



**National Park Service
Yosemite National Park
Fire Ecology Annual Report
Calendar Year 2006**

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Division of Visitor Protection
Branch of Wilderness Fire



Figure 1. 2006 Fire Ecology staff: Isaiah Hirschfield, Frank Szajko, Kim Regier, Jen Hooke, and Ilana Abrahamson

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Figure 2. Monitoring plot burning on the Laurel Wildland Fire Use Fire, August 2006.

Summary

2006 was another active year for the Yosemite Fire Ecology Program. Monitoring the effects of prescribed fire, Wildland Fire Use (WFU) fire, and mechanical thinning was accomplished in a variety of ecosystems throughout the park. The program gained and sampled fifteen wildfire-burned plots that had been previously maintained by the Yosemite Division of Resources Management and Science. These plots were located within high severity areas of the A-Rock (1990) and Ackerson (1996) fires. Field work proved very challenging because of high brush cover at many plots, the difficulty of relocating old rebar, and the interpretation of less-standardized data. The newly collected data should be helpful in determining the impacts of high severity wildfire, while contributing to fire ecology and education programs. Burn severity assessments were made in last year's PW-3 (Gin Flat) prescribed burn with assistance from the Yosemite Fire Use Module. Rapid Assessment -style monitoring was continued within mechanically thinned areas and WFU fires. Monitoring of sugar pine (*Pinus lambertiana*) mortality and mitigation efforts continued in the PW-3 burn unit and unburned (control) areas.

Fire Ecology staff also participated in fire management operations as firefighters (FFT1, FFT2, ICT5), fire effects monitors (FEMO), helicopter crewmembers (HECM), and resource advisors (READ) on in-park and off-park assignments. The entire Fire Ecology staff participated in operations on the Frog Complex Wildland Fire Use fire, providing firefighting and operational support during the time spent in resource-strapped National Preparedness Level V.

A presentation on Ten Years after the Ackerson Fire was made to the Yosemite Resources Management and Science staff and at the Third International Fire Ecology Congress (San Diego, CA). Posters were presented at the Third International Fire Ecology Congress in November and the International Association of Wildland Fire's Fuels and Fire Behavior Conference in March (Portland, OR). Several Fire Ecology presentations were made to various school and university groups and park audiences.

Another highlight was the first Yosemite Fire Science Symposium on May 9-10, 2006. The Symposium gathered researchers and fire and resource management staff to discuss fire-related work and findings within Yosemite. 23 presentations were made on a diverse array of fire-related topics. Dr. Jan van Wagtenonk gave the keynote address on the History and Evolution of Fire Management and Research in Yosemite National Park. There will be another Yosemite Fire Science Symposium in the spring of 2008.

A project was initiated to study the effects of prescribed fire on soil pH and insect and arachnid communities. This is a collaborative effort between Yosemite Fire Management, Yosemite Education Services, UC Merced, and Yosemite High School (Oakhurst, CA). This is a good way to involve the local community in Fire Management activities and a great opportunity for education and outreach. The YHS students will be conducting most of the field work, specimen identification, and soil analysis. The YHS students will be sharing the results of this project with the Oakhurst community and other schools in the Oakhurst area. The Fire Effects Crew will provide assistance by assessing burn severity within the study area. The project will continue through 2008.

The Fire Effects Crew was in the field from June – October of 2006. Despite this heavy plot workload, a large chunk of the data entry backload was tackled this year. An extra payperiod of funds for the seasonal employees allowed entry and quality checking of most of the 2006 season data, and even allowed for some data entry of our backlog. “Retro” and Rapid Assessment plot data entry continues to remain a programmatic need. However, the data entry progress that has been made is allowing for monitoring results to be presented in this year’s report. These results will also be presented to the Fire Management staff, the Fire Management Committee, and the Division of Resources Management and Science.

Staffing and Workload

The 2006 season commenced without a Lead Fire Effects Monitor. Ilana Abrahamson, Assistant Lead Fire Effects Monitor, detailed into the Lead position from April – July of 2006. The Lead position was eventually filled in October by Isaiah Hirschfield. Ilana and Isaiah shared the Lead duties equitably and effectively from July – October, and were given STAR (Special Thanks for Achieving Results) awards to recognize their exemplary service. Two new seasonal Fire Effects Monitors, Kim Regier and Frank Szajko, joined the crew this year. Kristen Shive detailed with the Fire Effects Crew for two months, providing much-needed assistance throughout the most challenging period of field work.

Table 1. Fire Ecology Staffing for 2006.

Monitor	Starting Date	Ending Date	# PP	Training & Development
Ilana Abrahamson	3/26/06	12/09/06	18.5	IAWF Conference; YOSE Fire Science Symposium; ESRI course; AFE Congress
Isaiah Hirschfield	5/22/06	12/09/06	14.5	YOSE Fire Science Symposium; B-3 Aviation Refresher; AFE Congress
Jen Hooke	2/21/06	12/31/06	22	IAWF Conference; AFE Congress
Kim Regier	5/29/06	12/09/06	14	Intro to Fire Effects Monitoring, Plant ID, Data Collection & Entry; HECM Refresher
Kristin Shive	5/29/06	8/05/06	5	Intro to Fire Effects Monitoring, Plant ID, Data Collection & Entry
Frank Szajko	5/14/06	12/09/06	15	Intro to Fire Effects Monitoring, Plant ID, Data Collection & Entry; Fire Use Module Detail

The Fire Effects Crew remained busy in 2006, sampling a total of 215 monitoring plots in areas affected by prescribed fire, wildfire, WFU, and mechanical thinning (Table 2). The crew completed most of the scheduled plot sampling despite having up to three new crewmembers and lacking consistent leadership for the season.

The only workload items that had to be triaged due to lack of time were establishing Composite Burn Index (CBI) plots to ground-truth remotely sensed images of burn severity in the Wapama WFU fire, the Hetchy wildfire, and the Big Creek prescribed burn unit. Burn severity imagery has been requested for the Frog Complex WFU fire, which is adjacent to the Wapama and Hetchy fires and will allow ground-truthing of burn severity in similar vegetation types in 2007. The Big Creek prescribed fire is located within the lower mixed conifer forest type; some CBI plots were established within this vegetation type in 2006 in the PW-3 burn unit. More CBI data will be collected in units containing the lower mixed conifer vegetation type in the future.



Figure 3. Discussing FMH methodology early in the season in the Soupbowl burn unit.

Table 2. 2006 Fire Effects Monitoring Crew plot workload (continued onto next page).

Treatment Unit & Geographical Area	Treatment Type	Monitoring Type	Type of Plot	# Years Post-Treatment (1-20 yrs)	Total Plots Read in 2006
Soupbowl – Wawona	Prescribed Fire	FPIPO1T02	FMH	1	5
PW-17 – Yosemite West	Prescribed Fire	FABCO1T08	FMH	1	1
MG-5 – Mariposa Grove	Prescribed Fire	FABCO1T08	FMH	2	3
PW-3 – Gin Flat	Prescribed Fire	FABCO1T08	FMH	1	2
PW-5 – Crane Flat	Prescribed Fire	FABCO1T08	FMH	1	2
Ackerson Fire	Wildfire	FABCO1T10	FMH	10	3
Ackerson Fire	Wildfire	FABMA1T10	FMH	10	3
Ackerson Fire	Wildfire	FPIPO1T10	FMH	10	4
A-Rock – Foresta	Wildfire	FPIPO1G09	FMH	16	5
MG-11 – Mariposa Grove	Prescribed Fire	FSEGI1T08	FMH	10	1
Hodgdon Campground	Mechanical Thinning	-	Rapid Assessment	3	11
Big Oak Flat Rd.	Mechanical Thinning	-	Rapid Assessment	3	17
Yosemite West	Mechanical Thinning	-	Rapid Assessment	1	9

Treatment Unit & Geographical Area	Treatment Type	Monitoring Type	Type of Plot	# Years Post-Treatment (1-20 yrs)	Total Plots Read in 2006
Echo Fire	WFU	-	Rapid Assessment	1	5
Frog Fire	WFU	-	Rapid Assessment	Preburn	7
Kibbie Fire	WFU	-	Rapid Assessment	3	10
Whiskey Fire	WFU	-	Rapid Assessment	3	12
Big Creek – Wawona	Prescribed Fire	-	Retro	2	21
MG-2 – Mariposa Grove	Prescribed Fire	-	Retro	Immediate Post	18
PW-3 – Gin Flat	Prescribed Fire	-	CBI	1	36
PW-3 – Gin Flat	Prescribed Fire	-	Sugar Pine Mortality	1	28
PW-3 – Crane Flat/Aspen Valley	Control	-	Sugar Pine Mortality	Unburned	12
Total					215

Fire Effects Monitoring, Management Objectives, and Monitoring Results

Yosemite Fire Management is a complex and diverse program, and the Fire Ecology program's main purpose is to provide support for management decisions and to assess and evaluate management actions. The Fire Ecology program therefore mirrors the diversity of fire management actions by attempting to monitor fire suppression, prescribed fire, WFU fire, and mechanical thinning activities. Due to a recent database conversion, the Fire Ecology program is a little behind on data entry, so results are currently not available for all of our monitoring activities (but we're catching up!). 2006 updates from each of our monitoring projects (Fire Monitoring Handbook, "Retro" Fire Effects Monitoring, Rapid Assessment, Composite Burn Index, Yosemite Valley Exotics Survey, Sugar Pine/Fire Retardant Monitoring, and Sugar Pine Mortality Study) are presented here along with available results in relation to the original management objectives. Included are notes from the field on methodology and suggestions on how to make improvements in the future.

1. Fire Monitoring Handbook (FMH) Monitoring

The FMH methodology (http://www.nps.gov/fire/fire/fir_eco_mon_fmh.cfm) is the national NPS standard for monitoring effects of prescribed fire activities. Yosemite implemented the FMH monitoring program in 1988, and it remains our primary means for assessing management activities. We have achieved minimum plot installation to be 90% confident that we are within

20% of the population mean in two of our monitoring units: the white fir type (FABCO1T08) and the ponderosa pine/bear clover type (FPIPO1T02).

FMH plots were also installed immediately after the 1990 A-Rock and 1996 Ackerson wildfires by the YOSE Resource Management staff. These two wildfires burned with an uncharacteristic high intensity across large swaths of predominantly lower mixed conifer forest. The fire regime for the lower mixed conifer forest has historically been characterized by frequent, low-intensity, mostly surface fire (Yosemite Fire Management Plan 2004). In the wake of 100+ years of fire suppression, there is a higher potential for infrequent, high-intensity crown fire due to the altered forest structure and composition. The A-Rock and Ackerson plot data allow us to observe forest recovery after high-severity fire, and provide a case-study of fire exclusion consequences. Plot data will be incorporated into fire education programs to help garner support for our prescribed and WFU fire programs.

--White Fir Monitoring Type (FABCO1T08)

Twenty three plots have been installed in prescribed burn units within the white fir (*Abies concolor*) dominated lower mixed conifer forest type. Monitoring results for thirteen plots are presented here, followed through cycles of preburn (PRE), one year after the first-entry burn (01 YR01), two years after the first-entry burn (01 YR02), one year after the second-entry burn (02 YR01), and two years after the second-entry burn (02 YR02). These thirteen plots were selected because these plots have data for all of the burning cycles listed above. Prescribed fire objectives for the FABCO1T08 type are defined in the 2004 Yosemite Fire Management Plan and Environmental Impact Statement (hereafter referred to as the YFMP).

1. Tree Density

Management objectives have been met as per the 02 YR02 visit. As more burn units are treated and more plots are sampled in various postburn cycles, these data will be updated and revisited.

Table 3. Target conditions for the white fir-dominated mixed conifer forest from the YFMP compared with the most recent tree densities. DBH = Diameter at Breast Height (4.5' or 1.37 m).

YFMP Target Conditions	FABCO1T08 Actual Conditions
Achieve the following tree density: 4-20 trees/acre > 31.5" DBH 20-89 trees/acre < 31.5" DBH	Current 02YR02 tree density: 9 trees/acre > 31.5" DBH (SE = 2.041) 59 trees/acre < 31.5" DBH (SE = 11.032)

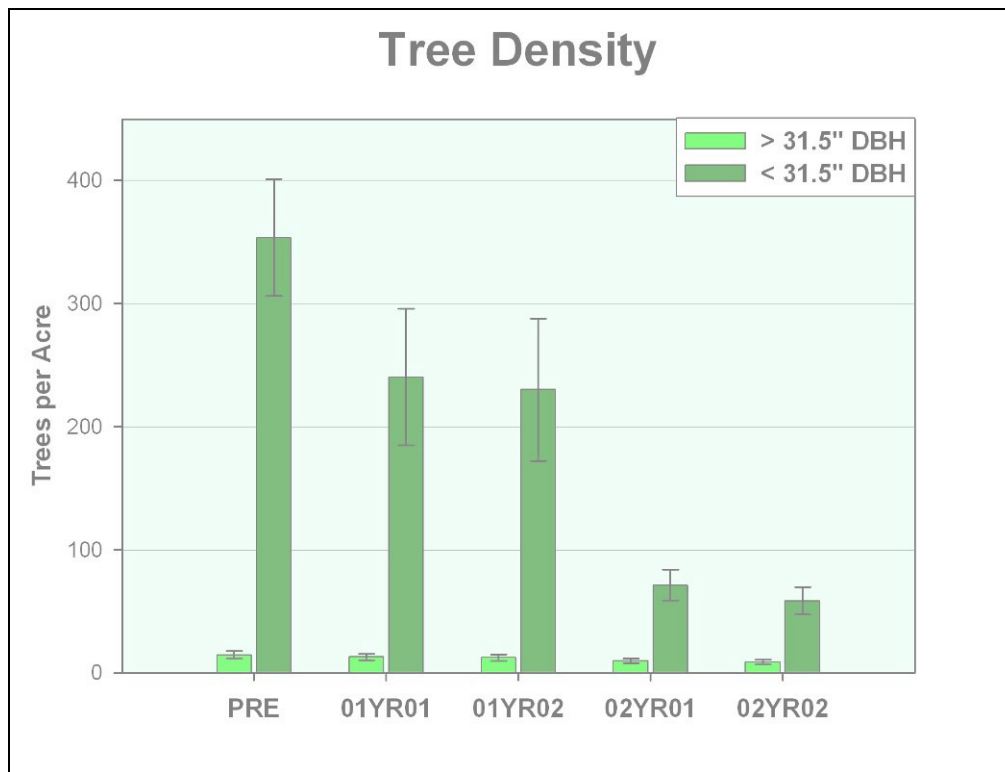


Figure 4. FABCO1T08 total tree density over time by size class.

Sapling or “pole sized” trees are defined as being greater than 2.5 cm DBH and less than 15.0 cm DBH. When the pole-sized trees are removed from the analysis, we have a picture of “overstory” tree density.

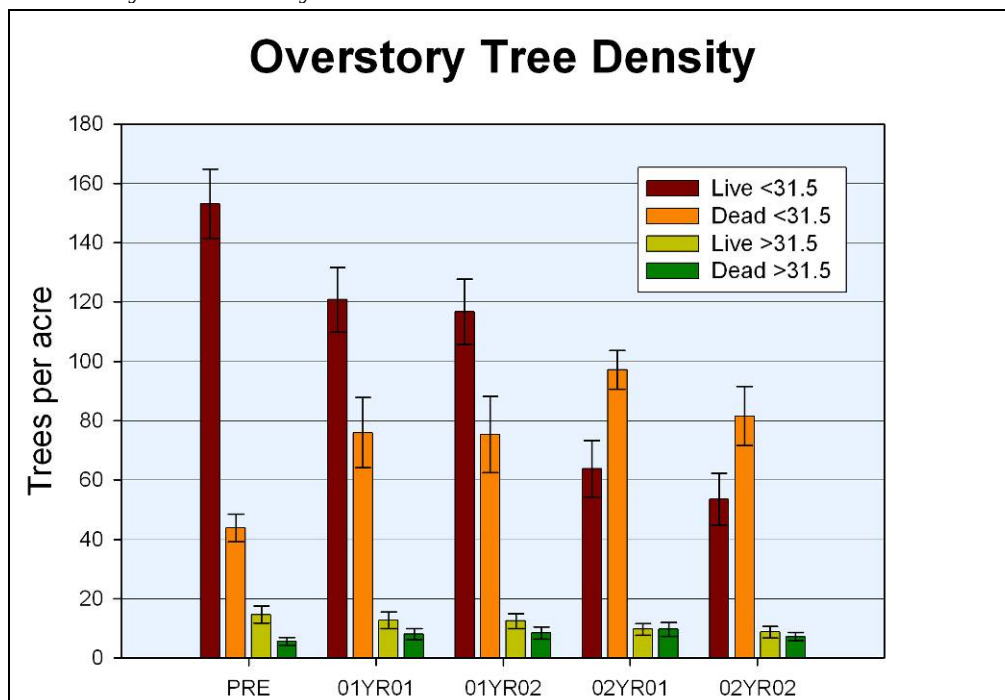


Figure 5. Overstory tree density (trees/acre) for the FABCO1T08 monitoring type. Overstory tree density excludes the sapling (<15.0 cm DBH) age class.

Pole sized trees were one of the primary targets of the prescribed fire treatment. Preburn pole-sized tree density was 200 trees/acre (SE = 45.915); 02 YR02 pole sized tree density was 5 trees/acre (SE = 3.372).

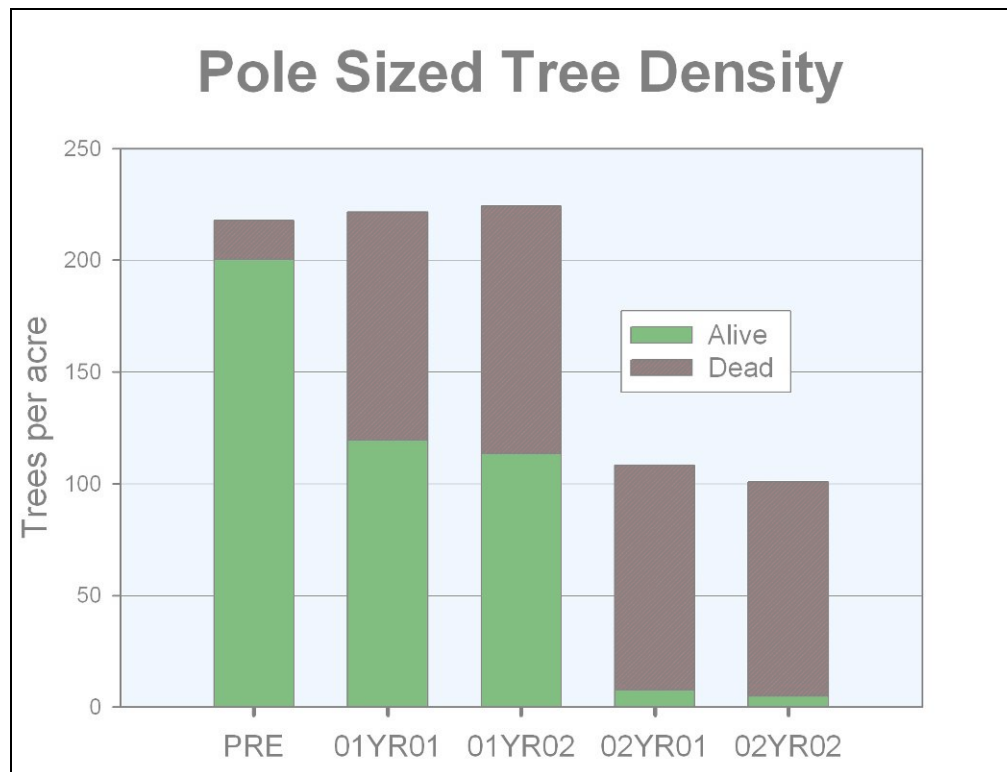


Figure 6. Pole-sized tree density (trees/acre) over time for the FABCO1T08 type. Pole sized trees are between 2.5 and 15.0 cm DBH.

2. Tree Composition

Management objectives were not met with respect to all of the tree composition target conditions. The target conditions aim for more pine species (*Pinus*) and less fir species (*Abies*) on the landscape after fire treatments. We are close to reaching the lower end of our pine targets, but we have a greater than desired proportion of fir in the overstory. We have reached our target conditions with respect to desired cedar proportions in the canopy.

Table 4. Target conditions for desired overstory tree composition compared to actual current overstory composition in the white fir-dominated mixed conifer forest.

YFMP Target Conditions	FABCO1T08 Actual Conditions
Achieve the following tree composition by genus: • 40-65% fir • 15-50% pine • 0-10% cedar (<i>Calocedrus</i>)	Current 02YR02 overstory tree composition: • 79% fir • 14% pine • 6.5% cedar • 0.5% oak (<i>Quercus</i>)

The change in overstory tree composition over time has not been too dramatic, as illustrated in Figure 5. Average preburn overstory composition was 69% white fir, 3% red fir (*Abies magnifica*), 10% incense cedar (*Calocedrus decurrens*), 4% Jeffrey pine (*Pinus jeffreyi*), 11% sugar pine (*Pinus lambertiana*), 1.5% ponderosa pine (*Pinus ponderosa*), and 1.5% black oak (*Quercus kelloggii*). As of the 02 YR02 visit, the average overstory canopy was composed of 75% white fir, 4% red fir, 6.5% incense cedar, 4% Jeffrey pine, 9% sugar pine, 0.5% ponderosa pine, and 0.5% black oak.

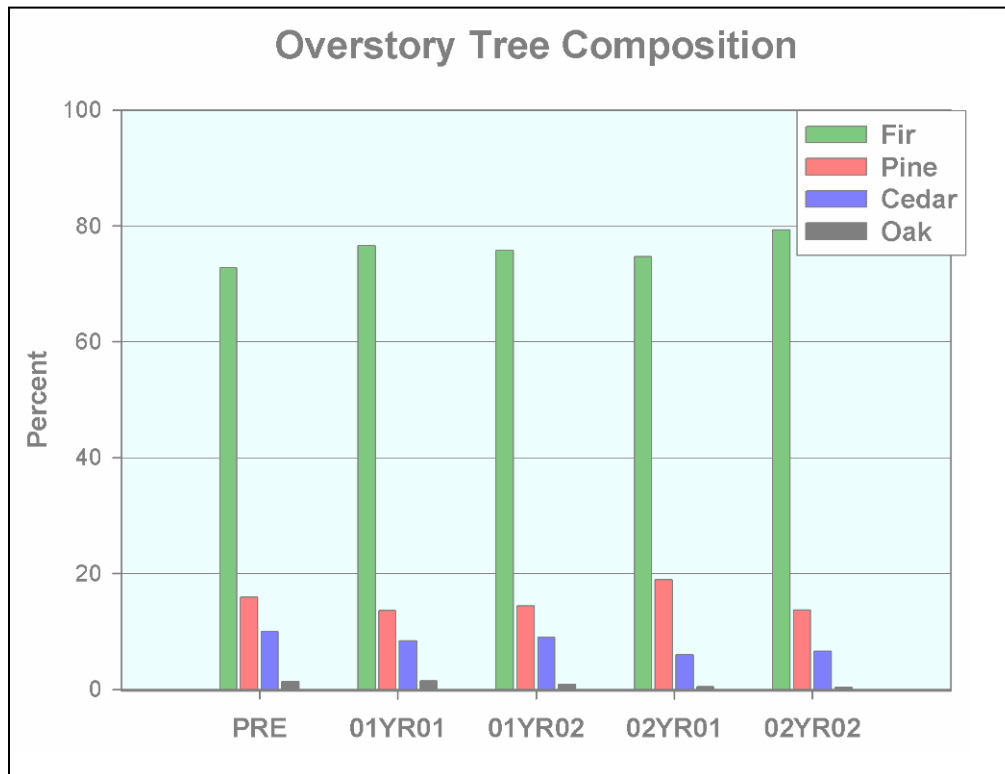


Figure 7. Overstory tree composition over time in the FABCO1T08 monitoring type.

The composition of pole sized trees within the FABCO1T08 monitoring unit has changed substantially over time. We have lost some of the diversity in pole sized tree species that was present preburn, but this is not of a concern. Our target conditions desire a higher proportion of pines vs. firs on the landscape. The more open canopy conditions present in the current treated forest provide a more suitable habitat for pine germination than what was present preburn.

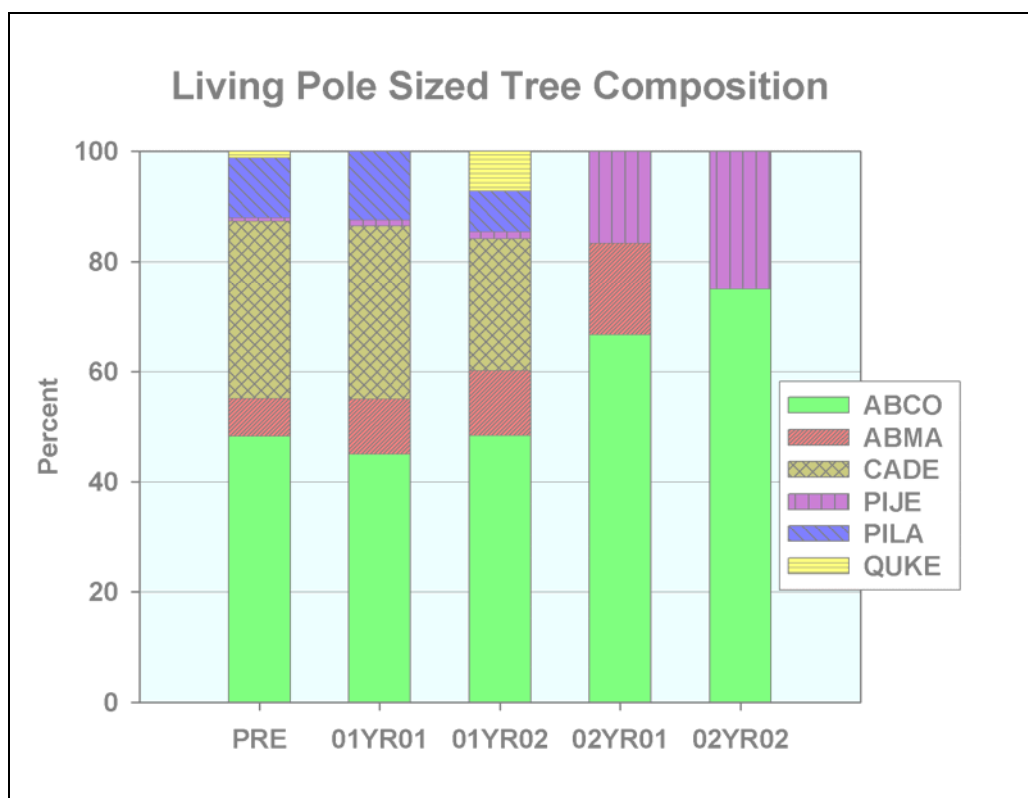


Figure 8. Changing pole sized tree species composition over time in the FABCO1T08 type. ABCO = white fir; ABMA = red fir; CADE = incense cedar; PIJE = Jeffrey pine; PILA = sugar pine; QUKE = black oak.

3. Fuel Loading

Target conditions for managing dead & down woody fuels have been met in the white fir-dominated mixed conifer forest. The average 02 YR02 total fuel load is 26.7 tons/acre, with a range of 10.2 to 57.1 tons/acre. The upper range of the fuel loading target (5-20% of the treated forest with fuel load > 60 tons/acre) was not captured by our monitoring plots, but pockets of heavy fuels still remain in our burn units.

Table 5. White fir-dominated mixed conifer forest target conditions compared to current monitoring results.

YFMP Target Conditions	FABCO1T08 Actual Conditions
Achieve the following fuel loading: 20-40% = 5-30 tons/acre 20-50% = 30-60 tons/acre 5-20% = > 60 tons/acre	Current 02YR02 total fuel loading: 26.7 tons/acre (SE = 3.9)

Total fuel load over time in the FABCO1T08 type has been reduced substantially by two prescribed fire entries. Immediately after the first treatment, fuel loads start to creep upward again as dead trees fall down and add to the fuel load. Fuel loading is further reduced by a second prescribed fire entry, bringing the treated forest closer towards a restored condition.

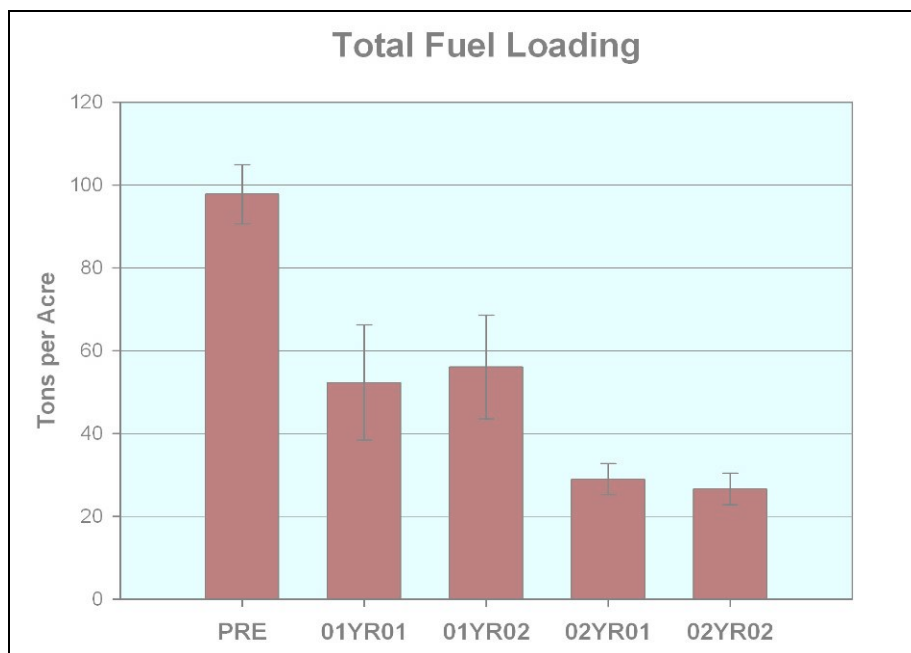


Figure 9. Changes in total fuel loading over time in the FABCO1T08 type. The decrease in total fuels from 02YR01 and 02YR02 is probably due to sampling error.

Dead and down woody fuels are often referred to as timelag fuels, and segregated into classes based on their diameter. The timelag classes correspond to the amount of time it will take the fuel to regain 63% of its equilibrium moisture content when it is subjected to a change in moisture (van Wagtenonk 1998). 1-hour fuels are between 0 – 0.25” diameter; 10-hour fuels are 0.25 – 1” diameter; 100-hour fuels are 1 – 3” diameter, and 1000-hour fuels are > 3” in diameter.

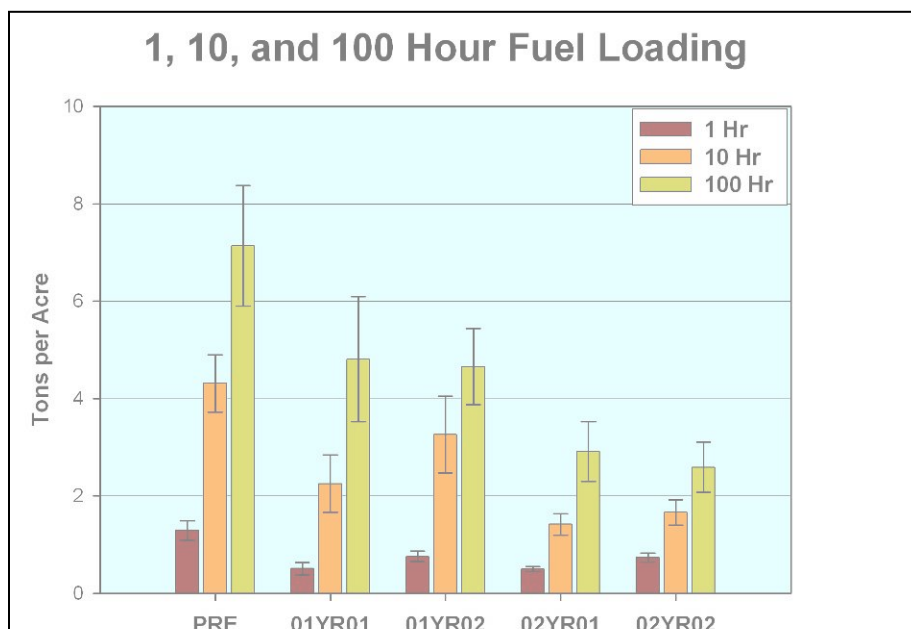


Figure 10. Trends over time in smaller timelag fuel loading in the FABCO1T08 type.

1000-hour fuels are often differentiated into being “sound” and “rotten” due to the different role each plays in fire behavior and fuel loading. After two prescribed fire entries, an increase in sound 1000-hour fuels is evident; this is most likely due to dead trees falling down.

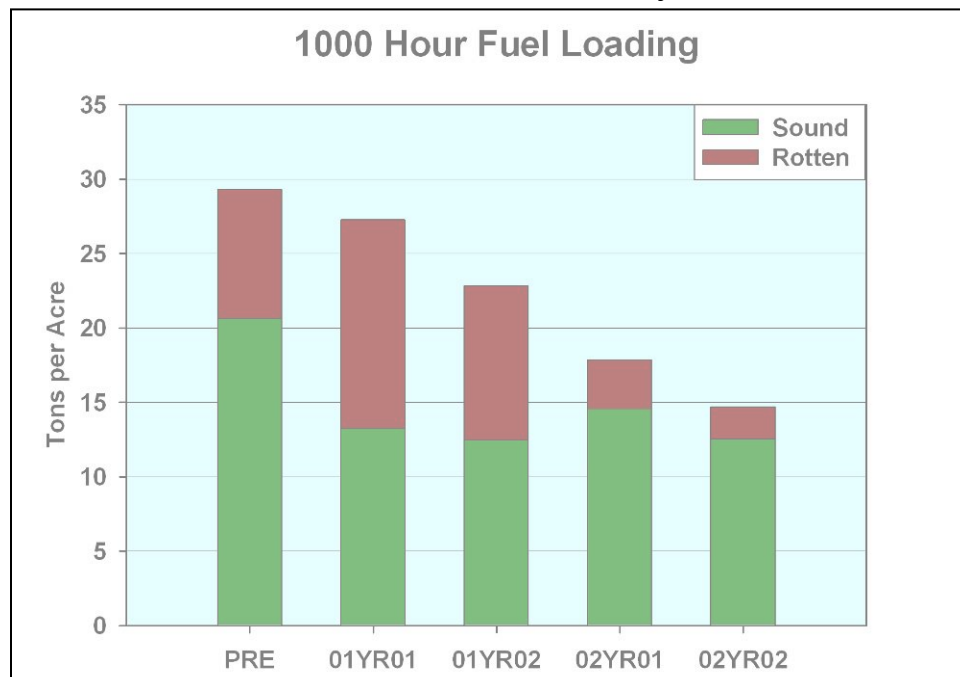


Figure 11. FABCO1T08 trends over time in 1000 hour fuel loading.

Fuel loading contributed by thick litter and duff layers is also substantially reduced after two prescribed fire entries.

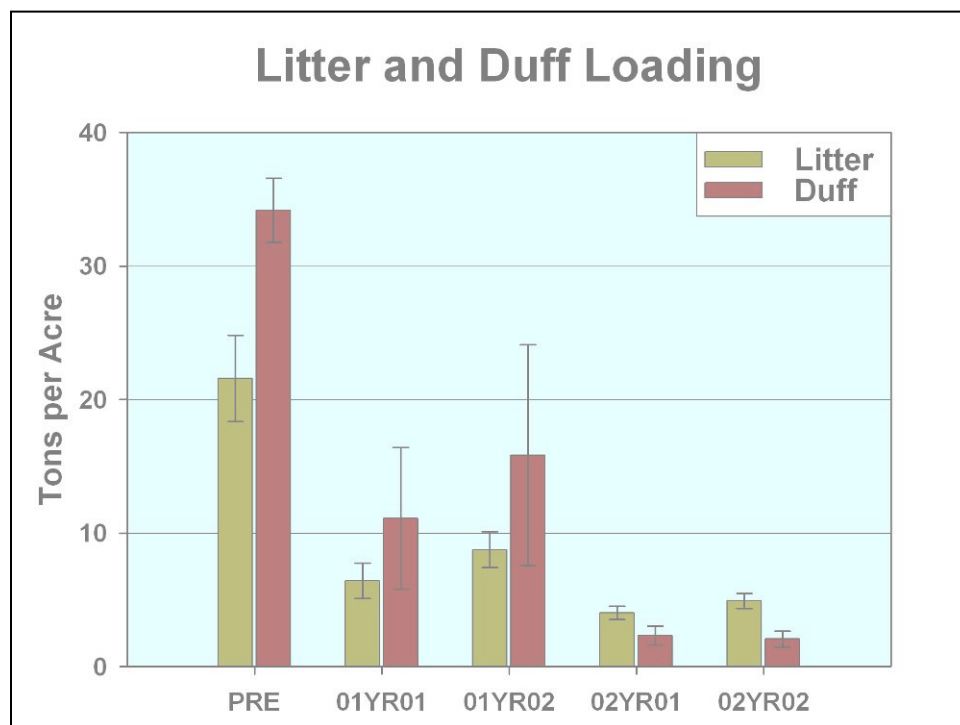


Figure 12. Litter and duff fuel loading over time in the FABCO1T08 type.

--Ponderosa Pine Monitoring Type (FPIPO1T02)

Seventeen plots have been installed in prescribed burn units within the ponderosa pine/bear clover (*Chamaebatia foliolosa*) - dominated lower mixed conifer forest type. Monitoring results for thirteen plots are presented here, followed through cycles of preburn (PRE), one year after the first-entry burn (01 YR01), two years after the first-entry burn (01 YR02), five years after the first-entry burn (01 YR05), and one year after the second-entry burn (02 YR01). These thirteen plots were chosen because these plots have data for all of the burning cycles listed above. Prescribed fire objectives for the FPIPO1T02 type are not included in the YFMP.

1. Tree Density

The YFMP has not yet defined target conditions for restoring ponderosa pine/bear clover – dominated forest with prescribed fire. These target conditions will be defined in the near future. In the meantime, target conditions for the ponderosa pine/mixed conifer forest are presented with results from the FPIPO1T02 monitoring type for comparison purposes.

Table 6. Ponderosa pine/mixed conifer forest objectives and monitoring results from the FPIPO1T02 type.

YFMP Target Conditions—FPIPO1T09	FPIPO1T02 Actual Conditions
Achieve the following tree density: • 4-30 trees/acre > 31.5” DBH • 4-91 trees/acre < 31.5” DBH	Current 02YR01 tree density: • 8 trees/acre > 31.5” DBH (SE = 1.52) • 98 trees/acre < 31.5” DBH (SE = 27.7)

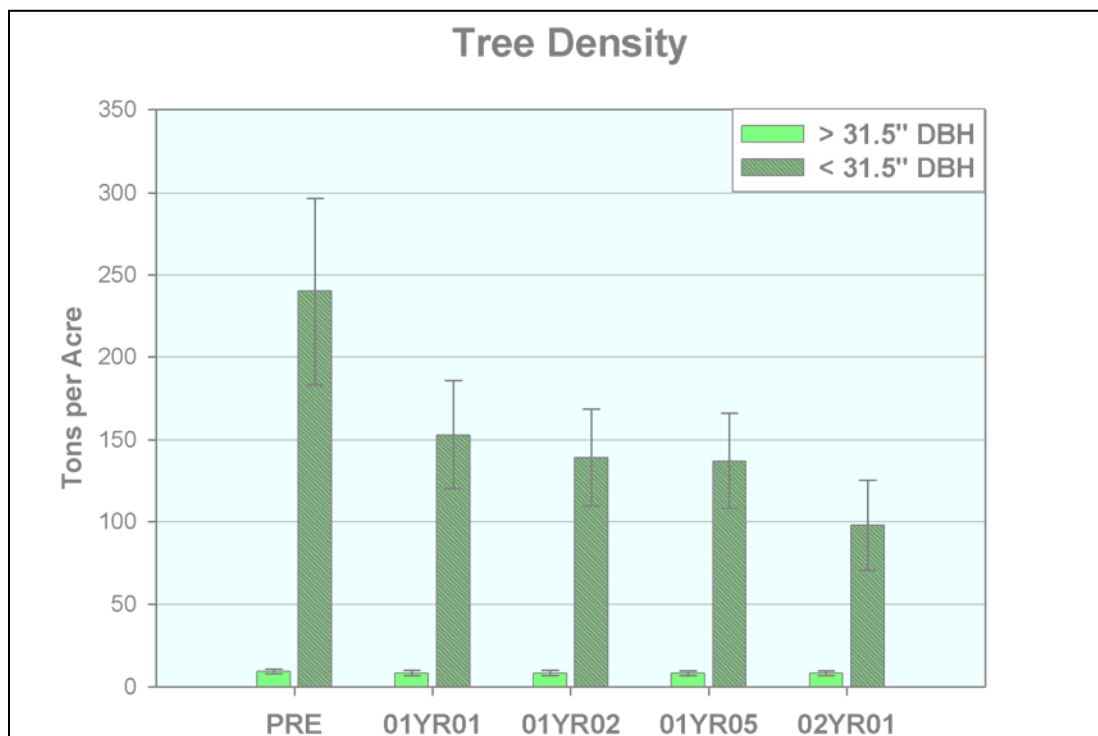


Figure 13. Total tree density through two burn cycles in the FPIPO1T02 type.

Removing the sapling or pole sized trees (<15.0 cm DBH but >2.5 cm DBH) from the analysis gives another look at trends in overstory tree density over time. Average preburn and 02YR01 densities of living trees > 31.5" DBH are 9.3 (SE = 1.55) and 8.09 (SE = 1.52) trees per acre, respectively. Average densities of living trees between 6 – 31.5" DBH are 93.1 trees/acre preburn (SE = 13.1), and 69.4 trees/acre 02 YR01 (SE = 12.3).

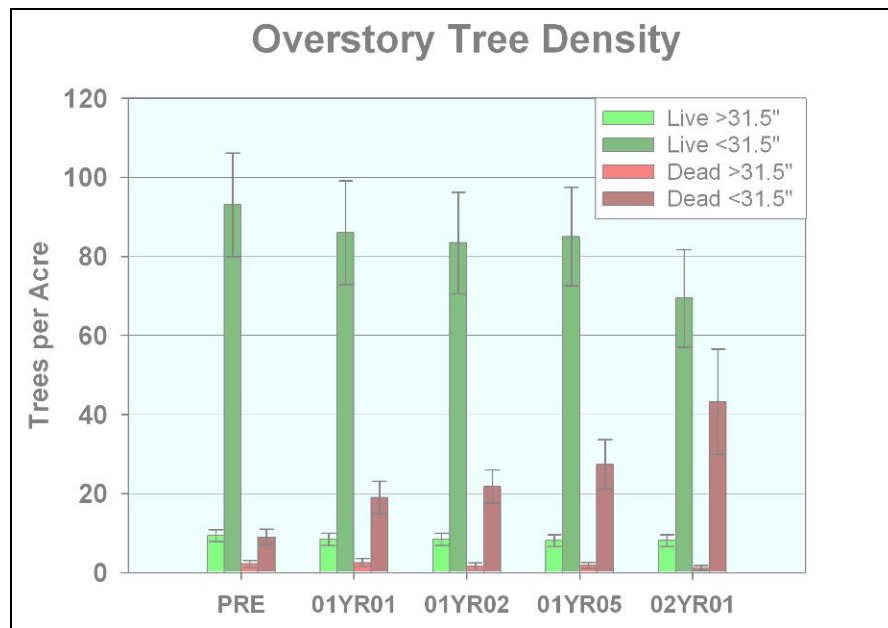


Figure 14. Trends in overstory tree density in the FPIPO1T02 type.

Pole sized tree density has been dramatically reduced by two prescribed fire treatments. Average preburn pole sized live tree density was 151 trees/acre (SE = 46.2); after one prescribed burn this dropped to 67 trees/acre (SE = 21.5), and a second prescribed fire dropped this number to 29 trees/acre (SE = 17.1).

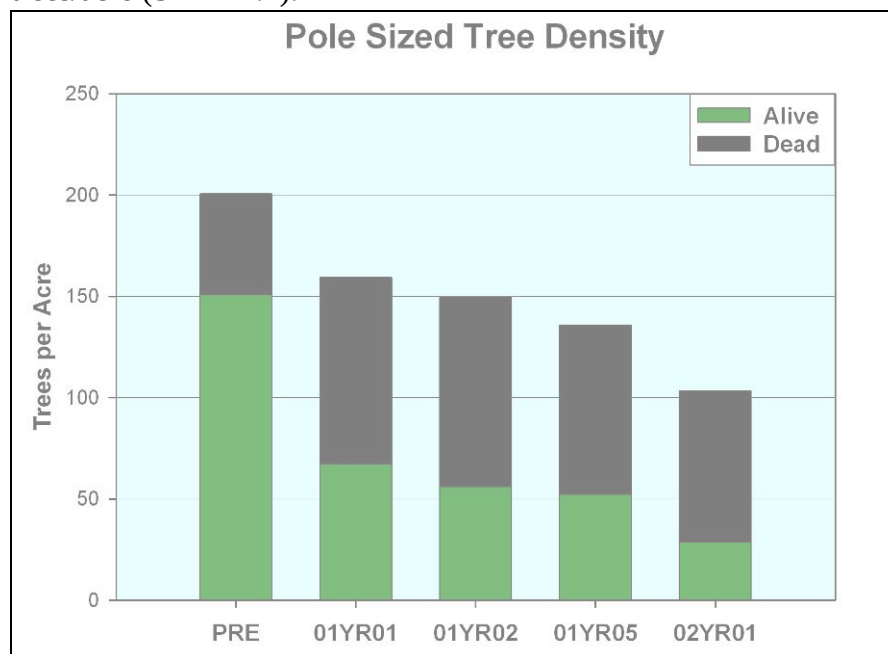


Figure 15. FPIPO1T02 pole sized tree density through 02YR01.

2. Tree Composition

Target conditions for the ponderosa pine – mixed conifer forest are presented with monitoring results from the ponderosa pine/bear clover – dominated forest monitoring type for comparison purposes.

YFMP Target Conditions – FPIPO1T09	FPIPO1T02 Actual Conditions
Achieve the following tree composition by genus: • 60 – 95% pine • 15 - 40% cedar • 1 – 10% oak	Current 02YR01 live overstory tree composition: • 48% pine • 34% cedar • 18% oak

Overstory tree composition has changed from preburn conditions: the average overstory composition of live trees was 38% cedar, 41% pine, and 21% oak.

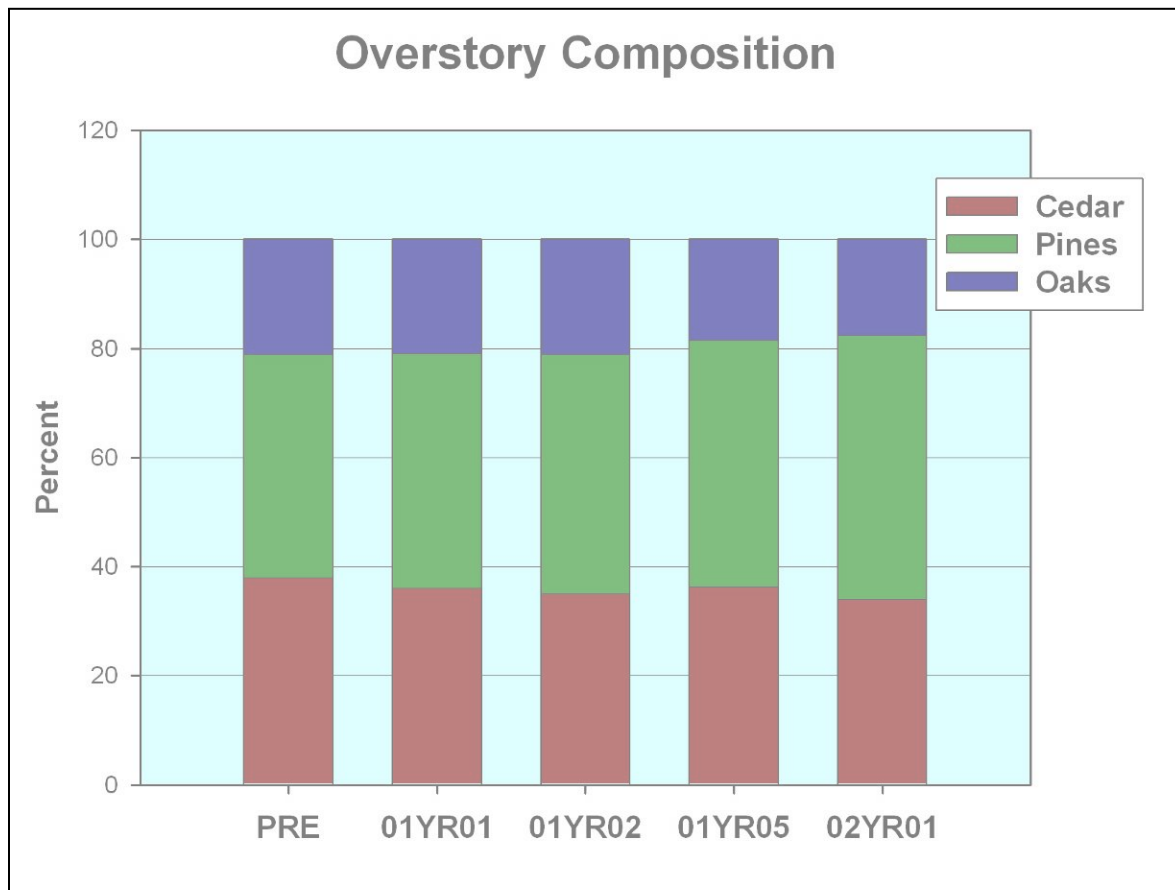


Figure 16. FPIPO1T02 average overstory composition through time.

Average pole sized tree composition has changed after two prescribed fire treatments that also substantially reduced the total number of pole sized trees. The change from preburn to 02YR01 has favored cedar, ponderosa pine, and black oak, while live oak saplings have declined. Sugar pine seedlings grew into the pole sized tree size class after the first burn, but were killed by the second prescribed burn.

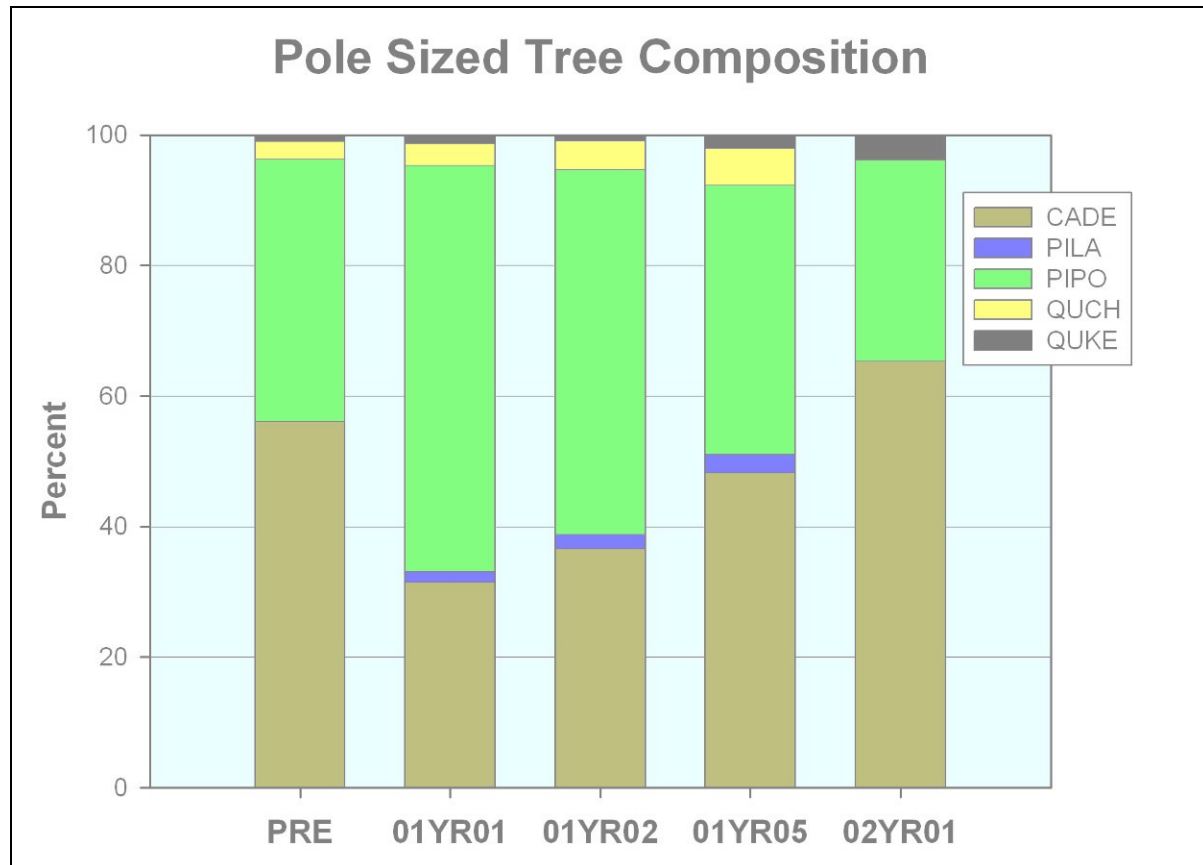


Figure 17. Average composition of pole sized trees in the FPIPO1T02 type. CADE = incense cedar; PILA = sugar pine; PIPO = ponderosa pine; QUCH = live oak; and QUKE = black oak.

3. Fuel Loading

Again, YFMP target conditions for fuel loading in the ponderosa pine/bear clover – dominated mixed conifer forest have not yet been defined. Monitoring results are presented in relation to the ponderosa pine – mixed conifer forest for comparison purposes.

Table 7. Ponderosa pine - mixed conifer forest target conditions compared with monitoring results from the ponderosa pine/bear clover - dominated mixed conifer forest.

YFMP Target Conditions – FPIPO1T09	FPIPO1T02 Actual Conditions
Achieve the following fuel loading: • 20-40% = 5-30 tons/acre • 20-50% = 30-60 tons/acre • 5-20% = > 60 tons/acre	Current 02YR02 total fuel loading: • 36.3 tons/acre (SE = 10.4)

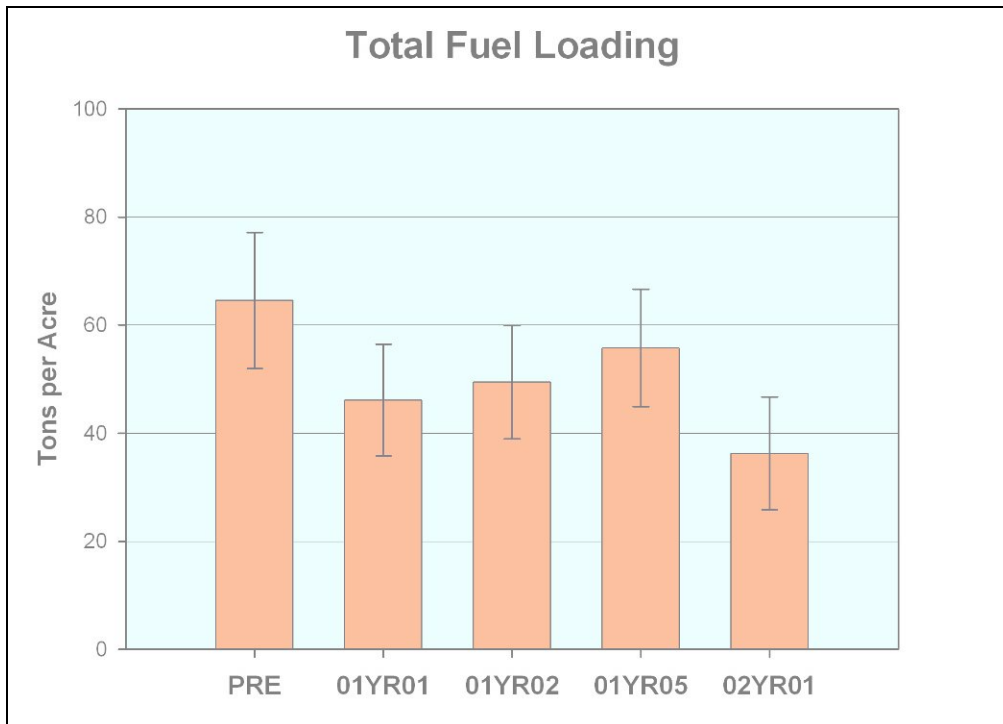


Figure 18. Trends in total fuel loading for the FPIPO1T02 monitoring type.

1, 10, and 100 hour fuel loading has not fluctuated too wildly after prescribed fire treatments; although there has been a decrease in 100 hour fuels from preburn conditions.

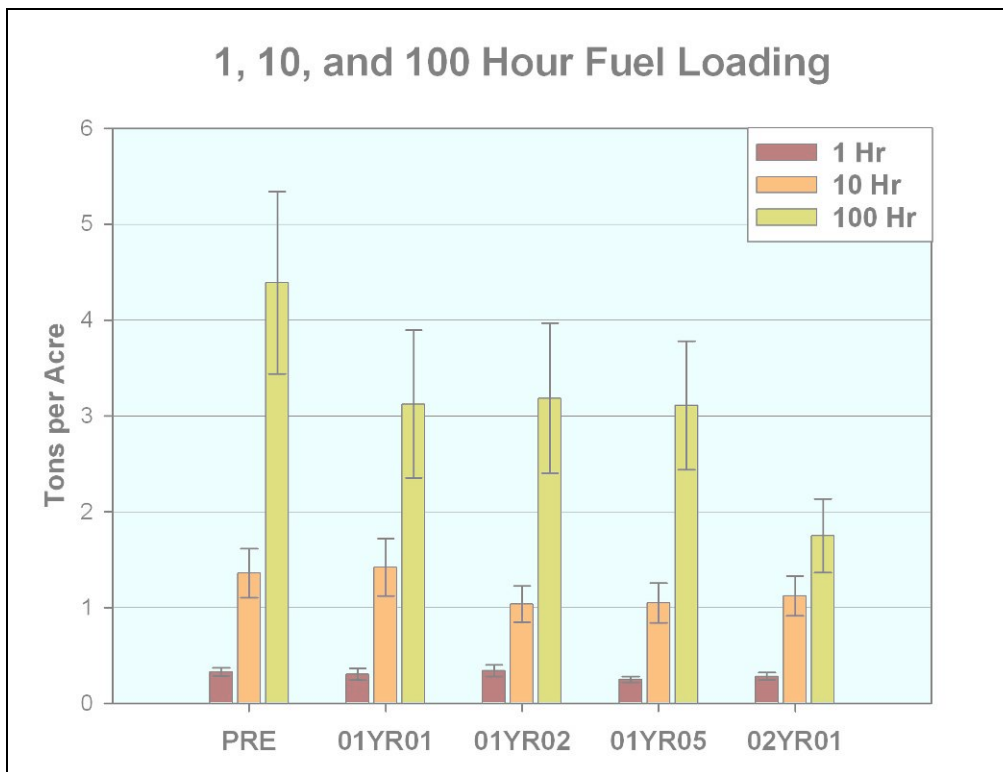


Figure 19. 1, 10, and 100 hour fuel loading in the FPIPO1T02 monitoring type.

Two prescribed fire treatments have been successful in reducing 1000 hour fuels (both sound and rotten) and litter and duff layers within the FPIPO1T02 monitoring type, bringing these treated forests closer towards a restored condition. Follow-up prescribed fire treatments are essential for managing fuel loadings in these forests.

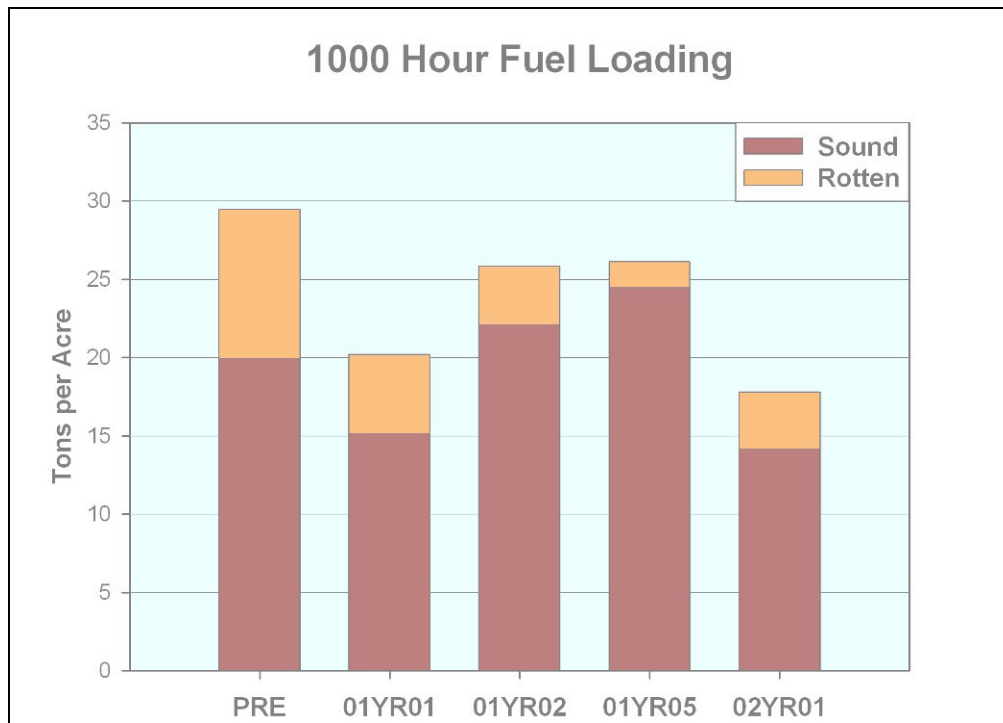


Figure 20. 1000 hour fuels have been steadily reduced by prescribed fire treatments in the FPIPO1T02 type.

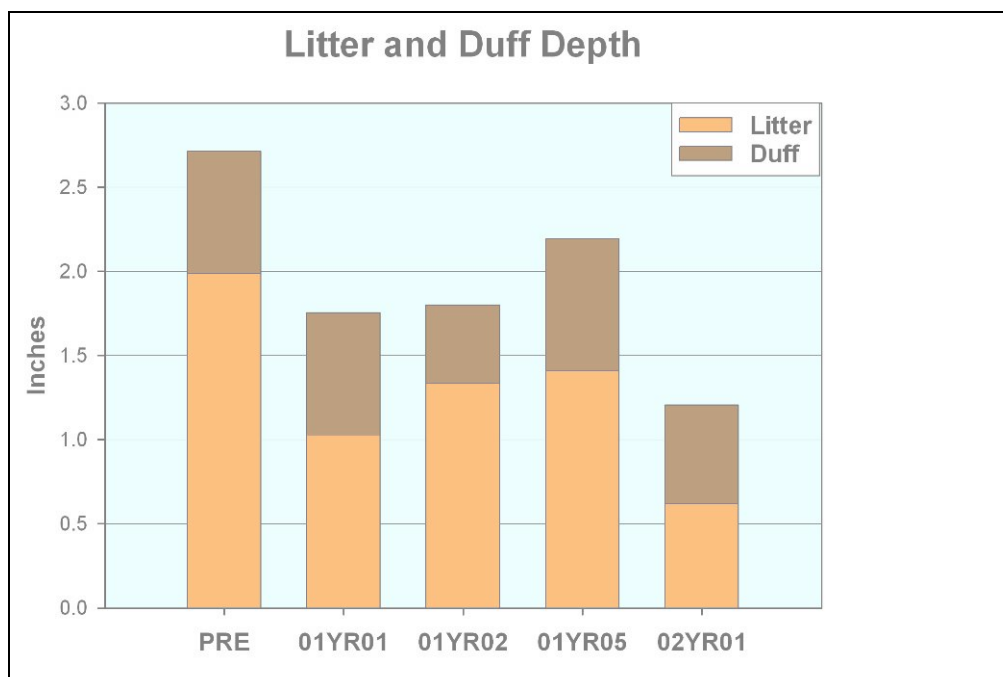


Figure 21. Trends in litter and duff depths in the FPIPO1T02 monitoring type.

--Ackerson Wildfire

The Ackerson Complex wildfire of 1996 was the largest in recorded park history, burning almost 60,000 acres, most of which fell within Yosemite. Ten FMH plots were installed the following year (1997) by YOSE Resource Management staff in areas burned under moderate and high severity. Seven of these plots were located within high-severity burned lower mixed conifer forest, and three of these plots were located in moderate-severity burned red fir forest. These plots were sampled immediately after the fire (POST), one year postfire (YR01), two years postfire (YR02), five years postfire (YR05), and ten years postfire (YR10) in 2006. Results from the seven plots located in the high-severity affected lower mixed conifer forest are presented here.

This photo was taken two years after the Ackerson fire in 1998. This plot experienced 100% canopy mortality.



This is the same photo as above taken ten years postfire in 2006. This plot has a high cover of whitethorn (Ceanothus cordulatus) and conifer seedling regeneration is minimal. The photo pole in the picture is 6' tall.



Most of the Ackerson plots experienced heavy canopy mortality. During the immediate postburn (POST) read, dead overstory tree density was 158.4 trees/acre (SE = 40.4) and living overstory tree density was 20.23 trees/acre (SE = 13.9). Over the next ten years, delayed mortality further reduced living overstory tree density to an average of 6.9 trees/acre (SE = 5.7). Fire-killed trees started to decay and fall down with wind and weather events, which reduced the density of standing dead trees to an average of 104.1 trees/acre (SE = 23.7). The SE is high for the living overstory trees because only two of the seven plots sampled contained live overstory trees.

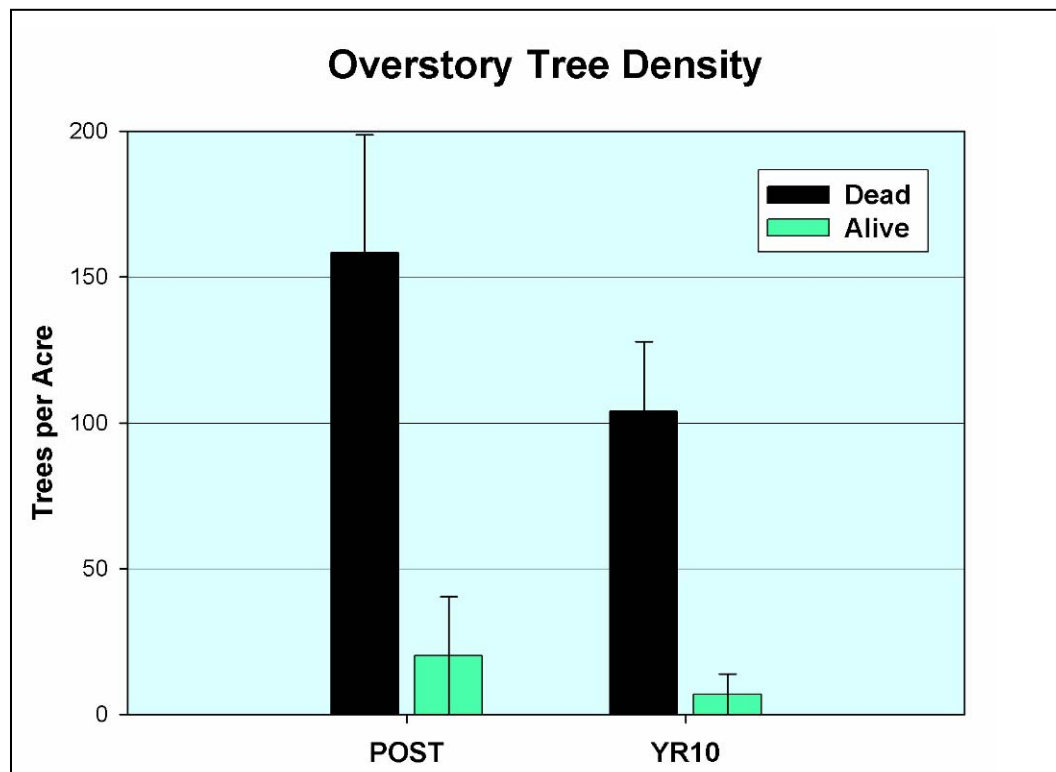


Figure 22. Average overstory tree density for the Ackerson plots over time.

As of the YR10 sampling visit, saplings or pole sized trees remain sparse across the Ackerson plots. Only two of the seven plots contained any pole sized trees; most of these were resprouting black oaks that had grown into the pole sized tree class. One plot had some ponderosa pine pole sized trees (16 trees/acre). Tree seedling regeneration is becoming apparent across these plots. Data are highly variable due to the low sample size ($n = 7$), but some interesting trends are apparent regardless. Tree seedlings seem to have experienced the highest densities five years after the fire. The composition of seedling species has also changed in the plots over the years.



Figure 23. Ponderosa pine seedling in one of the YR10 Ackerson plots.

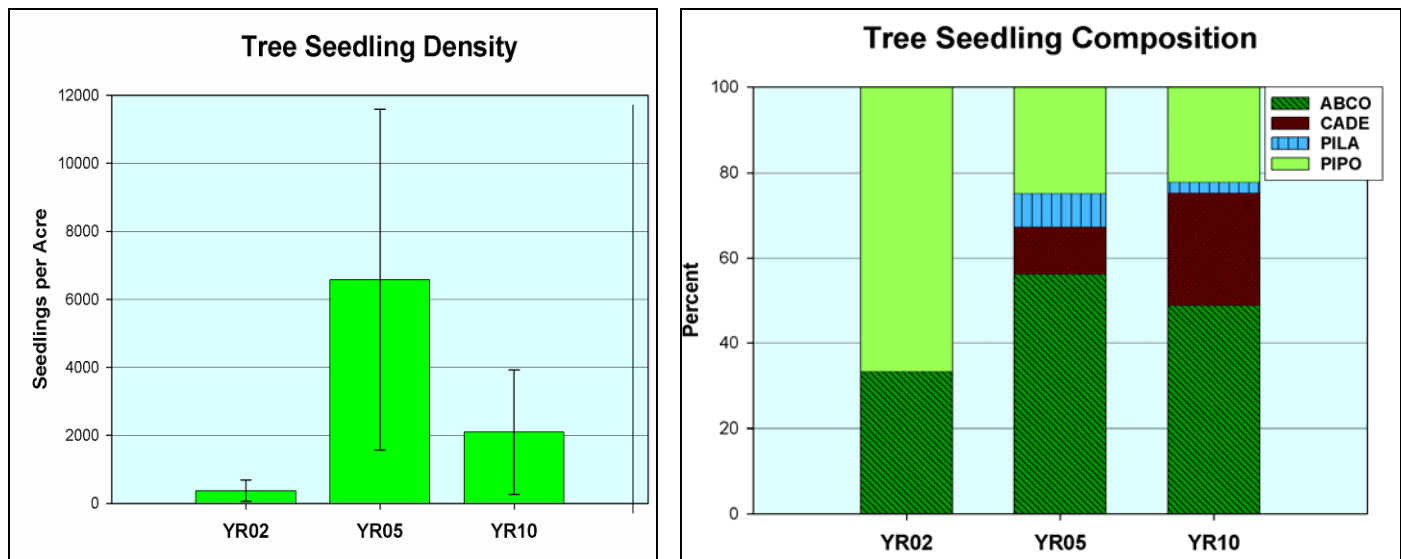


Figure 24. Tree Seedling (tree species < 2.5 cm DBH) density and composition over the years in the Ackerson wildfire. ABCO = white fir; CADE = incense cedar; PILA = sugar pine; PIPO = ponderosa pine.

Shrub cover has increased dramatically in the ten years following the Ackerson fire. Two *Ceanothus* species comprise 90% of the YR10 shrub cover: whitethorn (*C. cordulatus*) and deerbrush (*C. integriramus*). These nitrogen-fixing shrubs are important sources of nutrient recovery in postfire ecosystems. The YR10 average shrub height is 1.3 m.

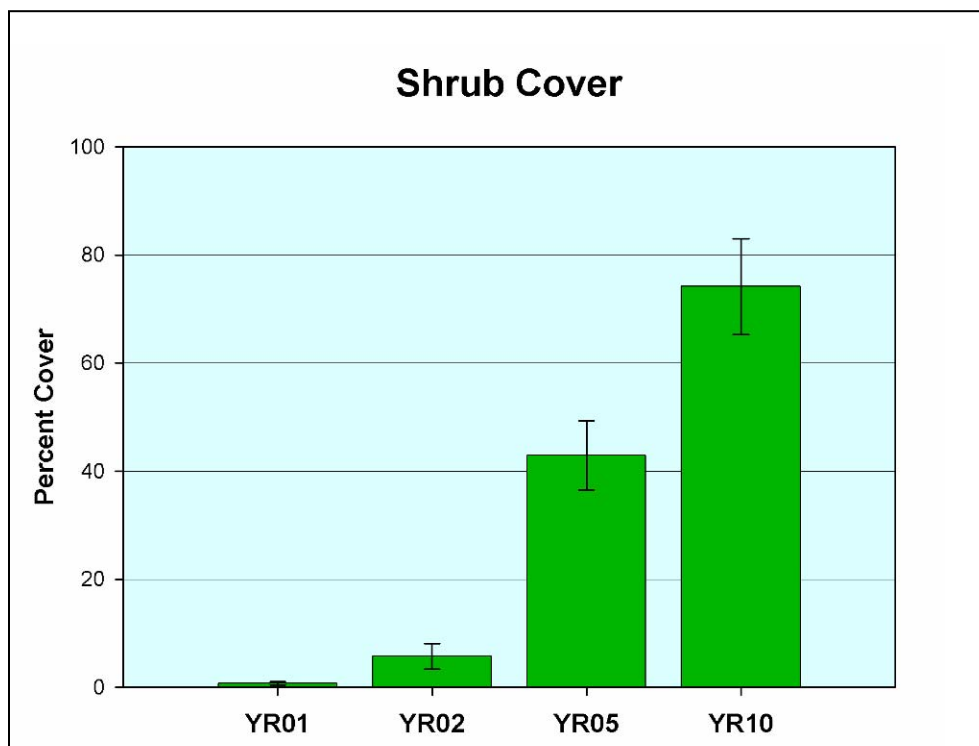


Figure 25. Ackerson shrub cover over time.

Non-native plants have also increased over time in the Ackerson fire area. The primary non-native plant species found in the YR10 Ackerson plots are cheat grass (*Bromus tectorum*) at 10.9% cover and bull thistle (*Cirsium vulgare*) at 1.8% cover.

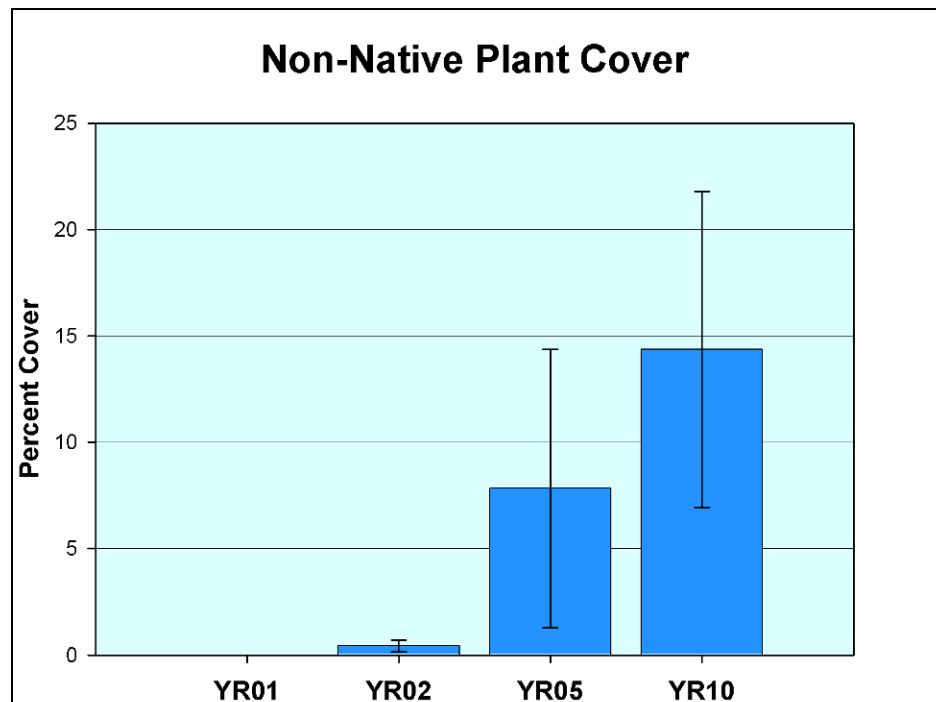


Figure 26. Trends in non-native plant cover within the Ackerson fire.

Fuel loading data for the complete set of Ackerson plots was not collected POST, YR01, or YR05, so data presented here are from the YR10 sampling visit. The main contributor to fuel loading in the Ackerson plots is 1000 hour fuels resulting from dead trees falling down. There is an average of 51.9 tons/acre of sound 1000 hour fuels and 28.8 tons/acre of rotten 1000 hour fuels in the Ackerson plots. There is also 11.5 tons/acre (SE = 3.2) of litter and 12.2 tons/acre (SE = 1.8) of duff comprising the average total fuel loading. The total average fuel loading from these plots is 119.4 tons/acre (SE = 10.1).



Figure 27. The Ackerson plot field work was the highlight of 2006 for the Fire Effects Crew.

--A-Rock Wildfire

The 1990 A-Rock wildfire was one of the most devastating fires in park history, affecting 18,000 acres and burning through the town of Foresta. Five FMH plots were installed immediately after the fire by YOSE Resource Management staff in areas that burned with high severity. These plots were read immediately postfire (POST -- 1990), one year postfire (YR01 -- 1991), two years postfire (YR02 -- 1992), five years postfire (YR05 -- 1995), ten years postfire (YR10 -- 2000), and sixteen years postfire (YR16) in 2006.

Fire killed trees have fallen in the sixteen years since the fire, although there are still many standing snags in the burned area. As of the YR16 read, some young ponderosa pine trees have grown into the overstory tree size class.

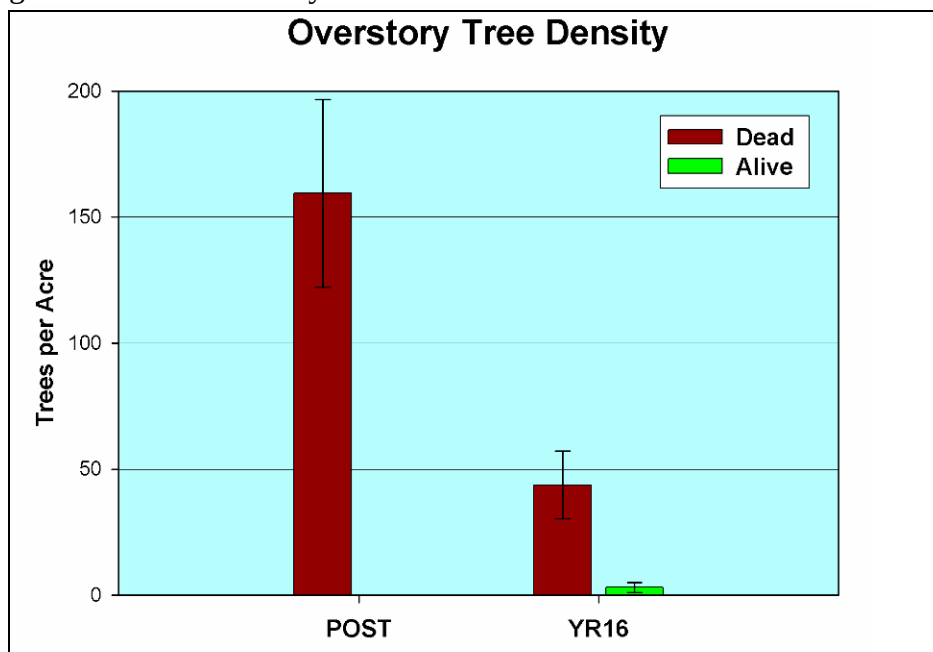


Figure 28. Overstory tree density over time in the A-Rock plots.



Figure 29. Kristen Shive (right) demonstrates the importance of repeat photography. The photo on the left was taken YR05 (1995) and the one on the right was taken YR16 (2006).

As of YR16, there is an average of 97 pole sized trees/acre, primarily ponderosa pine with some black oak resprouts that have grown into the pole-sized tree size class. Seedling regeneration is highly variable due to the small sample size. The seedling regeneration in the A-Rock plots is also dominated by ponderosa pine and resprouting black oaks. Average ponderosa pine seedling density has fluctuated over the years: 0 trees/acre YR01, 388 trees/acre YR02, 227 trees/acre YR05, 81 trees/acre YR10, and 65 trees/acre YR16.

Shrub cover has increased over time. The A-Rock fire area is dominated by Mariposa manzanita (*Arctostaphylos viscida* ssp. *mariposa*), with a smaller *Ceanothus* component. The YR16 manzanita cover is 82% of the total shrub cover; total *Ceanothus* cover (*C. cordulatus* and *C. integerrimus*) is 12% of the total shrub cover. Additional shrubs found within the A-Rock plots YR16 are golden-fleece (*Ericameria arborescens*), Sierra gooseberry (*Ribes roezlii*), and live oak.

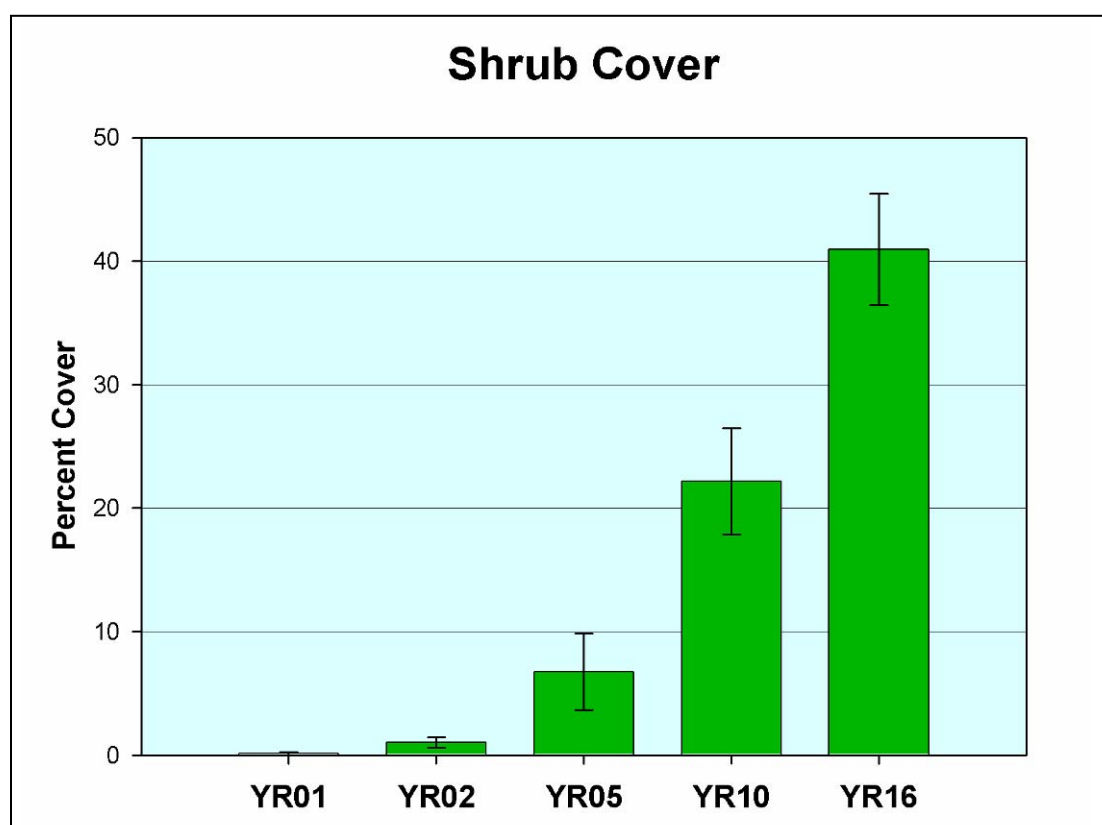


Figure 30. A-Rock shrub cover over time.

Non-native plants have also increased over time, though non-native cover across the plots is variable due to the small sample size. The main non-native plants found in the YR16 read are velvet grass (*Holcus lanatus*) at an average of 2% cover, foxtail fescue (*Vulpia myuros*) with a cover of 1.5%, and cheat grass with a cover of 0.4%. Additional non-native plants found within the YR16 A-Rock plots were ripgut brome (*Bromus diandrus*), and Kentucky bluegrass (*Poa pratensis*).

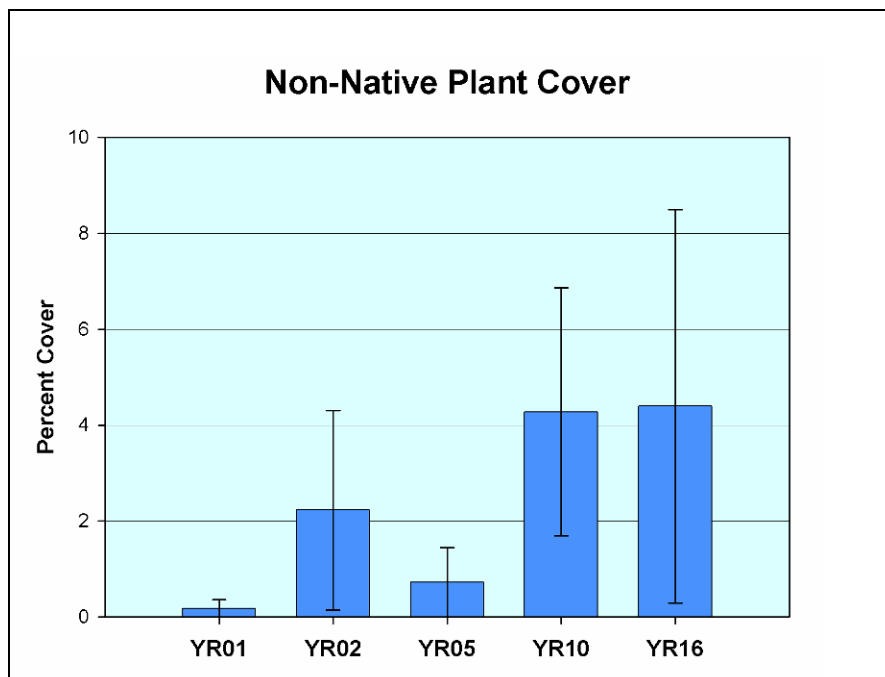


Figure 31. A-Rock non-native plant cover over time.

Fuel loading data show that 1000 hour fuels comprise the bulk of the fuel loading, which is not surprising given the amount of standing dead trees that remained in the wake of the A-Rock fire.

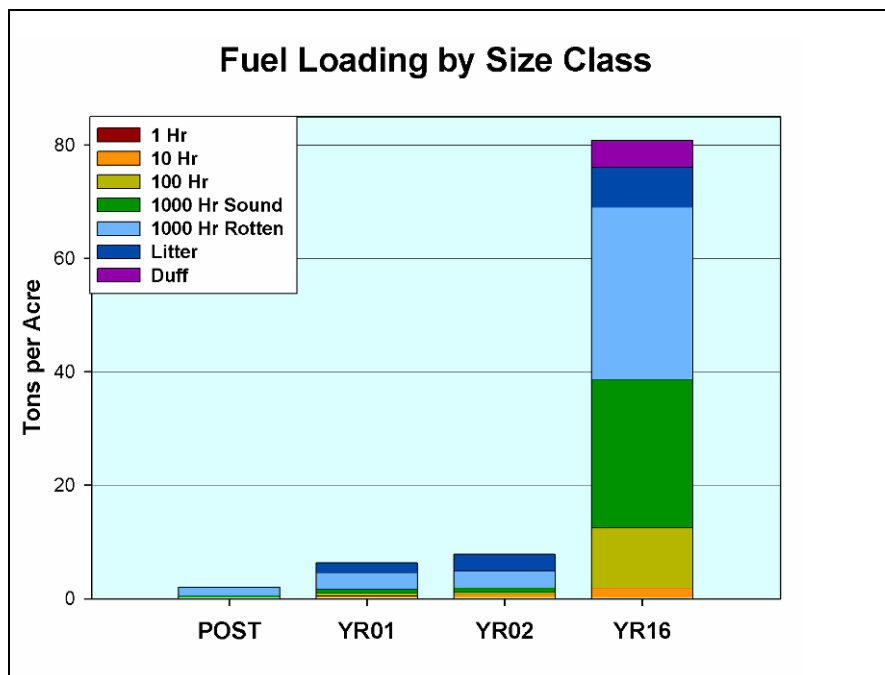
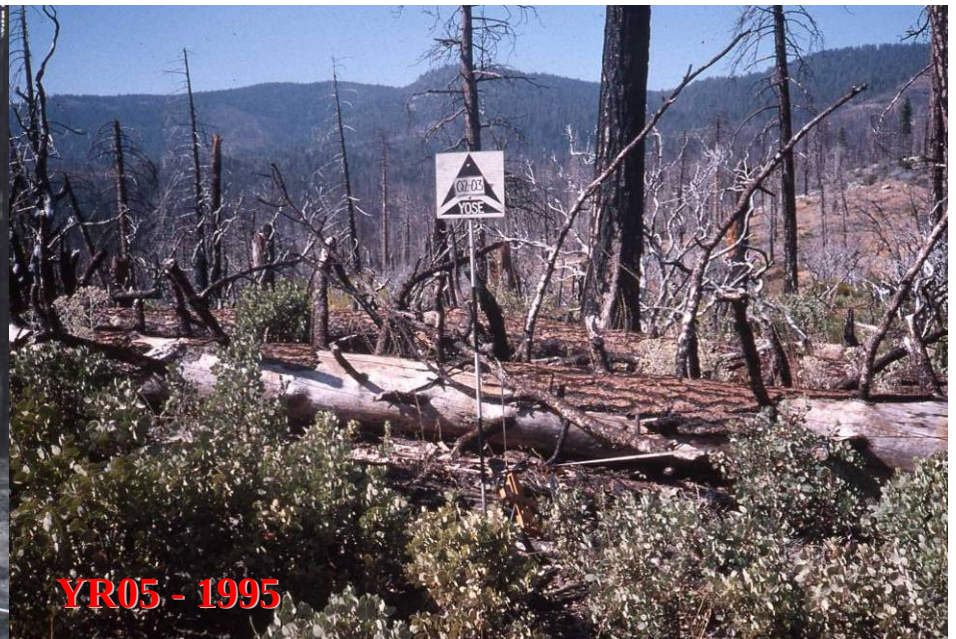


Figure 32. Fuel loading through time in the A-Rock plots.

One of the best ways to understand the change that has occurred in the A-Rock fire over time is by examining repeat photography from established photopoints within the fire area. The following photo series is from one of the A-Rock plots and displays the dramatic change that high severity fire has brought to the landscape.



FMH Notes from the Field: In 2005 and 2006 the crew attempted to install ponderosa pine - dominated mixed conifer forest (FPIPO1T09) plots without success. In 2005, we tried to install plots in PW30 – a burn unit between the Mariposa Grove and the South Entrance Station. We used our vegetation map, but areas that were supposed to be PIPO dominated with fuel model 9 were either too small, too close to burn perimeters, or the incorrect vegetation type. The same thing happened in Soup Bowl B Segment A in Wawona in 2006. We also tried to install in Hodgdon but ran into similar problems. It may be worth trying again in Hodgdon as the unit did not burn in 2006. This raises two issues: the accuracy of our vegetation map, and secondly, the difficulty of installing FMH plots in our burn units that seem to be shrinking due to air quality demands for contingency lines.

2. “Retro” -Style Fire Effects Monitoring

The “Retro” plots are the result of fire effects monitoring efforts by the Yosemite fire and resource management staffs before there was any official policy mandate to do so. Almost 400 of these old plots were installed across Yosemite in the 1970’s and 1980’s. This monitoring project was abandoned in the late 1980’s when the current national fire effects monitoring program (characterized by FMH methodology) was implemented. These old plots are being evaluated for their relevance and value to our current program, and in some cases have been re-incorporated into our monitoring network.

Protocols for measuring these fire effects monitoring plots were developed in 1978 (Sydoriak 1985). Plots are arranged along three parallel transects 20 m apart. Overstory trees (> 6” DBH) are measured in variable radius plots using a 30’ BAF prism. Fuel loading is sampled using a planar intercept method (Brown 1974). Tree seedlings are sampled in a milhectare (1.78m radius) circle. Pole sized trees (< 6” DBH) are also sampled in a milhectare (1.78m radius) circle.

--Big Creek Prescribed Burn Unit

Twenty “Retro” plots in the Big Creek burn unit were recently analyzed and presented in poster format by Jen Hooke and Monica Buhler at the International Association of Wildland Fire Fuels & Fire Behavior Conference in Portland, Oregon. Monitoring results were also published in the Rx Effects Newsletter, the annual publication of the NPS Fire Ecology Program.

The Big Creek burn unit is located near Wawona in the southwestern part of the park and is dominated by ponderosa pine – dominated mixed conifer forest. The Big Creek unit was treated with prescribed fire in October of 1985 and again in May of 2004. The Big Creek plots were sampled preburn (PRE -- 1985), immediately postburn (01 POST -- 1985), one year postburn (01 YR01 -- 1986), two years postburn (01 YR02 -- 1987), five years postburn (01 YR05 -- 1990), fourteen years postburn (01 YR14 -- 1999), sixteen years postburn (01 YR16 -- 2001), immediately after the second burn (02 POST -- 2004), and one year after the second burn (02 YR01 -- 2005). Monitoring results are presented in relation to the fire management objectives (YFMP target conditions) for the ponderosa pine – dominated mixed conifer forest.

1. Overstory Tree Density and Composition

Overstory tree density steadily decreased in the 20 years after the first entry burn but target conditions were not met until after the second entry burn. Nearly all mortality was in trees < 31.5" DBH. There was a significant shift in dominance from CADE to PIPO in the 20 years of monitoring indicating that we are approaching target conditions. PILA occurrence has declined significantly, perhaps due to infection with the exotic pathogen White Pine Blister Rust (*Cronartium ribicola*). The proportion of black oaks in the overstory has increased as total density has decreased, so treatments have been effective at retaining this species in the canopy.

Table 8. Target conditions compared with monitoring results from the Big Creek Retro plots.

YFMP Target Conditions for ponderosa pine – dominated mixed conifer forests	02 YR01 Actual Conditions
Create tree density as follows: • 4-91 trees/acre < 31.5" DBH • 4-30 trees/acre > 31.5" DBH Create the following overstory composition: • 60-95% pine • 15-40% cedar • 1-10% oak	Tree density: • 78.2 trees/acre < 31.5" DBH (SE = 17.1) • 5.8 trees/acre > 31.5" DBH (SE = 0.71) Overstory composition: • 48.5% pine • 31% cedar • 6.8% oak • 13.7% fir

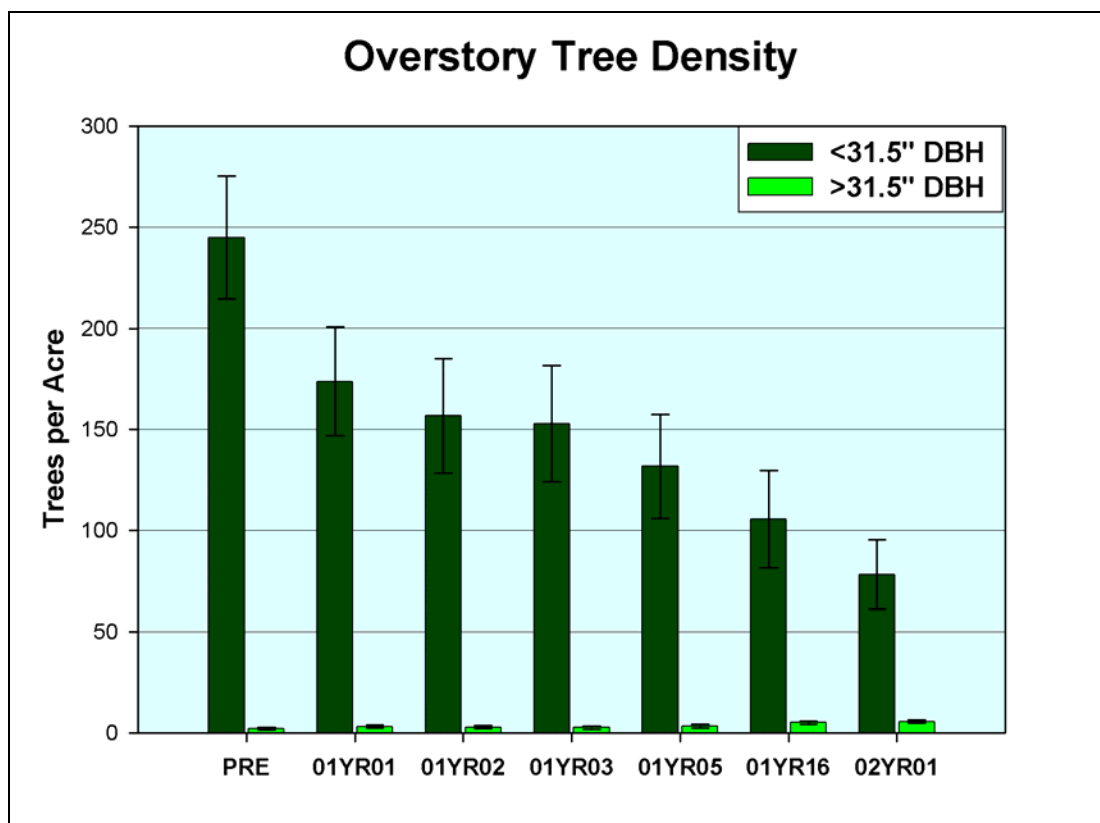


Figure 33. Overstory tree density over time in the Big Creek burn unit.

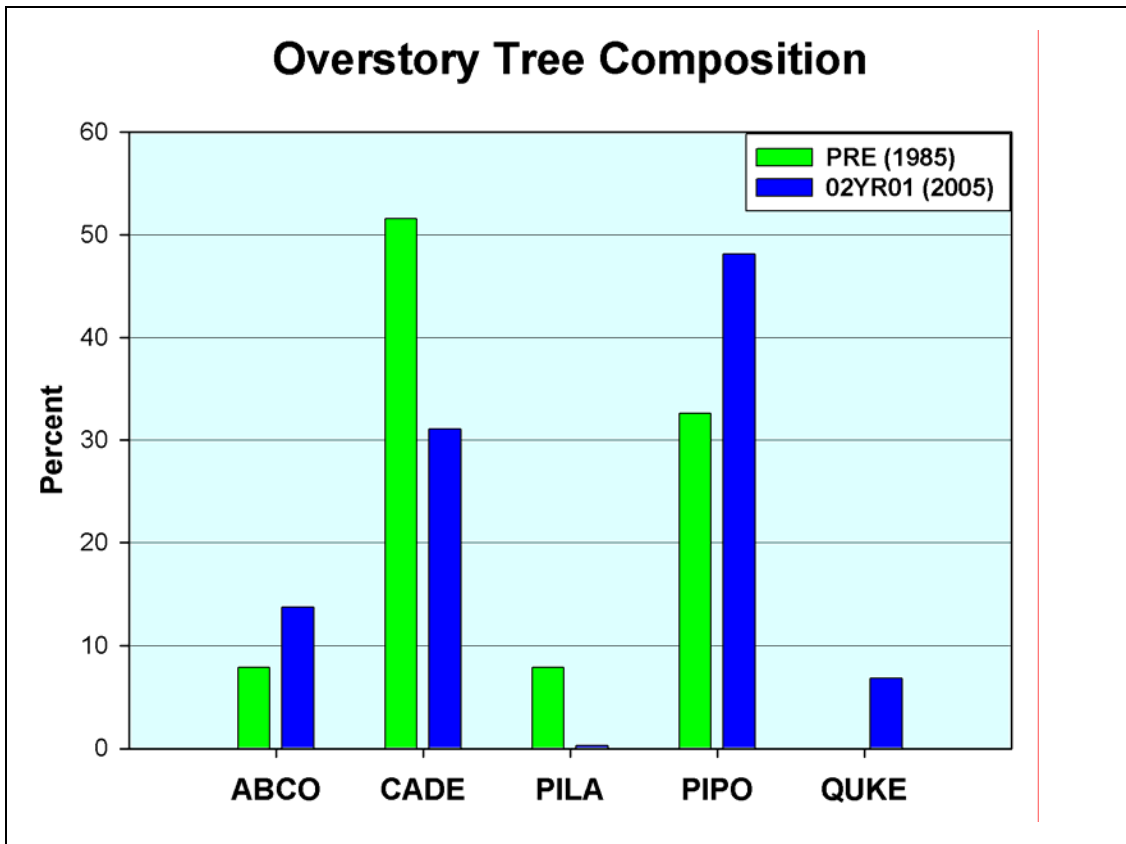


Figure 34. Overstory tree composition in the Big Creek burn unit over time. ABCO = white fir; CADE = incense cedar; PILA = sugar pine; PIPO = ponderosa pine; QUKE = black oak.

2. Fuel Loading

Fuel loading in all size classes was dramatically decreased by prescribed burning. The first burn reduced duff levels by 98%, woody fuels by 50%, and total fuels by 78%, achieving management objectives. The second burn reduced total fuels by 38%. One year after the second burn, average total fuel loading was 41 tons/acre, which is well within the range of target conditions.

Table 9. Target conditions compared to actual monitoring results in the Big Creek burn unit.

YFMP Target Conditions for ponderosa pine -dominated mixed conifer forests	02 YR01 Actual Conditions
Reduce total fuel load so that: • 20-40% = 5-30 tons/acre • 20-50% = 30-60 tons/acre • 5-20% = > 60 tons/acre	• Total fuel load = 41 tons/acre

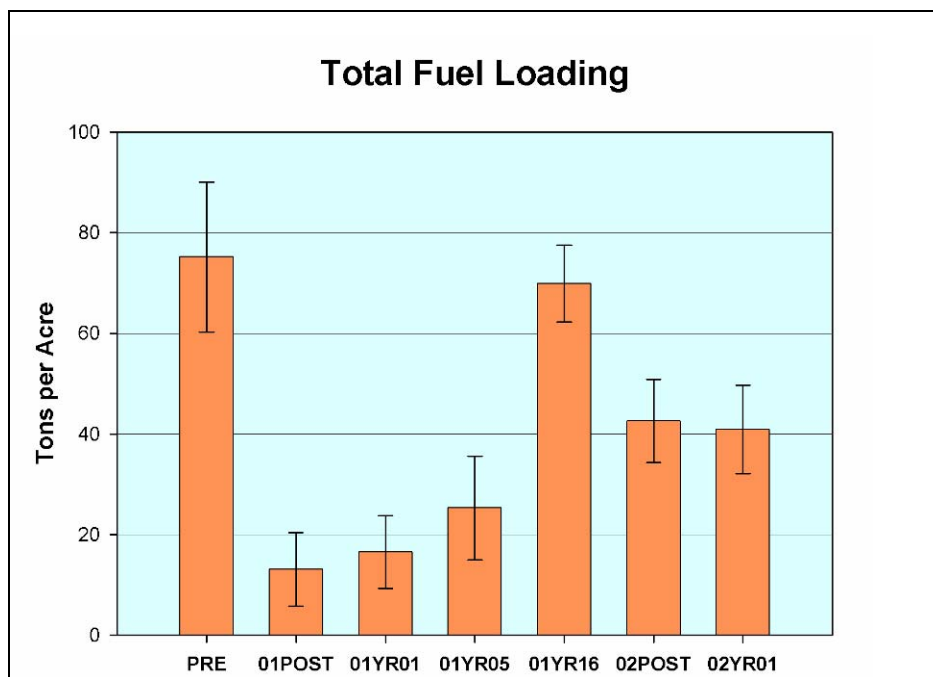


Figure 35. Total fuel loading for the Big Creek burn unit reflecting two prescribed burn cycles and 20 years of monitoring efforts.

The first entry burn was conducted in the fall, and the second entry burn was conducted in the spring. A 78% reduction in fuels was accomplished by the first entry burn (fall 1985), where duff was the largest component of the total fuel loading. The second entry burn (spring 2004) caused a 38% reduction in fuels. There were significantly more 1000 hour (> 3" diameter) fuels 16 years after the first burn. Due to higher fuel moistures in the spring, fewer 1000 hour fuels were consumed.

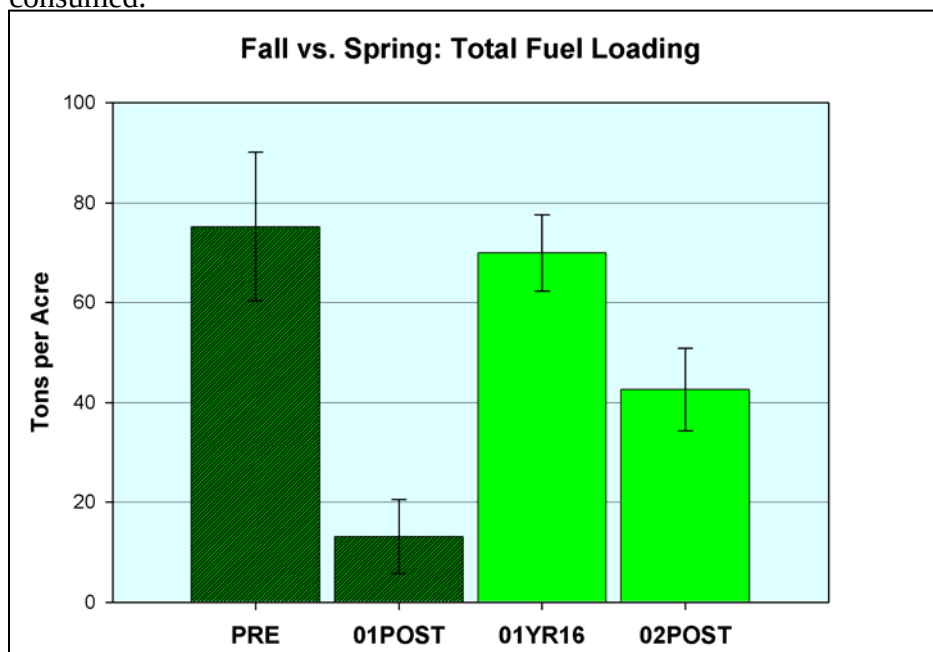


Figure 36. Total fuel consumption after the first prescribed fire in the fall of 1985 (dark green) vs. the second prescribed fire in the spring of 2004 (light green).

3. Pole Sized Trees

Understory tree (tree saplings < 6" DBH) densities were relatively low before the first entry burn, were eliminated postburn, and did not recover until 16 years postburn. Total density was reduced again after the second entry burn. There was a large shift in species composition from CADE dominance before the first entry burn to PIPO dominance 14 years after the burn. Preburn canopy cover was probably high, favoring shade-tolerant species such as CADE. The postburn environment became more pine-friendly with exposed mineral soil, a more open canopy, and lower fuel loads. After two burn entries, regeneration has shifted to align with target conditions, excepting the oak component.

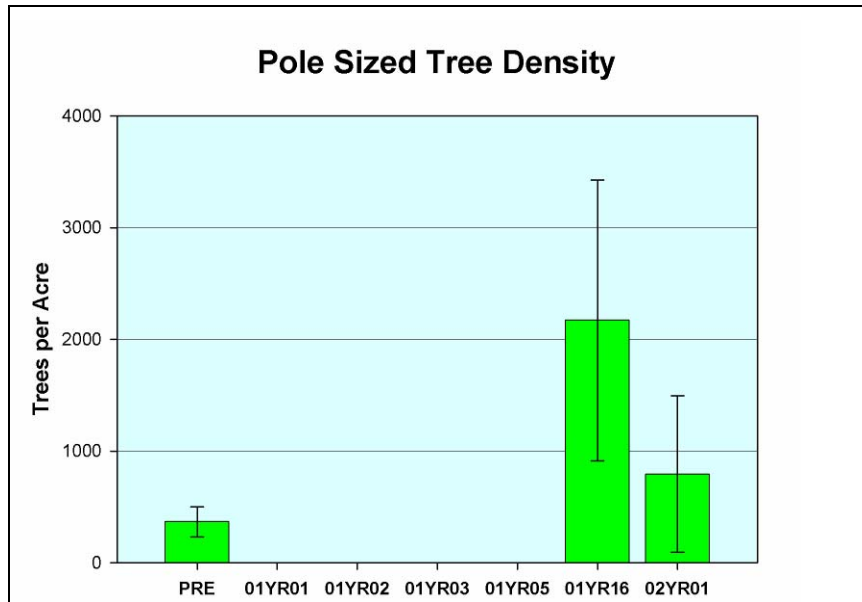


Figure 37. Pole sized tree density over time in the Big Creek burn unit.

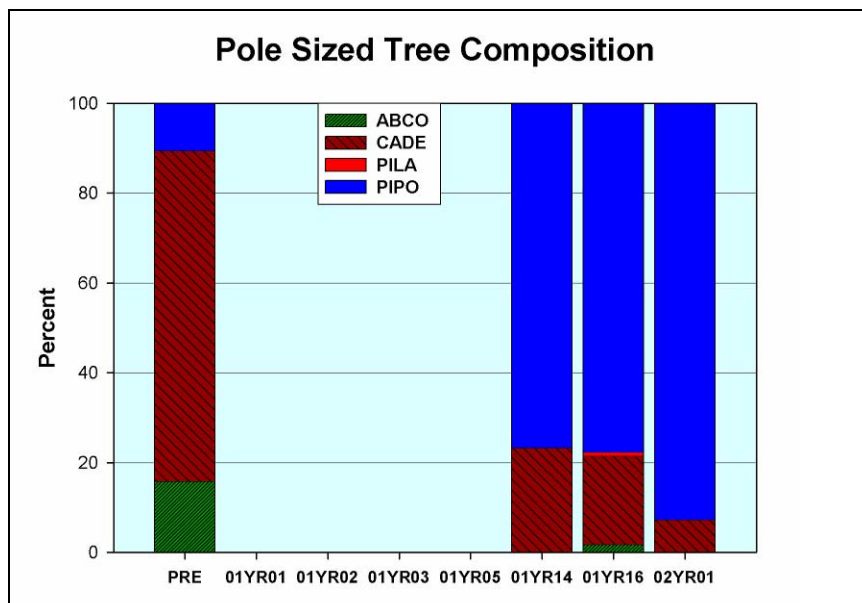


Figure 38. Pole sized tree composition over 20 years of monitoring in the Big Creek burn unit.

The Big Creek data show that forest restoration is a slow, incremental process. The first prescribed fire entry was effective at killing small-diameter trees and reducing fuel loading. The fire-killed trees decayed and came down with weather events to create a pulse of restoration-related fuel loading. The second entry burn was a critical time for reducing fuels related to meeting target conditions for overstory tree density and composition and fuel loading. A second entry fall burn might have been more effective at reducing heavy fuels than burning in the spring, however a “cooler” spring burn may have mitigated against higher burn severities. Third and fourth entry burns will be essential components of restoring forest health and prescribed fire treatment schedules will be vigilantly maintained. Monitoring efforts will continue to assess whether management objectives are being met.



Figure 39. Change over time in one of the Big Creek plots.

“Retro” Notes from the Field: Accuracy in tree data continues to be challenging because of the variable plot radius (prism) methodology. Because determining which trees fall into the prism has a degree of subjectivity with borderline size trees or trees that are obscured to the reader **it is critical** to be consistent year to year to not skew tree density calculations. Only trees that legitimately grew in because of increased size should “appear” in the data. Also, continuing to record an azimuth associated with each tree is critical especially when wholesale changes occur postburn and trees are harder to relocate.

3. Rapid Assessment Monitoring

Rapid Assessment methodology was developed by Kara Paintner and Monica Buhler in response to management needs for monitoring mechanically thinned areas. A modified Rapid Assessment protocol has been developed for monitoring fire effects in WFU fire areas (see appendices for methodology). Rapid Assessment monitoring results are unavailable this year, but results will be available soon.

Brief results are available for mechanical thinning monitoring plots (n = 16) located along the Big Oak Flat Road and are summarized in tabular form below.

Table 10. Pre-treatment and one year post-treatment (thinning & subsequent pile burning) results are summarized for mechanical thinning treatments along the Big Oak Flat Road.

Status	Pole Sized Tree Density	Seedling Tree Density	Canopy Cover	Height to Live Crown	Total Fuel Loading	Non-Native Plants
PRE	233 trees/acre	4749 seedlings/acre	83%	11.5 m	45 tons/acre	None observed
YR01	33 trees/acre	1144 seedlings/acre	75%	11.7 m	19 tons/acre	None observed
Change	-85%	-76%	-10%	+2%	-58%	

Rapid Assessment Notes from the Field: Anecdotal observations made while sampling along the Big Oak Flat Road include an increase in bull thistle (*Cirsium vulgare*) in and around a few of the BOFR plots. Suggestions for refining methods for existing mechanical thinning plots:

1. Tree DBH and heights should be taken on a longer term schedule (maybe every 5 years). Without tree tags, the error in measuring DBH and height is greater than tree growth trends.
2. Soils – The longer the time from the actual disturbance, the more subjective disturbance detection becomes. In other words, only record disturbance one year after the disturbance event and maybe every 5 years afterward to see if the disturbance is persistent.
3. Brush – stop counting dead brush

4. Composite Burn Index (CBI) Data Collection

Yosemite NP is part of the National Burn Severity Mapping Project (http://burnseverity.cr.usgs.gov/fire_main.asp), and receives burn severity data for all fires > 300 acres. Burn severity is assessed using dNBR (differenced Normalized Burn Ratio) methodology and is derived from Landsat imagery. The dNBR data are field verified by establishing CBI plots within recently burned areas, and comparing the field-rated burn severity score to the satellite-derived assessment. CBI data collection has been ongoing at Yosemite since 2002. CBI data collection efforts were limited this year due to a heavy workload and a year of transition for the Fire Effects crew. CBI data were collected within the lower mixed conifer forest type within the PW-03 burn unit segments treated in 2005. A larger CBI data collection effort will be made in 2007. Data will be analyzed at a later date by the Fire Ecologist and the Fire GIS Specialist, hopefully in collaboration with our counterparts at Sequoia-Kings Canyon National Parks.

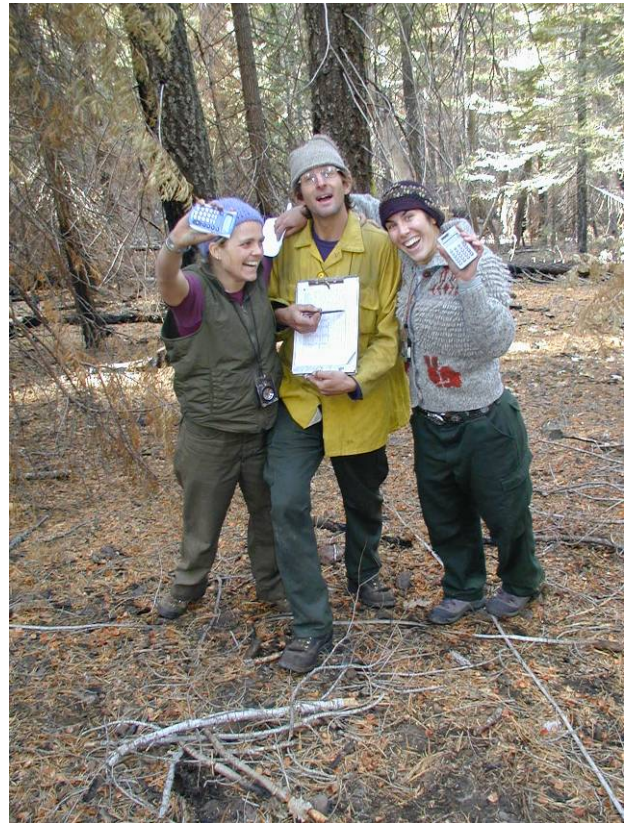


Figure 40. Members of the Yosemite Fire Use Module assisted with CBI data collection within the PW-03 burn unit.

CBI Notes from the Field: *The plots read in 2006 were concentrated in the lower mixed conifer forest where we have few CBI plots from previous years. GPS coverage was better than expected given the high canopy cover, yet it was difficult to determine exactly what pixel we were in (or exactly where we were on the landscape). We suspect that the topographic maps may be somewhat skewed (minor drainages especially). The Yosemite Fire Use Module (Crew 6) was a great help in completing these end of season plots.*

Observations:

- Understory strata almost always rate substantially higher than overstory strata. This is true for Yosemite CBI in all years.
- When relating CBI to dNBR, **MAYBE CONSIDER:**
 1. Weighting understory strata differently than overstory
 2. Review preburn cover estimates and weight accordingly
 3. Weight CBI in regard to ecological value
 4. Definitely adjust weights when intermediate and overstory trees are combined
- The herbaceous (< 1 m tall) stratum remains the most difficult and subjective to evaluate. This is especially true for new observers who are less familiar with prefire conditions and colonizing species. It is also the most subjective for experienced crewmembers for two

reasons: a) pre-fire species richness and percent cover is only an educated guess; b) when rating colonizers especially, it seems like it may take more than one year for species richness and cover to become evident.

5. Yosemite Valley Mechanical Thinning Exotics Survey

Mechanical thinning and subsequent pile burning was completed in the WUI areas of Yosemite Valley in 2002. 20 monitoring plots were established around the Yosemite Village residential area, the Ahwahnee Hotel and meadow, and the stables to see if there was a post-treatment increase in the frequency of exotic plant species. Monitoring of the area commenced pre-treatment in 2002, and continued one year post-treatment (2003) and three years post-treatment (2005).

Exotic plant frequency increased steadily in the three years after the thin/burn treatment. A full report will be available in the spring of 2007. This monitoring project is completed; plots will be removed in the summer of 2007 and data will remain housed in the Yosemite NP Fuels & Ecology office in Wawona.

6. Sugar Pine—Fire Retardant Slurry Investigation

The 2003 Tuolumne WFU fire was converted to a suppression fire due to active fire behavior and spread. During the suppression operations, much fire retardant “slurry” was dropped along the fire perimeter to cease growth. In the process, many large and stately sugar pines (*Pinus lambertiana*) were drenched with the chemical-laden slurry. Resource Advisors staffing the fire were concerned about the long-term impacts of slurry on sugar pine vigor and growth; therefore monitoring the health of 28 trees (18 slurry-affected; 10 controls) commenced immediately after this incident in December of 2003.



Figure 41. Area and sugar pine affected by fire retardant drops on the 2003 Tuolumne Fire.

Site visits were made one year (2004) and two years (2005) after the slurry drops. Data have shown no slurry-caused mortality in the monitored pines thus far. Site visits will again be made five-years postburn in 2008. If no mortality, damage, or reduced vigor is apparent in this visit, the trees will be untagged and the monitoring shall cease.

7. Sugar Pine Mortality Mitigation Study

Yosemite implemented a study in 2004 to investigate the effectiveness of mitigation efforts against prescribed fire-induced mortality in burn units. 28 plots have burned within the PW-03 prescribed burn unit that was treated in 2005; 12 control plots are being monitored; and 6 plots have not yet been burned in the PW-05 (Rockefeller Grove) burn unit. Within each plot, three sugar pines are monitored and randomly assigned to either a “lined” treatment (removing litter and duff layers to mineral soil around the base of the tree), a “cleared” treatment (removing ladder fuels and dead & down fuels within 2 m of the tree but causing no ground disturbance), and a “control” treatment (no action).

Preliminary results are available for one year post-treatment for the 28 PW-03 plots and the control plots. The control plots have shown no sugar pine mortality or decline in vigor.

Results from the 28 burned plots show that one-year postburn, 12% of monitored sugar pines have died. 7% of those were untreated (“control”) trees; 2.5% of those were “lined” trees, and 2.5% of those dead trees experienced the “cleared” treatment. These plots will continue to be monitored until five years after the prescribed burn in 2010.

Notes from the field: *White Pine Blister Rust (WPBR) detection was difficult especially in large overstory trees. It is difficult (or impossible) to identify WPBR on the crowns of enormous trees. Use vigor ratings to assess the tree health. WPBR was also difficult to identify in seedlings and poles without cankers. The other sign of WPBR is needle mottling. Is it possible to determine if needle mottling is due to ozone or WPBR? Implications- do not hold much confidence in our WPBR assessments. There could be more WPBR than we found.*

Fire Ecology Program Accomplishments and Notes

Fire Ecologist Accomplishments and Areas of Focus

Program maintenance, Fire Effects Crew oversight, database clean-up, and data analysis were the main priorities for the Fire Ecologist in 2006. Integrating the Fire Ecology program with other programs within Fire Management and assisting with management decisions, priority setting, and operations were also primary foci.

Table 11. Fire Ecologist accomplishments and focal areas.

Category	Percent Time	Notes
Presentations	10	IAWF conference poster; AFE Conference presentation; Fire Symposium presentation; 4 presentations to YOSE staff; 4 presentations to school groups; 1 Sametime training session held for FEAT users
NPS Meetings/task groups	5	Member of Forest Health Team and Sierra I&M Network Forest Dynamics & Fire Regimes working groups; participate in READ program; serve as YOSE BAER/BAR Coordinator
Fire Assignments	10	2-week assignment on Frog Complex (YOSE) as READ & FEMO; 2-week assignment on Sequoia NF as FEMO (assisted with ecological assessment for the Broder-Beck WFU); acted as READ on in-park incidents
Research	5	Implemented study on prescribed fire effects on soil pH & terrestrial invertebrates; continued sugar pine mortality mitigation study; served as ATR for 1911 Research Project (UC Berkeley)
Data Entry	5	Entered data as needed for analysis
Data Management	15	Clean-up of FEAT and other monitoring databases; troubleshooting of SQL issues and computer crashes; data stewardship; digitizing information
Data analysis	30	Analyzed several datasets
Supervision/Admin	13	Hired seasonal crew + new Lead Monitor; provided supervision to Lead & Asst. Lead Monitors; managed safety, budget, & personnel issues
Training	5	PT; fire refresher; reading
Miscellaneous	2	Meetings of various nature

Fire Effects Crew Accomplishments and Areas of Focus

The Fire Effects Crew was able to complete most of the scheduled field work, enter most of the 2006 data and some of the data entry backlog, ensure that crewmembers were adequately trained in methodology and that data quality was high for all work completed, and assist with Fire Management operations and management activities as needed.

Table 12. Fire Effects Crew accomplishments and focal areas.

Category	Percent Time	Notes
FMH plots	20%	29 rereads, 15 in challenging conditions in Ackerson & A-Rock fires
Mechanical Treatment plots	15%	30 rereads, Roadside and Campground WUI
CBI plots	10%	36 plots in PW-3 Gin Flat RX
PILA mortality study	10%	28 rereads/ 12 control
Other Plot work	10%	--Retro --Rapid assessment in WFU
Fire Assignments and Fuels Projects	7%	--Crew assisted on 3 prescribed fires as FEMO, FFT1 and FFT2 (10 shifts) --Crew assisted on 5 WFU fires as FEMO, HECM, IC5, FFT1 and FFT2 (20 shifts) --1 crewmember went on 2 week off park with YNP WFU module. (15 shifts) --Crew assisted on off days as HECM, FFT2 (30 shifts), not factored in Percent Time total
Data Entry	10%	--All FMH data from 2006 entered into FEAT --Some of the backlog of Retro and Rapid assessment data entered into Excel spreadsheets
Data Management and Information Technology	8%	--Quality checking --Problem solving FEAT networking, access, functionality, etc.
Supervision/Admin	3%	--Travel --Payroll --Meetings (Fire Staff and parkwide)
Training & Professional Development	5%	--All crewmembers attended refresher training --Intro to fire effects monitoring, plant i.d., data collection/entry --Lead and Assistant attended Yosemite Fire Science Symposium and 3 rd Fire Ecology Congress; Assistant attended IAWF Conference
Miscellaneous	3%	--Poster presentation for Fire Ecology Congress --Presentations for visiting high school and college groups --Cross-training --Required online federal trainings

FEAT Notes

The Fire Effects crew continued to enter FEAT data using desktop computers rather than PDAs. We had numerous problems with FEAT and our computers this year, which made us unable to use our PDAs. We entered quite a lot of data into FEAT, including 15 plots that were never entered for any reads (A-Rock and Ackerson plots).

Difficulties that we encountered included the crash of our master computer, setting up a temporary master, and finally getting a new master. We did not set up new partnerships with our PDAs, and the use of a temporary master preventing us from using PDAs for most of the field season. We also had one client computer crash as well.

Recurring problems with FEAT include the client computers' not being able to access the master computer. These problems have all been related to SQL and security problems. Solutions to these problems include:

- 1) Setting macros security to low (in Microsoft Access).
- 2) Creating exceptions and adding TCP and UDP ports in Windows Firewall.
- 3) Having our IT folks request group policy firewall exceptions from the national office when our IP addresses changed. In the meantime, turning off Windows Firewall on the master and the clients worked.

On the positive side, subsamples with different naming conventions in FMH and early FEAT entries were merged, simplifying data entry and data queries. Monitoring event names were standardized and data were merged. The FEAT Forum was very useful for troubleshooting and learning from other's experiences.

We still have much quality checking to do of our FEAT database.

And we still have hopes of being able to see the following changes made to FFI (FEAT-FIREMON Integration), our next database:

1. The ability to copy, cut, and paste multiple rows/cells of data at one time.
2. Add burn unit to the macroplot data so that we can make queries by burn unit.
3. The ability to carry over data from previous reads.
4. Restructure PDA data entry to ensure accuracy (something like columns with data from previous reads next to data-entry columns).
5. We have had many problems with Microsoft Active Sync (especially with our security settings and requirements). Is there another PDA/desktop interface?

Equipment Notes

A laser range finder was bought last year and has proved very helpful for improving accuracy and efficiency when recording tree heights, scorch heights, and live crown heights. The data it yields seem to be very accurate. Users should make sure the laser does not reflect off an obstruction other than the intended tree (in dense conditions), and accuracy is improved by being farther away from really tall trees to better record the true top of the tree. It's a good piece of technology **but its outputs still should be verified** with eyeball estimates!

A large set of calipers was used this season for measuring 1000 hour fuels (up to 1.5 m in diameter). They are bulky for transporting but seem to have improved data quality for measuring diameters of large fuels.

Proposed Changes for the Upcoming 2007 Field Season

Brian Mattos, Park Forester, has offered to hold a Tree Pest and Disease Training. This training would focus on recognition of tree pest and disease indicators. This would improve skills for

monitoring of tree health characteristics, which would be valuable as forest health issues are frequently encountered while conducting fieldwork.

In 2006, a “Mini RX 80” (Introduction to Fire Effects Monitoring) was held for 2 days to train new crewmembers in monitoring methodology and assure high data quality. In 2007, a complete day devoted to plant identification and vouchering will be added to this effort.

The goal for 2007 Fire Effects work in the wilderness is to avoid use of the helicopter for support. This will require a greater time commitment and the use of pack animals for extended trips.

Another goal is to increase our efforts toward preventing the establishment and spread of invasive plant seeds and/or propagules. We will maintain regular and frequent schedules for vehicle and equipment cleaning, and will inspect our boots, clothing, and gear before and after field work.

Appendix Notes

Please see the appendices folder for copies of posters presented at conferences (IAWF and AFE), the agenda from the 2006 Yosemite Fire Science Symposium, the revised WFU Rapid Assessment methodology, and the proposal for the research project on prescribed fire effects on soil pH and arachnid and insect communities.

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