



**Yosemite National Park
Fire Ecology Annual Report
Calendar Year 2010**

A. Summary:

The Fire Ecology and Fuels program had a productive and safe year. This year was marked by standing up the prescribed fire program after the Big Meadow escaped prescribed fire, and enduring a year without a lead for the Fire Effects crew. The summer was bumpy but we all learn from the experience.

Although it was a slow fire season nationally and in California, Yosemite seemed to have fire on the ground for most of the season. The most successful were the Slope and Vernon Fires that burned on the south canyon wall of Hetch Hetchy and 3 miles to the North of Hetch Hetchy, respectively. Both fires created minimal smoke impacts to Tuolumne County, although there were several nuisance complaints in September. Four fires started in July; the Tuolumne, Wildcat2, Slope, and Vernon, and another 35 started in October. The October lightning bust started fires all over the park but fuel conditions were too wet for any of them to grow. The Tuolumne Fire and Wildcat2 fires also extinguished on their own. Of the 35 fires this year, 16 were suppressed because of their location in the “suppression zone”.

The PW-05 segment D was ignited this year and burned 211 acres in July. Crews black-lined the Garnett Ridge Road and burned jack pots of fuel the first two days and helicopter ignitions filled in the belly of the burn with PSD. Although there were many resource concerns in this burn unit, the fire effects were generally very good. Future monitoring will determine how much mortality was caused in the overstory sugar pines in the northeast section of the unit. There were many cultural resource concerns because of the existence of railbeds and evidence of historic logging. Natural resource concerns were the large trees in the northeastern corner of the unit and the large diameter snags along the Garnett Ridge Road. Snag retention became such a big focus for the READs on the fire that it led to the development of the “snag dialogues”; a working (not quite) policy for snag mitigation during fire operations.

Two research projects were initiated this summer. In one funded by Research Reserve (NPS Fuels), LiDAR data was collected in a predetermined flight path near crane flat. Researchers at the University of Washington will process and analyze the data later in 2011. Carbon sequestration work began this summer as well and planning for the 2011 field season.

Fire Ecology program of work

The fire effects crew read 22 FMH plots, 5 Rapid Assessment plots, 6 sugar pine plots, and 235 CBI plots this season (Table 1). The crew also worked every shift on the PW-05 prescribed burn, helped with mechanical treatments, and each crew member got at least 14 days on wild fire assignments throughout the summer. Catherine Airey, a returning crew member left Yosemite early in the summer to attend graduate school at the Pennsylvania State University working on a Master of Science degree with Alan Taylor.

All data that was collected this summer was entered into FFI or spreadsheets and nearly all the backlog of data was entered.

The fire ecologist assisted the fire management team with authoring the WFDSS documentation, writing the “Snag Dialogues”, and collaborating on the Tuolumne County Air Pollution Control District air quality appendix to WFDSS. He also co-hosted the Yosemite Fire Science Symposium in March and attended trainings and conferences.

More FFI data quality control was done early in 2010 and late in the season and FFI was updated to version 1.0.4.

Table 1. Fire Effects plot workload in 2010.

Park	Monitoring unit	Plot type	Pre-burn	Post	Post-burn	Park total
YOSE	Incense cedar-mixed conifer	FMH – forest				3
YOSE	Ponderosa pine-mixed conifer	FMH – forest			7	12
YOSE	White fir – mixed conifer	FMH – forest			10	24
YOSE	Sequoia	FMH – forest				13
YOSE	Ponderosa pine-bear clover	FMH – forest			5	18
YOSE	Meadow –Yose valley	FMH – grass				8
YOSE	Red fir – mixed conifer	FMH – forest				2
YOSE	Mixed conifer	Retro				41
YOSE	Mixed conifer (Yose valley)	Retro				41
YOSE	Mixed conifer – red fir	Retro				20
YOSE	Upper mixed conifer	Wild fire Rapid assessment			5	37
YOSE	Mixed conifer	CBI		235		235
YOSE	Sugar pine mortality	Tree-based mortality	6	6		40
YOSE	<i>Total</i>		0	235	27	494

Table 2. Fire Ecology 2010 staffing.

Staff member	Start date	End date	# pay periods	READ qualified Yes or No	Training and development ¹
Gus Smith	01/01/2010	12/31/2010	26	Yes	S-212, ATR refresher, Dendrochronology field week
Justin Romanowitz	05/10/2010	11/05/2010	13	No	S212
Gerald Joest	05/10/2010	11/05/2010	13	Yes (t)	S212
Catherine Airey ¹	05/10/2010	08/12/2010	7	No	S212
Tim Martell	05/10/2010	11/05/2010	13	Yes (t)	S212

¹Catherine left early to attend graduate school at the Pennsylvania State University.

Table 3a. Restoration target conditions and monitoring results of tree density, YNP, 2010.

Monitoring Unit	Management Objective	Monitoring Results $\bar{X}$ (+/- 90% CI)	Objective Achieved Yes or No
Red Fir Forest (n = 2 plots)	20-202 trees/ac <31.5in dbh 4-30 trees/ac >31.5in dbh	38.4 trees/ac <31.5in dbh (+/-36.6) 20.2 trees/acre > 31.5in dbh (+/- 6.7)	Too few plots Too few plots
Giant Sequoia/mixed conifer Forest (n = 13 plots, 1 fire)	20-101 trees/ac <31.5in dbh 4-26 trees/ac >31.5in dbh	116 trees/ac <31.5in dbh (+/- 43.0) 10.4 trees/ac >31.5in dbh (+/- 2.6)	No confidence Yes
White fir/mixed Conifer forest (n = 24 plots)	20-89 trees/ac <31.5 in dbh 4-20 trees/ac >31.5 in dbh	<31.5 in – 43.2 trees/ac (+/- 4.4) ¹ >31.5 in – 13.5 trees/ac (+/- 9.7) ¹	Yes Yes
Ponderosa pine/mixed conifer forest (n = 4 plots)	4-91 trees/ac <31.5 dbh 4-30 trees/ac >31.5 dbh	<31.5 in – 409.8 trees/ac (+/- 311.0) >31.5 in – 15.2 trees/ac ¹ (+/- 5.7)	No confidence Yes
Ponderosa pine/bear clover (n = 18 plots)	No management objectives at time of FMP	<31.5in – 165.4 trees/ac (+/- 79.3) >31.5 in – 8.8 trees/ac (+/- 2.4)	

¹Analysis included only the Re02YR10 plots (10 years after the second burn).

Table 3b. Restoration target conditions and monitoring results for species composition, YNP, 2008.

Monitoring Unit	Management Objective (Restoration)	Monitoring Results $\bar{X}$ (+/- 95% CI)	Objective Achieved Yes or No
Red Fir Forest FABMA1T08	70-100% fir, 0-30% pine	Trees < 31.5 in dbh 56% ABMA, 44% ABCO Trees > 31.5in dbh 70% ABMA, 30% ABCO	Yes Yes
Giant Sequoia/mixed conifer Forest (n = 13 plots)	35-65% fir, 0-20% SEGI, 40- 55% pine	Trees <31.5in dbh 73% ABCO, 11% PILA, 11% CADE, 2% SEGI, 2% CONU, <1%PSME & PIPO Trees >31.5in dbh 55% PILA, 23% SEGI, 20% ABCO, 3% CADE	No No, but very close
White fir/mixed Conifer forest FABCO1T08 (n = 24 plots)	40 – 60% fir, 15 – 50% pine, 0 – 10% cedar	Trees <31.5 in dbh 79% fir, 12% cedar, 9% pine Trees >31.5 in dbh 40% fir, 30% cedar, 30% pine	No No (cedar)
Ponderosa pine/mixed conifer forest FPIPO1T09 (n = 4 plots)	60-95% pine, 15-40% cedar, 1- 10% oak	Trees <31.5 dbh 62% ABCO, 16% CADE, 17% pine, 3% oak, 2% PSME Trees >31.5 in dbh 74% pine, 20% CADE, 7% oak	No Yes
Ponderosa pine/bear clover FPIPO1T02 (n = 18 plots)	No management objectives at time of FMP	Trees <31.5 dbh 41% CADE, 29% PIPO, 19% QUKE, 5% PILA, 5% ABCO, 1% PSME, < 1% CUCH2	

		Trees >31.5 dbh 65% PIPO, 30% CADE, 3% PILA, 3% QUKE	
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White fir – mixed conifer forest highlight:

I re-analyzed the data from our most numerous mixed conifer plots (FABCO1T08) to evaluate when in the prescribed fire history, the forest community moves within the desired condition range specified in the Fire Management Plan. For pre-settlement trees, or trees larger than 31.5” (80.0 cm) dbh prescribed fire does not appear to reduce the number of these sentinel trees significantly (Figure 1). Out of 24 plots, only one plot did not have a pre-settlement tree. The species composition of pre-settlement trees in the lower mixed conifer is nearly equally split between white fir, incense cedar and pines (ponderosa, sugar and occasionally Jeffrey). Incense cedar is over-represented (Figure 2).

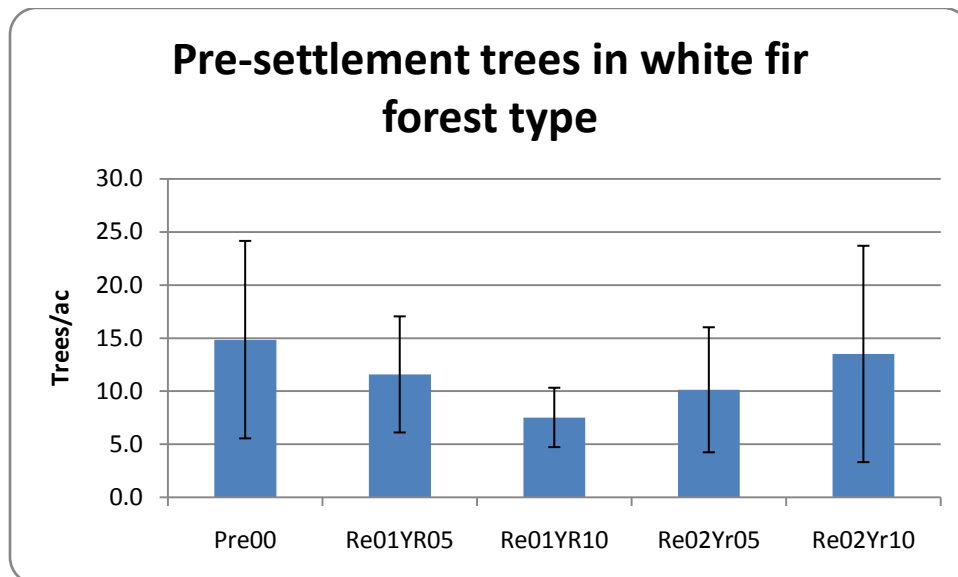


Figure 1. Pre-settlement trees in the lower mixed conifer forest type, YNP, 2010. Error bars equal 1 standard deviation. Pre00= preburn, Re01YR05 = 5 years post first burn, Re02YR10 = 10 years post second burn.

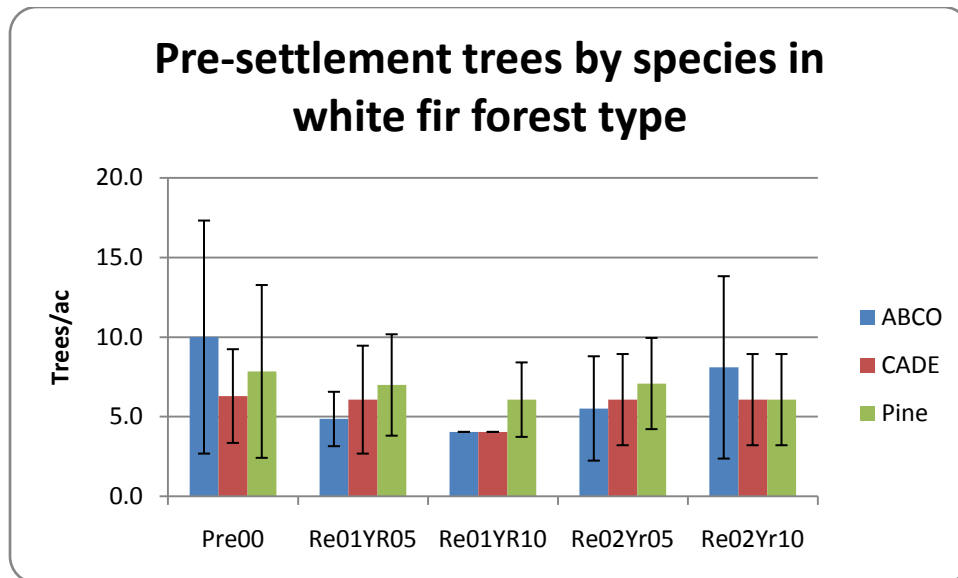


Figure 2. Species composition of pre-settlement trees in the lower mixed conifer forest, YNP, 2010. ABCO = white fir, CADE = incense cedar, Pine = ponderosa, sugar, and Jeffrey pines. Error bars = 1 standard deviation.

Post-settlement tree recruitment was the result of fire suppression and the cessation of American Indian burning practices. The latter would suggest changes to forest structure and composition began around the late 1700s and the former would suggest change starting at the turn of the 20th century. If tree density objectives in the FMP are an optimal target then prescribed fire appears to be a good surrogate for historic fire for restoring forest structure. However, species composition seems resistant to change (Figure 4), even ten years after the second prescribed fire. Perhaps prescribed fires are not hot enough to 1) reduce shade tolerant firs and incense cedar and/or 2) create canopy gaps for shade intolerant species (pines) to germinate and recruit to the canopy (Figure 4). White fir and incense cedar remain outside the FMP desired composition range while pines remain at the very low end of the desired range.

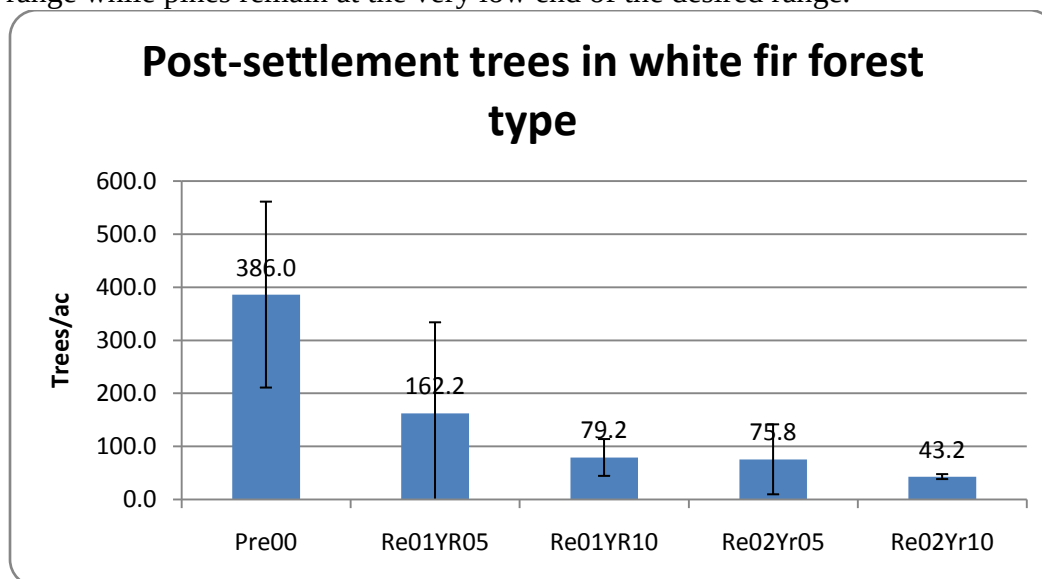


Figure 3. Post-settlement tree density in the white fir forest type in YNP, 2010. Error bars = 1 standard deviation and numbers above bars are averages.

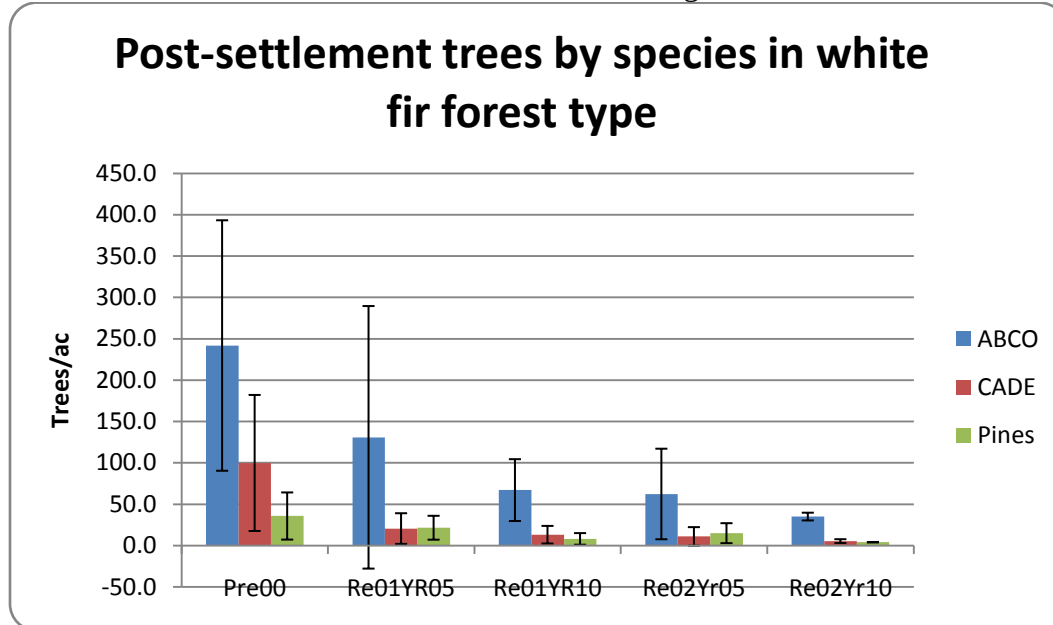


Figure 4. Post-settlement tree species composition in the white fir forest type, YNP, 2010. ABCO = white fir, CADE = incense cedar, Pines = sugar, ponderosa, and Jeffrey. Error bars = 1 standard deviation.

Table 4. Fire Ecologist's accomplishments and areas of focus.

Category	Percent Time	Accomplishments and/or areas of activities
Planning	5%	5yr. FMP review, Monitoring plan, writing/reviewing burn plans.
Presentations	<1%	Cal Poly field trip (1 day with Chris Dicus discussing research possibilities, 1 with 29 Cal Poly Fire Management students), UC-Merced Ecology Field trip, University of Washington field trip, Presentation to the Yosemite Fire Science Symposium, Vegetation and Ecological Restoration Branch presentation, 2 presentations to Interpretive Rangers, and 1 presentation/field trip with Mather District Interpretive Rangers.
NPS Meetings/task groups	15%	RM&S meetings, research permits, FMO command staff meetings, FMC meetings, collaboration with RM&S staff, liaison with RM&S and Wilderness Branch on resource or wilderness issues.
Fire Assignments/WFDSS	10%	FEMO – PW-05 seg D, ICT5t – Olmsted Fire, WFDSS author/editor responsibilities – Slope, Vernon, Wildcat2, Tuolumne, and October lightning bust fires.
Research	20%	Field work: 1. SEIN whitebark pine protocol development 2. Yosemite big plot Logistics and planning: 1. LiDAR project 2. Carbon sequestration static approach 3. Carbon sequestration dynamic approach Agreements/contracting 1. LiDAR 2. Carbon sequestration x 2 Proposal development: 1. Canopy gaps created by fire

		2. Public perceptions of smoke 3. READ guide 4. Pests and fire
Data entry/data integrity	10%	Researching data errors in FFI and Excel spreadsheets.
Data analysis	15%	Estimated amount of time spent performing analyses, including data summaries and statistical tests.
Supervision/Admin	15%	Hiring, supervision, travel, budget, Agreements, etc.
BAR	10%	BAR coordination and budgets!

Table 5. Fire Effects crew Accomplishments/Focus areas

Category	Percent Time	Notes
FMH plots	21%	
WUI plots	0%	
CBI plots	20%	Grouse, Hardin, and Big Meadow Fires
Retro fire effects	11%	
PILA mortality	4%	Re-raked and read pre-burn PILA mortality mitigation plots
Wildfire assignments	8%	Crew served as FEMO and FFII on Slope and Vernon Fires
Prescribed fire projects	2%	Crew members served as FEMO, and FFII on PW-05 Segment D for one week.
Non-fire fuels projects	< 1%	Crew members helped fuels crew with fuels projects to practice using chainsaws and hand tools
Data entry	25%	Backlog of data entry, and all 2010 field data entered into FFI and spreadsheets (Retro
Data analysis	< 1%	This is expected to be very low number or zero for fire effects crew/lead monitor
Supervision/Admin	< 1%	Payroll, travel authorization/voucher, etc.
Training	8%	List all training courses attended including in-park, NPS/interagency, and non-government
Miscellaneous	< 1%	Things that don't fit in other categories – search and rescue, assisting other work groups, etc.

Table 6. Data entry and projects monitored.

Park	% 2010 Data Entered	% 2010 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Yosemite National Park	100%	100%	9	0	4	0

E. Optional information.

Fire Ecology Research

The Fire Ecologist collaborated on several research projects this year that required data sharing, logistical support, Cooperative Agreements, and field work. Early in the year we provided our FFI database to Phil vanMantgem which exposed a lot of issues with some of our POST reads. Phil offered his employee's time to enter some of the POST data and I entered a lot of location (UTM) and other data for this data request. I am still unclear why this data was not in FFI. The

plot folders show that the data was entered and QC'd many years ago. Perhaps this is an artifact of database migration (FIREMON to FEAT to FFI).

We began work this year on an NPS Fire Research Reserve project to investigate sequestered in forests that have never burned, burned once, and burned more than once. We used FFI data to estimate carbon in each pool (trees, shrubs, herbs, litter, duff, etc.) and to determine how much carbon was fluxed to the atmosphere with successive prescribed fires. We also began planning an NPS Global Climate Change initiative funded project further investigating the fate of carbon stocks in forests in Yosemite and Sequoia & Kings Canyon National Parks. In 2010 we developed the maps and plots to sample, developed the database, and in 2011 the fire effects crew will be funded on this project to collect tree cores to measure the annual increment of carbon sequestered in tree boles. Lastly, the Fire Ecologist worked with researchers from the University of Washington and USGS on our NPS Fire Research Reserve project to investigate canopy gaps with LiDAR. Most of the work will occur in 2011 but the Fire Ecologist wrote all the cooperative agreements and helped plan the study area to maximize the number of FMH, USGS, and Yosemite Forest Dynamics Plot. Lastly, the 1911 project was finally completed in early 2011 and final report sent to the park.

WFDSS

The Fire Ecologist spent a large part of the summer working with wildland fire managers supporting wildfires by authoring most of the Wildland Fire Decision Support System documents. This role was filled by Mike Beasley, as the Fire Use Manager but in his absence the Fire Ecologist has become the most proficient at authoring WFDSS documents. Fire Ecologist also worked all summer with the Air Quality Specialist and Tuolumne County Air Pollution Control District to develop a document that outlines our communication strategy with the regulators. That document was never finished, but we should have a working document to begin the 2011 fire season.

Fire Effects Lead

The loss of the Lead Fire Effects Monitor was felt throughout the summer this year. The crew needs a supervisor to function well. The Fire Ecologist at Yosemite cannot spend the majority of his time directly supervising the crew unless the Fire organization changes dramatically. Although all ended well and safely, there were issues that could have been prevented if they had a good supervisor.

Future Projects

When the Fire Ecologist has a Permanent, Subject to Furlough position to help several big projects can be initiated. Big projects include: 1) Developing a database for the Yosemite Fuel Moisture samples and populating the database with past data, 2) Developing a fire effects plot photo database that is searchable, 3) upload all digital plot photos into database or filing structure, 4) scan all photographs into digital format and put in database or filing structure, 5) Write the Monitoring Plan, 6) Convert all RAPASS and Retro spreadsheets to FFI, and 6) convert all fuels constants to Jan's Sierra Nevada fuel constants.