

The Fire Learning Network: A Promising Conservation Strategy for Forestry

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ABSTRACT

Conservation Learning Networks (CLN) are an emerging conservation strategy for addressing complex resource management challenges that face the forestry profession. The US Fire Learning Network (FLN) is a successful example of a CLN that operates on a national scale. Developed in 2001 as a partnership between The Nature Conservancy, the US Forest Service, and land-management agencies of the US Department of the Interior, the FLN has solicited the participation of fire professionals from more than 600 partner organizations to collaboratively design and implement ecological fire restoration strategies. Our review of the FLN provides evidence of the network's ability to improve conservation practices, points to its potential to transform and empower fire management practices and institutions on a national scale, and illustrates the utility of CLNs for other natural resource management challenges.

Keywords: learning network, ecosystem management, fire management, community of practice, collaboration

Forestry's history is full of professionally sanctioned actions to suppress, manage, and restore fire. The current budget, if not the mandate, for many federal and state forest agencies continues to be dominated by fire-related initiatives. This emphasis will likely continue because federal policies such as the National Fire Plan and the Healthy Forest Restoration Act support fire-oriented forest management and because fire has direct and visible impacts on public health and safety.

The social, spatial, and temporal com-

plexities of fire management challenges often overwhelm current conservation strategies and institutions, many of which remain mired in outmoded theories, concepts, and standards of practice (Pyne 2004). These challenges are not categorically unique; forestry professionals confront similar complexities when dealing with the challenges posed by insects, disease, urbanization, and climate change. Conservation Learning Networks (CLN) such as the US Fire Learning Network (FLN) have shown promise in addressing similar challenges (Keen and Ma-

hanty 2006), and the approach may merit broader implementation. The purpose of this article is twofold: first, we seek to introduce readers to CLNs as a new strategy that is applicable to a broad array of forest management challenges that require integration across institutions, disciplines, property boundaries, time and space; second, and more significantly, we want to present a case study of a premier CLN—the US FLN. The intent of this case study is to show how FLN functions, to describe how it attends to the complexities of fire management, and to identify ways in which efforts such as the FLN may catalyze the institutional changes that are necessary to address looming natural resource management challenges in the 21st century.

CLNs as Adaptive, Collaborative, Integrative Conservation Strategies

Contemporary conservation challenges require strategies that (1) promote adaptive management (Norton 2005); (2) facilitate networking and collaboration within and across disciplinary, institutional, and prop-

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erty boundaries; and (3) build a community of practice (Wenger 1998). Fire managers, e.g., must literally be able to cross property and jurisdictional boundaries that go unheeded by fire and other ecological processes, as well as to work across disciplinary and professional specializations. They must continually adapt, learn, and respond to the unique characteristics of each biosocial landscape. They must also be able to collaborate and work as a unified group to address policy and regulatory barriers. CLNs address these needs by facilitating the sharing of know-how among practitioners and, thus, can improve forestry's capacity to manage fire and other complex resource challenges.

CLNs are distinct from other learning strategies such as formal curriculum, technology transfer, and experiential education. They promote learning both from and by practicing professionals, fostering the spread of best practices and emerging concepts within and throughout the field (Daniels and Walker 2001). Learning networks draw lessons from experience, instill sound decisionmaking processes, and identify barriers and solutions to effective practice.

CLNs are more participatory and less hierarchical than traditional learning strategies such as academic degree programs and agency training workshops. They create more opportunity for reflection and open and free exchange than is possible in a workplace setting that is necessarily focused on reactive problem solving. Learning networks encourage autonomy, adaptability, and self-coordination so that relationships can emerge reflecting mutual work and shared everyday concerns (Beeby and Booth 2000). Indeed, in a move that reflects the pioneering nature of this model, learning networks and their close cousin, communities of practice, are being embraced by startups and large multinational businesses to improve agility and foster innovation (Dyer and Nobeoka 2000).

Learning networks have three core components: a domain, a community, and a practice (Wenger 1998). A *domain* is the core issue that the network focuses on (i.e., restoration of desired fire regimes). A network is much more likely to be sustainable if organized around a single problem or issue than a broad spectrum of interests. The *community* is composed of participants who operate in the domain and who share common objectives to enhance a particular practice (i.e., fire resource specialists). Strong communities are grounded in mutual trust and

reciprocity that sustains an atmosphere of openness and the ability to admit mistakes and learn from them, as well as the capacity and willingness to contribute skills, access, and resources toward the group's shared ends. Participants must see the network as contributing to this community as well as their own work priorities in a mutually reinforcing way, as members share know-how and experiential knowledge about their successes and failures. Close, direct, and sustained engagement is critical, supporting the relationships that allow each participant to contribute their own experience and learn from others, through "war stories" and other means (Brown and Duguid 2001). Finally, learning networks are about a *practice*—the expertise, skills, methods, and techniques used to solve problems (i.e., identifying ecologically appropriate, institutionally sanctioned, socially acceptable, and fiscally responsible fire management practices).

Learning networks are deliberate and organized and involve an infrastructure composed of planning guidelines, technologies, and forms of media to build and sustain ties among far-flung participants (Keen and Mahanty 2006, Goldstein and Butler 2009a). Most learning networks rely on a host organization and/or funding agency to provide seed money and operating costs and to hold participants accountable for their time and resource commitments (The Heinz Center 2004, Keen and Mahanty 2006). Establishing procedures for internal control in each collaborative group can prevent sponsors from dominating the network and further enable collective ownership, creativity, and self-direction (Brown and Duguid 2001, Goldstein and Butler 2009b). A network leader provides logistical support and connects multiple network sites through communications links and common tasks that bind a network together. However, an effective network leader does not attempt to prescribe interaction among participants. There are no teachers or students in a network. All participants assume both roles at different times, which encourages them to take responsibility and initiative.

Learning networks can support a variety of services and activities, such as field projects, planning activities, exchange visits, field trips, information clearinghouses, publicity, the creation and maintenance of a central contact list, and more. Less tangibly, networks support an increased capacity to solve problems across organizational and procedural boundaries, to connect and share

insights, and to use common analytic strategies. These abilities allow individuals to stay current in their profession, save time otherwise spent hunting for answers, and prioritize information. In addition to helping experienced practitioners pass on professional "know-how" to others, networks can provide a safe and engaging space to question the status quo and develop new perspectives, operational procedures, and action strategies (Argyris and Schon 1996). The network model fosters innovation by building trusting relationships and shared purpose. Individuals are more inclined to assist others and take risks if they know they will be encouraged and supported and that their contributions will be reciprocated (Bryan 2004). Network ideas may not only guide the action of network members, because networks can also produce planning materials or action plans for the broader world. Collaborative initiatives might lead to more fundamental change as network members develop their capacity, nurture new patterns of thinking, acquire collective aspirations, and learn how to learn together.

Methods

The method used in this article adheres to standard case study protocols (Yin 2003), where a specific instance is described in context, and detail and results are used to make inference to broader issues, in this case, forest conservation practice. We chose the FLN as the case because it is regarded as an exemplary CLN that has obtained recognition from government agencies and independent researchers as an effective approach to responding to the institutional crises of wild-fire management (TNC Global Fire Initiative 2003, Pyne 2004).

We conducted over 100 interviews with network leaders and participants and attended and recorded a dozen regional and national workshops. We reviewed several hundred documents including planning guidelines, landscape plans, network newsletters, proposals, cooperative agreements and partner reports, progress reports, internal communications, and briefing documents. Finally, we drew on raw and aggregate data from two participant surveys conducted by FLN staff in 2003 and 2007.

Using NVIVO qualitative data analysis software (QSR International Doncaster, Victoria, Australia), we analyzed transcripts from interviews and text from documents to identify specific instances in the case that related to the purpose, processes,

and outputs of the network in constructing the case story. Next, we grouped specific instances into emergent themes and categories with sets of common attributes. To check and support our analysis, we used the survey data and presented intermediate results to FLN participants and leaders while conducting follow-up interviews to correct, fine tune, and elaborate on our findings.

The US FLN

The 2001 National Fire Plan is characteristic of the evolution of national fire policy away from routine fire suppression and toward ecologically grounded, cross-jurisdictional risk management. It attracted the interest of The Nature Conservancy (TNC), which had been looking for ways to increase collaboration and coordination among agencies and organizations responsible for ecologically oriented land management. TNC staff proposed establishing an inter-organizational fire learning network, building on models of successful TNC-based networks initiated for freshwater systems, wetlands, forest management, grasslands, and invasive species (TNC 2002). By the end of 2001, TNC, the US Forest Service, and the multiple land-management agencies of the US Department of Interior (DOI) signed a cooperative agreement creating the US FLN (TNC 2001). The US Forest Service offered an initial annual commitment of \$300,000 to support fire restoration planning efforts of landscape teams while TNC offered to provide staffing and other in-kind resources to manage and sustain the effort. FLN coordinators hired by TNC assembled an advisory council consisting of representatives from federal land-management agencies as well as state forestry agencies. This council solicited proposals for landscape teams to form around geographically bounded fire-related issues. The 25 selected teams agreed to participate in a 2-year, four-step planning process of setting goals and priorities, developing strategies, taking action, and measuring results (Figure 1) [1]. Participants completed each of these four “homework” exercises before attending biannual workshops where they would exchange information, learn new techniques, and give and receive feedback (TNC Global Fire Initiative 2003).

In 2004, as more fire managers expressed interest in joining FLN teams, FLN coordinators proposed organizing regional networks. The national staff recruited regional leaders who guided landscape teams

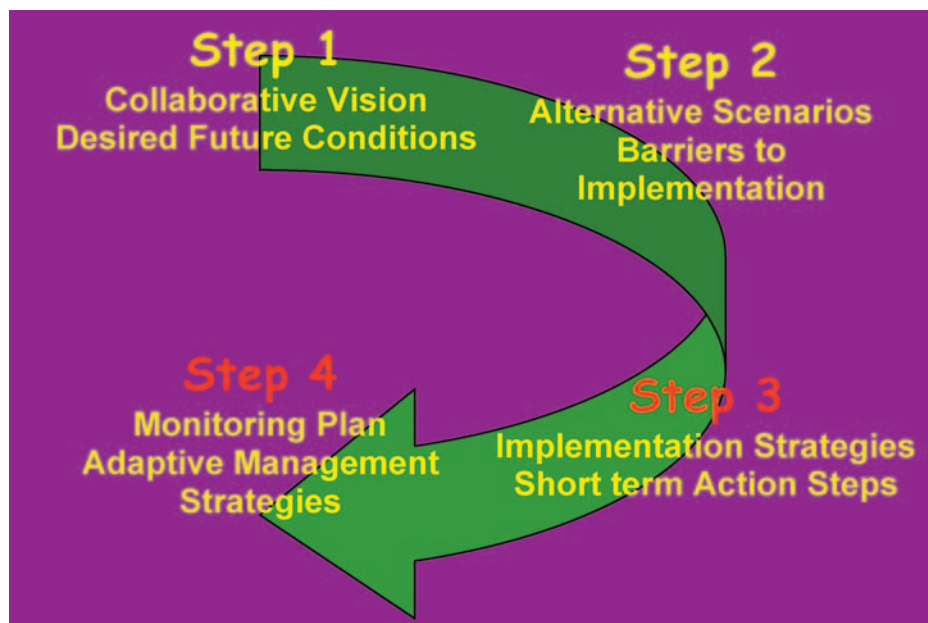


Figure 1. The four-step process used by the FLN landscape teams to plan restoration of fire-dependent ecosystems.

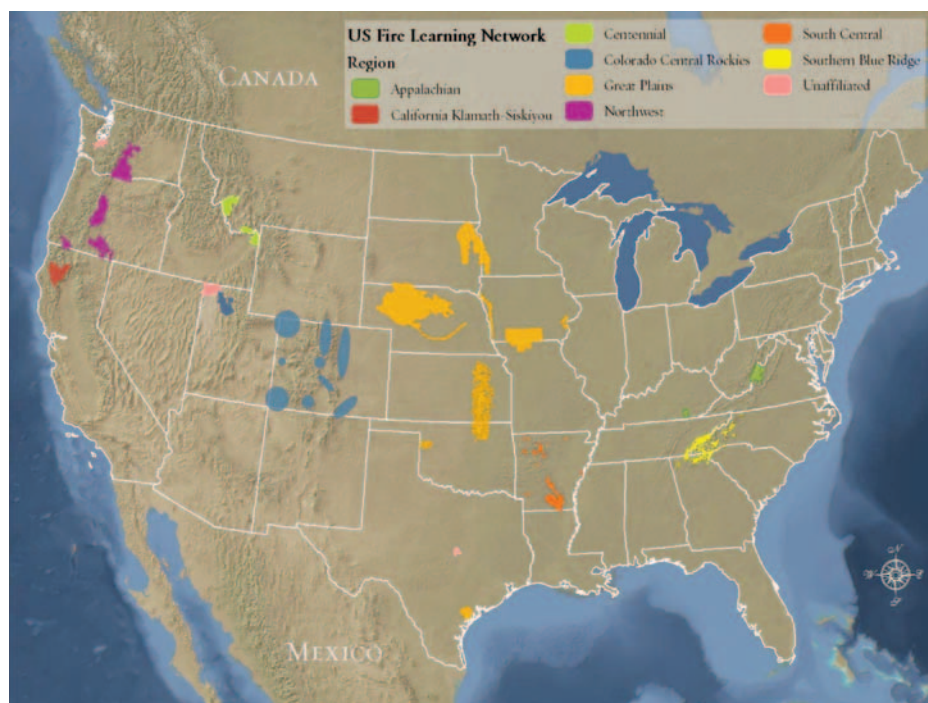


Figure 2. Map of FLN landscapes and regions, 2008.

through common planning exercises and designed and facilitated biannual regional workshops. By the end of 2008, the network had involved over 600 participating organizations in 12 regional networks in nearly 100 landscapes over the course of its existence (Figure 2) [2].

Like other effective learning networks, the FLN operates within a specific domain and involves a particular community that fo-

cuses on enhancing a defined practice. The *domain* of the FLN is captured in the title of the cooperative agreement that initiated the network: Promoting the Restoration of Fire-Adapted Ecosystems.

FLN participants who make up the network community typically are resource management professionals such as wildlife biologists, ecologists, geographic information system (GIS) modeling technicians,

and fire management officers employed by TNC; other conservation nongovernmental organizations, US Forest Service, and DOI agencies; and state wildlife, forestry, and park agencies. Many are experienced in fire restoration techniques and most have land-management responsibilities within a participating landscape. Despite the preponderance of well-trained professionals in the network, members hail from a variety of disciplinary backgrounds and often struggle to work within and across the directives and protocols of diverse agency and organizational missions.

FLN participants sought to enhance their capacity to restore and manage fire-adapted ecosystems, the practice of the network. The FLN homework and workshops led participants to collaborate with partners across multiple jurisdictions and organizations, develop scientifically informed assessments of existing landscape conditions, model and map the role of fire in ecological systems, identify and prioritize strategies to get fire on the land, and develop techniques to monitor progress and feedback into restoration plans, as well as promote the development of a host of other skills and techniques. Each of these techniques was necessary to complete landscape-scale ecological fire restoration plans. This work is undertaken in landscape teams and nurtured in regional networks where participants learn together how to enhance and refine both their capacity to engage in collaboration and to build quality ecological restoration plans.

The complementary role of the four-step planning exercises and FLN workshops provided opportunities for network participants to obtain the knowledge and capabilities they sought. Although the homework requires landscape teams to produce specific elements of fire restoration plans collaboratively, biannual regional workshops foster and facilitate interaction across the network. Participants from each landscape present restoration plan elements, offer reviews of one another's work, share information on policy developments and scientific findings, and collectively create and test new ideas. Each team completes the same phase of the ecological fire restoration planning process before workshops and presents them at the gatherings. The review process after the team presentations consists of open questioning, critique, and brainstorming to resolve challenges and address inconsistencies. Workshops also include open dialogue on particular topics, small group sessions, panel

discussions, invited talks by respected scientists and experts, field excursions, and plenty of time for informal conversations. Network participants share stories about techniques they have tried on their landscapes, point out problems with particular approaches that arise under specific ecological conditions, and suggest alternative techniques based on their field experience. By sharing experiences, challenges, and successes with each other, network participants learn about ways to address complex challenges, overcome organizational and social barriers, and apply novel fire restoration techniques on their own landscapes.

Network Outcomes

Network activities produced tangible outcomes of improved conservation and management practices, including more restoration action on the ground, improved funding, dissemination of lessons and innovation through the network, expanded collaborative capacity, improved planning efforts, and the creation of a self-maintaining network. Ultimately, through these and related outcomes, the FLN has laid the foundation for institutional changes that have the potential to improve fire management practice.

On-the-Ground Action

The traditional measure of success in applying restoration treatments to the landscape is "acres treated" or in the prescribed fire lingo, "acres black." FLN staff currently estimate that landscape teams are treating over 500,000 ac. As reported in the 2007 FLN participant survey, 43% of respondents stated that they had applied fire restoration treatments on the ground as a result of their work in the FLN. In some cases, resource managers already engaged in restoration work were able to leverage their efforts in the FLN to expand restoration action. For example, land managers on the Bayou Ranger District in Arkansas were able to increase the application of prescribed burning from 2,000 ac/year to 20,000 ac/year over the 2 years they participated in the FLN as they developed scientific justification for ecological restoration and built collaborative partnerships to coordinate across disciplines within the agency and garner support from stakeholders beyond the agency (John Andre, US Forest Service, pers. comm., Mar. 12, 2009).

Implementation Money Generated

Another measure of success is the amount of funds generated by FLN teams to engage in implementation of planned fire restoration activities. Since the network's inception, FLN leaders estimate that participating landscapes have generated more than \$14 million in funding for project implementation. In one example, the South Central regional network used FLN planning products to develop a proposal for funding of restoration treatments in multiple districts in the Ozark-Saint Francis National Forest. They received \$2 million to conduct prescribed burning and mechanical thinning on five ranger districts. The landscape-scale view of the FLN provided the framework for a joint proposal to be developed across all the districts simultaneously.

Learning and Innovation

Transferring techniques and technologies among network participants is one of the basic functions of a CLN. The Southeast Regional FLN offers an example in which a specific type of technology has been developed, refined, and distributed across the FLN to other landscapes. Partners from the Eglin Air Force Base in Florida developed an ecological fire restoration prioritization tool to use in GIS software that had the capability to locate and map the areas where restoration strategies should be implemented. They presented the tool at a regional workshop in 2004. The landscape team leader from Onslow Bight in North Carolina described the system at one of her subsequent network meetings and piqued the interest of her partners. With input from consultants from Eglin, Onslow Bight partners representing numerous federal and state agencies and nonprofit conservation organizations began developing the tool for the entire landscape, which covers over 1 million ac. Since that time, the tool has also been introduced to the Southern Blue Ridge regional FLN, where teams are considering adopting a similar technology.

Beyond the distribution of technologies and information, the FLN also helps to promote innovation and creativity. FLN workshops offer both formal and informal opportunities for interaction among fire professionals. Through pooling their collective insights in these various forums, fire professionals generate novel approaches to respond to complex fire management challenges. For example, on a field excursion in the Allegheny Highlands of Virginia, partic-

ipants in the Central Appalachians FLN were led to an overlook of a 5,000-ac forest of rolling hills with rural development nearby. Landscape team members noted a lack of fire breaks and suggested that a prescribed burn might take multiple days or even weeks to implement. Their usual approach was to start and extinguish a prescribed fire within a day or two. After some discussion, one participant suggested mimicking lightning ignitions by dropping igniters from a helicopter at various locations across the landscape and managing the ensuing blaze as if it were a natural ignition. The group brainstormed how that approach might be accomplished, identified policy or organizational barriers that might impede such an approach, and determined which staffing and mechanical resources would be needed to implement the endeavor. Numerous participants noted this exchange as one of the most productive moments of the meeting, as it offered them a new paradigm for thinking about and planning the implementation of fire restoration techniques on the ground.

Expanding Collaborative Capacity

To work across institutional, disciplinary, and property boundaries, fire managers have to engage in the process of developing strong collaborative partnerships. The FLN was designed both to encourage collaboration and to build collaborative capacity. For example, instructions for each step of the team homework projects usually begin with the charge to work “collaboratively,” as in “collaboratively draft a three-year implementation plan” or “collaboratively begin drafting a monitoring plan.” Regional workshops included sessions explicitly aimed at improving collaborative capacity by offering trainings and panel discussions on how to nurture collaborative partnerships and engage in collaborative planning and management effectively.

By building in an expectation for collaboration and providing participants with the tools to improve their capacity to collaborate effectively, the FLN was able to enhance collaborative action among FLN participants. In the 2007 survey, more than 70% of respondents reported that participating in the FLN had resulted in significant improvements in the number and quality of partnerships they had established. Forty-three percent noted that FLN involvement had been instrumental in formalizing collaborative partnerships through Memoran-

dums of Understanding or other formal agreements. As one forest supervisor reflected, “I think that the Fire Learning Network has allowed us to formulate projects in a more integrative way and it has helped each part of the teamwork better together.”

Improved Planning

The FLN four-step planning process (Figure 1) was meant to generate products applicable to other planning and management efforts within the participating organizations, particularly in completing National Environmental Policy Act (NEPA) planning requirements. By participating in the FLN, participants developed planning products to inform other types of plans that would guide implementation in their respective partner organizations.

FLN participants have reported on the extent to which the planning products developed in the network were used to inform other planning or implementation efforts. Nearly 30% of respondents to the 2007 FLN survey noted that NEPA documents were easier to prepare because of FLN products they were able to reference. Forty-five percent of respondents reported that the FLN planning products had informed prescribed burn plans on their landscapes and 37% had used FLN planning products to inform more generalized fire management plans. Forest plan revisions were informed by FLN products for 16% of respondents and around 12% of respondents had used FLN products to develop Community Wildfire Protection Plans or resource management plans for private lands. For example, the project leader of the Bayou Ecosystem Restoration Project noted that, “We served as a model for the forestland management plan when it was revised. Under the new plan, it’s formally recognized that we have restoration areas. A lot of credit goes to the partnerships that we developed through the Fire Learning Network and [that we] came up with a scientifically sound and defensible proposal.”

Self-Maintaining

A network’s ability to maintain and replicate itself sustains network action over time and serves to increase the breadth of its impact over time and space. New ways of doing business are all too common these days and cynical practitioners are understandably cautious of investing too much in the latest and greatest strategy because another wave of institutional innovation is

likely not far behind. Over the last several decades, innovations such as new forestry or ecosystem management systems have ebbed and flowed through agency culture (Predmore et al. 2008). Although the FLN has suffered its share of attrition and fiscal struggles in times of declining staff and budgets, it has generally proven itself worthy of practitioner investment. It has not only found enough continued support among participants to sustain and maintain its activities, but gradually has spread to new locations.

Cooperative agreements with the signatures of and funding from top agency officials and TNC helped to garner high-level legitimacy and to formalize the organizational support necessary for the network to function as a credible forum for improving fire practice. Beyond these formalized agreements, the FLN staff strategically promoted legitimacy both internally and externally. National-level FLN representatives communicated with high-level organizational staff about the network and its accomplishments. Ongoing expansion and enhancement of its organizational reputation was always a clear objective of the FLN staff and leaders, many of whom provided briefings, semiannual reports, stories from the field, and network newsletters as part of the effort to build support for sustaining the FLN.

FLN leaders attended regional meetings and worked to shepherd the creation of new regional networks to provide support and guidance to fledging efforts. Particularly successful and charismatic regional and landscape team leaders were invited to give talks illustrating successful FLN projects and to deliver motivational speeches to newly forming network teams. We have also observed examples of FLN broadening its reach when agency staff members were transferred to new regions, taking FLN ideas with them and initiating networks and teams in new locations. Ultimately, though, the FLN persists because participants at every level found the network’s mission and activities to be worthwhile.

Conclusion

The fire management field, and forestry and conservation more generally, are changing. We are transforming our 20th century institutions in ways to better support and enable practices that solve 21st century problems. A cursory glance at recent opinions published in this Journal evidences repeated calls for change: to forestry education; to our capacity to reach across political

and institutional barriers; to business models for working with reorganized industry and reprioritized agencies; and to skill sets required to address fire, climate, urbanization, globalization, and a myriad of other factors reshaping our forests.

The ultimate outcome of learning is change. Thus, CLNs provide one means to foster some needed changes. CLNs reach across institutional, professional, and disciplinary barriers. They capture and promote synergies that improve practice by creating and rewarding innovation. They work at ecosystem scale and across political property boundaries. They focus on the needs of practitioners and on improving practice.

The FLN provides a case in point. Its success enables more on-the-ground restoration of fire-adapted ecosystems, and, by extension, exposes an ever-widening network of professionals to the ideas, concepts, and standards of best practice behind the fire restoration paradigm. The learning and innovation that are disseminated through the network also allow a wider range of professionals to have access to new ways of doing and thinking. The enhanced collaborative capacity built by these networks compels once-insular institutions of fire management to reach beyond their own organizational and jurisdictional boundaries to operate in partnerships, share resources, avoid redundancy, and capture synergies. Improved planning practices for fire restoration initiatives can also help to inform planning processes in other parts of organizations in which FLN participants are embedded.

Network activities require consistent investment of time and money. The US Forest Service and DOI contribute over \$1 million/year to support the network and TNC annually provides \$400,000 of in-kind support (Lynn Decker, Director of the US Fire Learning Network, pers. comm., May 6, 2009). We conservatively estimate that a typical FLN participant spends 8–12 workdays/year on network activities. In return, through developing better plans, strength-

ening collaborations, and establishing a shared store of demonstrated actions with desired results, the network helps fire managers shift institutional priorities and practices toward more ecologically sound practices in fire management (Pyne 2004). This network potential to catalyze transformative change may also be useful in addressing other mounting challenges to sustainable forestry, such as invasive species, urbanization, and climate change.

Endnotes

- [1] For a more detailed explanation of the FLN four-step planning process see Goldstein and Butler 2009b.
- [2] Some regional networks and landscapes have cycled through 2 or 3 years in the FLN, completed fire restoration plan elements using the planning guidelines or modeling protocols, and have disbanded. For example, the Southwest FLN in Arizona and New Mexico, the Intermountain West in Nevada, Utah and Idaho, and the Southeast FLN spanning the coast from North Carolina to Florida participated from 2004 to 2006 but did not continue. From 2005 to 2009, new networks were established in the Central Appalachians, Southern Blue Ridge, Northern California, and Centennial Valley in Montana and Wyoming. Meanwhile, as of mid-2009, FLN coordinators were in the process of establishing new networks in the fire-prone Southwest and Intermountain West. Numbers in the text represent total participation in the network over the 8 years that the FLN has existed. At the end of 2008, 55 active landscapes participated in 8 regional networks.

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