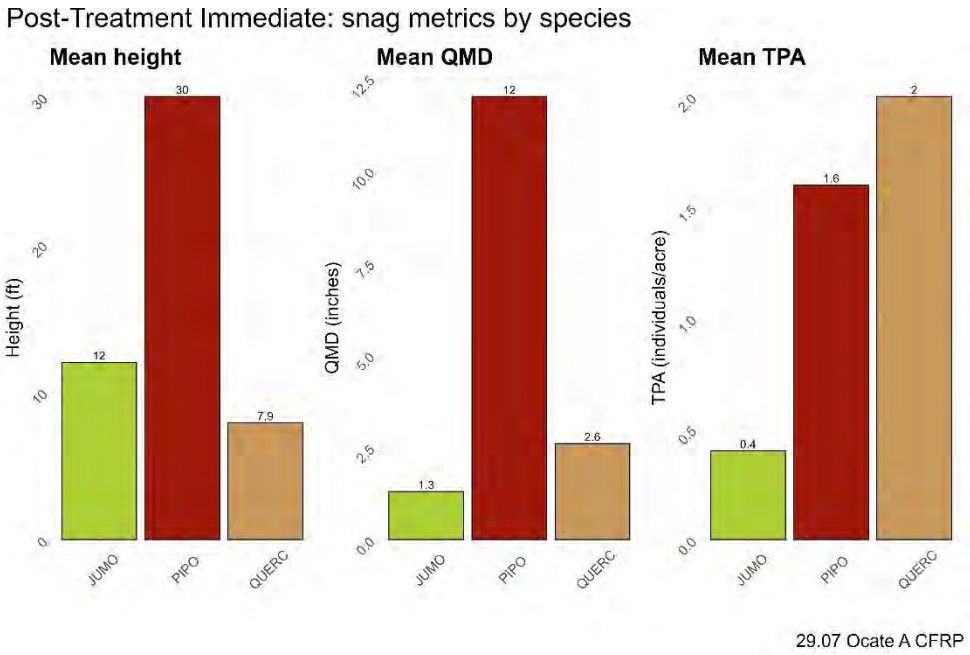

***Figure 23**. 2009 immediate post-treatment snag metrics by species.*

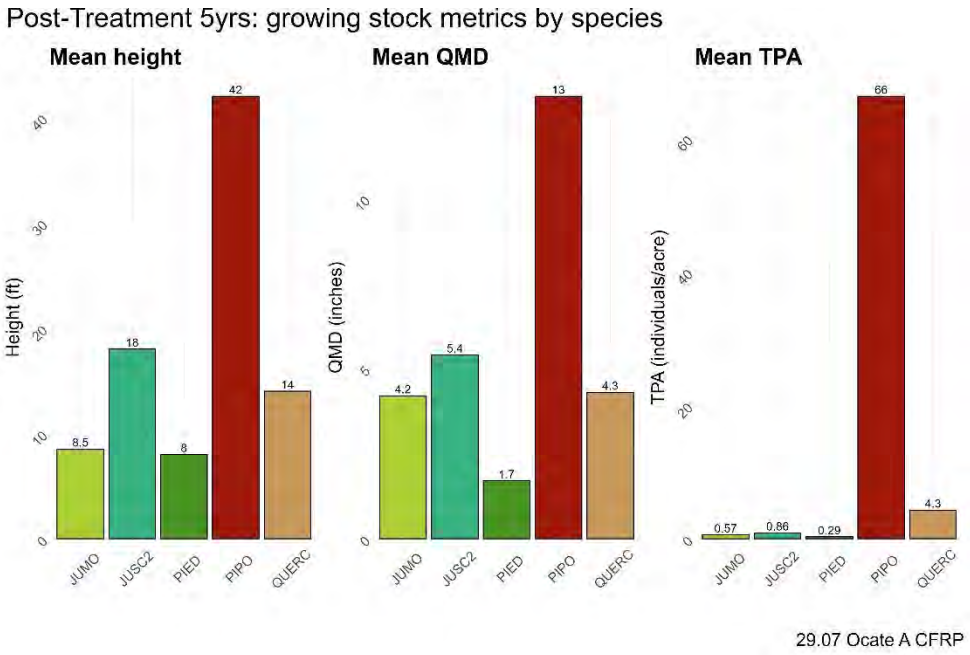

***Figure 24.** Growing stock metrics by species in 2013, 5 years post-treatment.*

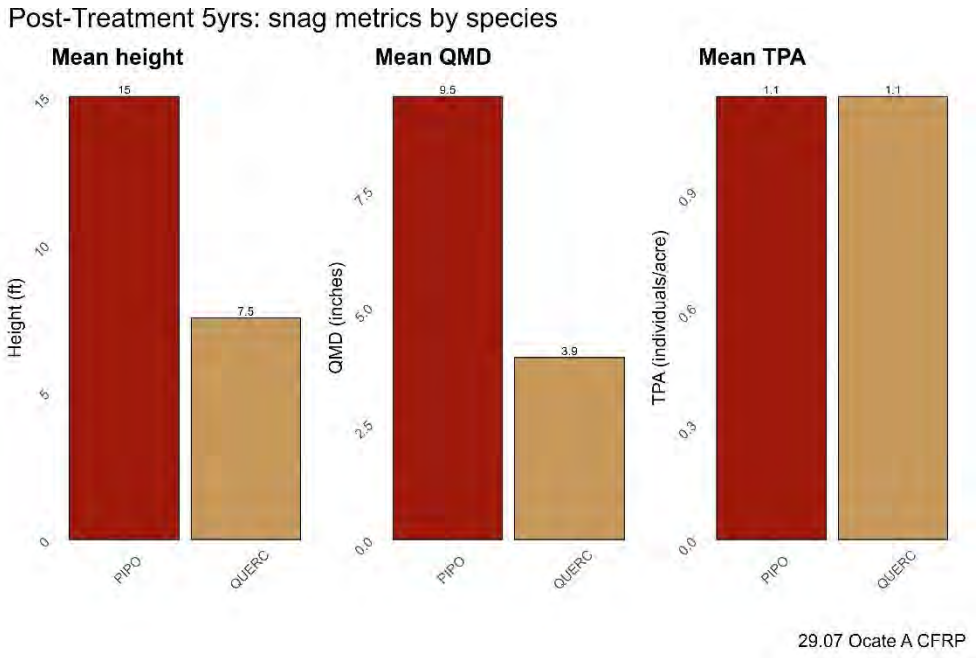

***Figure 25**. Snag metrics by species in 2013, 5 years post-treatment*

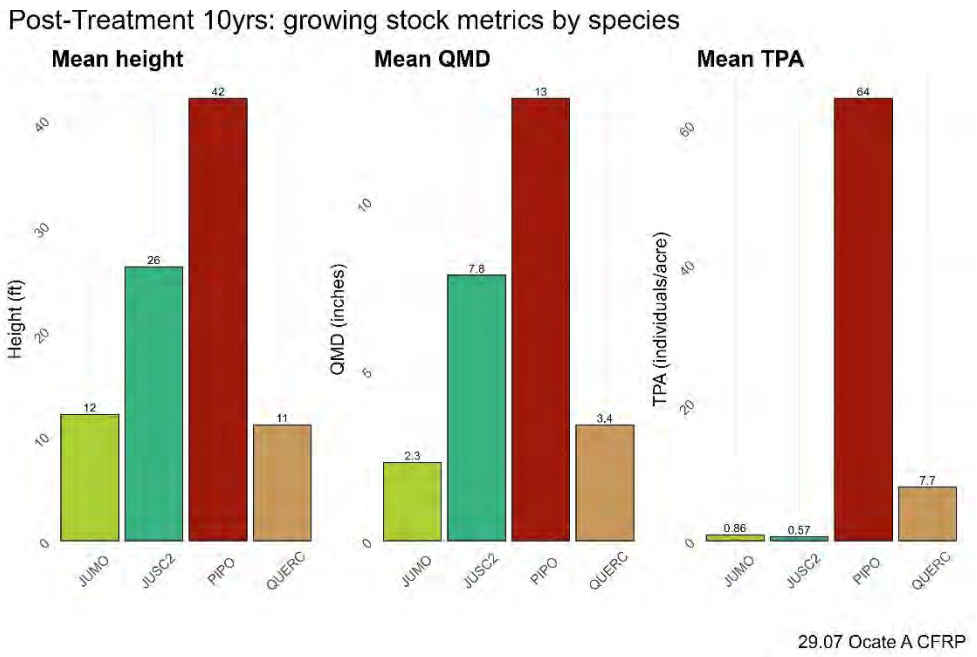

***Figure 26**. Growing stock metrics by species in 2018, 10 years post-treatment.*

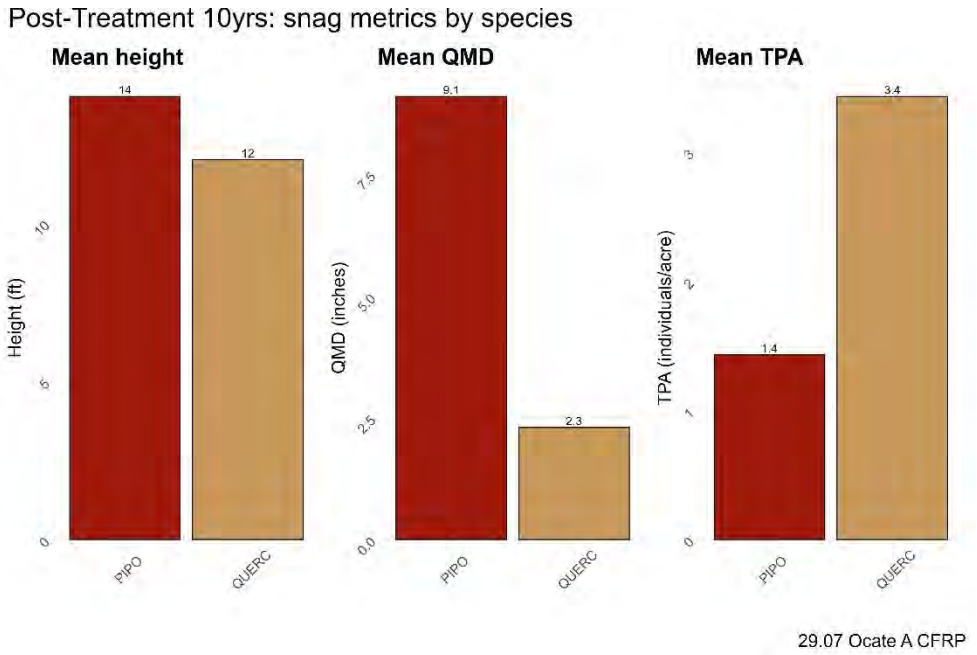

Figure 27. *Snag metrics by species in 2018, 10 years post-treatment.*

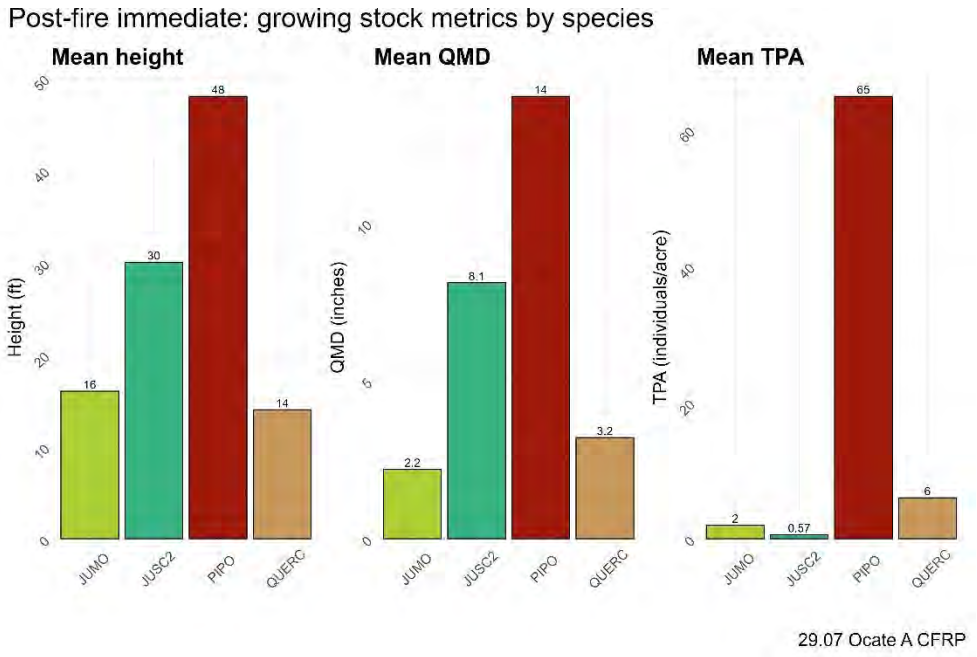

Figure 28. *Growing stock metrics by species immediately post-wildfire, 2022.*

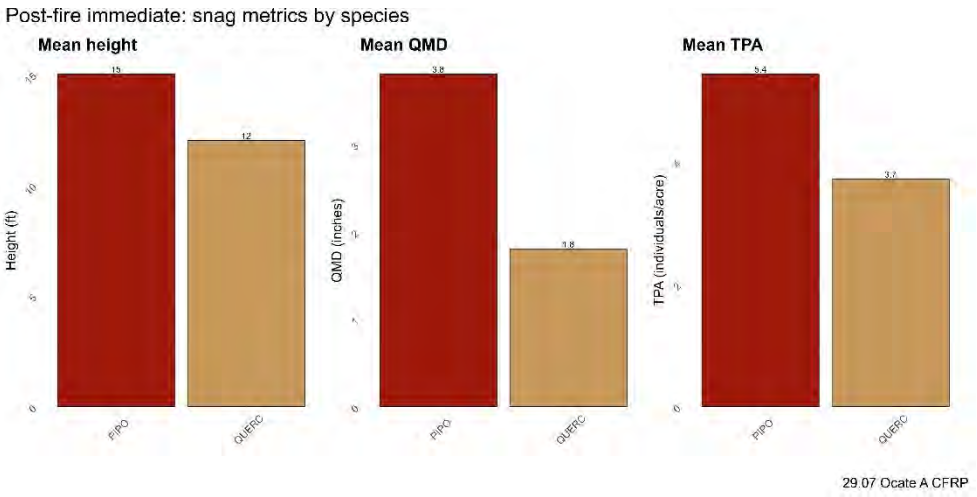

***Figure 29**. Snag metrics by species immediately post-wildfire, in 2022.*

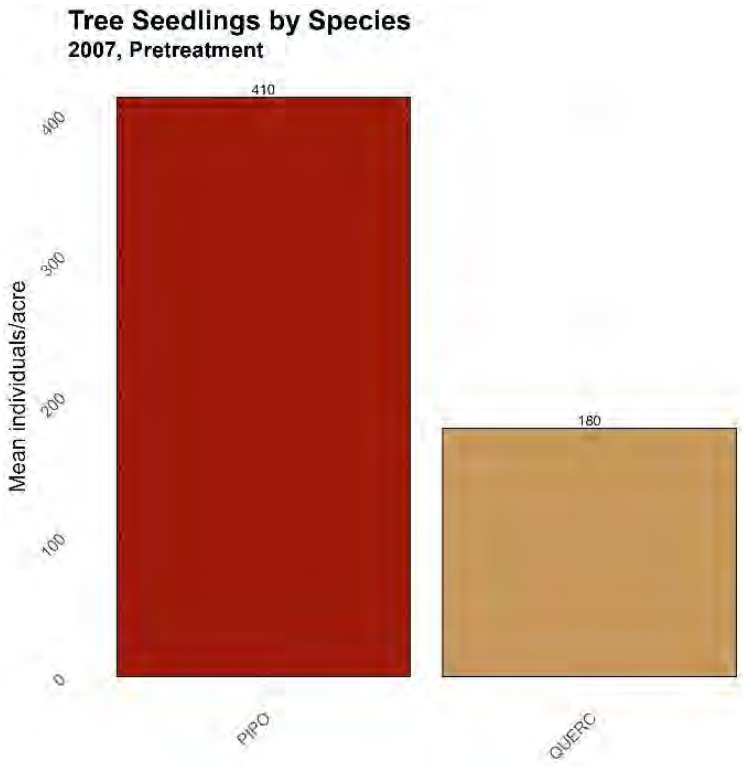

***Figure 30**. Live tree seedling density by species, 2007 pretreatment.*

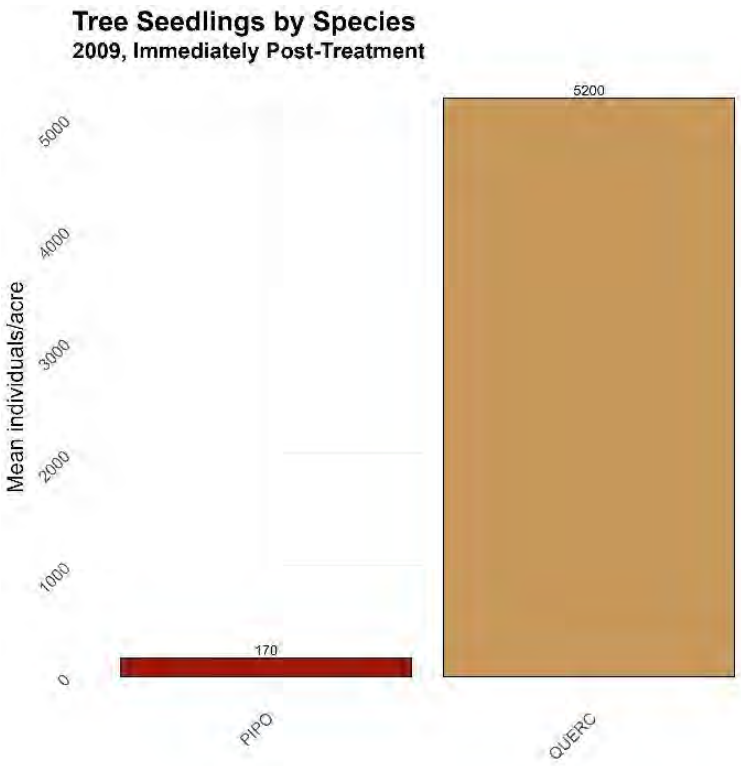

***Figure 31**. Live tree seedling density by species, 2007 pretreatment.*

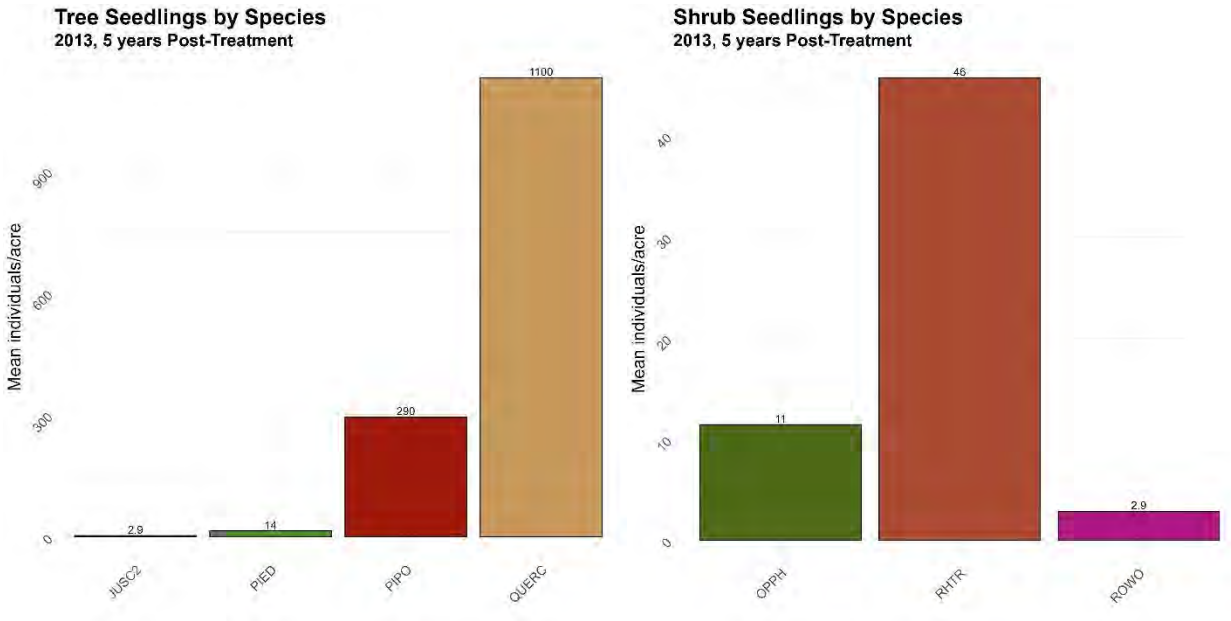

***Figure 32**. Live tree and shrub seedling density by species, 2013 5 years post-treatment.*

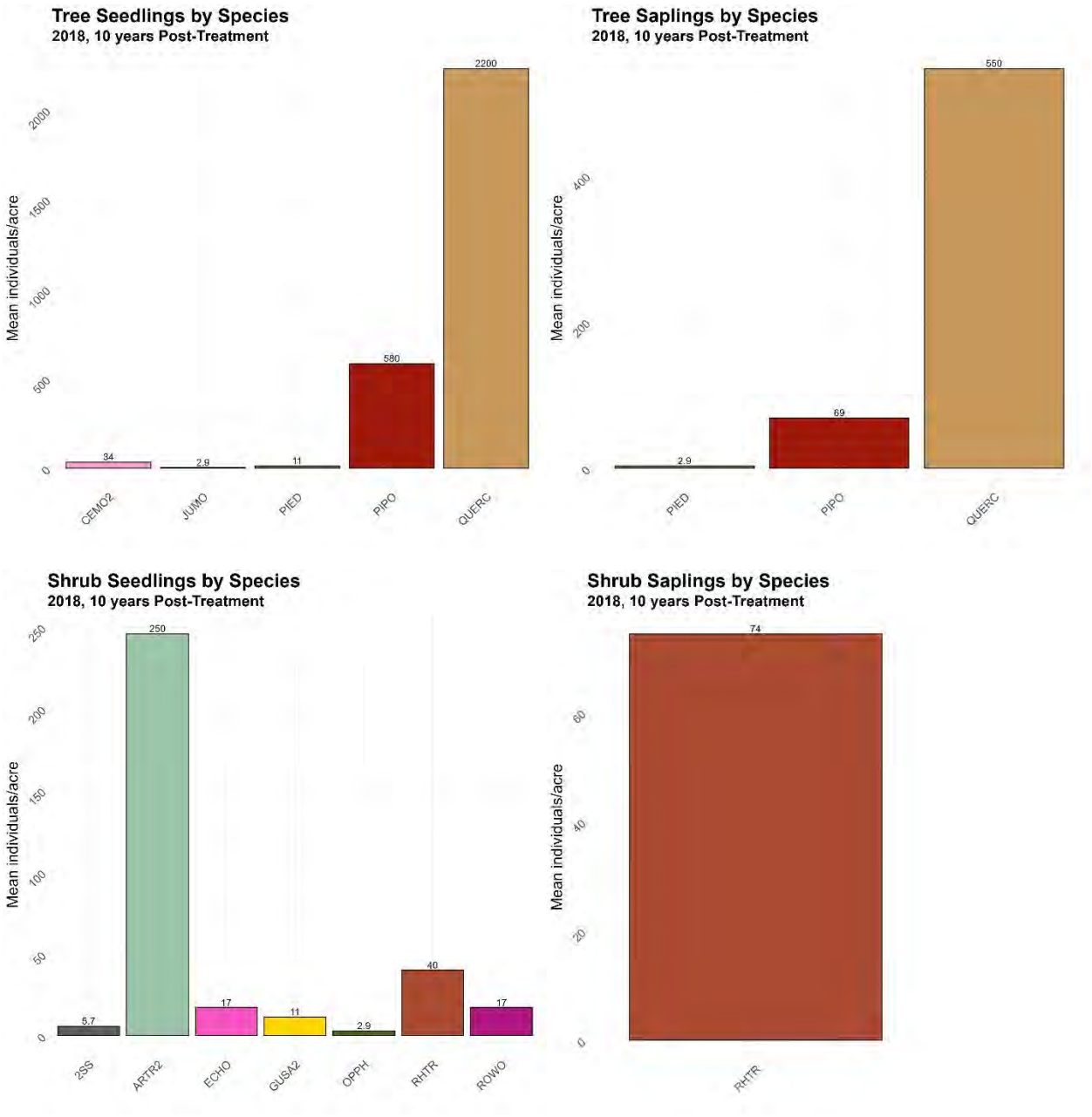

Figure 33. *Live tree and shrub seedling and sapling density by species, 2018, 10 years post-treatment.*

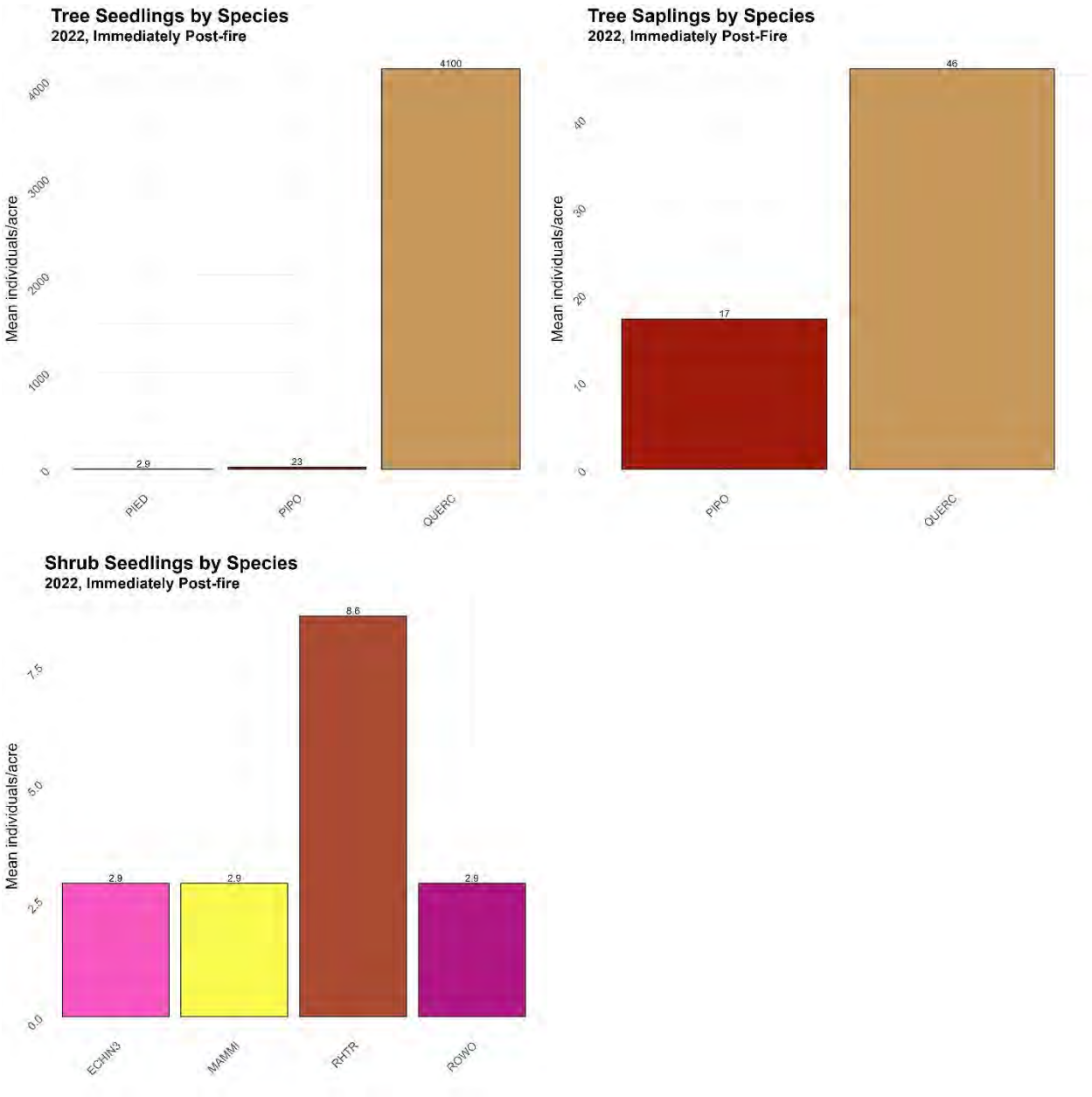

Figure 34. *Live tree and shrub seedling and sapling density by species, 2022, immediately post-fire*