



Saguaro National Park National Park Service Fire Ecology Annual Report Calendar Year 2012

A. Summary

It was a slow year for wildfires and prescribed fires, but there was a heavy monitoring load, mainly because of wildfires in 2011. In that year, two fires almost entirely burned Chiricahua NM (CHIR) and Coronado NM (CORO).

James Leckie, with assistance from two Student Conservation Association teams, NPS Resource staff, a fire ecology graduate student from the University of Arizona, a backcountry ranger, and the Grand Canyon NP fire effects crew, collected data on 73 plots. Some of these people were able to help with data entry, as was Fire Module Clerk, Julia England.

Four plots were read at Saguaro NP (SAGU) two years after the 2010 Mica Prescribed Burn. In 2010, ten additional plots were read in hopes of also burning them, but the burn window closed and prevented it. Their data can serve as somewhat of a “control” to compare to the burned plots. Forty-one plots burned in the 2011 Horseshoe II Fire at CHIR and 15 plots burned the same year in the Monument Fire at CORO were sampled as well.

Perry Grissom and James also participated in the triennial Mexican spotted owl monitoring at SAGU in conjunction with Science and Resource Division staff. Owls were detected in three territories, but none were detected in a fourth. Great horned owls were detected several times, especially in that fourth MSO territory. No breeding activity was detected this year.

Table 1. Fire Effects Plot Workload (2012) and Total Plots Installed

Park	Monitoring Unit	Plot Type (FMH Brush plot, photo point, CBI, etc.)	Pre-burn 2012	Immed. Post 2012	Postburn (1-20 yrs) 2012	Annual Total (2012)	Total Plots
Saguaro NP	Ponderosa Pine Forest	28 FMH Forest Plots 1 Rapid Assessment Plot*			18	18	29
	Madrean Evergreen Woodland- Encinal Woodland (Arizona oak)	FMH Forest Plots					10
	Madrean Evergreen Woodland- Encinal Woodland (mixed oak-PJ)	Rapid Assessment Pilot Plots*					1
	Pine-Oak Forest (Arizona oak)	FMH Forest Plots					12
	Douglas Fir-Mixed Conifer Forest	10 FMH Forest Plots 2 Rapid Assessment Plots*					12
	Silverleaf oak	3 FMH Forest Plots					3
	Pine Oak Forest (Chihuahuan pine)	7 FMH Forest Plots 3 Rapid Assessment Plots*					10
Coronado National Memorial	Semi Desert Grassland (disturbed)	FMH Grassland Plots			15	15	15
Chiricahua NM	Ponderosa Pine Forest	9 FMH Plots			9	9	9
	Madrean Evergreen Woodland- Encinal Woodland (Emory oak)	13 FMH Plots			13	13	13
	Interior Chapparal-Manzanita Series (Pointleaf Manzanita)	10 FMH plots			10	10	10
	Semi Desert Grassland (Blue Grama)				9	9	10
Total					73	73	133

* Pilot sampling plots

Table 2. Fire Ecology Staffing 2012

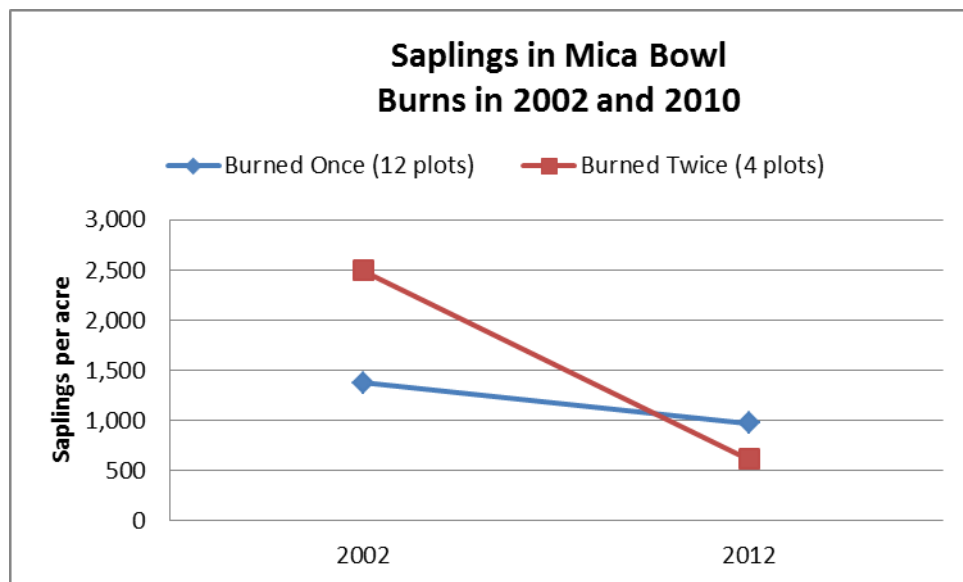
Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Perry Grissom, Fire Ecologist	1/1/12	12/31/12	26	Yes	Fireline refresher, mandatory online classes, 1 st Aid/CPR, supervisory training, safety day, herbicide applicator
James Leckie, Lead Fire Effects Monitor	3/19/12	10/26/12	16*	Yes	Fireline refresher, mandatory online classes
*Received 13 pay periods of fire effects funding. Worked additional pay periods on Deepwater Horizon oil spill and wildfire assignments. James also served in a detail 1/1-3/18 as BAER implementation leader for Monument and Horseshoe 2 fires.					

Table 3. 2012 Management Objectives and Monitoring Results

Monitoring Unit	Management Objective (Restoration)	Monitoring Results	Objective Achieved?	Year Last Analysis Completed
SAGU Mica Rx (2010) Ponderosa Pine (Fuel Model 9)	Reduce pine saplings 15%-70%	Reduced density 43% (n=4 plots) (range 29-100% decrease). In 8 nearby unburned plots, density decreased 1%. Five plots were unchanged in 10 years, two decreased 2% and 8%, and one increased from zero to 99 saplings per acre).	Yes	2012
	Other important notes: Fuels decreased 16.8% overall, from 14.39 tons per acre to 11.97 in the four burned plots. Most of the decrease was in duff (2 t/ac) and rotten logs (0.8 t/ac). The biggest increase was in solid logs (1 t/ac). Four unburned adjacent plots decreased 7.8% over the same period, mainly in duff (1.9 t/ac) and litter (0.65 t/ac). Fairly large increases were seen in 10-hour fuels (0.8 t/ac) and 100-hour fuels (0.6 t/ac) in the unburned plots. (Some of the decrease in duff and litter in both groups of plots may have been from disturbance during repeated sampling.)			

Monitoring Unit	Management Objective (Restoration)	Monitoring Results	Objective Achieved?	Year Last Analysis Completed
SAGU Mica Bowl Rx (2002) Ponderosa Pine (Fuel Model Model 9)	Reduce pine saplings 15-30% Two years post-burn	Saplings in twelve plots burned once in 2002 decreased an average of 29%. Four plots burned once in 2002 and again in 2010 saw saplings decrease 75% over the 10-year period (see graph below). Multiple entry strategy, incrementally reaching longer term objectives.	Did Not Meet Initial Objective in 2004, with 14% Decrease. Ten-year mortality was within 2-year target range for plots burned once. Favorable Ten year mortality for plots burned twice is higher than initial objective, but met objectives for both 2002 and 2010 burns. Favorable.	2012
	Reduce Trees No More Than 15% Two years post-burn	Plots burned twice have decreased 19.5% over the ten years, exceeding initial goal, but meeting both incremental goals. Plots burned once have decreased 12.8% over the ten years. An increase of 6.1 since the 2004 sampling.	Met Initial Objective in 2004 with 6.7% Decrease. Still favorable.	2012
	Reduce Fuel Load 30-50% first year	Plots burned twice decreased 34.2% overall, from 18.18 t/ac to 11.97 t/ac. Plots burned once decreased 28.6% overall, from 27.69 to 19.76 t/ac. The biggest decrease in twice-burned plots was in duff (4.3 t/ac) and litter (2.6 t/ac). 10-hour fuels increased 0.5 t/ac. In once burned areas, fuels decreased 28.6% overall, with biggest decreases in duff (2.8 t/ac), litter (2.2 t/ac), and 1000-hour fuels (5 t/ac). Increases occurred in all other classes of fuels, with biggest increases in 1000-hour rotten fuels (1.3 t/ac).	Achieved initial goal in 2004, with 44% reduction. Plots burned twice are still meeting initial objectives. Favorable. Plots burned once have returned back above initial target levels. Unfavorable.	2012

Monitoring Unit	CHIR, 2011, Horseshoe 2 Wildfire No numeric objectives. Data taken in 2012 and compared to latest previous data.
CHIR Ponderosa Pine (Fuel Model 9)	Trees averaged 436 per acre in their previous sampling and averaged 125 per acre in 2012 after the fire (a 71% decrease). Previous samplings ranged from the years 1990-2004. (9 plots) Three plots decreased in density over 90%. One plot increased 13%.
	Data problems in Emory oak, Manzanita, and Blue Grama monitoring types will require further clean up before analysis.



B. Fire ecologist accomplishments and areas of focus

Table 4. Fire Ecologist 2012 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	13	CWPP, buffelgrass strategic plan, NFPORS, FMP EA's for ORPI, FOBO, MOCA, TUMA, & CAGR, structural FMP,
Presentations/ Outreach	7	Post-disturbance EA open house, fire talking points, Fire Effects Newsletter, fire restrictions, web content development, buffelgrass outreach strategy/talking points/FAQ's, success stories
NPS Meetings/ task groups	3	FMO/FUM calls, IMR FMO meeting, division meetings
Interagency work	2	Tuzigoot NM/FS/NPS responsibilities, FireScape
Wildfire assignments	2	Fox Fire NFPORS support, False alarms
Prescribed fire projects	2	Arizona DEQ smoke meeting, Santa Catalina RD (FS) pile burning
Non-fire fuels projects	24	SCA task agreement administration (SAGU buffelgrass and mechanical projects at MOCA, CORO, and TUMA), site visits, buffelgrass spraying and aerial mapping, found and pulled two patches of cheatgrass in SAGU, CORO treatment implementation plan, structural assessments (NFPORS)
Research	3	Two approved projects and one proposed/unfunded
Data collection	6	Mexican spotted owl monitoring
Data entry	1	FMH plots
Data analysis	6	Data requests from NPS Inventory and Monitoring and Rocky Mountain Research Station severity, FRID, MSO reports, WFDSS wildfire perimeters
Supervision/ Admin	8	Acting FMO January-March, Leadership Team and PEPC meetings, taskbooks, red cards, Accident Review Committees, charge cards, drafted packing contract, division Annual Work Plan, Readiness Reviews, budget, charge cards, travel, time sheets
Training	4	See table 2.
Travel out-of-park for plot or project work	0	
Miscellaneous	19	Review PMIS proposals, review Wilderness article, border safety protocol development, READ meeting coordination, READ notebook coordination, BAER plan, saguaro census, coordination of M3/B3, M580 field trip, Steven Pyne—document compilation, Safety Committee, Operational Leadership GAR's, I&M coordination meeting, coordinated digital fire sand table, RAWS part replacement, Manning Camp Leadership Team hike, Wilderness character mapping, MSO draft recovery plan comments, FWS-ES meeting

C. Fire effects crew accomplishments and areas of focus

James worked on plots a lot in 2012, and arranged a large number of helpers from a wide variety of sources. James entered a lot of the data himself and was able to acquire help and train a few people. He went on a few fire assignments as READ or FFT2.

Table 5. Fire Effects Crew 2012 Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	18	SAGU, CHIR, CORO
WUI plots	0	
CBI plots	0	
Other plot work	0	
Wildfire assignments	17	Apache Pass, Mica and Springs fires in AZ, severity detail with engine in Montana
Prescribed fire projects	6	Pile burning at FS SCRD
Non-fire fuels projects	16	Spraying buffelgrass at SAGU, mechanical fuels reduction at TUMA, MOWE, MOCA, TUZI
Travel out-of-park for plot or project work	4	Plotwork at CHIR and CORO
Data entry	10	FMH
Data analysis	3	FMH
Supervision/Admin	5	Travel authorizations/vouchers, payroll, backcountry travel plans
Training	3	See table 2
Miscellaneous	16	Deepwater Horizon Response, MSO Surveys for SAGU, live fuel moisture sample collection, Operational Leadership exercises, GIS, success stories, reports

D. Additional Program Information**Table 6. Planning - 2012**

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project- or Community-level Monitoring Plans (not just 2012)	Assisted with how many BAER plans in 2011?
Saguaro NP	Yes	No	2	1*
Tumacacori NHP	Yes	No	0	0
Organ Pipe Cactus NM	Yes	No	0	0
Casa Grande NM	Yes	No	0	0
Coronado National Memorial	Yes	No	1	0
Chiricahua NM	Yes	No	1	0
Fort Bowie NHS	Yes	No	0	0
Tuzigoot National Monument	Yes	No	0	0
Montezuma Castle/Well National Monument	Yes	No	0	0
Tonto National Monument	Yes	No	0	0
	In other land management plans.			*Programmatic, pre-fire BAER plan.

Table 7. Monitoring – 2012

Park	% 2012 Data Entered	% 2012 Data Quality Checked	# Prescribed Fires Monitored	# Non-fire Fuels Treatments Monitored	# Wildfires Monitored	# BAER Treatments Monitored
Saguaro National Park	100%	100%	2	0**	0	0
Coronado National Memorial	100%*	50%*	0	0	1	0***
Chiricahua National Monument	100%	90%	0	0	1	0***
* Data entered but lost during server migration (hopefully only temporarily). ** Non-fire (i.e., chemical) treatments are monitored by Science and Natural Resources Division using their protocols. *** Monitored by park resources staffs.						

Table 8. Communicating Results - 2012

Park	# of Project Monitoring Reports completed in 2011	# of Annual meeting(s) with Park staff	# of Formal presentations of results	Do you use Minitab?
Saguaro National Park	3	2	0	No
Coronado National Memorial	1*	0	0	No
Chiricahua National Monument	1*	1	0	No
*Annual report.				

Table 9. Research - 2012

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2012	# of Proposals Funded in 2012	# of Research Projects Supported in 2012*	Additional Comments
Saguaro National Park	Yes	1	0	3	Supported 1 new Fuels Research proposal, and 2 ongoing Fuels Research projects

Reserve Fund Research:

Assessment and Guidelines for Determining Effectiveness and Longevity of Buffelgrass Treatments in Southern Arizona. Dr. Molly Hunter, Northern Arizona University. Final report

submitted January, 2012. Park using results in formulating treatment strategies. Pending a technical manuscript submitted to a scientific journal.

Buffelgrass control treatments were less effective on south-facing aspects and on steeper slopes. Treatments were more effective in seasons with higher rainfall. Buffelgrass was effectively controlled when multiple treatments occurred in consecutive seasons and when both manual and chemical treatments were used. Because buffelgrass cover, density, and patch size all decrease with treatment, monitoring can be difficult. Dr. Hunter recommended establishing fixed area plots within buffelgrass patches in which density and cover could be measured.

Herbicide effects on mortality of invasive buffelgrass (*Cenchrus ciliaris*). Under the direction of Dr. Mitch McClaran, University of Arizona, by Drs. Grant Casady and Travis Beane. Final report submitted June, 2012. Results presented at a local scientific meeting, results used in formulating treatment strategies as well as generating experimental design of phase 2 of study (Herbicide impacts on native plants and pre-emergent herbicide effects on *C. ciliaris* and native plant seed emergence; NPS BRMD grant). Pending a manuscript to a peer reviewed scientific journal.

The grass-specific herbicides that were tested were minimally effective on buffelgrass. Glyphosate, currently the main tool against buffelgrass, had little effect on native species tested (saguaro cacti (*Carnegiea gigantea*) and little leaf paloverde (*Parkinsonia microphylla*)) after one year.

Predicting buffelgrass greenup to improve fuels treatment efficacy. Drs. Steven Smith and Travis Beane. In second year of data collection. The evaluation of greenness as a function of Relative Water Content (RWC) and meteorological conditions, consisting of a plot-based experiment intended to develop an initial plant growth index under controlled and instrumented conditions and a calibration and evaluation of an index for more operational use across the Tucson Basin.

Expected completion date: June 30, 2014.

Deliverables: Final report which will include a tool for predicting buffelgrass greenness from meteorological data and RWC. The report will also outline protocols for using available daily meteorological data to improve spatial predictions of buffelgrass greenness and suitability (distribution) models being used in risk/vulnerability assessments. Maps of weekly greenness predictions from the spring and summer seasons of 2012 and 2013 will be provided to personnel at Saguaro NP. Results from the proposed work will be submitted for publication in a peer-reviewed journal.

E. 2013 Direction

A large number of plots are to be read in 2013 from three past wildfires. Lead Fire Effects Monitor, James Leckie, is planning to leave his position in the summer. The only prescribed burning planned this year is piles, but the new Fire Management Officer is seeking new ways to resume prescribed burning in the upper elevations of SAGU. Budget decreases mean filling the monitor position is not ensured, and the fate and methods of future monitoring are unsure. Budget cuts to Fire Fuels treatments and NPS base-funding means that buffelgrass treatments are

at risk. Currently, there is more travel “cap” than funding. Tasks must be reprioritized and some dropped, and service to more remote parks is likely to decrease.

F. Optional Information

FFI: Calculating densities in FFI Query Builder was found to be inaccurate and variable between attempts. To overcome that, we exported row counts and calculated densities in Excel. FFI does not take sapling live/dead status into account in its reports; we exported to Excel and filtered there.

James was able to line up a large amount of assistance in reading plots from a wide variety of sources. Much of that help was free or at very low cost. Otherwise, data collection needs would have far exceeded our capacity. Help in data entry was not as easily acquired.



CHIR Ponderosa Pine plot 2, photographed in 2010, and again in 2012, one year after the Horseshoe 2 Wildfire.



SAGU Ponderosa Pine plot 13, photographed in 2010, and again in 2012, two years after Mica Prescribed Fire.