Resolution No. 06-2002-127

RESOLUTION OF THE WHITE MOUNTAIN APACHE TRIBE OF THE FORT APACHE INDIAN RESERVATION

WHEREAS, the White Mountain Apache Tribal Council has received notification - through the White Mountain Apache Tribal Forestry Department Director - that Northern Arizona University and the University of California, Los Angeles, wish to conduct an investigation of the regenerational response, over decades, of ponderosa pine and other woody species to crown fires in areas within the Fort Apache Indian Reservation; and

WHEREAS, the Tribal Council has reviewed a letter from its Special Counsel, Sylvia Cates, advising that the water rights team has no problem with the proposed study provided the investigators are escorted at all times during the study, the researches enter through a negotiated legal agreement and that the results of the study are provided to the White Mountain Apache Tribe; and

WHEREAS, the Tribal Council requires the researchers from Northern Arizona University and the University of California, Los Angeles, to enter into a legal contract, drafted and negotiated through the Tribal Legal Department, for their presence upon, and use of, tribal lands during the study.

BE IT RESOLVED by the Tribal Council of the White Mountain Apache Tribe that it hereby authorizes the Tribal Legal Department to draft and negotiate a access and use agreement with the Northern Arizona University (NAU) and the University of California, Los Angeles, (UCLA) to enter the Fort Apache Indian Reservation and conduct a ponderosa pine crown fire study as proposed this day, provided such agreement protects all information, data, drawings, photographs and other materials directly or indirectly related to NAU and UCLA's presence upon, and use of, the resources of the Fort Apache Indian Reservation and provided the agreement requires the presence of a Tribal escort, authorized through Tribal Forestry, to accompany and assist the representatives of NAU and UCLA at all times during their presence on the Reservation.

BE IT FURTHER RESOLVED by the Tribal Council of the White Mountain Apache Tribe that it authorizes the Tribal Chairman, or in his absence the Vice Chairman or other duly authorized representative, to execute any and all documents necessary to carry out the intent of this resolution.

The foregoing resolution was on June 6, 2002 duly adopted by a vote of FIVE for and ZERO against by the Tribal Council of the White Mountain Apache Tribe, pursuant to authority vested in it by Article IV, Section 1 (a), (c), (s), (t), and (u) of the Constitution of the Tribe, ratified by the Tribe September 30, 1993, and approved by the Secretary of the Interior on November 12, 1993, pursuant to Section 16 of the Act of June 18, 1934 (48 Stat. 984).

ACTING Chairman of the Tribal Council

Secretary of the Tribal Council

The Fate of Ponderosa Pine Forests

Decades After Intense Crown Fire

Joy Nystrom Mast, Northern Arizona University

Melissa Savage, University of California, Los Angeles

Abstract:

The exclusion of low-intensity surface fire from the ponderosa pine forests of the Southwest has changed ecosystem structure and functions such that intense crown fires increasingly cause extensive mortality in burns across the region. What is the trajectory of recovery in these burns? The proposed research would explore the regenerational response of ponderosa pine and other woody species to crown fires that occurred from the late 1940s to the early 1970s. We address two main questions: 1) what is the natural regenerational response of ponderosa pine and what is the survival rate of planted ponderosa pine seedlings, and 2) can these sites be "captured" or inhibited by other woody species. The sites of large, crown fire burns in the Southwest are now increasingly extensive, and by themselves merit an inquiry into their restoration. In addition, the burns offer an unusual opportunity to investigate whether crown fires in ponderosa pine forest is actually driving the ecosystem past a critical threshold into a new domain (Moir and Mowrer 1995). Such a finding would offer another justification for restoration of altered ponderosa pine forests of the Southwest, and answer critics who suggest that allowing crown fires to burn is an acceptable option.

Project Narrative

Background

The ponderosa pine forests of the American southwest are no longer within their range of natural variation for the keystone process of fire; a century or more of domestic grazing, logging and fire suppression has converted open stands of uneven-aged ponderosa pine to dense stands of suppressed young trees (Weaver 1951, White 1985, Covington et al. 1994, Covington and Moore 1994, Swetnam et al. 1999). One critical aspect of this shift has been the alteration of the natural fire regime from one of frequent, low-intensity surface fires to intense crown fires that are capable of causing near complete ponderosa pine stand mortality.

Stand-replacing fires were either rare or nonexistent in the historical forest (Swetnam 1990) but are now increasing in size and number in the Southwest (Dahm and Geils 1997, Hardy et al. 1999). Swetnam (1990) documented that fires occurring in ponderosa pine forests of the southwestern United are now larger than those occurring prior to settlement by Euro-American. Indeed, restoration is being proposed and implemented largely to avoid these intense fires (Covington 1994, Covington and Moore 1994, Covington et al. 1997). Restoration seeks to reverse these trends and increase resilience to natural disturbance events such as fires, insects, and regional drought.

Intense crown fire in the ponderosa pine forests threatens both human and ecological communities (Moir and Dieterich 1988, U.S. General Accounting Office 1999). In recent years, crown fires in the ponderosa pine forest has gotten a lot a attention. 1996 and 2000 were years in which such fires were Clearly, there is no reason that the tragic destruction of several hundreds of homes in Los Alamos in the Cerro Grande Fire in 2000 could not happen anywhere in the urban-wildlands interface throughout the Southwest. Ecologically speaking, some effects of the fires are relatively obvious. Habitat for animals that require mature forests, such as the northern goshawk and other species, may Destructive flooding and erosion may follow such fires (Robichaud et al. 2000). Mature forests are destroyed, removing a resource that will take several hundreds of years to replace. Serious ecological damage to these forests will accumulate following intense crown fires (Covington et al. 1994, Noss 1995).

Some ecological effects, however, are not so obvious, in particular, those associated with long-term While there has been some investigation of the short-term effects of intense fire on that burned in recent years (e.g., Crawford et al. In press and see two La Mesa Symposia, 1984 and 1996), we have very little understanding of the long-term effects of such large, intense fires. In fact, there have been intensive crown fires in the regional forest starting in the 1950s, with the relatively severe, persistent drought that affected many parts of the Southwest ( ). Throughout the 1950, 1960s and 1970s, intense fires began to burn with increasing frequency in the region. Appendix 1 gives a graphic idea of fire size and frequency. The past decade has definitely experienced the most fires, burning the greatest area. However, the intensive crown fires of the 1950s, 60s, and 70s offers an opportunity to investigate the conditions and consequences of such fires in the intermediate or meso-term that has thus far been neglected.

There is anecdotal evidence that some of these burns may form near-treeless "landscape scars" may persist for decades to centuries (Allen et al. In press) (e.g., portions of the 1977 La Mesa Fire Across the Southwest unnaturally dense stands of suppressed young trees, most under a hundred years old, now threaten the remaining large trees through competition and by fueling crown fires (Covington et al. 1994, Covington and Moore 1994), as in ponderosa pine forests of other regions (Everett et al. 1997, Smith and Arno 1999).

Goals and Objectives

The research proposed here will investigate the regenerational response, over decades, of ponderosa pine and other woody species to crown fires. Study areas will include sites across the Southwest where large, high intensity crown fires burned in ponderosa pine forests in the middle of last century, in the 1950s, 1960s and early 1970s. There are a number of good short-term studies of responses to intense fire (e.g., see the La Mesa studies, 1984 and 1996), but virtually no longer-term studies. Understanding woody regeneration trends in these burns is essential to managing the sites for forest recovery.

The research has two primary objectives: 1) to provide information relevant to the restoration of the sites of large crown fires in ponderosa pine forest, and 2) to establish the degree to which the sites of crown fire burns in ponderosa pine forests can be "captured" or "inhibited" by other woody vegetation types over the temporal meso-scale--on the order of decades.

Significant ponderosa pine acreage has burned in the past decade. For example, in New Mexico in the spring of 2000, the Cerro Grande Fire burned about 48,000 and Vivash Fire, 22,000 acres. The portion of the landscape that has burned in these anomalously hot fires is increasing dramatically (Appendix 1). An important question is, what is to become of these sites? Are they recovering to the ponderosa pine forest type, either through natural or artificial establishment of pine trees?

The set of old large fires provide a natural, if imperfect, experiment on a landscape-scale. For one, the burns varied in the treatments by managers, such as planting and seeding, in the aftermath of the fires. Since some but not all of the burns were planted, and sometimes replanted, with ponderosa pine seedlings, both the survival of planted seedlings and natural seedling establishment will be sampled. However, since the dates of the plantings are known, and the ages of the trees will be determined by ring count, it should be possible to disentangle the two types of establishment. In many cases, the plantings, even replantings, were known to have failed to establish. Also, what is the impact of return fires, the consequence of remaining dead wood from an initial fire, on regeneration?

Secondly, these sites vary by environmental factors, such as latitude and soil type, and, perhaps more importantly, by the climate conditions that prevailed for the regenerational setting after the fire. Initial climatic conditions would have been highly relevant to the conditions for the burn, and also to the success of planted seedlings and natural regeneration. Ponderosa pine regeneration and survival is known to be highly sensitive to climate conditions (Savage et al. 1996). It has been anecdotally suggested that some of these large burns from some decades ago may have been "captured" by species other than ponderosa pine trees, such as Quercus gambelli, Robinia neomexicana, and other woody species. To some degree these other species may have defeated the artificial planting and the natural regeneration of pine.

Are these burns, or portions of them, are regenerating to woody species other than pine, and is pine regeneration then inhibited? This kind of behavior has recently been treated in complexity literature in terms of alternative stable states, or basins of attraction (Connell and Sousa 1983, Holling 1986, Moir and Mowrer 1995, Savage et al. 2000).

There are also traits characteristic of such behavior, such as critical slowing, or an uncertain domain outcome, threshold effects, and sensitivity to initial conditions, such as climate factors.

Significance

The project offers an opportunity to gain insight in an singularly unstudied aspect of the altered ponderosa pine forests of the Southwest, namely the decades-long response of the forests to stand-destroying fire. The set of burns represent a regional-scale, if uncontrolled, natural experiment in woody regeneration under different conditions.

The overarching question is, how well is the ponderosa pine forest recovering from intensive fire? Specific hypotheses to be tested include: 1) successful levels of natural regeneration by ponderosa pine occur after crown fires, 2) successful levels of survival by planted ponderosa pine seedlings occurs, 3) ambient climatic conditions prevailing at the site after the burn is significant in the establishment of ponderosa pine, both natural and artificial, 4) where other woody species have established, ponderosa pine regeneration is significantly lower, and 5) where significant levels of establishment by woody species other than ponderosa pine have occurred, there is no trend toward continuing or increasing ponderosa pine regeneration.

In addition, the burns offer an unusual opportunity to investigate whether crown fires in ponderosa pine forest is actually driving the ecosystem past a critical threshold into a new domain (Moir and Mowrer 1995). Such a finding would offer another justification for restoration of overly dense, fire-suppressed ponderosa forests.

Methodology and Plan of Research

We propose to sample woody species regeneration in a set of about 10 large crown burns that date from the 1950s, 60s, and 70s, in southwestern ponderosa pine forests. Suitable burn sites will 1) be larger than 1,000 acres, 2) have burned in a crown fire in the period from the late 1940s through the 1970s, and 3) have adequate documentation relevant to fire location and post-burn treatment. Burn sites to be investigated for suitability will include, but are not limited to, the following fires:

Fire sites which will be investigated for suitability include: the Saddle fire, which burned 8,500 acres on the North Kaibab in 1960; the Kelly Tank fire No. 1, which burned 4,100 acres near Flagstaff in 1954, the Kelly Tank fire No. 2, which burned 3,550 acres near Flagstaff in 1971, the Wild Bill fire, which burned 7,140 acres near Flagstaff in 1973; the Spring Burn, which burned X acres on the Lincoln National Forest in 1955; the McNary and Faught Ridge fires which burned 4,000 acres on the Fort Apache Reservation in 1948 and 1950; the Cottonwood fire which burned 9,100 acres in the Guadalupe Mountains in 1974; the Escudilla Mountain fire which burned 19,000 acres on the Apache National Forest in 1951; the Gila Black Range fire which burned 40,000 in 1951.

At each burn site, information will be collected on the following conditions: soils, topography, aspect, and climatic data--annual temperature and precipitation at least--from the nearest climate stations, and, where available, data such as fire intensity and severity, and planting and seeding regimes.

The sampling design is as follows: a series of 6 parallel transects will be placed orthogonally to the original fire run, spaced 500 m apart, with 5 plots located every 100 m on each transect. In each 10 x 10 m plot, all tree species will be sampled. Size class, diameter and species will be recorded for each tree, and for adult trees, a core will be taken at breast height. Cores will be prepared according to standard procedures (Stokes and Smiley 1968). All seedlings and saplings will be counted. Understory vegetation cover will be estimated in 5 1-meter square microplots in each plot. Data will be copied and stored both at Northern Arizona University and at the Four Corners Institute. Cores will be marked, documented with site information and stored in the Department of Geography at Northern Arizona University.

Dissemination/Expected Outcomes

In general, the expected outcome will be a portrait of the medium-term (decades long) response of ponderosa pine trees regeneration and that of other woody species, to intensive crown fire. The results will be reported in a document to the Ecological Restoration Institute of Northern Arizona University at the funding period, and presented as a paper at an NAU Restoration Research Workshops. We also expect to present result in the peer-reviewed literature and at professional meetings. We expect to produce at least two papers, the first focussing on the empirical findings--do the burn sites exhibit inhibition by other than pine types, what are the pine regeneration patterns, how do initial conditions influence the community that establishes, what conditions in the burns may require restoration? A second paper will focus on the more theoretical implications of the work--can different initial conditions, such as climate, influence the medium-term temporal scale community trajectory, can these trajectories be interpreted as alternate states, do these states appear to be stable? In addition, we expect to present papers at the annual meeting of several professional organizations, at least at the Society for Ecological Restoration, the Association of American Geographers, and the Ecological Society of America.

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