



**National Park Service  
Fire Ecology Annual Report  
Calendar Year 2008**

**Saguaro National Park**  
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**Summary**

In addition to the regular fire ecology staff of two, two SCA interns were employed for 5-6 weeks. A fire effects crew from the Grand Canyon also came down to assist reading FMH plots.

Fire activity picked up compared to the previous two years at SAGU. In 2006 and 2007, each year had two fires that burned eight acres. In 2008, five wildfires burned a total of 154.3 acres. Four of the fires were caused by lightning during June 25-26 in the upper elevations of the Rincon Mountains. A fifth fire (0.1 acre) was human caused and started along the boundary. Two fires were quickly put out by rain, and each was credited with 0.1 acres. One 20-acre fire was suppressed. The park had its first Wildland Fire Use fire since 1999, and it burned 130 acres before being drowned by the monsoon.

Pile burning was conducted at MOWE. A burn to research fire behavior in buffelgrass was conducted in May on property owned by Tucson Water.

A large human-caused wildfire, much of it with high severity, burned in cottonwood forest along the Santa Cruz River at TUMA. Plots had been recently installed by the Inventory and Monitoring Program, and TUMA staff, with help from SAGU fire staff, are monitoring post-fire effects. A wildfire also burned part of CORO, but monitoring has not been conducted.

Dealing with invasive plants (mainly buffelgrass) continued to take up considerable amounts of time, especially for the fire ecologist.

### **Plot Work**

In July, Grissom, Leckie, Riggins, and Shay visited plots on SAGU on the north slope of the Rincons. The area was burned by the Helens 2 wildfire in 2003. The trip coincided with the Chimenea WFU fire, so they monitored that fire periodically as well. The crew arrived at Manning Camp the day of the first major rainfall, a 4.5-inch rain and hail storm. The fire exhibited little growth after that storm, as the monsoon set up and the area received repeated rains over the next month. The Chimenea WFU fire burned within the Saddle Prescribed burn unit, and three fire effects plots established for that burn were at least partially burned between 6/28 and 7/11.

In September, Grissom, Leckie, Riggins, and fire effects staff from GRCA (Missy Spandl, Karen Koenig, and Jasper Peach), read plots from the 1998 Chimenea prescribed fire and more north slope plots. In addition, the three plots burned by the 2008 Chimenea WFU fire received their immediate post-burn reads. Missy had worked at SAGU in her first fire effects job, and had read some of these plots. Having just accepted another job out of fire effects, this may have been her last FMH hitch. Due to the large number of plots needing to be read and limited staffing, photographs were taken, and only trees and poles were measured in the 5-year and 10-year reads. The full FMH protocol was followed for the immediate post-fire reads of plots burned by the Chimenea WFU fire.

The Chimenea WFU fire burned in ponderosa pine and pine-oak woodland. Visual estimates of fire severity throughout the fire area concluded that about 90% was low severity, and the rest was moderate severity. The eastern part of the burn occurred in areas burned by the 1943 Manning and 1954 Rincon Fires. The Chimenea fire also burned close to and possibly up to the 1994 Rincon Fire on the south.

Due to suppression of several fires in the area over the last few decades, duff had built up to considerable depths in some areas. Where much or all of the duff burned, heat damage to the roots of large trees may result in delayed mortality. Very little mineral soil was exposed by the fire.

Fire effects data for the three plots burned by the Chimenea WFU fire indicate very mild burning conditions. One plot was only partly burned--only 7 of 40 sample points burned. The other two plots were nearly 100% covered by the fire. Organic substrate (litter and duff) was estimated lightly-burned/scorched for one plot (average value 3.7) and scorched for another (average value 3.9). There were no heavily burned points in any of the plots. In the two mostly burned plots, 33 of 80 points (41%) were scored "moderate." The partly burned plot was rated scorched/unburned with an average value of 4.7.

In the fully burned plots, which were dominated by ponderosa pine, a majority of the trees and poles were affected. Oak species included silverleaf, Arizona, and netleaf oaks. Poles were mainly oak with some ponderosa pine. Ponderosa pine had higher char heights (roughly 1-2 meters) than the oaks (less than 1 meter), but lower crown scorch percent (averaging under 15%) compared to the oaks (46-67%). Scorch height in ponderosa pine averaged 4-14 meters in the two plots, and 0-6 meters in the oaks.

Tree mortality cannot be accurately assessed in the plots for one to two years; however, overall fire severity in the plots, and throughout the Chimenea WFU, fire could at this point be classified as low to moderate severity, meeting objectives for the area.

Due to the ongoing data conversion to FFI, the other FMH data has not been entered or analyzed.

The Golden Gate fire was a human-caused fire in desert vegetation of the Tucson Mountain District in June, 1994. Permanent photo-points were established soon after, and they have been revisited periodically--last photographed in 2003. Grissom, Leckie, Riggins, and Shay, along with Natasha Kline and Mike Ward, from the Resources Division, repeated photographs in July. The photos will be used for outreach purposes in websites, slide shows, and written materials, demonstrating the long recovery time of burned Sonoran Desert vegetation.

The 2009 workload will depend on which prescribed burn unit is burned. There are six 5-year reads due from the Devil's Bathtub prescribed burn. If the Saddle unit is burned, the workload would include sixteen post-burn plots. There would also be three post-burn rapid assessment plots to be read. If the North Slope unit is burned, no pre-burn FMH plots exist. There are two rapid assessment plots within that burn unit, and more would be installed.

Burns are planned for Coronado National Memorial over the next few years, and agave monitoring is needed. A protocol for agave monitoring is being developed in collaboration with interagency partners (Coronado National Forest, The Nature Conservancy, National Audubon Society, Department of Defense--Fort Huachuca).

**Table 1. Fire Effects Plot Workload, 2008**

| <b>Park</b>                                                    | <b>Monitoring Unit</b>                                             | <b>Type of Plot (FMH, photo point, other)</b>            | <b>Pre-burn</b> | <b>Immed. Post</b> | <b>Postburn (1-20 yrs)</b> | <b>Total Plots</b> |
|----------------------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------|-----------------|--------------------|----------------------------|--------------------|
| <b>Saguaro National Park</b>                                   | <b>Ponderosa Pine Forest</b>                                       | <b>28 FMH Forest Plots<br/>1 Rapid Assessment Plot</b>   |                 |                    | <b>5*</b>                  | <b>5</b>           |
|                                                                | <b>Madrean Evergreen Woodland- Encinal Woodland (Arizona oak)</b>  | <b>10 FMH Forest Plots</b>                               |                 |                    | <b>2*</b>                  | <b>5</b>           |
|                                                                | <b>Madrean Evergreen Woodland- Encinal Woodland (mixed oak-PJ)</b> | <b>2 Rapid Assessment Pilot Plots</b>                    |                 |                    |                            |                    |
|                                                                | <b>Pine-Oak Forest (Arizona oak)</b>                               | <b>12 FMH Forest Plots</b>                               |                 | <b>3</b>           |                            | <b>3</b>           |
|                                                                | <b>Douglas Fir-Mixed Conifer Forest</b>                            | <b>10 FMH Forest Plots<br/>2 Rapid Assessment Plots</b>  |                 |                    | <b>10*</b>                 | <b>10</b>          |
|                                                                | <b>Silverleaf oak</b>                                              | <b>3 FMH Forest Plots</b>                                |                 |                    |                            |                    |
|                                                                | <b>Pine Oak Forest (Chihuahuan pine)</b>                           | <b>7 FMH Forest Plots<br/>4 Rapid Assessment Plots</b>   |                 |                    |                            |                    |
| <b>Total</b>                                                   | <b>7 monitoring types</b>                                          | <b>70 FMH Forest Plots,<br/>6 Rapid Assessment Plots</b> |                 | <b>3</b>           | <b>17</b>                  | <b>20</b>          |
| <b>* Measured trees and poles, took photos--not full read.</b> |                                                                    |                                                          |                 |                    |                            |                    |

**Table 2. Fire Ecology Staffing, 2008**

|                                                                                             | <b>Starting Date</b> | <b>Ending Date</b>  | <b># of Pay Periods</b> | <b>Training and Development</b>                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------|----------------------|---------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Perry Grissom<br>Fire Ecologist                                                             | 1/1/08               | 12/31/08            | 26                      | Fireline refresher; I-700; NPS Fundamentals V; S-580; FFI; herbicide applicator continuing ed; CPR; Endangered Species Act Alternative Consultation Process; NEPA, Wilderness; Operational Leadership |
| James Leckie<br>Lead Monitor                                                                | 3/31/08              | 10/17/08            | 15                      | Fireline refresher, I-700, FFI, herbicide applicator continuing ed, First Aid/CPR                                                                                                                     |
| Nicolette Riggins<br>SCA Intern                                                             | 6/23/08<br>9/1/08    | 7/18/08*<br>9/12/08 | 3                       | S-130/190, I-100, First Aid/CPR, Security Awareness, Computer Use, herbicide safety/application                                                                                                       |
| Christopher Shay<br>SCA Intern                                                              | 6/16/08              | 7/18/08*            | 2.5                     | S-130/190, I-100, First Aid/CPR, Security Awareness, Computer Use, herbicide safety/application                                                                                                       |
| * SCA interns worked for the Resources Division in late July and August on invasive plants. |                      |                     |                         |                                                                                                                                                                                                       |

**Table 3. Management Objectives and Monitoring Results 2008**

| <b>Monitoring Unit</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Management Objective (Restoration)</b> | <b>Monitoring Results (XX% confidence interval)</b> | <b>Objective Achieved?</b> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------|----------------------------|
| No broadcast prescribed burns were conducted in 2008. Pile burning was accomplished at MOWE, which accomplished objectives. A contract to clean up FMH data was entered into with the University of Arizona Center for Applied Spatial Analysis through the Desert Southwest Cooperative Ecosystem Studies Unit in 2007. One pass has been made through the data in 2008. Further work is dependent on the conversion to FFI. Complete analysis of the data collected in 2008 is also waiting for the conversion. |                                           |                                                     |                            |

**Table 4. Fire Ecologist Accomplishments/Focus Area**

| <b>Category</b>                   | <b>Percent Time</b> | <b>Accomplishments/Focus Areas</b>                                                                                                                                                                                                                 |
|-----------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Planning                          | 5%                  | Huachuca Area Fire Partners FireScape Planning, mid-level NEPA, (includes CORO)--EA draft completed, and agency comments ( 95 items) submitted; Catalina-Rincon FireScape (SAGU) starting; consultation with FWS; amend SAGU FMP and WFIP criteria |
| Presentations                     | <1%                 | Tucson Habitat Conservation Plan, Technical Advisory Committee-- presentation about planned buffelgrass research prescribed burn                                                                                                                   |
| NPS meetings/ task groups         | 4%                  | WFSA/WFIP preseason prep/sand table exercise; Park, Fire Staff, and Resource Staff Division meetings                                                                                                                                               |
| Interagency work                  | 4%                  | Fuels, non-native invasive plants; Coronado NF, USGS, USFWS/ES, Rural Metro FD                                                                                                                                                                     |
| Fire Assignments & Fuels Projects | 17%                 | Fuels: RXB2 pile burning MOWE; site visits CORO, TUMA, TONT, TUZI; spray buffelgrass, SAGU, and aerial sketch-mapping; review NPS burn plans; live fuel moisture monitoring; FEMO 11,000-acre broadcast burn and FFT2 pile burn Coronado NF;       |

|                   |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |     | Wildfire: READ and AREP at Mission Fire, TUMA; READ and ICT4 at Chimenea WFU fire, SAGU; WFSa prep Alamo, Frye Mesa, and Distillery fires, Coronado NF                                                                                                                                                                                                                                                                                                                                                            |
| Research          | 12% | Coordinated and implemented fire-buffelgrass research project, working with University of Arizona on fuel loading/fire behavior study; RXB2 at 160-acre burn on Tucson Water property; contributed to 3 JFSP research proposals; attended 1 PhD defense about fire history work in the Rincons                                                                                                                                                                                                                    |
| Data collection   | 9%  | FMH plots, SAGU; Golden Gate wildfire photopoint revisit, SAGU; help coordinate Mexican Spotted Owl monitoring for 2009                                                                                                                                                                                                                                                                                                                                                                                           |
| Data entry        | 1%  | Data entry and cleanup                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Data conversion   | <1% | FMH-FEAT-FFI conversion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Data analysis     | 2%  | Fire severity data; plant ID; GIS for fire and Trails Plan BA; CORO fire regime data request                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Supervision/Admin | 12% | Hiring, supervision, travel, payroll, develop performance plan, etc.; mainly SCA recruitment, training, and supervision; periodically served as acting FMO                                                                                                                                                                                                                                                                                                                                                        |
| Training          | 13% | See table 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Outreach          | 4%  | Drafted or contributed to press releases about wildfire activity and buffelgrass sketch mapping; web content review/creation; SAGU Outreach Committee member; staffed information booth at the Rincon Valley Farmer's Market about buffelgrass, also answering questions about prescribed burning and fire use                                                                                                                                                                                                    |
| Miscellaneous     | 16% | Safety (buffelgrass advisory); attended Fire in the Southwest Symposium (Tucson); contributed to grant application proposals; reviewed plans and reports; coordinated Resource Advisor workshop at SAGU (15 participants, SAGU, CHIR, SOAR, USFS); National Program Review; lead instructor for S-130/190 for 2 SCA's, 1 Biotech (Resources), and 1 Park Ranger; contributed to report to FWS-ES for FMP BA on 2008 fire activities; PEPC contributor, helispot relocation; Combined Federal Campaign Coordinator |

**Table 5. Fire Effects Crew Accomplishments**

| <b>Category</b>                   | <b>Percent Time</b> | <b>Notes</b>                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Data collection                   | 25%                 | FMH plots, SAGU; Golden Gate Wildfire photo point revisit, SAGU; invasives mapping and fuel load sampling                                                                                                                                                                                                                                                                   |
| Fire Assignments & Fuels Projects | 30%                 | Leckie: went with Pleasant Valley Hotshots to NM; herbicide buffelgrass (both to cover base shortfall); fuel moisture monitoring; invasives control; FEMO Buenos Aires NWR Rx burn and Chimenea WFU, SAGU; READ Distillery Fire, USFS; FFT2 Beaver Meadow Rx, ROMO; FEMO Avra Valley Research Prescribed Burn; Riggins & Shay: FFT2, Chimenea WFU; fuel moisture monitoring |
| Data entry                        | 20%                 | Mainly data cleanup; slide scanning                                                                                                                                                                                                                                                                                                                                         |
| Data conversion                   | 2%                  | Prep for converting FMH data to FEAT-FFI                                                                                                                                                                                                                                                                                                                                    |
| Data analysis                     | 3%                  | Mainly for data cleanup/trouble-shooting; Golden Gate photo series construction                                                                                                                                                                                                                                                                                             |
| Supervision/Admin                 | 5%                  | Travel, supervision of SCA's                                                                                                                                                                                                                                                                                                                                                |
| Training                          | 10%                 | See table 2                                                                                                                                                                                                                                                                                                                                                                 |
| Miscellaneous                     | 5%                  | Job Fairs; Outreach Trapline for Distillery/Castro/Chimenea fires; observing IMT at ICP                                                                                                                                                                                                                                                                                     |

## **Complete Attached Annual Report Supplement (“2008 Annual Report Supplement.xls”)**

Provide additional explanation for the Annual Report Supplement spreadsheet here.

Be sure to **complete numbers 1 and 2**. Number 3 is optional.

1. Fire effects monitoring databases or spreadsheets being used:  
Almost entirely FFI; Excel used to summarize 2008 post-burn information. Waiting on conversion before resuming serious data entry.
2. Annual Meetings:  
Observations and photos about the Chimenea WFU fire on SAGU were provided to park staff immediately after the monitoring trip. Informal discussions have occurred periodically during the year about fire effects, fire use, and other topics. General fire ecology discussions were had with park staffs during site visits to TUZI, MOCA/MOWE, TUMA, TONT, and CORO, where no FMH plots exist. For CORO, numerous discussions were held with the park staff and interagency and NGO partners about fire effects monitoring protocols and design criteria for treatments.

### **Other:**

The biggest issue for SAGU continues to be non-native plants, especially buffelgrass (*Pennisetum ciliare*, known in Australia as *Cenchrus ciliaris*), and the increasingly severe fire threat to the Sonoran desert and the park’s resources that they are creating. For more information, see [www.buffelgrass.org](http://www.buffelgrass.org).

The invasive plants program is run by the Resources Division, with technical assistance, some funding, and even manual labor contributed by the fire program. In fiscal year 2008, 27 groups consisting of 309 volunteers contributed 1,185 hours, removing 21 acres of buffelgrass from the park. Eighteen Southwest Conservation Corps members contributed 490 hours toward buffelgrass removal, pulling approximately 3 acres. Manual removal is the only control option available when buffelgrass is dormant (generally 9 months of the year).

During March 2008, the park chemically treated all of the areas that had been sprayed during the summer of 2007 or had been recently pulled, totaling 137 acres. During the summer growing season, the park treated 633 acres of invasive plants with back-pack sprayers with glyphosate. Buffelgrass made up the vast majority of that acreage (621 acres). Much of this acreage is retreatment, because germination events can occur episodically during the monsoon season. Aerial sketch-mapping, done in fall with fire funds, indicates that the park has about 2,000 acres of buffelgrass.

Preliminary data from the buffelgrass fire behavior research project gives insight to the potential damage from buffelgrass fires. The experimental burn, conducted in an old agricultural field covered with buffelgrass, generated fire behavior very close to fuel model 3. Fuel loading in the experimental burn area was somewhat higher than most (but not all) areas of invaded natural vegetation sampled within the park. The burn received some attention in the media, and the project has already accrued benefits in raising awareness among the public, local fire departments, and federal fire and land managers.



SCA Riggins being photographed spraying buffelgrass by a local TV station for Media Day.



Far from the glitz and glamour, fire ecologist retreats buffelgrass sprayed the previous year.



Media interviewing Dr. Guy McPherson before the buffelgrass fire behavior research burn. Note the rainbow of colors of fire trucks, indicating the collaborative effort involved (USFS Photo).



News Flash: Preliminary results--buffelgrass burns well!  
(5/28/08, 11:45 a.m., 89F, 21% relative humidity, fine fuel moisture 4%, wind 2-3 mph)



Smoke from the Chimenea Wildland Fire Use fire, 6/28/08.  
If buffelgrass fills in the desert that currently buffers urban areas,  
fire management across the whole park will be affected.



A buffelgrass infestation on the outskirts of Tucson.