

social sciences

All Lands Approaches to Fire Management in the Pacific West: A Typology

Susan Charnley, Erin C. Kelly, and Kendra L. Wendel

Since 2009, the US Department of Agriculture Forest Service has promoted an “all lands approach” to forest restoration, particularly relevant in the context of managing wildfire. To characterize its implementation, we undertook an inventory of what we refer to as fire-focused all lands management (ALM) projects, defined as projects in which fuels reduction treatments are planned or implemented across more than one landownership to reduce wildfire risk or increase forest resilience to wildfire. We focused on regions of Washington, Oregon, and California dominated by dry, fire-prone forests and documented 41 projects. From this sample we developed a typology with five project categories. We found that ALM takes many forms and occurs in diverse contexts, federal lands and land managers are frequently involved in them, and all projects foster relationship and capacity building for future ALM. Our typology provides a framework for better understanding of all lands approaches and suggests areas for further investigation.

Keywords: forest management, collaboration, USDA Forest Service, wildfire mitigation

Since 2009, the US Department of Agriculture Forest Service (USDAFS) has promoted an “all lands approach” to forest restoration, following US Secretary of Agriculture Tom Vilsack’s speech presenting a national vision for America’s forests (Vilsack 2009):

The threats facing our forests don’t recognize property boundaries. So in developing a shared vision around forests, we must also be willing to look across property boundaries. In other words, we must operate at a landscape scale by taking an all lands approach.

Secretary Vilsack emphasized the need for the USDAFS to protect and maintain forests on federal, state, and private lands through collaboration in taking an all lands approach

to forest restoration. Then USDAFS Chief Tom Tidwell spoke of this change in focus in 2010 (Tidwell 2010):

Forest ecosystems typically form mosaics—mosaics of plant and animal communities and mosaics of landownerships...issues [including fire and fuels] neither begin nor end at boundary lines... That’s why we are taking an all-lands approach. Cross-boundary partnerships for landscape-scale conservation are the only approach that makes sense.

The USDAFS 2012 Planning Rule was developed with this new approach in mind. It notes, “Ecosystem services produced by national forests and grasslands affect and are affected by land management activities on adjacent private, State, local, and other Federal Government lands” (USDAFS 2012, p.

21178). The Rule directs responsible officials to consider the context of the broader landscape when conducting forest planning, assessment, and monitoring by taking an all lands approach. The National Association of State Foresters (NASF) also supports this approach and has an All Lands Policy Platform that states, “An all-lands vision for forests must recognize...that public benefits as well as forest threats cross boundaries and are best addressed through integrated partnerships and infrastructure... (NASF 2009, p. 1).

The all lands approach is particularly relevant in the context of managing wildland fire. One of three goals of the National Cohesive Wildland Fire Management Strategy is to restore and maintain landscapes across all jurisdictions to enable wild and managed fires to create fuel and successional patterns that support characteristic fire regimes. Research demonstrates that where appropriate, managed wildfires and proactive fuels reduction, including mechanical treatments and prescribed fire, are more ecologically and economically effective than fire suppression for reducing wildfire hazard (Stephens and Ruth 2005, North et al. 2012, 2015b). The efficacy of fuels reduction treatments depends on using scientifically grounded approaches. In fire-prone coniferous forests having frequent low- to mixed-severity fire regimes (characteristic of

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our study area), such approaches entail strategically planning and implementing treatments whose size and spatial pattern are appropriate to the local ecological context, considering whole watersheds or other ecologically functional landscape units (Finney et al. 2007, North et al. 2012, Stine et al. 2014, Hessburg et al. 2015). Doing this may require crossing landownership boundaries. In this article, we refer to the all lands approach as realized on the ground using the term “all lands management” (ALM).

Forests in California, Oregon, and Washington (where this research was conducted) are distributed across multiple ownership types (Oswalt et al. 2014) and can occur in complex, multiownership patterns, posing a challenge for coordinating fuels treatments. Diverse forest owners have different management goals, values, practices, and institutions; different fuels conditions on their ownerships; different perceptions of fire risk; and different decisionmaking drivers (Bergmann and Bliss 2004, Shinneman et al. 2010) (Figure 1). Private, public, and tribal owners must therefore overcome potentially significant barriers to collaborate and coordinate management actions with one another to achieve ALM.

Nevertheless, we anticipate that all lands projects will become more prevalent in the future owing to current policy direction, scientific research, and investment of resources that support them. However, the all lands approach remains a rather amorphous concept, lacking specificity about what it looks like in practice and guidance documents to help USDAFS and other land managers implement it. We therefore developed a typology of ALM projects (Table 1) to characterize how all lands approaches have been implemented to date, who participates, and what tools are facilitating them. We focused on wildfire mitigation projects in regions of Washington, Oregon, and California dominated by dry, fire-prone forests. We refer to these projects as “fire-focused ALM,” recognizing that other kinds of ALM projects exist. We found a total of 41 such projects as of September 2014 in our study area.

We are also interested in assessing how effective different types of ALM, as represented by different categories of the typology, are likely to be for reducing losses from large, severe wildfires and increasing forest resilience to fire. Typology construction represents the first phase of a longer-term research project in which we are studying a sample of case study projects across categories to investigate how promising different



Figure 1. Forests span public and private boundaries; different owners take different management approaches, resulting in different fuels conditions across ownerships. These differences may pose challenges for ALM. (Photograph courtesy of Susan Charnley.)

forms of ALM are for wildfire mitigation, and to identify the social factors that promote collective action for wildfire mitigation among diverse forest owners in mixed-ownership landscapes.

Relevant Literature

Forestry in Mixed-Ownership Landscapes

Biophysical studies of forestry in mixed-ownership landscapes in the United States rely largely on modeling these landscapes and projecting future forest conditions on different ownerships (Spies et al. 2007, Ravenscroft et al. 2010, Shinemann

Table 1. Fire-focused ALM Project typology, by category.

Category	Name
1	Large scale, part of national program
2	Large scale, not part of national program
3	Small scale, federal lands focused
4	Private lands focused
5	WUI focused

et al. 2010) or on assessing forest conditions on different ownerships using remote sensing and geographic information systems (GIS) (e.g., Stanfield et al. 2002, Zheng et al. 2010). These studies demonstrate the effects of landownership on forest conditions

Management and Policy Implications

Many scientists, land management agencies, and policies in the United States promote an “all lands approach” to forest restoration, but the concept remains somewhat abstract. We provide a typology of “all lands management” (ALM) projects that aim to mitigate wildfire risk or increase forest resilience to wildfire using all lands approaches and examples of projects in the five typology categories. Through the typology, we demonstrate the diversity of ALM projects and project participants and offer a framework that allows for comparisons across projects. By characterizing different all lands approaches, we provide a common language that may help managers and policymakers communicate and share ideas about ALM and improve policy tools to support it. The typology may also help managers interested in fire-focused ALM pursue the approach most appropriate for them and learn from strategies used by other projects. It also offers a starting point for developing hypotheses about how different types of ALM may be more or less effective in achieving desired outcomes, highlighting areas for future research.

across landscapes and over time but neglect the underlying causes of these differences. Studies by social scientists in mixed-ownership forest landscapes have included owners' attitudes toward cross-ownership boundary management and how they might increase cooperation to achieve ecological or economic forest management objectives of mutual benefit, but have focused primarily on family forest owners (e.g., Finley et al. 2006, Schulte et al. 2008, Gass et al. 2009, Rickenbach et al. 2011, Fischer and Charnley 2012, Ferranto et al. 2013, Meadows et al. 2013). Much less common is research examining cross-boundary forest management *between* ownership groups (especially private and public landowners) or coordinated across large scales. There is also a paucity of research on cross-boundary forest management between tribes and public or private forest owners (but see Donoghue et al. 2010 and Middleton 2011) and between private corporate forest owners and others (except Brody et al. 2006). Recent coupled human and natural systems research about forests, landowners, and fire conducted at the landscape scale is beginning to fill some of these gaps (e.g., Spies et al. 2014).

Social scientists have studied a variety of institutions that promote fire-focused ALM in the western United States. These include community-based collaborative groups formed to address wildland fire management across ownerships, such as Collaborative Forest Landscape Restoration Program (CFLRP) groups (Schultz et al. 2012), Prescribed Fire Councils (Quinn-Davidson and Varner 2012), Fire Learning Networks (Goldstein et al. 2010), and Fire Safe Councils (Everett and Fuller 2011). In contrast, we examine a wide spectrum of fire-focused ALM projects being implemented by landowners. Some involve the institutions (alone or in combination) mentioned above; others exhibit alternative approaches to ALM.

Typologies

Typologies provide a framework for describing and comparing complex organizational forms by clustering them into a set of ideal types based on a unique combination of attributes (Doty and Glick 1994, Patton 2015). Researchers have developed them in a number of contexts for a variety of purposes. Typologies related to forest and wildfire management include those that segment forest landowners based on their views of specific conservation policies (Jansujwicz et al. 2013), motivations for owning and managing forestland (Majumdar et al. 2008), interest in cross-ownership boundary

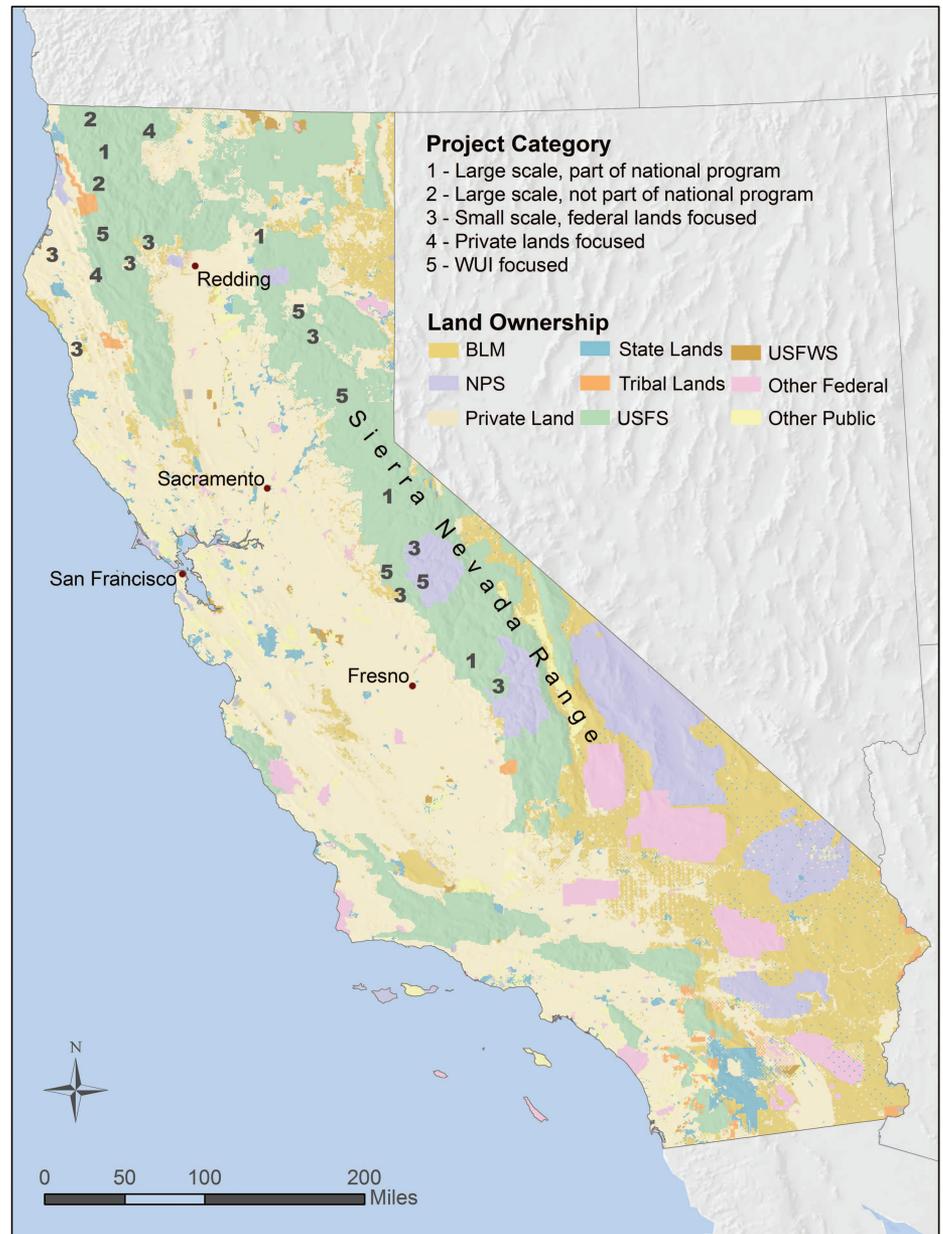


Figure 2. Fire-focused ALM project locations by typology category, northern California and Sierra Nevada, September 2014. (Figure courtesy of Gabriel Rousseau and David Banis.)

cooperation for forest management (Finley et al. 2006), and approach to and motivations for mitigating wildfire risk (Fischer et al. 2013). Others classify different types of collaboration and partnerships between agencies and stakeholders for forest management (Seekamp et al. 2011, Wyatt et al. 2013); or characterize different types of forest communities located in the wildland-urban interface (WUI) based on how they approach and respond to wildfire risk (Paveglio et al. 2014).

The merits of such typologies are many. They promote understanding of complex and highly variable concepts by breaking them down into categories that can be more

easily understood (Wyatt et al. 2013). They help facilitate comparison across multiple case studies by providing a general framework within which to situate individual cases and generalize beyond the individual case (Wyatt et al. 2013, Paveglio et al. 2014). Typologies may present an array of options for approaching a similar resource management endeavor, making it easier to select and pursue the approach that is most appropriate to a particular place (Danielsen et al. 2008, Wyatt et al. 2013). They also make it possible to design better programs, policies, and communication strategies appropriate to different subgroups and local contexts (Emtage et al. 2007, Fischer et al.

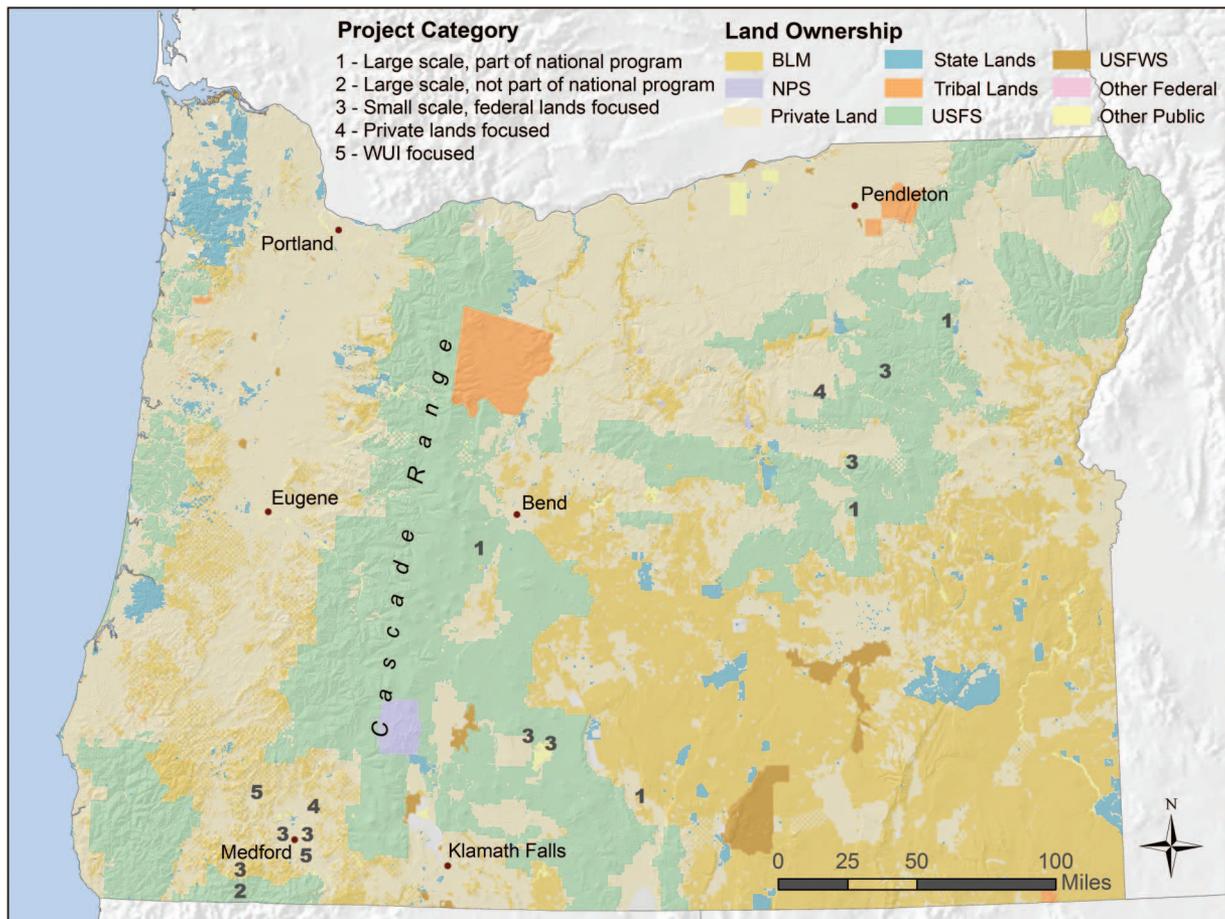


Figure 3. Fire-focused ALM project locations by typology category, eastern and southwestern Oregon, September 2014. (Figure courtesy of Gabriel Rousseau and David Banis.)

2013). From a theoretical standpoint, typologies can be used to predict or explain outcomes; e.g., certain types may be more effective in achieving desired outcomes than others (Doty and Glick 1994, Fiss 2011). As such, typologies provide a framework for future research and highlight areas for further investigation (Wyatt et al. 2013).

Methods

We conducted our inventory of fire-focused ALM projects for fire-prone forests of Washington, Oregon, and California (Oregon and Washington east of the Cascade crest, southern Oregon west of the Cascades, California north of the San Francisco Bay area, and the Sierra Nevada Range). We did not include other parts of southern California. We chose this study area because of our previous research experience there, because the region frequently experiences severe wildland fires, because biophysical scientists have emphasized the need for landscape-level approaches to wildfire mitigation in this region, including ALM (Long et al. 2014, Stine et al. 2014, Hessburg et al. 2015), and because USDAFS Regions 5

(California) and 6 (Oregon and Washington) have placed a high priority on landscape-level approaches to forest restoration.

We defined a fire-focused ALM project as a project in which fuels reduction treatments are planned or implemented across more than one landownership to reduce wildfire risk or increase forest resilience to wildfire. We conducted the project inventory between April and September 2014 using a template we developed for systematic data gathering about each project. The template was designed to record information about the project purpose, time frame, location and geographic scope; treatments and management plans; landowners involved and who initiated the project; accomplishments to date; and institutional and financial support. We filled out a template for each project through a combination of web searches, document review, and e-mail and telephone inquiries with a purposive sample of key informants from federal, state, and local agencies, Native American tribes, timber industry companies, universities, grassroots organizations, Fire Safe Councils, and large nongovernmental organizations

(NGOs). We considered individuals who held specialized and authoritative knowledge about their organization’s fuels reduction projects to be key informants and spoke with at least one per project. We identified initial informants through conversations with university extension agents, The Nature Conservancy’s (TNC) Fire Learning Network Coordinators, and Forest Service Region 5 and 6 staff and by consulting the Oregon Forest Collaboratives Statewide Inventory (Oregon Solutions 2013). We then used snowball sampling to identify additional key informants (Bernard 2011) and ceased sampling when the same projects were repeatedly referenced and no new projects were mentioned. We spoke with a total of 81 people. Rather than asking them to tell us about “ALM” projects or projects using the “all lands approach,” we asked about projects they were aware of or involved in that met our definition of fire-focused ALM.

We used the following criteria to determine which projects to include in the typology: (1) project objectives included fire risk reduction or forest restoration to increase resilience to wildfire; (2) the project area in-

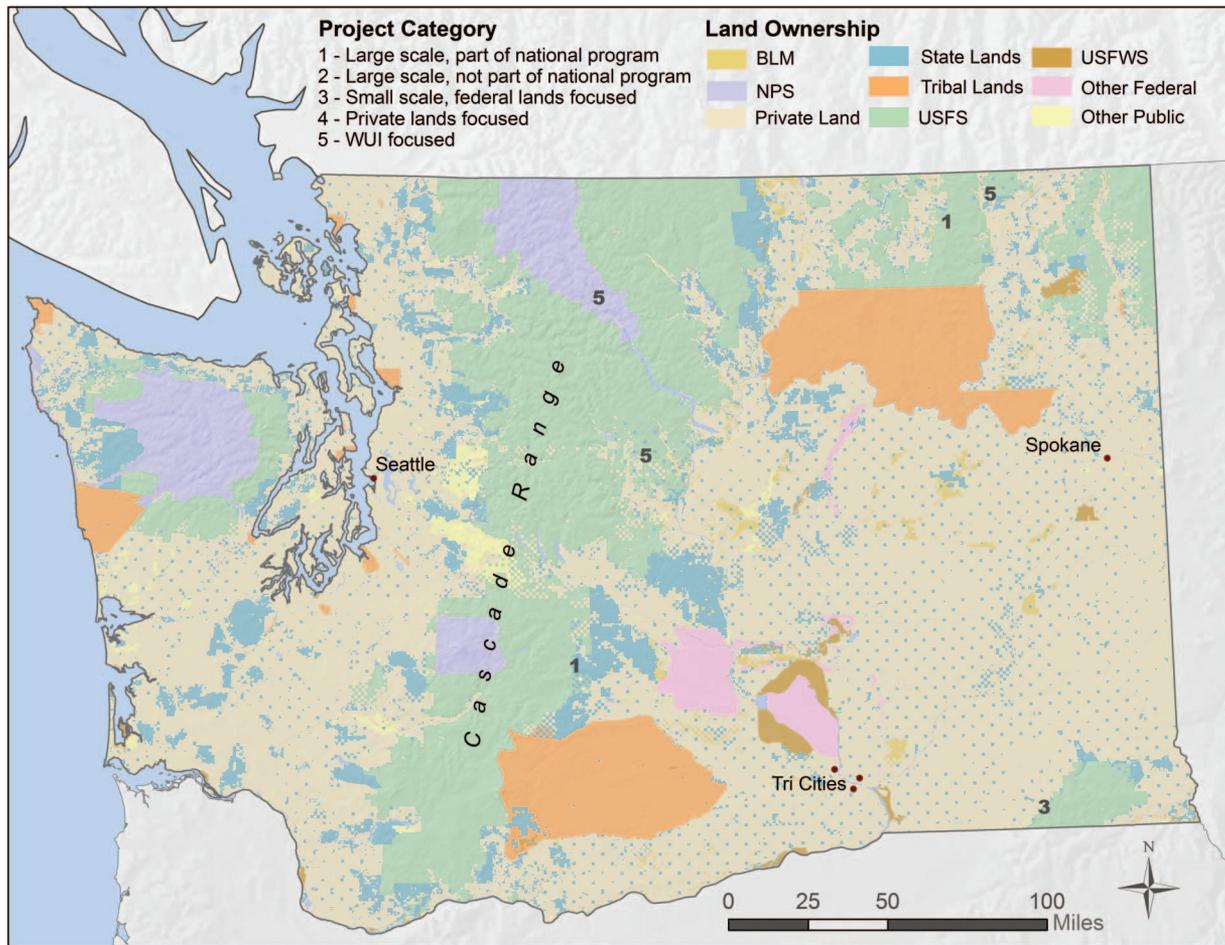


Figure 4. Fire-focused ALM project locations by typology category, eastern Washington, September 2014. (Figure courtesy of Gabriel Rousseau and David Banis.)

cluded more than one landownership (with the intent to implement treatments on more than one ownership); (3) the project was in the conceptualization, planning, implementation, or recently completed stage; and (4) partners representing multiple landowner groups played a role in developing or implementing the project. We included WUI projects except for those that focused solely on “Firewise” activities around structures by homeowners. We did not include cross-ownership boundary wildfires jointly managed to meet resource objectives (“wildland fire use”) (Meyer 2015).

Some projects were small and entailed only one treatment area; others were complex and large scale, involving multiple treatments in different locations and a variety of restoration goals. Because of this variation, we defined a “project” (our unit of analysis) as a geographic area delineated by the participants for planning purposes, regardless of the number of treatments. For example, a CFLRP project, composed of multiple treatments in different locations, was considered one project because treatments occurred un-

der the auspices of the larger CFLRP project. We recognize that follow-up maintenance treatments may occur in the future under different arrangements.

We used an inductive, empirically grounded approach to develop an “analyst constructed” typology by identifying patterns among projects (Kluge 2000, Patton 2015). We identified typology categories during data analysis based on the following salient characteristics: (1) project goal; (2) size of project area (small = <20,000 acres, medium = 20,000–100,000 acres, large = >100,000 acres); (3) sources of institutional and financial support; (4) number of distinct participating landowners or organizations (few = <5, medium = 5–10, many = >10); (5) landowner type (federal, state, other public, tribal, private corporate, family forest, other private, homeowner)¹; and (6) number of treatment areas (single or multiple). The typology categories are not mutually exclusive with regard to these characteristics; each category has a unique combination of characteristics that define it. The typology contains five categories (Table 1).

To ensure intercoder reliability, the authors independently sorted projects into categories, compared results, and then discussed and mutually agreed on how to categorize the few projects where discrepancies existed. We followed up with key informants ($n = 7$) to seek guidance on classifying projects for which we could not mutually agree on a category. Key contacts reviewed descriptions of the example projects described here for accuracy.

ArcGIS was used to produce three maps (one of each state) that illustrate the geographic dispersion of projects within our study area. We created a point for each project using existing project maps and location descriptions as guides; the map points are approximate.

Our ALM typology has some limitations, not unique to this effort. First, some projects did not fit neatly into one category. A small number were hybrids, in which case we placed them in the category that was the best fit; within-category variation is common in typologies (Doty and Glick 1994). Second, although we attempted comprehen-

sive coverage, the inventory on which the typology is based is incomplete. We had low response rates from some landowner groups who were more difficult to contact (e.g., tribes and family forest owners) and may have missed some projects that included their lands unless mentioned by other interviewees. Projects centered on private lands (Category 4 of the typology) are the focus of a related research project for which a separate inventory is underway. It is also possible that key informants failed to mention some projects they knew about. Nevertheless, our inventory contains a sufficient number of projects to support development of the typology, which provides an initial assessment of the variety and type of fire-focused ALM projects in the study area at one point in time. Although typologies are necessarily limited by the sample from which they were derived (Doty and Glick 1994), we believe that we characterized the five main categories of fire-focused ALM projects in the study region.

We did identify one potential additional category, however (roadside fuels reduction projects), in which many landowners, public or private, coordinate treatments along existing road corridors. Treating along roadsides achieves several objectives: it creates a fuelbreak should a fire occur, provides safe evacuation routes, improves firefighter response, and reduces roadside ignitions.

These projects may be a first step toward larger-scale cross-boundary treatments among neighboring landowners that extend beyond roadsides. We did not include roadside fuels projects in our typology because, of the two we learned about, one only used county right-of-way to conduct work (meaning that landowners did not need to coordinate treatments), and the other was not yet developed sufficiently to gauge whether it met our criteria. Nevertheless, this approach to wildfire mitigation may emerge as a distinct type of ALM.

Results

As of September 2014, we identified 6 fire-focused ALM projects in eastern Washington, 15 in eastern and southwestern Oregon, and 20 in northern California and the Sierra Nevada (2 projects spanned the Oregon and California borders, counting as one-half project for each state) (Figures 2–4). The five typology categories developed from this sample are as follows: (1) large scale, part of a national, federally funded program; (2) large scale, not part of a national, federally funded program; (3) small scale, federal lands focused; (4) private lands focused; and (5) WUI focused. Table 2 shows the number of projects from each state in each category. Table 3 summarizes the key characteristics of each category (in-

cluding definitions), described in more detail below.

Category 1: Large Scale, Part of National, Federally Funded Program

Category 1 projects participate in one of two national, federally funded programs authorized to support wildfire risk reduction and forest restoration at the landscape scale: the CFLRP and the USDAFS-Natural Resources Conservation Service (NRCS) Chiefs' Joint Landscape Restoration Partnership (Joint Chiefs). The CFLRP, established under Title IV of the Omnibus Public Land Management Act of 2009 on Forest Landscape Restoration, supports collaborative, science-based cross-boundary projects in priority landscapes that include USDAFS lands (Schultz et al. 2012). Although program funding can only be used for treatments on USDAFS lands, projects include other land ownerships to help leverage resources from other sources (e.g., state or NGO) for treatments there. The Joint Chiefs Program, established in federal fiscal year 2014, is a partnership between two agencies, one with public lands (USDAFS) and one that helps private landowners (NRCS). The program goal is to promote an all lands approach to improving the health and resilience of forest ecosystems across public and private ownerships. Category 1 projects receive substantial annual funding through their respective federal programs (>\$1 million for Joint Chiefs projects, >\$500,000 for CFLRP projects in our sample).

The 10 Category 1 projects in our study area have funding horizons from 3 (Joint Chiefs) to 10 (CFLRP) years in duration. Several projects had longer histories, emerging from preexisting collaborations that included current partners. Project planning areas are typically large (>100,000 acres),

Table 2. Number of projects in inventory by typology category and state.

State	1: Large scale, part of national program	2: Large scale, not part of national program	3: Small scale, federal lands focused	4: Private lands focused	5: WUI focused	Total by state
California	4	1.5	8	1.5	5	20
Oregon	4	0.5	7	1.5	2	15
Washington	2	0	1	0	3	6
Total	10	2	16	3	10	41

Table 3. Typology category descriptions based on key criteria.

Category	Project goal	Size ¹	Main funding source	No. of participants ²	Landowner types ³	No. of treatment areas
1: Large scale, part of national program	Forest restoration, wildfire mitigation	Large	CFLRP, Joint Chiefs Program	Many	Diverse	Multiple
2: Large scale, not part of national program	Forest restoration, wildfire mitigation	Medium, large	Diverse	Many	Diverse	Multiple
3: Small scale, federal lands focused	Forest restoration, wildfire mitigation	Small	Federal agency, grants	Few	Federal-federal or federal-other	Single or multiple
4: Private lands focused	Wildfire mitigation	Small to large	Grants, cost-share programs	Few to many	Private corporate, family forest	Single or multiple
5: WUI focused	Wildfire mitigation to protect homeowners	Small to large	Diverse	Many	Diverse	Single or multiple

¹ Small = <20,000 acres; medium = 20,000–100,000 acres; large = >100,000 acres.

² Few = <5; medium = 5–10; many = >10.

³ Federal, State, Other Public, Tribal, Private Corporate, Family Forest, Other Private, Homeowner.

although individual treatments are much smaller. Because the CFLRP only provides funding for implementing treatments on USDAFS lands, projects generally have many stakeholders (>10) interested in federal land management, but few landowners (<5) participating in multiownership fuels treatments. Partnering landowners are usually federal, state, tribal, private corporate, or other private owners such as land trusts. In contrast, Joint Chiefs projects include many family forest owners as a result of coordination through NRCS.

Example of Category 1. The East Face of the Elkhorn Mountains (“East Face”) project is a Joint Chiefs project located in eastern Oregon that aims to improve the health and resilience of forest ecosystems and reduce the risk of unwanted wildfire impacts in the project area, which totals roughly 85,000 acres. Landowners in the project area include the USDAFS, Bureau of Land Management (BLM), Oregon Department of Fish and Wildlife, private corporate (nonparticipating), and about 135 family forest owners (not all participating). The USDAFS, NRCS, and Oregon Department of Forestry are implementing partners. Fuels reduction activities and timing vary by ownership owing to different requirements but include timber sales, mechanical thinning, and prescribed burning, with an emphasis on placing treatments along the boundaries of private and federal lands and near the WUI.

Category 2: Large Scale, Not Part of National, Federally Funded Program

Projects in Category 2 are similar to those in Category 1, but they are not part of a special national program with a central pool of federal funding to support them. They have numerous and diverse partners and participating landowners, entail multiple treatments over time, and have landowner cooperation and forest restoration across land ownerships at the landscape scale as their focus, with variable emphasis on treating the WUI. Category 2 projects have large project areas (>100,000 acres). Funding for project planning and implementation comes from a diverse set of federal and state agencies, NGOs, tribes, municipalities, and other sources. Managers sometimes use creative funding and implementation mechanisms to support work on multiple ownerships, such as Wyden Amendment authority, which allows USDAFS funds to be spent on private lands to benefit natural resources and reduce natural disaster risk within shared watersheds. Category 2 projects may

be precursors to Category 1 projects, as they have characteristics that may make them attractive for future national funding opportunities. Note, only two projects in our sample were in Category 2, meaning our ability to make broader inferences from this characterization is limited.

Example of Category 2. The Mid Klamath Watershed Council (MKWC) fire and fuels program was established in 2001 with the mission to protect communities from wildfire and reintroduce fire in the Salmon River Watershed and a section of the Klamath River in northern California (1.2 million acres). The organization has since cultivated relationships with local landowners to conduct a number of fuels reduction treatments (including prescribed fire use) on private and tribal lands. They have also incorporated GIS layers from multiple sources to identify high-risk areas for fire; helped coordinate fuels reduction treatments among state, federal, and tribal entities; and supported training workshops in the area. Most recently, the group spearheaded the formation of the Western Klamath Restoration Partnership, which developed from a desire for stronger collaboration among the MKWC, the USDAFS, Fire Safe Councils, environmental groups, the Karuk Tribe, and other stakeholders in the area. In 2014, the group proposed a Plan for Restoring Fire Adapted Landscapes, which outlines restoration goals and identifies integrated fire management plans that include manual, mechanical, and prescribed fire treatments on public, tribal, and private lands. A portion of the project area was designated a Joint Chiefs Project in Fiscal Year 2014.

Category 3: Small Scale, Federal Lands Focused

Category 3 projects are typically small scale (<20,000 acres), involve a small number of landowner types (two or three) and landowners, and focus on treating federal lands with limited but coordinated multiownership treatments. Projects in our sample include multiple federal ownerships (e.g., USDAFS and BLM), and state, private, municipal, or tribal landowner partners, with the majority of treatment acres on federal lands. They range from 2 years to >10 years in duration, entail either single or multiple treatments, and are initiated by either a local federal unit (i.e., national forest or BLM district) or a neighboring landowner concerned about fire risk from federal lands. Funding for treatments usually comes from the federal landowners involved, or if

private lands are concerned, from a granting agency or organization. Projects often include both wildfire risk reduction and ecological restoration objectives.

Examples of Category 3. The Yosemite National Park-Stanislaus National Forest prescribed burn project, carried out from 2011 to 2012, illustrates a collaboration on federal lands. The USDAFS and Park Service fire staff worked together to implement coordinated, first-entry prescribed burns totaling about 600 acres to reduce the risk of wildfire along their shared border. Both agencies contributed funding and resources for this treatment through relatively informal arrangements initiated by cooperating managers. A second illustrative project was the Brattain Ridge Restoration Project, a collaboration between the USDAFS and TNC that lasted from 1999 to 2011 and had multiple restoration objectives. Managers from both organizations planned a series of fuels reduction treatments spanning the boundary between the Fremont-Winema National Forest and TNC’s Sycan Marsh Preserve in southcentral Oregon. Managers established a Memorandum of Understanding and jointly planned the treatments in a project area having 6,000 acres of USDAFS and 1,000 acres of TNC land. Each organization paid for treatments on its own land and employed a single burn boss to manage the prescribed burn across ownerships.

Category 4: Private Lands Focused

Our characterization of Category 4 projects is based on the three projects in our inventory and a review by a research collaborator undertaking a separate inventory of these projects in our study area (Paige Fischer, pers. comm., Sept. 15, 2015). Category 4 projects aim to reduce fire risk across private forestlands and occur at small to large scales. Public landowners may be participants in these projects, but they focus on private lands, usually family forestlands. The family forest projects tend to have many participating landowners (>10); private corporate landowner projects would have only a few participants (<5) with large land holdings. These projects can entail single treatments or multiple treatments over several years. Some are initiated by landowners themselves, others are initiated by a local NGO or collaborative group. Projects are coordinated locally and usually involve a natural resource professional (e.g., a state extension agent or an individual from a local NGO) who helps initiate the project, secure funding, or provide coordination, technical

assistance, or outreach. The degree of direct interaction among landowners is highly variable. Category 4 projects often tap funding through federal, state, or local grants or cost-share programs available to private forest owners.

Example of Category 4. One such project is the Ritter Collaborative, located in remote Grant County, northeastern Oregon. This project started in 2012 with discussions among family forest owners seeking more economical ways to conduct forestry projects on their properties. The discussions ultimately led to formation of the Collaborative, coordinated by an Oregon State University Extension Agent who was hired using grant funds. Group members are developing a strategic action plan that incorporates landowner management objectives with existing ecological data to address restoration needs, including fuels reduction. The Collaborative will eventually seek funding to implement treatments across the project area.

Category 5: WUI Focused

The distinguishing feature of Category 5 projects is their focus on reducing hazardous fuels at the interface of public and private lands to protect homeowners living in the WUI from wildfire. These projects differ from traditional WUI fuels reduction projects (implemented on federal lands around homes and communities) in that they entail treatments by neighboring public and private landowners. They may also include a Firewise component to protect structures on private lands. Although projects in other typology categories may also prioritize WUI treatments, this category is distinct in that broader ecological restoration objectives are absent or secondary, and treatments do not occur in the wildlands. WUI projects having only a Firewise component for structure protection (not included in our typology) may eventually develop into a WUI-focused ALM project. Category 5 projects typically have many participants (>10, both public and private), range from small to large, and generally involve single treatments, although large projects can include multiple treatments. Funding often comes from local sources, such as local units of federal land management agencies, state agencies, or municipalities or from grants through local organizations such as California's Fire Safe Councils.

Example of Category 5. The Pierre Lake Fuels Reduction Project is a collaborative effort between the USDAFS, BLM, and Washington's Department of Natural Re-

sources (DNR) that began in 2009 to reduce hazardous fuels in the Pierre Lake WUI in northeastern Washington. Managers from these agencies collaborated to identify high-risk WUI areas within an 11,520-acre project area and planned roughly 8,700 acres of pruning, commercial and noncommercial thinning, and pile burning treatments, most of them on the Colville National Forest. The DNR conducted treatments on its land and used mailings to recruit private landowners, facilitating their participation in the project including treatment implementation. National Fire Plan grants paid for treatments on state and private lands. Most private land work was contracted to a private firm; the USDAFS and BLM funded and implemented treatments on their jurisdictions. The BLM also completed some treatments on adjacent State Trust lands. Treatments have been temporally staggered across ownerships owing to different legal requirements associated with implementation.

Discussion

Our inventory and typology suggest that fire-focused ALM takes many forms—from small projects in which two neighboring landowners coordinate a single fuels treatment across ownership boundaries to large-scale projects lasting 10 years or more and involving many landowners and diverse landowner types. Moreover, projects can evolve and change categories and become more strategic and bigger to include additional landowners over time. For example, one project that was in Category 3 at the time of our inventory has since received Joint Chiefs funding, moving it to Category 1.

We found some geographic clustering of projects (Figures 2–4), with overlap in participants on multiple projects in the same region. This clustering may reflect high-capacity regions having well-established forest collaborative groups that have been working across ownerships for years; local business capacity for forest restoration; the presence of community-based organizations that have engaged in forest management previously; and/or the presence of federal land managers who have worked with neighbors to develop cross-boundary projects for some time. We did not observe geographic clusters of project types, however. This finding is not surprising for Category 1 projects; national, federally funded programs may wish to spread resources geographically. It was surprising for other categories, where we expected clusters of project types through local diffusion of existing ALM models via social

networks or observation and learning by neighbors.

Most projects included USDAFS lands, not surprising given that the USDAFS has been an instigator of all lands approaches to forest management and is a main funding source for these projects. Many projects included federal land managers as leaders, coordinators, funders, or partners. Categories 1 (large scale, part of national program), 3 (small, federal lands focused), and 5 (WUI focused) had the most projects, reflecting the important role of federal agencies in facilitating and supporting ALM and the high priority placed on WUI treatments. The majority of projects in our sample also included family forestlands. Very few projects included tribal lands, city or county lands, or private corporate lands. These findings suggest a need to better integrate these landowners into fire-focused ALM projects in our study area.

Some projects may adopt an all lands approach but not conform to the vision of ALM promulgated by scientists. From a fire science perspective, wildfire mitigation treatments in our study area will be more effective when project planning and implementation are based on biophysical risk assessments so that treatments are strategically located to target conditions most conducive to fire movement across the landscape (including across ownerships) (Finney et al. 2007, Ager et al. 2015, North et al. 2015a). Where treatments cannot be spatially optimized, as in cases where large land areas are reserved from treatments (e.g., Wilderness), much larger areas need to be treated to increase the likelihood of effective large wildfire mitigation (Finney et al. 2007). Large ALM projects (Categories 1 and 2 and some Category 4 and 5) may have the greatest potential to meet the objective of treating more acres and implementing large treatments because they typically have more resources and involve many partners that pursue treatments on their respective ownerships. However, small projects (Category 3, some Category 4 and 5) may be more likely to implement coordinated, strategically designed treatments that cross ownership boundaries by virtue of having fewer partners and smaller project areas, making it easier to cooperate in planning and implementing integrated, well-placed treatments. ALM projects with homogeneous partners (e.g., all family forest owners and all federal agencies) may also be more likely to implement strategically designed treatments by virtue of sharing a similar operating environment for conducting treatments relative to landown-

ers in other categories. Thus, different project types are likely to have different strengths with regard to meeting the scientific criteria for effective fire-focused ALM. We plan to test these hypotheses in subsequent research. Importantly, all project types foster relationship building between participating forest owners, a necessary foundation for more extensive and effective ALM work.

The all lands approach to forest restoration to reduce wildfire risk is not new. Many projects in our inventory were initiated before Secretary Vilsack's 2009 speech. Although Category 1 projects have been formally recognized as all lands projects and receive national resources to support them, others have not been, yet are implementing all lands approaches. Having a well-established group may help formal ALM projects become more common. For example, Category 1 projects often emerged from pre-existing collaborations. Funding mechanisms that support long-term collaboration among landowners should help them build their capacity for ALM. As forest managers initiate ALM projects, they can learn from and build on past and ongoing projects.

Our typology pertains to fire-focused ALM projects in the Pacific West and may not apply to other kinds of ALM projects (e.g., invasive species management, watershed restoration, and wildlife habitat protection) or to ALM projects in the eastern United States, where forestlands are predominantly private. State foresters may be approaching ALM differently. Research about how all lands approaches are being implemented in other parts of the United States, in other forest management contexts, and with what success would help fill existing knowledge gaps and provide a comparative perspective.

Conclusions

The USDAFS is promoting an all lands approach to forest restoration, planning, and management, but as yet there is a gap in the published literature about what this approach as implemented on the ground ("all lands management") looks like, how common it is, who participates, and how effective it has been at achieving coordinated, landscape-scale forest management across land ownerships. The existing literature referencing the all lands approach commonly focuses on family forest owners or presents specific case examples or types (e.g., Schultz et al. 2012, Bobzien and Van Alstyne 2014, Kelly and Kusel 2015). We developed a typology to characterize different approaches to wildfire mitigation through fuels reduc-

tion across more than one landownership in the Pacific West that offers a broader framework for describing and better understanding ALM within which individual cases or types can be situated. Our typology also demonstrates the variety of landowners that participate in these projects and the array of options that landowners and collaborative groups have adopted to reduce wildfire risk and restore forests in fire-prone, multiownership forest landscapes at different scales. It indicates that all lands approaches are diverse and respond to a wide range of local settings in which landowners pursue multiple funding strategies. Our finding that projects can evolve and change typology categories over time suggests that existing projects and partnerships may provide a foundation on which to build future capacity to implement scientifically informed, landscape-scale fuels reduction across land ownerships.

In developing this typology we hope to increase awareness of all lands approaches to forest management by identifying types that make the concept less abstract. The typology will help facilitate comparisons across multiple individual case studies by providing a general framework within which to situate them and potentially develop generalizations about how and why different approaches are more or less successful at achieving their objectives. The typology also catalogs an array of options for approaching wildfire mitigation in multiownership landscapes, which may help landowners interested in fire-focused ALM select and pursue the approach that is most appropriate to them. It facilitates communication and sharing of ideas about all lands approaches among planners, landowners, and managers interested in landscape-scale approaches to forest restoration and wildfire mitigation by making these approaches more concrete. Finally, our typology offers a framework for developing hypotheses about how different types of ALM may be more or less effective in achieving desired outcomes, some of which we have proposed here, highlighting areas for future research that could help improve the success of these endeavors.

Endnote

1. We follow Butler et al. (2015) in defining "family forest" as owned by individuals, families, trusts, estates, and family partnerships; "corporate forest" as incorporated ownerships, e.g., by timber industry, timber investment management organizations, and real estate investment trusts; and "other private" as owned by nongovernmental organizations and other private groups (e.g., clubs and associations).

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