RECOMMENDED ACTIVITIES FOR HIGH-INTENSITY FIRE HABITATS: A CONFERENCE SUMMARY

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In 1989, Tall Timbers Research Station and The Nature Conservancy convened a conference focused on topics related to natural and prescribed fires that are classified as high-intensity or catastrophic. These are fires that are unusually difficult to deal with from a public relations standpoint and/or due to problems with fire containment and smoke management. The habitats and associated fires discussed at the meeting covered a wide ecologic and geographic spectrum. This diversity was also reflected in the conference participants, a group that represented disparate professions; despite such large differences, there were impressively strong similarities in the management problems, administrative concerns, and solutions were expressed.

Many, if not most, of the conference participants agreed that under natural conditions, some habitats are subjected to and perhaps even dependent upon high-intensity or catastrophic fires. Documented examples of such habitats include chaparral, scrub, serotinous-cone pine forests, ecologically equivalent habitats in Australia, and southeastern peat-based marshes (see papers throughout this volume).

Both the general public and land managers must be educated to understand that many natural habitats cannot be held in suspended animation, never changing. For those communities that evolved under conditions that included periodic burning, fire suppression will eventually cause the loss of the original habitat. Great strides have been made in educating the public relative to natural fire disturbance in habitats that normally burned at low intensity and with high frequency. A current challenge is to repeat this educational process for habitats that naturally experienced catastrophic fires.

Concern over the fires in Yellowstone National Park during 1988 exemplifies the heart of the public relations problem. To paraphrase Christensen (1989), the public is fond of wilderness (at least the idea of it) until it bites. During the Yellowstone fires, some of the most vocal criticism was generated by those whose livelihoods depended on the scenic beauty of the park (e.g. motel owners and expedition guides). The public must be made to understand that wilderness does not come without a price of, at least, inconvenience. For tourist businesses associated with the scenic lodgepole pine forests and meadows of Yellowstone, that price is periods of smoke once or twice in a lifetime.

Amelioration of problems associated with high-intensity fire involves interrelated activities. Discussions among conference participants suggested six points needing attention: 1) long-term monitoring of community and population parameters; 2) development of better catastrophic fire behavior models; 3) creation of habitat mosaics or landscaping of boundary/buffer zones;

4) reallocation of funds, possibly from that slated for suppression, to promote preplanning activities, including those covered above; 5) enhanced use of media coverage of high-intensity fires, including well-informed follow-ups; and 6) increased attention to education of the general public, agency administrators, and elected officials.

There is much to be learned about how communities respond to both high-intensity fire and prolonged periods without fire. While the natural history of some of the dominant species in high-intensity fire habitats have been studied, many aspects of community dynamics are not well understood. An organized program of long-term monitoring is needed to provide the basis for informed management. Conference participants from outside the United States expressed surprise that U.S. agencies lack financial commitment to research and monitoring. During a question and answer period, W. P. D. Gertenbach noted that effective management of the vast land in South Africa's park system would not be possible without their well-developed habitat and fuel monitoring programs. This belief was echoed by conference participants from Canada and Australia.

In addition to support from agencies, researchers also must be responsible for the establishment of long-term habitat assessment projects. Many academicians do not view monitoring as science; however, all researchers who work in a park, refuge, preserve, or forest should invest in future research opportunities by assisting in establishing long-term monitoring programs at these sites. This will benefit all parties and, if designed properly, will eventually produce important scientific information as well as a sound basis for management activities.

Conference speakers, representing many fire management programs, discussed the need for more sophisticated prediction of the behavior of high-intensity fires. Behavior models generally neglect catastrophic fires. Information on projected fuel loads and vegetation patterns gained from monitoring activities will aid in making these models more realistic.

An especially appealing approach to management of high-intensity fire habitats includes landscaping on a large scale. Many authors in this volume allude to this. Buffer zones can be created using cultivated and/or nonflammable vegetation or by creating preserves with boundary areas supporting natural low-intensity-fire habitats. An agency may then have the option of creating large areas of black line. These options do not, of course, guarantee control of a high-intensity fire. However, containment capabilities will be enhanced. At the same time private inholdings and construction of permanent public accommodations must be eliminated or at least limited to potentially defensible clustered sites. An added benefit of large-scale landscaping is the creation of a mosaic of habitat patterns.

All of the above activities require long-range planning and, of course, funding. Securing funds for any activity is difficult; money is power and both are usually limited. It seems logical to consider reallocation of some monies designated for suppression activities or to include the proposed activities under

suppression responsibilities. Administrators must understand that these expenditures are likely to eliminate some, if not most, of the costs of post-ignition activities.

Conference participants all seemed to recognize the need to interact with and use the news media. Agencies appear to have taken the lead in the production of video material explaining the general importance of fire and management and, in some cases, documenting specific fires. Researchers associated with academic institutions need to explore possible contacts with university news media services. These offices often are anxious to document research in action; visual images of fire always appear more interesting on the nightly local news or weekly newspaper than does measuring the diameter of trees.

High-intensity fires will always require and receive special media attention; the news media tends to focus on the sensational. Land managers and researchers must take the lead in explaining to writers and reporters the utility of such fires and the importance of removing human bias from evaluating ecological processes. For example, what is destruction to a human may be no more than a "stubbed toe" in the continuity of a forest. Land stewards must teach the public that a desire to protect all living things from events that humans find destructive is not always beneficial to the entire natural community.

The need to educate administrators and public officials is overwhelming. Without the backing of people in these positions, few gains can be made for better fire management practices. Public officials must understand the need for potentially expensive pre-suppression activities and for preserve designs directed at securing boundaries. They must also become aware of the risks land stewards assume when they make fire management decisions. During the meeting, D. Despain (National Park Service) pointed out that one of the most difficult factors facing land managers in areas affected by high-intensity fires is politics.

The gulf that separates academic research and land management has been recognized by the National Research Council (1986). In their report, reviewing the relationship between ecological knowledge gained from scientific work and environmental problem solving needs, they stressed that conservation and management projects must be treated as scientific experiments. Further, they explained the importance that monitoring be reported and analyzed in a form useful to both scientists and managers. Lack of funds is often used to justify ignoring these concerns. The result is the same as neglecting pre-suppression activities; in the long run, more money would be spent and important natural resources damaged or lost in the process.

Reassessment of traditional approaches in both management and science reveal some important and useful parallels. Table 1 outlines analogous steps that categorize each endeavor. This suggests that the process of doing science versus management is surprisingly similar. If additional rigor was interjected in land management programs, many stewardship questions could be answered

Table 1. Comparison of parallel steps involved in conducting a scientific experiment and those in implementing a land management project.

PARALLEL ACTIVITIES	
SCIENTIFIC EXPERIMENT	**LAND MANAGEMENT**
HYPOTHESIS	MANAGEMENT GOAL
EXPERIMENTAL	DESIGN MANAGEMENT PLAN
EXPERIMENTAL MANIPULATION	MANAGEMENT ACTIVITY
SAMPLING	MONITORING
TESTING	EVALUATION

definitively without substantial alteration of planned activities. Conservation efforts must build upon the land manager's intuition, an expertise that is developed over many years. The strongest use than can be made of this talent is to formalize the knowledge so that it can be used to statistically evaluate management options.

As land managers formalize and test their methods, researchers must develop more efficient transfer of knowledge, so that their work can be used to its fullest potential. Land stewards of high-intensity fire communities should welcome all possible sources of information. Unfortunately, as the National Research Council (1986) noted, the lack of communication is great between "generators and users of new knowledge." This knowledge is the foundation for decisions made by land stewards; it can help explain and justify budget requests, land purchases and alteration of management plans.

The comparison presented in Table 1 is valid only if management activities are rigorously planned; good land management is always based on well-defined goals and expectations, just as good science is. Fortunately, legal attention directed at prescribed burning has focused on careful establishment of management goals and plans. Unfortunately, budget limitations often truncate a management plan before adequate experimental design can be implemented. Lack of funds also often eliminates monitoring (sampling); in the long run, this may negate the value of the initial activity and the money that it cost. From a practical perspective, replication is probably the most frequently neglected component of the design of a management project; it is also the only mechanism by which environmental variability can be accounted for in assessing the results of management activities. Recently, Eberhardt and Thomas (1991) suggested some creative methods for interpreting management results when replication is impossible.

Not all management activities can or should be approached as a rigorous scientific experiment, however some of them must be or there will be no chance for understanding or perpetuating natural communities. Without careful and

continued monitoring, managers will never accurately know the outcome of their efforts. Monitoring also provides a feedback mechanism and permits reassessment and fine-tuning or redirection of management goals. In a high-intensity fire habitat, monitoring takes on special significance. Resource values are high and the number of opportunities to observe results in these infrequently-burned communities is low. Effective monitoring will help decrease the likelihood of management error.

When the basic notions of conservation were first developed, there was little thought given to quantification, monitoring, and evaluation of management activities, let alone justifying those activities to the public. In fact, a land manager's primary duty was to eliminate human intervention and to protect a preserve from all perturbations. At that time we did not understand how dynamic some aspects of nature are nor the importance of ecological events, perceived by humans as disturbances. We now know that a hands-off approach is often not desirable, especially where high-intensity fire habitats are concerned. However, these communities may benefit from "walls," constructed not so much to keep out the influence of civilization but rather to contain the dynamic and sometimes frightening activities of wilderness.

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