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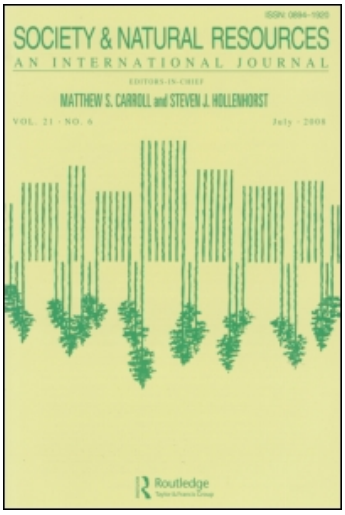

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The U.S. Fire Learning Network: Providing a Narrative Framework for Restoring Ecosystems, Professions, and Institutions

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The U.S. Fire Learning Network: Providing a Narrative Framework for Restoring Ecosystems, Professions, and Institutions

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Through the U.S. Fire Learning Network (FLN), The Nature Conservancy and federal land management agencies are attempting to reorient fire management from fire suppression toward ecological restoration and community protection. In its first 2 years, the FLN linked place-based collaboratives at a national scale. Using structured planning exercises, the FLN mediated between central coordination and collaborative autonomy by guiding partners through construction of place-based and mutually coherent narratives. These narratives situated landscape partners within an arc of conflict, crisis, and resolution, aligning partners with the goals of FLN's sponsoring organizations while enhancing community solidarity and shared purpose. FLN's narrative framework placed fire managers in a heroic role of restorationist, legitimized multiple professional ways of knowing, and built collaborative capacity, thus charting a path from crisis to renewal for ecological and human communities and for fire management itself.

Keywords collaboration, co-production, ecological restoration, ecosystem management, fire management, forest service, learning network, narrative, networks

Introduction: A Frustrated Transition

Wildland fire management in the United States is in the midst of a frustrated transition. Nearly 40 years ago, federal agencies began abandoning a commitment to wildfire suppression that had dominated U.S. fire management policy and practice since the 19th century (Pyne 2004). Wildland fire policy today is informed by an understanding of the dynamics of natural fire regimes and embraces multiple goals

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including ecosystem restoration, fuels reduction, and community protection (Steelman and Burke 2007). Nonetheless, the continued focus on suppression is reinforced through incentive structures, agency budgets, professional practice, and other aspects of institutional culture (Arno and Allison-Bunnell 2002).

The challenges of managing fire regimes require integration of the ecological and social sciences. Goldstein and Hull (2008) suggest that fire regimes should be understood as socially explicit, combining biophysical factors with institutional relationships and the identities and knowledge practices associated with fire management. Each dimension of a socially explicit fire regime mutually sustains the other dimensions, so change requires a simultaneous co-production of ways of knowing, managerial identity, and institutional form (Jasanoff 2004). Adoption of new strategies may falter when fire managers cannot construct socially explicit fire regimes that accommodate stakeholder differences across these three domains (Goldstein 2008).

In order to foster the transition to ecologically based fire management, the nation's primary land management agencies, the USDA Forest Service (USFS) and various agencies of the Department of Interior (DOI), joined with The Nature Conservancy (TNC) to create the U.S. Fire Learning Network (FLN) in 2001. The FLN was designed to change fire management practices by engaging participants in collaborative learning at regional and national scales. Fire managers from across the nation created restoration plans for fire-adapted landscapes by participating in a process designed and facilitated by TNC leaders and enhanced through national workshops and peer review.

While this network had the potential to generate widespread change in fire management, operating within a sponsored interorganizational collaborative context created other tensions. Collaboration is most effective when participants are able to operate in open, flexible, and autonomous settings to jointly construct new understandings, resolve conflicts, and engage in social learning. Tight control of a collaborative process may undermine productivities of collaboration as it creates tensions between organizational requirements and effective collaborative action.

To address these tensions FLN provided a planning framework through which each place-based collaborative developed a narrative that was both situated in their landscape and comparable to other landscape narratives. This framework was designed to create the institutional basis for landscape-scale fire restoration. It required managers to work together across jurisdictions, engendering collaborative relationships. In addition, it validated multiple ways of knowing, reinforcing the centrality of scientific knowledge to restoration practice while allowing for the use of tacit knowledge acquired by working in specific places. The resulting narrative linked fire managers to a new professional identity, motivating and mobilizing them as they retained a heroic role on the landscape while shifting the purpose and means of fire management. Through the narrative framework, the FLN mediated tensions that are inherent in interorganizational sponsored networks while providing the arena through which new co-produced socially explicit fire regimes could emerge.

Methods

Our study of the FLN began in 2005. For this article, which covers the first two years of the FLN (2002–2003), we focused on a fire restoration planning framework that FLN partners applied in their respective landscapes. We closely examined the four so-called "homework" assignments in this framework both from a design perspective

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and by reviewing completed homework from the five landscapes that were selected as demonstration landscapes and were required to complete all of the homework exercises. We accompanied analysis of FLN planning documents with 25 interviews of FLN participants and organizers in which we asked about FLN design and implementation and the experience of working through planning exercises and participating in other network activities. Participants' accounts were also obtained from raw data from a survey and interviews of 26 network participants that TNC staff conducted in 2003 following the third FLN workshop, as well as other post-workshop evaluations conducted by FLN staff.

We entered text files of all documents and interview transcripts into NVIVO qualitative analysis software and analyzed the data using a grounded theory methodology, an inductive investigative process whose goal is to formulate theory using a coding paradigm examining the conditions, context, strategies, and consequences related to the phenomenon of interest (Strauss and Corbin 1990). FLN transcripts were coded in NVIVO, assigning ideas or action descriptions with category names based on thematic similarities. We identified properties and dimensions of these initial categories and developed subsidiary categories connected around a core category, linking these into interactional sequences to bring a sense of process into the analysis. Continuously modifying and reinterpreting initial theoretical constructs about a narrative framework, we fed new data into the analysis to complete the "grounding" of the theory.

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Literature Review

Socially Explicit Fire Regimes

Ecological fire regime classifications are established and proven tools that guide fire policy, management, and science. They summarize and organize complex information about fire behavior and fire history into a measure of timing, intensity, and distribution of fire (Pyne 2004). While ecological fire regimes are not predictive of when fire will strike, large departures from idealized ecological fire regimes imply that an area has poorer ecological integrity and/or higher fire risk.

Pyne (1997, 20) writes that "as a dialectic between humans and nature, fire regimes express the values, institutions and beliefs of their sustaining societies." Goldstein and Hull (2008) expand on this insight by considering how fire regimes are a co-produced outcome of interaction between the natural world and institutional order, ways of knowing, and professional identity (Jasanoff 2004). We use the term "socially explicit" fire regime to suggest that ecological fire regimes always have had an unarticulated social component. The work practices and social relationships of fire managers and others sustain ecological fire regimes as meaningful truths, a process that emphasizes the social dimensions of cognitive commitments while at the same time underscoring the epistemic and material correlates of social life. As this implies, socially explicit fire regimes are contingent on both the ecological and cultural variety. In any one place many co-produced alternatives may coexist, as agencies and activists struggle to understand one another and cooperate within a specific ecological context.

Despite this potential for difference, there has been remarkable uniformity among socially explicit fire regimes in the United States for most of the last century. The organization, practices, and ways of knowing of public land management have

remained consistent since their origins. Drawing inspiration from the European colonial model of governmental control of key resources, architects of America's public land programs placed millions of acres under newly created federal agencies. The USDA Forest Service, created in 1905, applied Progressive Era ideals of scientific management and economic efficiency to conserve lands and resources in their charge. The agency set out to eliminate destructive flames from valuable resource lands, developing scientific understanding of fuel types and fire behavior and organizing armies of firefighters and fire managers whose objective was total victory over fire (Langston 1995). Early trials such as the Great Fires of 1910 that burned millions of acres and killed scores of people in Montana and Idaho solidified the resolve among agency leaders to eradicate fire from the landscape and fire control policies became progressively more stringent (Pyne 2001). After World War II, the agency stepped up its campaign against fire, directing personnel, training, and military-surplus equipment to this paramilitary endeavor (Arno and Allison-Bunnell 2002).

This institutional focus and professional practice came under scrutiny in the 1970s. The emergent field of disturbance ecology associated fire suppression with outbreaks of pests, disease, and catastrophic wildfire. The fire manager, the one-time hero in the war against fire, was cast as the heedless villain in a disastrous alteration of entire landscapes (Carle 2002; Pyne 2004). Fire ecologists proposed to reform fire management through restoration of ecological fire regimes. Institutional arrangements compatible with this reorientation were proposed under the rubric of "ecosystem management" (USDA Forest Service 1992), which aimed to restore ecological functions to public lands through scientific evaluation of management alternatives, collaboration across jurisdictions, and enhanced citizen engagement (Cortner and Moote 1999). Official wildland fire policy came to embrace multiple goals including ecosystem restoration, fuels reduction, and community protection (Arno and Allison-Bunnell 2002).

Despite the development of ecosystem management as an institutional framework and disturbance ecology as a way of understanding landscapes, fire management for ecological fire restoration had trouble gaining traction. Agency focus on fire suppression persisted, in terms of acres, budgets, and professional recognition (Arno and Allison-Bunnell 2002). Fire managers continue to suppress fires whose extent and intensity is increasing where suppression has added to fuel loads (Carle 2002). Pyne (2004, 52) suggests that "the issue is not that we have failed to cross the divide, but that we have so little to show for having breached it decades ago."

The Challenges of Reform

Goldstein (2008) described the difficulty in reforming agency-centered socially explicit fire regimes after the largest fire recorded in California history, San Diego's 2003 Cedar Fire. The USDA Forest Service, California Department of Forestry, and county and city resource agencies responded with a shared narrative that framed causal relationships and created intelligibility, explanation, and coherence around their socially explicit fire regime. With more manpower and funding, fire managers could continue serving as heroic protectors of forest resources and human communities, resisting encroachment of destructive fire through suppression and fuels reduction. Working primarily within government agencies, managers would continue to provide fire safety by applying knowledge practices developed in fields such

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as forestry, fire, and hydrology, while providing the citizenry with advice, incentives, and enforcement. The arc of the narrative was redemptive, beginning with brush-choked back-country and fire crisis and ending with community safety within a regulated landscape.

Simultaneously, a community group, the San Diego Fire Recovery Network (SDFRN), articulated a different storyline, in which local residents were to take responsibility for living with recurring wildfire by not building in high-risk places and by engaging in ecological education and grass-roots organizing (Goldstein 2008). Like all planning narratives, SDFRN's disrupted assumptions and old habits, enlisting its tellers and readers to envision and desire social and ecological change and position themselves in active roles within the tale to bring change about (Sandercock 2003; Throgmorton 2003).

The narratives told by SDFRN and the resource agencies were predicated on different assumptions about appropriate knowledge, organizational response, and professional practice (Goldstein 2007). Their mutual incomprehension led to open conflict after SDFRNers questioned the ecological impact of agency slope stabilization efforts and then publicly challenged the scientific integrity of an agency fire planning document.

For the agencies, SDFRN's interventions challenged agency expertise and prevented fast action on the urgent issues at hand. The agencies had no role to play in SDFRN's narrative—responsibility for reducing fire vulnerability was assigned to community activists, new heroes who would champion smart growth planning and help landowners protect themselves in a landscape that inevitably burns. County administrators directed their employees to stop attending SDFRN meetings, and SDFRN was unable to attract support to promote its agenda. By the second anniversary of the Cedar Fire in October 2005 the group only remained active as an information clearinghouse and assumed this limited role after the 2007 southern California wildfires. SDFRN's short, contested life suggests that agency managers might be more receptive to efforts to redefine socially explicit fire regimes when included in the new regime rather than superseded, and engaged in creating a new shared narrative. Considering how this might be done can begin by examining how collaborative processes can foster these connections.

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Collaborative Processes

Over the past two decades, natural resource managers have come to rely on stakeholder-based collaboration to address the limitations of normal modes of governing and decision making by providing a structured space for stakeholders to build relationships, resolve conflict, and reach consensus (Wondolleck and Yaffee 2000). As collaboration has grown in popularity to become a regular part of environmental governance rather than an uncommon crisis intervention, our appreciation for what collaborative processes can achieve has expanded. From an initial emphasis on how stakeholders uncover core interests, attention has shifted to how collaboration enhances capacity for individual and collective change. This recent work aligns with the three co-produced elements of a socially explicit fire regime:

- *Institutional order*: Collaborative relationships can engender transformation of the social order by bringing to life new discursive frameworks and worldviews (Booher and Innes 2002; Daniels and Walker 2001; Roling and Maarleveld 1999).

- *Ways of knowing*: Collaboration can alter the way that participants understand and view natural systems when exposed to different forms of expertise, such as local knowledge, tacit knowledge, or professional "know-how" (Maarleveld and Dabgbégnon 1999; Parkins and Mitchell 2005; Schusler, Decker, and Pfeffer 2003).
- *Professional identity*: Collaboration can shape identity by connecting people to specific places (Cheng, Kruger, and Daniels 2003) or by aligning people with broader goals, creating new opportunities to engage in natural resource management or developing shared solutions that connect them in new ways (Bryan 2004; Poncelet 2004).

Initially identified as intermediary steps toward consensus or a useful by-product of stakeholder-based collaboration, these features are being recognized as worthy goals in their own right, bringing to life new discursive frameworks and worldviews and shaping institutions over time (Healey 1997). This recognition has proceeded along with a diversification of collaborative processes whose purpose is not problem solving and conflict resolution, but capacity building, learning, and implementation (Innes and Rongerude 2006). These collaboratives may not be representative or stakeholder-based, since their principal objective is not resolving intractable disputes or redressing a democratic legitimacy deficit. Indeed, diverse participation might diminish this form of collaboration by making it difficult to define and sustain a practice model or practitioner identity. These collaborative approaches vary greatly in composition, purpose, and methodology, from citizens forums such as America Speaks (Lukensmeyer and Brigham 2005) to expert-based "communities of practice" (Wenger 1998) that maintain and reproduce a common identity and knowledge practice.

As a collaborative practice model, the FLN is closely akin to a community of practice, although its goal is not only to sustain an identity and practice but also to catalyze institutional change. With this expanded scope comes an essential tension. A basic characteristic of communities of practice is the ability to acquire new properties or modify its own organization (Wenger 1998; Brown and Duguid 1991). The challenge is harnessing the transformative capacity of self-organizing collaboratives within an interorganizational initiative that cannot be entirely self-organizing. Reconfiguring socially explicit fire regimes requires engagement at a sufficient organizational and spatial scale to foster coherence and sustain organizational commitment and resources. Sponsoring organizations must provide guidance and coordination in a way that does not stifle qualities of autonomy, adaptability, and self-coordination that are essential to collaboration (Booher and Innes 2002; Daniels and Walker 2001). Efforts to ensure consistent outcomes may interfere with collaborative emergence of shared problem frameworks, knowledge practices, and identities.

A Narrative Framework

How can a collaborative process remain open, adaptable, and flexible while allowing sponsors to maintain enough control to produce a collective vision for fire regime change? Sponsoring organizations must do more than require specific outcomes—they must somehow facilitate the productivity of collaborative relationships. This requires voluntary mediation between the requirements of participants and sponsoring organizations, through a willing and mutual delegation of power.

In the study of SDFRN and San Diego's natural resource agencies cited earlier, competing narratives were markers of incommensurability of institutional order,

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ways of knowing, and professional identity. Yet narratives can also provide collaborators with insight into each other's perspectives and values, a way to grapple with complexity and uncertainty while expressing individual and collective identity (Forester 1996). Developing collective narratives permits participants to reassemble familiar ideas, methods, and strategies, trying different combinations until a new story emerges that seems workable and mutually acceptable (Innes and Booher 1999).

Narratives structure reality within a timeline, range of space, and level of detail that influences what is made visible and what remains hidden or untold (Mathews 2003; Sandercock 2003). These parameters establish the setting in which a character's fate is determined or perspective altered, drawing on a culture's catalog of generic plot conventions, such as the archetypical tale of a golden age lost often told in environmental planning and resource management. These plots enhance intelligibility by permitting generalization, while creating moral tension that can provide the motivation to embrace new values and act in ways that avert decline and restore what was lost (Sandercock 2003).

Our study of the FLN focuses on the power of a shared narrative framework to productively mediate across differences within a collaborative forum as well as between a collaborative process and sponsoring organizations. We consider how provision of a framework for assembling shared narratives allowed USFS and TNC fire managers to chart a path toward co-producing a collectively desired socially explicit fire regime as they operated under new institutional arrangements, integrated multiple ways of knowing, and articulated a heroic role for fire professionals. The FLN's narrative framework reconciled the need for organizational oversight with the productive contingency and autonomy of collaborative processes. In each location where it was applied, FLN's narrative framework accommodated local conditions and preferences. The framework also provided for enough commonality for organizational sponsors to justify ongoing support for the FLN as it facilitated nationwide coordination and collective action.

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Case Study

Fire Learning Network

Numerous high-profile wildfires in the early 2000s focused national attention on the insular world of fire management. The National Fire Plan (USDA Forest Service and U.S. Department of Interior 2001) prioritized agency projects based on both protection of human communities and restoration of ecological health. Agency leaders were open to new approaches to fire management based on ecological principles while remaining keenly aware of the difficulty of reorienting employees enculturated in the practice of fire suppression.[1]

Just as ecological fire restoration was becoming a priority of the nation's resource management agencies, leaders within The Nature Conservancy (TNC) envisioned creating a global movement of conservation practitioners operating at ecological scales to achieve a goal of preserving 10% of all major habitat types by 2015. As their principal strategists observe, "We will succeed only if many times the number of conservationists that TNC employs possess, and are using, the know-how required to implement effective conservation" (Global Conservation Strategies Team 2006, 1). Recognizing that the great majority of priority landscapes in the United States were managed by public agencies, TNC worked to develop

collaborative relationships to expand the reach of ecological restoration. One approach to support partnerships was the "learning network," a voluntary, interorganizational, collaborative forum to develop shared knowledge, objectives, and professional capabilities (TNC 2002).

TNC strategists recognized a window of opportunity with the National Fire Plan and Congressional appropriations for fire restoration in 2001. The USFS and DOI were receptive when TNC hosted a National Fire Roundtable and promoted establishing a fire learning network to enhance ecological fire restoration. TNC leaders drafted a cooperative agreement (TNC 2001) describing the FLN as a way to help land managers share tools and ideas to foster landscape-scale ecological restoration of fire adapted ecosystems while protecting property, lives, and natural resources. Collaborative learning would enhance knowledge transfer, motivate partners, and build relationships at landscape scales. The agencies cosponsored the agreement, providing more than half of a $900,000 two-year budget while TNC provided leadership, staffing, and logistical support.

The cooperative agreement complemented rather than undermined agency fire management culture, combining TNC's ecological fire restoration objectives and USFS efforts to protect communities through fuels reduction. It described how the network would build on the science of disturbance ecology and institutional innovations in ecosystem management to restore fire-adapted ecosystems at ecologically meaningful scales while managing fuels in order to reduce wildland fire risks. The network would bring together the fire management community to jointly create plans and implement projects to accomplish these complementary objectives.

For the first two years of the network, 25 landscapes across the United States were selected from proposals that were solicited from 50 landscape contacts identified by an Advisory Committee of agency and TNC representatives. In the end, the 25 landscapes chosen to participate in the network brought around 250 partner agencies, tribes, and organizations from all levels of government, nonprofit, public, and private sectors into a collaborative planning process for ecological fire restoration. Participation in the network was largely voluntarily assumed in addition to other work obligations, except for a small number of TNC staff who coordinated the national network. Five sites were designated "demonstration landscapes." These landscapes were chosen by the Advisory Committee for their potential to forward ecological restoration goals through collaborative planning processes based on prior accomplishments and already established relationships. They received more funding and were required to complete all components of a four-step planning process, while other sites were asked to complete one or more of the planning exercises.

The network operated at two scales: a landscape scale delineated by ecological boundaries, and the national scale, where representatives from each landscape gathered to share knowledge, information, and technology. Landscapes involved a diverse array of partners representing organizations or government agencies with management responsibilities within the landscape boundaries. TNC staff took the lead in organizing place-based partnerships to work through the planning exercises. Landscape collaboratives completed this so-called "homework" and developed draft fire restoration planning documents to share, review, and obtain feedback on from peers at biennial national workshops.

Each of the four national workshops brought together around 100 representatives from participating landscapes. Most participants were associated with TNC or federal agency sponsors, were certified to conduct fire suppression, were

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experienced prescribed burners, and were responsible for fire management on lands within FLN landscapes. Fire managers engaged in peer review of landscape-level work, participated in training and workshop sessions on specific fire restoration topics, and shared lessons learned with each other through both formal and informal means of exchange.

Inspired by TNC's internal planning framework, "Conservation by Design," and linked to agency planning processes,[2] the FLN homework guided participating landscapes through a process for setting goals and priorities, developing strategies, taking action, and measuring results. First, participants developed ecological models of current landscape conditions and a collaborative vision statement to clarify restoration goals. The second assignment involved mapping current conditions and desired future conditions to identify the need for change and prioritize treatment locations. The third homework required participants to develop an implementation plan to achieve desired future conditions. Partners constructed monitoring and adaptive management plans in their final assignment.

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Homework as a Narrative Framework

FLN homework facilitated construction of a shared narrative within each landscape by requiring network partners to complete a structured series of tasks. Each task guided network partners in identifying characters and settings within their landscape and key events along a timeline comprising a narrative arc. This framework helped partners develop a locally situated narrative as well as assure comparability and consistency across project sites.

Characters and Setting. The principal characters in the narrative were conservation partners on each landscape project team. They included federal, state, and private land managers, depending on ownership patterns, prior relationships, and available expertise in the region. The ecosystems themselves were characters as well. By identifying conservation targets, threats and viability rankings, partners documented ecosystem processes or species whose status could be improved by fire restoration

These characters were placed in the landscape setting, a physical space also characterized by land ownership and administration, management priorities, natural resource and amenity relationships, and other issues relevant to fire restoration. Participating landscapes operated in diverse circumstances. Land ownership ranged from 83% federal ownership in the Jemez Mountains of New Mexico to 95% private ownership in the Middle Niobrara Sandhills of Nebraska. Human communities played a central role in the Long Island Pine Barrens but were marginal in the sparsely populated Bighorns Range of Wyoming. Resource uses ranged from extensive timber operations and recreation in the Deschutes Basin of Oregon to grazing in the Bighorns and the Niobrara to groundwater recharge zones on Long Island.

The Past: "Natural Fire Regimes." Homework guided partners along a narrative arc. Participants first identified ecological fire regimes that existed before European colonization. Regimes varied considerably ranging from low-intensity fires every 4–10 years on the plains ecosystems of the Niobrara to as much as 200–400 years between stand replacement fires in spruce–fir forests in Wyoming's Bighorns landscape. The pre-European fire regime served as a proxy for the natural

fire regime and became the reference point for measuring restoration of ecological health.

The Present: Fire Regimes "Out of Whack." Then network participants in each landscape characterized current ecological conditions and threats to ecological health. While human communities were included in this analysis, homework guidelines focused attention on ecological concerns by requiring partners to determine threats to ecosystems or species designated as conservation targets and to rank each target's vulnerability to specific anthropogenic threats. This focus on conservation targets privileged a natural order while emphasizing that humans had placed this order in disarray. For example, in the Niobrara landscape, targets included the Sand Prairie ecosystem and the western prairie fringed orchid. Threats to these targets included woody invasion caused by the lack of fire, draining of wetlands, and inappropriate grazing or haying practices, and ecosystem fragmentation due to farming or development practices.

Partners then compared present-day to pre-European conditions to identify those fire regimes that were "out of whack" and focused on necessary changes to restore these systems closer to a natural fire regime. Participants from nearly all of the landscapes concluded that a primary threat to ecological health was fire suppression. For instance, partners in the Jemez Mountains reported in their homework that "fire suppression, overgrazing and fragmentation" had reduced fire frequency, resulting in intense burns that "obliterated forest stands," disrupted fragile soils, and endangered natural communities. In order to protect and restore ecosystems, fire managers had to address the central challenge of a landscape altered by decades of fire suppression.[3]

The Future: Natural Fire Regimes Restored. Remaining homework exercises focused on how to restructure landscapes to recover ecological health while protecting human communities. Partners described preferred future conditions on their landscapes in a "collaborative vision statement." Vision statements focused on restoring ecological health while recognizing human needs, principally through the reduction of hazardous fuels for community safety and through support for logging, recreation, and other resource uses. Network partners quantified and mapped desired future conditions based on vision statements and past conditions. They identified percentages of land cover types that should be represented across a landscape based on natural fire regimes. By comparing desired conditions to current vegetative cover, they developed a prescription for ecological changes necessary to achieve restoration objectives.

Positioning themselves at this low point in a narrative of decline from pre-European ecological health to present-day degradation, fire managers were asked to lay out two scenarios. One sustained the institutional status quo, while the other identified changes in management practices that would "maintain currently healthy fire regime conditions while restoring those 'out of whack.'"[4] The status quo was linked to continued ecological degradation. Reversing this decline required interventions such as prescribed burning, chemical spray, and/or mechanical thinning that legitimized the fire manager as restorative agent.

For the Bighorns landscape, partners described how continuation of wildfire suppression would maintain ecosystems that were "decadent," "susceptible to disease and pests," and in "decline due to grazing pressure and fire suppression." This was coupled with a description of desired future conditions that could be realized through prescribed fire, limited application of herbicides, and coordinated thinning treatments.[5]

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Problem-Solving Dimension. FLN partners then developed an implementation plan for this management change scenario. Partners identified barriers to implementation, which included the absence of coordination and cooperation across jurisdictions and ownerships, funding shortfalls, cultural resistance to fire, and poorly framed fire messages. Then they devised strategies to overcome barriers and achieve desired future conditions. For example, partners in the Jemez Mountains and Deschutes Basin wrote that a consistent mapping system would improve coordination, while the Long Island team proposed to complete an interagency fire management plan. Identification of barriers and strategies reinforced the fire manager's role as principle agent to achieving desired future conditions.

A Continual Role for Managers. Finally, partners generated monitoring and adaptive management plans to link proposed strategies to ecological and social conditions required for restoration. Monitoring plans focused on restoring "fire regimes within the natural range of variation." Adaptive management plans established how fire managers would integrate monitoring into changing strategies, given incomplete knowledge of ecosystem functions and processes. First acting as principal agents of ecological restoration, fire managers were then cast as caretakers to maintain desired future conditions into perpetuity.

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Fire Restoration Narrative

FLN homework guided each landscape team through creating a narrative patterned at first on the "golden age lost" archetype. Narratives began with healthy fire regimes before European colonization. Fire exclusion through the 20th century brought on decline, changing the composition and structure of ecosystems and raising the risk of catastrophic fire. Heroes of the 20th century, battalions of firefighters on the front lines of wildfire, fall from grace when viewed through this ecological lens.

In the narrative, the future is uncertain. If the status quo continues, fire risks increase as ecological conditions deteriorate. Ecosystems have been altered beyond their capacity to recover without help. If fire managers implement restoration plans that restore ecological health and protect human communities, then they can change the narrative archetype to "golden age restored." In the process, fire managers can reclaim the heroic identity denied to them within the ecological account of a century of fire suppression. Institutional barriers to fire restoration are the principal obstacles on this path to improved ecological conditions and fire managers are cast as the key agents of change.

Narrative Realignment of a Socially Explicit Fire Regime

We suggest that FLN homework facilitated creation of landscape-specific fire restoration narratives that were comprehensible and coherent to network participants across sites while fostering creativity by being applicable to social and ecological conditions at each site. This mediated the inherent tension between collaborative and organizational action (Brown and Duguid 1991). In addition, homework fostered the creation of shared socially explicit fire regimes by addressing the three elements of co-production:

- *Institutional order*: The role of fire management agencies and participating partners was preserved but collaborative relationships and work practices were initiated through shared practice.

- *Ways of knowing*: Different ways of knowing within the group were legitimized, creating space for participants' local, tacit, and professional knowledge as well as scientific knowledge.
- *Professional identity*: A collective sense of purpose and orientation for action was reinforced through a narrative framework that guided participants toward overcoming organizational barriers and applying fire treatments in order to heal landscapes and protect residents.

Through these means, FLN homework set the stage for fire management reform by inviting fire management professionals to create a narrative that was commensurable with existing organizational practices, epistemic frameworks, and professional identities.

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Institutional Order: Bootstrapping a Collaborative Future

Before enrolling in the FLN, most landscape partners could already imagine the benefits of fire restoration at regional scales. However, to collectively act across ownerships and management units it is necessary (although not sufficient) to acquire shared management routines and trusting professional relationships. These routines and relationships are in turn acquired through collective action. FLN's homework provided a solution to this recursive paradox, in which effective collaboration occurs under conditions that are produced by effective collaboration. Fire managers were provided the means to engage and an incentive to participate, allowing them to "bootstrap"[6] themselves from an absence of landscape-scale connection to collaborative management (Fung 2003).

FLN homework required participants to work together to define socially explicit fire regimes at ecologically meaningful scales. Homework guidelines prompted participants to collaborate with instructions like "collaboratively draft a three-year implementation plan" (FLN Homework number 3) or "collaboratively begin drafting a monitoring plan" (FLN Homework number 4). Partners responded in various ways to these requirements. Niobrara partners held large group meetings to complete homework assignments, work groups were formed to focus on specific tasks in the Bighorns, and the Long Island FLN repurposed existing resource management committees. In each landscape, collaborative data assembly, analysis, goal definition, and crafting of monitoring and implementation strategies allowed collaborative relationships and work practices to be established through shared practice.

For many FLN partners, this collaborative process facilitated the emergence of a common vision across the landscape among diverse partner groups. In an FLN Survey, one respondent reported that FLN helped "speed up the process" of developing "a better understanding of my partner organizations" (Pohl 2003, C-1). Another participant noted that "FLN really helped improve our team's shared common vision. [Homework]... helped us make progress and helped to get everyone together" (Pohl 2003, 6). Collaboration cultivated trust and understanding among FLN partners and laid the foundation for landscape-scale cooperation.

Fire managers also were integrated into a fire restoration community at the national scale. Peer review of each landscape's planning products allowed managers to understand how their own narrative was grounded in a national narrative of ecological fire restoration while they developed relationships with fire managers across the nation. As one participant pointed out, "The most exciting thing has been the

broader network. A whole new world was opened through other sites. The structure of the network (homeworks, workshops, etc.) was great, but the broader network was key'' (Pohl 2003, C-5).

The challenge for FLN's designers was to create an institutional culture in which fire professionals could share resources and knowledge and engage in cooperative activities to restore fire-adapted ecosystems at ecologically meaningful scales. FLN accomplished this by bringing together partners at a landscape scale and having them complete fire restoration planning exercises collaboratively. This created the institutional preconditions for a ''virtuous cycle'' (Putnam 2000) in which engagement and trust build on one another to support the transition to collaborative regional fire management.

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Ways of Knowing: Epistemic Pluralism

FLN homework encouraged partners to use best available scientific data as well as tacit and practice-based knowledge of fire managers. Instructions for defining desired future conditions suggested that partners supplement scientific data with ''any and all available information . . . including historical information, expert opinion, key species requirements, feasibility, natural disturbance regimes, spatial characteristics, intuition and gut feeling.''[7] While the FLN insisted on a ''minimum acceptable standard for ecologically and scientifically based collaborative fire management planning,''[8] even guidelines for ecological modeling stated that ''scientists and managers working in the field can contribute knowledge and intuition typically not found in journal papers.''[9]

The homework of the Jemez Mountains partnership provides an example of the application of informal, practice-based knowledge. Examining existing management actions, the partners concluded that prescribed fire treatments ''have generally not reduced crown density, but have likely been effective in reducing duration and extent of subsequent crown fires.'' They further suggested that ''the effectiveness of these treatments has not yet been tested against an actual wildfire. But our understanding of fire behavior in the affected systems suggests that treatments have decreased the probability of sustained crown fire.''[10] While scientific evidence for these causal relationships was inconclusive, the partners applied professional opinion and field expertise to suggest that a causal relationship was likely.

FLN's homework legitimized professional know-how and ecological science, rather than requiring or challenging specific ways of knowing. While agency managers rejected SDFRN's claims because they were incommensurable with fire agency ways of knowing, FLN's epistemic pluralism facilitated collaboration among fire managers from different organizations and backgrounds. In addition, at a different scale of engagement this epistemic pluralism also facilitated integration of the FLN within the broader fire policy environment. While collaborative processes like the FLN are particularly useful for informal knowledge transfer, scientifically credible planning products were required by the FLN's organizational sponsors, who operate in regulatory and legal settings. In these arenas, informal knowledge is largely inaccessible and invisible (Barley 1996) and cannot circulate in the absence of trust and common purpose (Jasanoff 1990). By encouraging epistemic pluralism, FLN's homework enhanced its capacity to circulate in both settings.

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Professional Identity: The Making of the Restoration Hero

Wildland fire managers share in firefighters' reputation as heroic defenders against an elemental danger. Over the past 40 years, emergent understanding of the damaging long-term effects of fire suppression on ecological health and community safety has prompted resource agencies to declare an end to the war on fire even while continuing to wage it (Pyne 2004). The FLN provided a way to resolve this inconsistency by offering fire managers the chance to be heroes again, although heroes of a different sort, adapting to dynamic landscape conditions to restore ecological health and protect human communities.

As fire managers prepared homework in each landscape, they did more than identify how the natural and social world functioned. They crafted an ecological fire restoration narrative, a storyline whose moral tension lay in choosing between complicity through inaction versus redeeming fire management by undoing a century of fire suppression. Fire managers were lead characters, removing barriers to restoration and judiciously applying fire to protect communities and heal landscapes.

As they inscribed their landscape within the narrative framework, fire managers expressed their desire for ecological and institutional transformation and their belief that they had the capacity to affect change. Identification with the roles, values, and knowledge of ecological restoration conscripted fire managers in their landscape's particular narrative of decline and redemption while connecting them to a greater whole. Through narration, managers redefined the meaning of professional practice and gained a renewed sense of purpose and orientation for action. As one fire manager put it, the FLN provided a framework for addressing "All the things that I had been wondering about for years that hadn't added up" and helped him make "a shift in focus from issue based land management . . . to ecosystem management."[11]

In contrast to SDFRN's narrative that assigned citizens the role of fire's mediating agent, the FLN narrative was attractive to agency fire managers. It provided the means for fire managers to extend the story of wildland fire suppression that ended with the recognition that fire managers had unwittingly harmed ecosystems and endangered communities they had tried to protect over the past hundred years. The narrative was more than just an ordering device for a complex new management plan. Drawing on age-old plot conventions of a golden age lost and then redeemed, the narrative inspired fire managers to restore ecological health and protect human communities, rather than instructing them simply to implement policies sought by FLN's sponsoring organizations.

Conclusion

Fire historian Stephen Pyne notes that "The creation of a Fire Learning Network, overseen by The Nature Conservancy, demonstrates both the need for such arrangements and the political vacuum left by forestry's institutional collapse" (Pyne 2004, 41). Operating to promote rapid diffusion of ideas and innovations and nurture and reproduce expertise and ways of knowing, the FLN was a sheltered, experimental setting for developing possible futures to respond to an institutional crisis (Goldstein 2008). Unlike a multistakeholder negotiation, the process was not broadly inclusive. By defining land management

as a complex, expert practice, FLN provided few opportunities for local residents and advocates who lacked both land to manage and managerial expertise. While participation in the FLN was narrower than a typical stakeholder-based collaborative, the scope and purpose of the network was broader. FLN sought to catalyze institutional reform within the fire services by transforming the identity of public, nonprofit, and for-profit fire managers in a way that preserved their privileges and responsibilities while reorienting their relationships and practices.

The FLN allowed fire managers to imagine new possibilities for leadership grounded in community protection and ecological restoration. Guiding each landscape through construction of a socially explicit fire regime, the FLN's narrative framework bootstrapped the social conditions necessary for institutional transition by mandating that partners collaborate in describing past, present, and desired future conditions. Drawing on a shared scientific vocabulary and techniques as well as local knowledge of their landscapes, FLN partners developed new collaborative routines, professional solidarity, and a collective willingness to consider new, potentially risky management approaches.

In addition to structuring collaborative capacity building in each landscape, the FLN maintained a productive tension between national coordination and local autonomy by facilitating creation of landscape narratives that were both place-based and mutually coherent. These narratives were situated at temporal, spatial, and organizational scales at which landscape partners had agency and opportunity. Characters were specific to each natural and organizational environment. Yet each narrative drew on the same plot convention of a heroic fire restorationist reversing generations of decline and restoring a lost harmony between humanity and the natural world. This redemption narrative aligned each landscape with the expectations of FLN's sponsoring organizations, while enhancing FLN partners' ability to generalize their experience and recognize shared moral purpose and community among fellow practitioners in other landscapes. Through the use of narrative, possibly the most ancient and universal of collaborative techniques, the FLN guided fire managers through charting a path from degradation to restored integrity, both for their own profession and for the landscapes and people that they serve.

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Notes

1. Jim Hubbard, Director of State and Private Forestry, USFS, personal interview, April 1, 2007.
2. Ayn Shlisky, Co-coordinator of the National FLN, personal interview, September 27, 2006.
3. Jemez Mountains Landscape, FLN Homework number 1, p. 2.
4. FLN Homework number 2, p. 4.
5. Bighorns Landscape, FLN Homework number 2, pp. 4–5.
6. The evocative term "bootstrapping" comes from a German folktale in which Baron von Munchausen pulls himself out of a swamp by tugging on his own bootstraps.
7. FLN Homework number 2, p. 3.
8. FLN Landscape Site Selection and Funding Program, Request for Proposals, p. 2.
9. FLN Homework number 1, Appendix A, p. 3.
10. Jemez Mountains Landscape, FLN Homework number 1, pp. 3–4.
11. Jim McCoy, South Central FLN partner, personal interview, March 14, 2007.

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