National Park Service Fire Effects Monitoring Program

Rx Effects

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From the Editor

Eric Miller (YELL)

Welcome to the second annual Fire Effects newsletter. There has been a lot of changes in Fire Effects Monitoring lately, including the new March deadline for the newsletter. Hopefully this will allow program leads ample desk time during the winter to write and submit quality articles about the various programs in the Park Service and will reach the field crews as they come on for the season. See page 7 for details. You might have noticed some other changes in Fire Effects Monitoring as it continually changes to adapt to new issues in fire management. Where the program has traditionally focused solely on the effects of prescribed burning we are facing more complex issues such as urban interface, monitoring mechanical fuel reduction and wildland fire use fires, and using satellite imagery to map fire severity. If your fire cache is like mine you are probably used to dealing with rapidly changing situations and these challenges should present little problem. New and improved FMH software is on its way to help you. Read on to learn about the projects and approaches that your colleagues are using to face these challenges.♦

Grand Teton: Feng Shui and Fire Effects in the Tetons

Beth Brenneman (GRTE)

Last year our Teton Fire Effects Crew was made up of five motivated and hard-working people types: DIAB1, BEBR1, JOSA1, JINE1, and DOYB1 (Diane Abendroth, Beth Brenneman, John Sandberg, Jill Nemacheck, and Dominic Yballe). We were all disappointed to find out that our much anticipated trip to Yosemite for the yearly RX-80 training was cancelled, but we forged ahead anyway (maybe next year?!). Expecting a crazy fire season, we put our noses to the grindstone, plowing our way through plots. We put in some new PICO (Pinus contorta), PSME (Pseudotsuga menziesii), and POTR (Populus tremuloides) plots, read numerous year two post-burns, and also re-read a lot of unburned plots from 1998. And of course we read our boring old ARTR plots, though they seem to be the spice of life for Diane. I can still see her crawling on hands and knees through the sagebrush, oohing and aahing over the tiny baby sage.

We had some much needed excitement in the willows by Jackson Lake this year, putting six new plots in a SAGE (*Salix geyeri*) type. Dead moose carcasses proved no problem for our fearless crew. Luckily it was a dry year so we didn't have waterlogged boots to add to the bush-whacking hell we endured.

We made another trip up to Bighorn (hot as heck) Canyon National Recreation Area this summer, placing new plots in the JUOS (*Juniperus osteosperma*) type and reading some year two post-burns in the SAVE (*Sarcobatus vermiculatus*) type. We had planned on a two-hour boat ride up the beautiful Bighorn Canyon to put in some cottonwood plots, but alas, the boat hit a floating log and our propeller broke. We slowly puttered back to shore, with the hope of returning next year.

Inside this issue:

Grand Teton

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We continue to place whitebark plots in our subalpine areas. We're waiting for a natural ignition to burn our plots, allowing us to monitor the effects of fire in these "really cool" communities. These plots also give us an excuse to escape our dry, scratchy lowlands, setting foot in the lusher plant communities of the subalpine parkland. Fortunately our whitebark forests are some of the healthiest I've seen, mostly free of the evil blistering rust, but there are subalpine fir encroaching on them even as we speak.

Our work with the Bridger-Teton forest this year included a trip to Pinedale to work with the Wyoming Game and Fish on PUTR monitoring plots. "Now *that's* a decadent PUTR" became our catch-phrase of the summer. We also traveled to the cow and grizzly-infested Mocassin Basin on the B-T forest to read nested-frequency plots on a prescribed burn done in 1991.

Our fall ended with the tedious monotony of burn severity plots, um, just kidding Nate. Some of us Tetonians headed north to the remote realms of Glacier National Park for the excellent tutelage we knew we would receive from Carl Key and Nate Benson. We haggled our way through plots in the smoky, yet beautiful north, and returned with a better sense of how these fire severity plots can work for us. We have forged ahead with new-found confidence in our educated guesswork, becoming the scienticians we always knew we could be. Though we would never dream of tooting our own horns, we have completed almost 200 plots to date (kicked some butt!!).

Prescribed fire season is now upon us, and the snow has started to fall on our beautiful mountain peaks. Yesterday we had an exciting burn in the sagebrush that charred two of our plots. They will be some of or easiest post-burn reads! Until next summer, wishing all you fearless Fx folks smoky dreams, flame-filled sunsets, and LANDSAT imaging beyond your wildest imaginations.♦

Fire Effects Monitoring with Local Students and Community Volunteers

Timothy Ingalsbee (Cascadia Fire Ecology Education Project and the Western Fire Ecology Center)

In 1991, the arson-caused Warner Creek Fire burned across 9,000 acres of a rugged inventoried roadless area and habitat reserve for the northern spotted owl located on the Willamette National Forest in Oregon. The relatively large area of intact, unmanaged forest and diverse topographic, vegetative, and microclimatic conditions resulted in a wide range of fire behavior and effects. From 1992-1996 the Willamette National Forest proposed salvage logging in the wildfire area to reduce fuel loads and construct fuelbreaks to facilitate future firefighting. However, due to widespread public opposition and executive action by the Clinton Administration, no logging ever occurred. Consequently, the Warner Burn is an extremely rare place on U.S. Forest Service (USFS) land in the westside Oregon Cascades precisely because it was not postfire salvage logged or replanted with nursery stock. For the last ten years it has attracted a wide array of fire ecology research and education activities documenting the area's astounding natural fire recovery.

The first couple years after the fire, scientists from the USFS Pacific Northwest Research Station established 24 permanent research plots to evaluate stand structure, fire mortality, vegetation composition, and natural regeneration in the Warner Burn. However, due to declining budgets and other institutional factors, the Forest Service has been unable to revisit these plots or do any other postfire monitoring. Consequently, the nonprofit Cascadia Fire Ecology Education Project (CFEEP), located in Eugene, Oregon, stepped in to organize community and student groups to fill the research and monitoring void.

A key interest of CFEEP and the community was monitoring the rate of fall and decay of the towering fire-killed old-growth snags that were slated for salvage logging. Again, since most large stands of burned old-growth in the westside Cascades have been systematically salvaged logged in recent decades, there is almost no field data available on "snag longevity."

Most of the literature addressing deterioration of snags comes from studies in other ecoregions, or focuses on the decline of lumber values, not the rate of fall of large snags or the ecological values of their decay processes over time.

This data gap on snag longevity is a particularly sensitive issue to conservationists since many contemporary Forest Service salvage logging proposals assume that most fire-killed trees will fall down in a relatively short time (e.g. 10-25 years), and thus will create a future "catastrophic" wildfire hazard. This assumption--known as the "reburn hypothesis"--underlies the common argument that fire-killed trees need to be quickly extracted for the sake of ecosystem fire protection. The Warner Burn offered us an ideal place to generate data that would test those assumptions by monitoring the accumulation of large-diameter logs, limbs, and other natural fuels over time.

Scientists from the National Park Service (NPS), USFS , and local universities helped us develop our methodology for establishing permanent postfire monitoring plots. A partnership was then established with the Northwest Youth Corps (NYC), a local alternative high school for at-risk youth interested in forestry careers, to have their students help set up the monitoring plots. The focus of these research-educational outings is to teach students about fire ecology processes while learning how to gather and record field data, and conduct basic scientific research. It is our intention to incorporate more elements of the National Park Service's fire effects monitoring protocol into our program, and archive our data with the NPS and USFS.

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Bryce Canyon and Zion: Prescribed Fire in the SW

Henry Bastian (BRCA/ZION)

Examples from Bryce Canyon and Zion National Parks using the NPS Fire Monitoring Handbook protocols establishing vegetation monitoring plots and using prescribed fire to treat landscapes. Poster/Paper was presented at the Fire Conference 2000 November 27 – December 1 and poster at the George Wright Society Conference April 16 – 20, 2001.

THE EFFECTS OF PRESCRIBED FIRE IN A MIXED CONIFER FOREST OF **BRYCE CANYON** NATIONAL PARK, UTAH

ABSTRACT Plots were established in 1995 and were sampled, 1 month, 1, 2, and 5 years after the burn. The prescribed burns were implemented in August of 1995 in the County Line and Yovimpa burn units. Analysis of 11 plots revealed fuel loading was reduced from 7.27 kg/m^2 to 2.50 kg/m^2 1 month after the fire. White fir (*Abies concolor*) overstory trees were reduced 31.9% and pole trees were reduced 47.8% five years after the burn. The above data was compared and analyzed with three control plots.

INTRODUCTION In 1993 Roberts and Jenkins studied historical landscape photographs of Bryce Canyon National Park and indicated that a major change had occurred in the Park's vegetative mosaic. What caused this change in the park's vegetation? Historically, the lands in and around the Park were used differently than they are now. Before early settlers moved to the area, natural processes such as drought and fire controlled the growth of the forest. Trying to protect the beauty of the Park, all wildfires were immediately suppressed. People perceive fire to be bad as it cascades across the land consuming all in its path. In some cases, fires are terribly catastrophic, destroying forests, brush and grasslands. But in many cases, like the phoenix rising from the ashes, new landscapes spring from the devastation.

The problem is the fire return intervals of these systems have changed because fire has been omitted from the land. This omission has increased fire intervals and intensities causing significant alterations in vegetation assemblages. Many of these changes may be long term, taking years to recover due to the intensity of the fire, with some effects being irreversible. Other areas may come back but be entirely modified. Prescribed fire may provide a way of treating altered vegetated landscapes and help preserve some of the natural range of plant diversity.

METHODS Data Collection. Mixed conifer (white fir/ponderosa pine) vegetation monitoring plots were established in the County Line and Yovimpa burn units in 1995. Three control plots and 11 treatment plots were randomly located and established following protocols of the Western Region Fire Monitoring Handbook (USDI, NPS 1992).

RESULTS Pre-burn fuel loading for 11 plots was reduced 64% from 7.16 kg/m^2 to 2.55 kg/m^2 within 1 month of the prescribed fire. Three control plots had a fuel load of 10.46

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PRESCRIBED FIRES IN PONDEROSA PINE WILDERNESS AREAS OF **ZION** NATIONAL PARK, UTAH

ABSTRACT Ponderosa pine (*Pinus ponderosa*) vegetation and fuel loading plots were monitored and sampled in wilderness areas treated with prescribed fire. Analysis of 11 plots 2 years after a burn treatment show litter was reduced 56% and duff was reduced 25% within 1 month after the burn. Ponderosa pine in the 10.1cm to 30.2cm size classes was reduced 14% and ponderosa pine greater than 60.6cm increased 2 years after the burn.

INTRODUCTION Vegetation is always changing and many vegetation types are dependent on disturbances for growth and reproduction. Fire is one of the predominant natural disturbances of vegetation. Prescribed fire is one way of reducing the unpredictability of wild fire. West and Madany's 1981 study stated that, "From the fire scar record we can safely state that any location within a ponderosa pine forest burned at least once, and more likely twice, every decade in the time before white settlement". This information shows that fire played an important role in shaping the vegetation communities of Zion and the surrounding area.

METHODS Data Collection. Ponderosa pine vegetation monitoring plots were established following Western Region Fire Monitoring Handbook Protocols (USDI, NPS 1992). Eleven plots (n=11) were stratified randomly within prescribed burn units and established before controlled burns in 1995 - 1997. Plots are 20 meters by 50 meters and sampled in the summer near peak phenology.

RESULTS Litter was reduced 56% from 0.97 kg/m^2 to 0.42 kg/m^2 within 1 month of the burn. Duff was also reduced 25.6% from 3.99 kg/m^2 to 2.97 kg/m^2. Total fuel loading was reduced 29% from 6.13 kg/m^2 to 4.33 kg/m^2 within 1 month of the burn. Ponderosa pine in the 10.1 cm to 30.2 cm DBH size classes were reduced 16% from 126.4 trees per hectare to 108.2 trees per hectare 2 years after the burn. Trees greater than 60.1 cm increased from .9 to 5.5 trees per hectare.

DISCUSSION Scientific literature has established that a relatively long time, usually at least 7 to 10 years, is required to detect realistic trends when monitoring plant populations (Elizinga et al. 1998; Sutter 1996). This early analysis indicates that prescribed fire may be used to reduce fuels and small trees without mortality of large trees. A paired t-test was performed with the following t values. Litter was 5.758, duff was 1.783, fuel loading was 2.864 and tree densities indicated a 2.204 for trees (10.1 to 30.2 cm DBH) and -1.250 for trees greater than 61.2 cm. The

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Glacier: Towering Smoke Plumes & Horrendous Bushwhacks

Bob Merrow

As I type away at my keyboard, the season ending event is unfolding outside my window. The West Glacier RAWS indicates that we received 0.74" of precipitation in the past 24 hours. We are all breathing a sigh of relief to see the fire season finally end. It is refreshing to have a moment to reflect on the season.

This field season, the Glacier fire effects crew completed year five postburn rereads in our North Fork Grassland monitoring type. As our objectives were 5-year objectives, the end of season analysis for this monitoring type will dictate which direction we take in this monitoring type in the future. We plan to produce a poster this fall/winter that presents our 5-year findings. If our preliminary results are any indication, we seem to have met or nearly met our objectives of decreasing density of lodgepole pine and tracking any changes in non-native herbaceous species.

Plots were also reread in the North Fork Ponderosa Pine monitoring type this season. Many of these plots were initially burned in 1998 and 1999. Two plots that were burned in 1998 reburned in the Anaconda WFURB in 1999. In addition, six plots slated for prescribed burning were also burned in the Anaconda Fire. This season we installed plots in a new burn unit within the Ponderosa monitoring type. This unit, the Lobo unit, was originally slated for 10 plots. Four were installed before our attention was turned to CBI plots.

We began reading CBI (Composite Burn Index) plots in the Anaconda Fire this year, but only had about a week before fire season heated up. We hope to complete the ground truthing of the Parke Peak Fire (2000), Anaconda (1999), Sharon (2000), possibly the Kootenai Complex (1998), and this year's Moose next season.

The monitoring crew, on a rotating basis, assisted the fuels inventory crew in the final year of fieldwork for their project. Most of the fuels plots this season were installed on the West Side of the park in dense coniferous forests with heavy downfall. This seemed to support the old idiom, "if it doesn't kill you, it will make you stronger." The horrendous bushwhacks endured by these folks will live on in infamy.

Glacier hosted a CBI training taught by Carl Key and Nate Benson in late September. Attendees came from all over the lower 48. Field days were spent in the Challenge Fire (1998) and the Sharon Fire (2000). Logistics for the field days were complicated by the Moose Fire, which had by then burned 26,000 acres within the park.

Obviously, the highlight of the season was the Moose Fire. Ultimately, it came to occupy all of our time. Destined for greatness, the Moose began as a single tree lightning that played

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Bryce Canyon

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kg/m^2 and at the five-year sample, fuels measured 11.10 kg/m^2.

White fir overstory trees had a density of 202.7 trees per hectare, which was reduced 40.4% to 120.9 trees/hectare for 11 plots 5 years after the prescribed burn. The 3 control plots had a density of 183.3 trees/hectare and at the 5-year sample period had 180.0 trees/hectare. Other tree species densities remained relatively constant in the control plots. Control white fir poles increased 5.1% from 520.0 to 546.7 trees per hectare.

The effects of these prescribed fires at Bryce Canyon National Park, reduced fuel loading and tree densities, moving the forest vegetation structure back, by cleaning and opening up the forest.

Minimum plot calculations were done using an 80% confidence level with an R-value of 25. Eleven plots were needed for total fuel load to meet the 80% confidence level. A paired t-test was done with a value of 3.692 for total fuel loading from pre burn to post burn conditions.

MANAGEMENT IMPLICATIONS With all of the information and knowledge that we have about prescribed fire there is still much we do not know. Monitoring is one method of gaining more knowledge and insight into the complex questions regarding the management of many ecological systems. Prescribed burns similar to this will hopefully prevent catastrophic wildland fires from setting the successional clock back too far or completely resetting it.♦

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Zion

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use of prescribed fire may allow the re-introduction of fire into these environments when conditions are appropriate and establish conditions where fires could occur naturally. It may be impractical to return to using wild fires to manage a wilderness ecosystem naturally, due to years of fire suppression and the resulting changes in vegetation.

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Yellowstone: Pushing Back the Frontiers of Fire Geekery

Eric Miller (YELL) www.nps.gov/yell/technical/fire/effects.htm

The Yellowstone Fire Effects crew does its best to debunk the myth of the burly chainsaw-toting wildland firefighter emerging through the smoke. In Yellowstone you might see something different— a yellow shirt emerging through the smoke with a pocket computer, spacy looking antennas, PVC plot frames and half a dozen orange measuring tapes. You've encountered the Fire Effects Crew!

The crew was exceptionally productive in 2001 despite a large crew turnover. Early in the season Mitch Burgard left the program to become the Prescribed Fire Specialist at Glacier National Park. Late in the season we were able to hire Becky Seifert and Scott Weyenberg, both exuding the requisite geekiness and having experience in prescribed fire and natural resources.

Yellowstone is a park that has been historically light on management ignited prescribed burning and very heavy on fire-use. In 2001 the park received 38 ignitions (29 natural) that burned 2,980 hectares of the park (fifth most burned area in the last 30 years). Since severe fire seasons do not occur every year we focused on taking advantage of the many fires in the different forest types to improve our knowledge of fire behavior and the effects of natural ignitions on the park's ecosystems. We installed four plots ahead of the Sulphur, Stone, Falcon, and Little Fires, three of which burned (One fire took its time getting there-- 5 weeks!).

Two of our plots intended for other purposes also unexpectedly burned in the Little Joe Wildfire. One plot was installed in 1999 with the help of the Saguaro Fx crew and was intended to monitor a proposed prescribed fire which was never implemented. The other plot was our very first attempt at our new mechanical hazard fuel reduction monitoring type at Deaf Jim Cabin. Two weeks after installation both the cabin and the plots were consumed in the human-caused Little Joe Fire. (Note: Aluminum tree tags are highly recommended for plots to be treated with chainsaws for safety reasons but in the event of a wildfire they vaporize!).

We also revisited two plots in our year 2000 Boundary Fire which burned in a young lodgepole pine forest resulting from the Falls Fire of 1988. There is considerable interest in the information resulting from these plots because the fire represents the extensive areas of Yellowstone that burned in 1988. In general young, post-fire lodgepole pine forests (LP0) don't carry fire because the carrier fuels haven't had time to accumulate. In the last two fire seasons we have seen large fires burn up to the edge of similar LP0 stands and go out. We are now interested in why fire carried at the Boundary Fire but not these others. We believe that the explanation lies partly in weather and partly in the fuels. Fire weather indices at the time showed record burning conditions during the week that the Boundary fire was most active. The fire resided in rotten logs from one burn period to the next, and carried through cured and dry culms of elk sedge between rotten logs when conditions were favorable.

On a related note, we are planning a project to develop a custom fuel model to represent young, post-fire lodgepole pine forests (LP0). Historically we have used brush model 5 to represent LP0 stands but this model does not fit well. The two parts of the project are to 1.) intensively sample the fuels using a photoseries approach, and 2.) as fire-use opportunities arise, verify weather and fire behavior in this type.

This year we resampled the full set of eleven fire plots established between 1977 and 1989 by former park Ecologist Don Despain. This set of data tracks the long-term succession of post-burn forests in Yellowstone. These plots are very similar to standard FMH plots and are sampled for ground-layer vegetation, fuel loading, and tree regeneration. Analysis is in progress and we plan to present some of the data in the fall at the Association for Fire Ecology Conference in San Diego.

In May our crew cooperated with Despain and students from the University of Iowa and Brigham Young University in collecting data on heavy fuels in the different forest types of the park. As fuels rot they become increasingly prone to sustained combustion. For example a newly fallen log may be so solid that it is merely scorched on the outside while rotten logs with punky interiors readily take fire and are capable of independently sustaining combustion to the point that the log is completely consumed. The forest cover types of Yellowstone differ in the amounts of solid and rotten fuels. Estimates of these fuel loadings will allow us to better predict fire behavior and fuel reductions in these forest types. When coupled with other information in a GIS Fire Management has spatial information which may be used to decide which fires may be safely allowed to burn or to predict changes in behavior as a fire crosses from one stand type to another.

We also resampled a set of twelve transects designed to test the effects of fire-line explosives (FLE) in creating control lines during suppression operations. This project was initiated in 1996 and compares the recovery of fire lines created by FLE, FLE plus improvement with hand tools, hand line dug by fire fighters against a control. The transects are sampled for vegetation and coverage of substrates such as litter and wood.

In the fall we visited some of our year 2000 burns in order to ground-truth fire severity maps from satellite imagery. We were able to sample 25 plots in the Moose and Boundary Fires to make sure they accurately depict fire severity. Unfortunately snow and the remoteness of our large fires in 2000 hampered our efforts to sample more plots.

We are also involved with creating a GIS-based history of fires in Yellowstone. Complete fire records have existed in the Yellowstone Archives back to about 1930 but there has been little effort to collate the data and maps into a coherent history. Bob Flather has been busy in the archives researching these old fires in the park. Ken Marchand created fire perimeters for all fires greater than 100 acres and Kendra Maas and other volunteers have entered the smaller fires into a GIS database. In cooperation with Ann Rodman and the Spacial Analysis Center the Fire Effects Crew hopes to have this database completed soon.

For the upcoming season Becky Seifert is returning and we have recently hired Vicki Pecha, both of whom are highly experienced in fire geekery.♦

Monitoring with Local Students

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Students are organized in small groups led by school teaching staff and CFEEP community volunteers. The various tasks are divided up so that everyone actively participates. We use simple, inexpensive instruments such as compasses, tape measures, clinometers, ribbon and rebar, but have recently began using GPS locators and digital cameras. We first locate a center point with rebar, then take compass bearings and distance measurements to the trees within 100' radius surrounding each center point. Each snag is identified with special rust-resistant numbered metal tags, and basic data on the species, diameter, height, and condition of each tree is recorded. Recently, GPS data has been recorded for each plot, and digital photographs and a narrative description of each plot are being added to our data sheets. Finally, students do intensive ground fuel surveys using a star sample plot method developed by USFS fuels technicians.

The NYC students consider these research-educational outings in the Warner Burn one of the most enjoyable activities of their outdoor program. They have integrated fire ecology into their core curriculum, and are receiving large foundation grants to upgrade their research tools and equipment. Our fire effects monitoring program provides a model for federal agencies to emulate: in an era of declining research budgets and staff, you can form partnerships to pool your staff's technical expertise with the youthful energy of students and community volunteers to do the inglorious "grunt" work of plot establishment and baseline data collection for fire effects monitoring.

We consider our fire effects monitoring program a great success, doing important work that is not being done by anyone else. Our goals are not just to document data for purely scientific reasons, but also to inspire the next generation to pursue careers in wildland fire research and management, and more broadly, to become what we call lifelong "citizen-scientists." We believe that by involving students and community volunteers in data collection and environmental monitoring, this will help democratize and demystify the scientific enterprise, and develop a constituency for fire effects monitoring over the long-term.

For more information or advice on how to recruit students and citizen volunteers in your fire effects monitoring program, contact the Western Fire Ecology Center. ♦

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MANAGEMENT IMPLICATIONS As we have recently seen in Los Alamos, New Mexico with the 2000 Cerro Grande Fire, the process of putting fire on the landscape is not risk free. Kilgore and Nichols (1995) stated that to achieve the objective of restoring fire to its unique natural role in each wilderness and park, our nation's best park and wilderness managers must take reasonable, calculated risks". Through monitoring and research with continued prescribed burning, these vegetation communities may be restored to a self-sustaining state, and more knowledge will be obtained about the intricate processes involved in managing and implementing prescribed burns.♦

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Glacier

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second fiddle to the rapidly growing Werner Peak Fire. Drought conditions and hot and dry weather combined, and the Moose was off and running. Extreme fire behavior and giant smoke plumes were commonplace. The last official acreage estimate was 71,000 acres. The Lobo Unit burned, but I don't think the mortality in overstory Ponderosa pines was less than the 25% we had hoped for. One interesting thing about it all is the way the Moose burned right up to the perimeter of the Anaconda and stopped. Another interesting thing is that looking into the park from the Outside North Fork Road you can see a stand of healthy green Ponderosa pines amidst a sea of char & scorch. Those green trees are within the burn units that we treated with a light underburn in 1998.

That about sums it up here. The last of the hose is being washed and we are wrapping up for another season in the Northern Rockies.

Joshua Tree: Fire in the Desert

Jane Rodgers (JOTR)

Joshua Tree National Park is currently undergoing a rewrite of the Fire Managment Plan. Following a large fire in 1996 park staff met in 1999 to discuss the role of fire in the desert and current "Let Burn" policies. As a result, all natural wildfires within the Quail Spring Watershed were to be declared full suppression, and other natural fires would be considered on a case by case basis. One month after this meeting, 15,000 acres burned within the Quail Springs watershed and elsewhere. The park is struggling to understand fire in the desert and how best to manage future natural ignition fires. Since 1999 we have been working on three main projects:

1) Fire and dynamics of temperate desert woodlands in Joshua Tree National Park (R. Minnich, UC Riverside).

2) Fire Behavior and Ecological Effects in Blackbrush (*Coleogyne ramosissima*) Shrublands and Invasive Annual Grasslands of the Mojave Desert (M. Brooks, USGS Las Vegas Field Station).

3) Demography of Joshua Trees Post-fire (T. Esque, USGS Las Vegas Field Station).♦

Post-Fire Recovery of the Joshua Tree (*Yucca brevifolia* ssp. *brevifolia*) at Joshua Tree National Park

Todd Esque[1], Leslie DeFalco[1], Dustin Haines[1], Sarah Eckert[2], Deanne Flock[2] and Jane Rodgers[2].

Based on fire history and a few known fire effects, fire is understood to be an occasional visitor to the desert; however, desert fires have increased in size over the last thirty years due to weedy plants introduced from Eurasia. Over the last forty years, the amount of non-native grasses has increased to such an extent that in some areas, they represent over 60% of the biomass created from annual plants. As a result, Joshua Tree National Park has been experiencing increasingly frequent, large-scale wildfires. Park fire managers and biologists are struggling to understand this newly created landscape and are particularly concerned with the park's namesake, the Joshua tree (*Yucca brevifolia* spp. *brevifolia*). In 1999, the Juniper Fire Complex burned over 16,000 acres of Joshua trees, pinons, junipers, and blackbrush. In spring 2000, USGS Las Vegas Field Station teamed up with park biologists to sample 600 burned and 600 unburned trees on adjacent sites. Long-term monitoring provides critical information regarding the survivability and post-fire response of the Joshua tree. This slow-growing, long-lived climax yucca can resprout after fire, depending on the severity of the scorch and subsequent precipitation. Resprouts occur on the trunk and tree base, however these sprouts are susceptible to predation and drought in the open conditions of a burn. Data collected in 2001 indicate that many trees appearing alive post-burn succumb to drought two years later. Basal and stem sprouts on many plants appear vigorous after two years, although on some sites sprouts have died back or been heavily grazed.♦

[1]USGS Las Vegas Field Station, 6770 S. Paradise Rd., Las Vegas, NV 89119. [2]Joshua Tree National Park, 74485 National Park Dr., Twentynine Palms, CA 92277.

Abstract for Society for Ecological Restoration, California Chapter. Annual Conference. October 31-November 3, 2001. San Diego, CA.

RxFx Subscription and Submission Information

Rx Effects is the newsletter of the Fire Effects Monitoring Program in the National Park Service. It is an outlet for information on Fire Effects Monitoring, FMH, fire research, and other types of wildland fire monitoring. The newsletter is annually produced for the National Park Service but we encourage anyone with an interest in fire ecology to submit information about their program or research. Examples of submissions include: contact information for your program, summaries of your program's goals, objectives, and achievements, monitoring successes and failures, modifications to plot protocols that work for your park, hints for streamlining collection of data, data entry, and analysis, event schedules, and abstracts of papers or posters resulting from your program. Submissions will be accepted in any format (e.g., hard copy through the mail or magnetic files through e-mail). The goal of the newletter is to let the Fire Effects community know about you and your program.

Rx Effects is issued each year in the Spring. The next submission deadline is 28 March 2003. If you would like a subscription or more information please see our website **www.nps.gov/yell/technical/fire/rxfx.htm** or contact Eric Miller 307-344-2474. Wildland Fire, P.O. Box 168, Yellowstone National Park, WY 82190-0168.♦

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Rx Effects, The Newsletter of the NPS Fire Effects Monitoring Program

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