

BURNING QUESTIONS FOR MANAGERS: FUELS MANAGEMENT PRACTICES IN RIPARIAN AREAS



Kristen E. Meyer, Kathleen A. Dwire, Patricia A. Champ, Sandra E. Ryan, Gregg M. Riegel, and Timothy A. Burton

Vegetation treatment projects for fuel reduction in riparian areas can pose distinct challenges to resource managers. Riparian areas are protected by administrative regulations, many of which are largely custodial and restrict active management. Like uplands, however, riparian areas have been affected by fire suppression, land use, and multiple types of disturbance. Also, many streamside areas are part of the expanding wildland-urban interface (WUI) or wildland-urban intermix that may be at high risk of wildfire.

In some cases, manipulative treatments of fuels may be needed to maintain riparian biodiversity, restore or protect valued riparian functions, and reduce wildfire risk. A growing number of Federal, State, and local land managers are exploring options for managing fuels in streamside areas. Because vegetation treatments to reduce fuels in riparian areas are fairly new

Kristen Meyer is a wildlife biologist for the Pike National Forest, South Park Ranger District, in Fairplay, CO. Kathleen Dwire is a research riparian ecologist, Patricia Champ is a research economist, and Sandra Ryan is a research geomorphologist for the Forest Service's Rocky Mountain Research Station, in Ft. Collins, CO. Gregg Riegel is an area ecologist and program manager in the Central and South Central Oregon Interagency Ecology Program in Bend, OR. Timothy Burton is a retired Bureau of Land Management fisheries biologist now working for Riparian Management Services, LLC, in Boise, ID.

and untested, limited information is available on where, why, and what practices land managers are implementing (Stone and others 2010), and what management strategies are most effective in different riparian types.

A Survey of Riparian Fuels Treatment Projects

In spring 2010, we conducted an online survey to gather information about completed and proposed

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fuel treatments in riparian areas and wetlands on federally managed lands of the Interior West. This online survey builds on the findings of a 2007 phone survey of Forest Service fire management officers (FMOs) in 11 Western States.

Results of the phone survey showed that 43 percent of FMOs were conducting fuels treatments in riparian

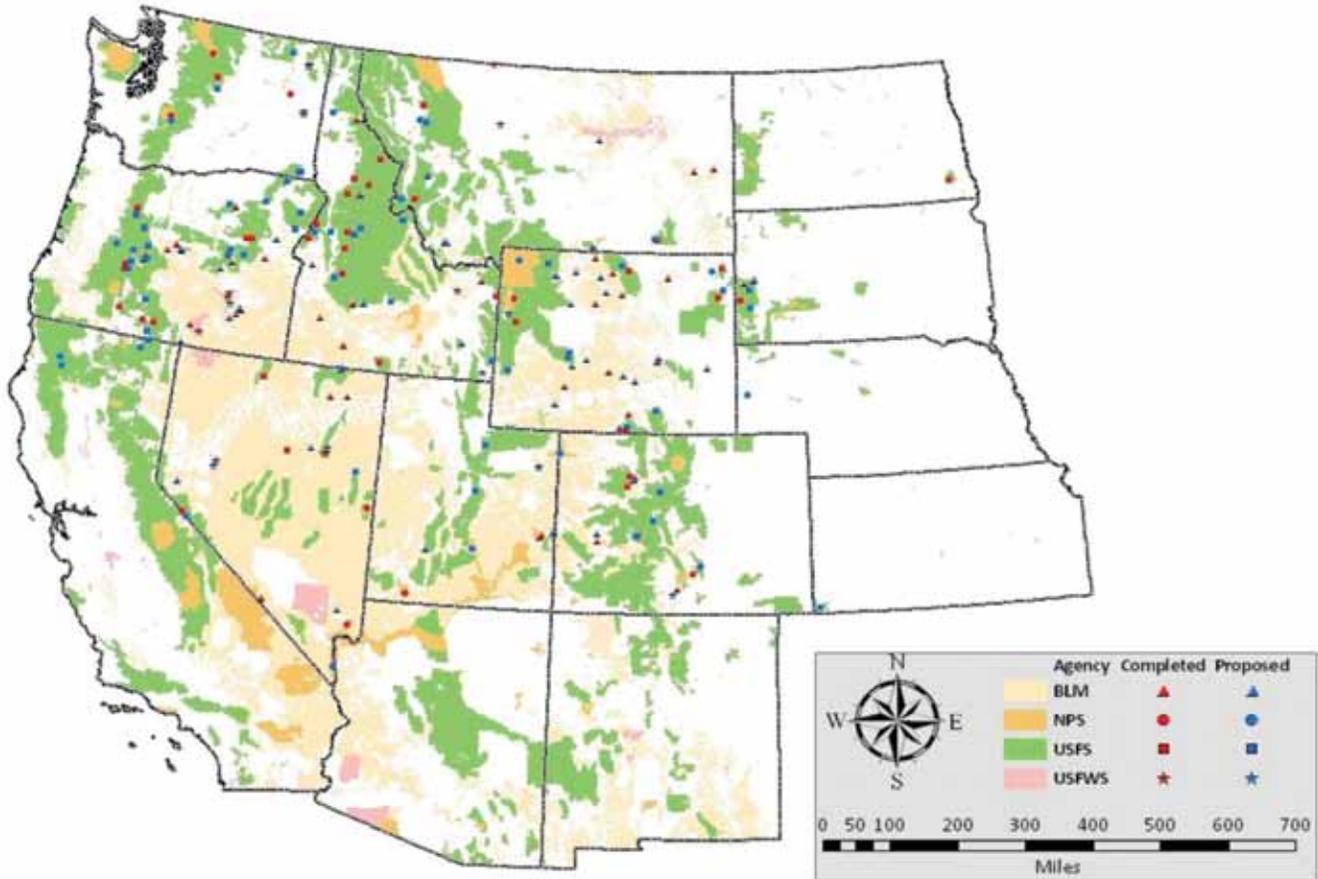
areas, primarily for hazardous fuels reduction, ecological restoration, or habitat improvement (Stone and others 2010). Our recent, expanded online survey included questions on wetland treatments and compiled responses from a range of resource professionals from four agencies.

We were interested in individual project objectives and the short-term effectiveness of treatments in meeting them, types of treatments applied, types of riparian vegetation treated, pre- and post-treatment monitoring, and concerns or constraints affecting the planning and implementation of projects. Here, we present the results of the survey and briefly describe a case study that illustrates several distinct features in treating vegetation to reduce streamside fuels.

Who We Asked

The survey targeted fire program managers and other resource professionals from the Forest Service and the U.S. Department of the Interior, Bureau of Land Management (BLM), National Park Service (NPS), and U.S. Fish and Wildlife Service (FWS). The study area included lands managed by these agencies in the States of Colorado, Idaho, Montana, Nevada, Utah, Wyoming, and the eastern portions of Oregon and Washington. The Black Hills region of South Dakota and a small area

Riparian Fuels Treatment Survey - Project Locations



Locations of completed and proposed riparian fuels treatment projects by agency. (Note: The online survey targeted Federal resource managers in the Interior West and northern Great Plains. Arizona, New Mexico, western Oregon and Washington, and most of California were not included.)

in northern California were also included. The survey was administered via a Web-based application and was sent to more than 2,000 potential respondents. The survey requested details about completed and proposed fuels management projects in wetlands and riparian areas.

The Response

There were 532 respondents (a 22-percent response rate), rep-

resenting a variety of resource specialists, including fire managers, hydrologists, fisheries biologists, wildlife biologists, ecologists, and cultural resource specialists. Responses were received from all four agencies (BLM, NPS, Forest Service, and FWS) and from the 10 different States. However, participation in the survey was voluntary, and respondents may not be representative of the entire sampled population.

Of the 532 respondents, 249 described vegetation treatment projects that were either completed or initiated in riparian or wetland areas within the last 10 years. Of those 249 respondents, 105 had completed projects, 87 reported on projects planned or in progress, and 57 reported on both completed and planned projects. Nearly 27 percent of the completed and proposed projects were planned specifically in riparian or wetland areas, while the others included such areas as part of larger projects. Interagency participation was reported to be an important component for 23 percent of completed and 63 percent of proposed projects.

A growing number of Federal, State, and local land managers are exploring options for managing fuels in streamside areas.

Fuel Treatment Objectives and Effectiveness

We asked respondents about five potential objectives that applied to their project (fig. 1a). We ranked each objective as primary, secondary, or tertiary. More than half of the respondents described projects with more than one objective, and nearly all had secondary and tertiary objectives. The most common primary objectives for both the completed and planned projects were hazardous fuels reduction (57 percent) and habitat restoration (55 percent). Virtually all of the FWS projects included habitat restoration as a primary objective. Treatment of invasive species was a primary objective in only a few projects and the least common objective overall.

Restoring the historic fire regime was the most common secondary objective and was reported as an objective for most projects. Protecting values at risk was an objective that included protection of campgrounds, roads, and other infrastructure located in the WUI or wildland-urban intermix; cultural resources; and sensitive ecosystems. In the “other” category, survey respondents noted the following additional project objectives: rangeland improvement, greater recreational access and opportunities for hunting and fishing, reduction of the influence of mountain pine beetle, salvage logging, and enhancement of aspen regeneration.

For completed projects, we asked survey participants to rank project effectiveness at meeting objectives using a five-point scale from “very effective” to “not at all effective.” Depending on the objective and

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treatment, project effectiveness was quite varied (fig. 1b). Projects were most successful at reducing hazardous fuels, and this objective scored the highest effectiveness rating (average effectiveness = 4.53, on a five-point rating scale). The objectives “habitat restoration” and “protection of values at risks” were also effectively met by most proj-

ects (average effectiveness = 4.12 and 4.13, respectively). For “control of invasive plant species,” it may be too early to determine effectiveness, as reflected in the higher number of “not sure” rankings. In general, respondents perceived most projects to be “somewhat effective” to “very effective” at achieving the objectives analyzed in this study.

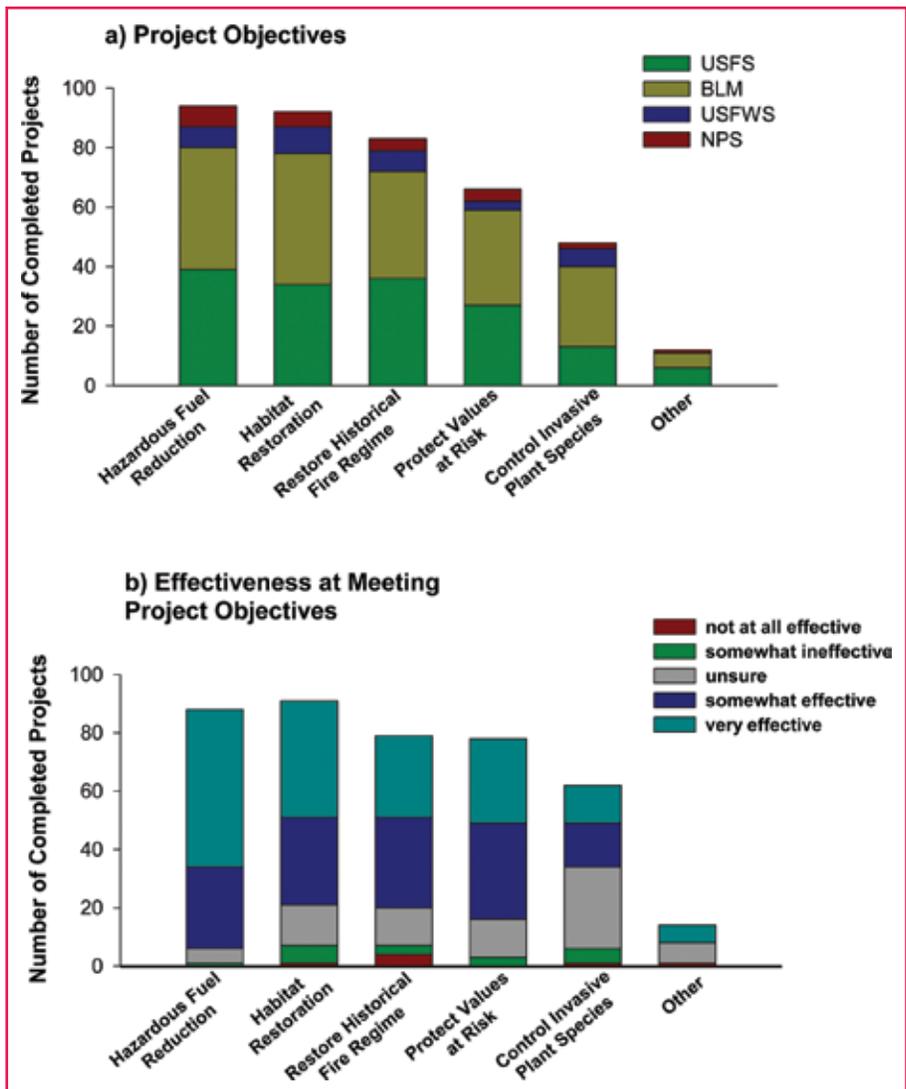


Figure 1—(a) Project objectives by agency; and (b) effectiveness at meeting project objectives (5 point scale from “very effective” to “not at all effective”).

Fuels Treatment Methods

Prescribed fire was the primary tool for fuels treatments used by all agencies in riparian and wetland areas (fig. 2). The FWS used prescribed fire on all of the projects that it reported.

It was clear, though, that most projects combined treatment methods; more than two-thirds of the completed projects used multiple treatments. Combinations of treatments, such as using hand thinning and pile burning, were common and often supplemented with prescribed burning. Mechanical treatments (using heavy equipment) were also included in many projects implemented by the Forest Service and the BLM. Mastication and scattering following thinning treatments were also used, but less frequently than other methods. Additional treatments reported by the survey respondents were follow-up herbicide application or tamarisk beetle release, mowing,

flooding to reduce cattail re-establishment (on FWS projects), and seeding of desirable species.

Tracking Riparian Vegetation Types

In the survey, we also requested information about riparian vegetation types in the fuels treatment project areas. Most projects, both completed and proposed, were located in conifer-dominated riparian areas, followed in frequency by willow-dominated areas (fig. 3).

There were trends among the four agencies, however, reflecting the ecology of the lands each administers. Projects in conifer- and willow-dominated riparian areas were most common on Forest Service lands, while projects in riparian areas dominated by upland shrubs were most common on BLM lands. Conifers were rarely present on the FWS projects, which were largely conducted in wetlands and riparian meadows.

Approximately 27 percent of the completed projects included some palustrine habitat (wetlands and marshes), and while these were located on public lands administered by all agencies, most were on FWS lands. Nearly 70 percent of the projects were conducted in riverine habitats, and the remaining 3 percent were located on the margins of lakes or ponds.

Cottonwoods occurred at numerous project sites, and a few projects focused on cottonwood restoration. Cottonwoods were not, however, present at many of the project areas (fig. 3). Other specific vegetation that was noted in treated areas included aspen and birch; boxelder; greasewood; upland shrubs, such as rabbitbrush and juniper (primarily on BLM lands); and invasive species, such as tamarisk, Russian olive, and whitetop.

Project Monitoring

Most of the respondents reported that project-related monitoring was planned or conducted for both completed (71 percent) and proposed (82 percent) projects to determine their effectiveness at meeting project objectives. In the survey, we asked questions regarding project monitoring, including duration, frequency, and methods used. Response rate ranged from 10 to 60 percent, depending on details on monitoring requested. In part, the varied response rate to specific questions reflected the discipline of the respondent; some survey participants (e.g., fire managers) were not directly involved with all aspects of monitoring and, therefore, did not respond to all questions.

Monitoring appeared to be focused on project effectiveness at meeting

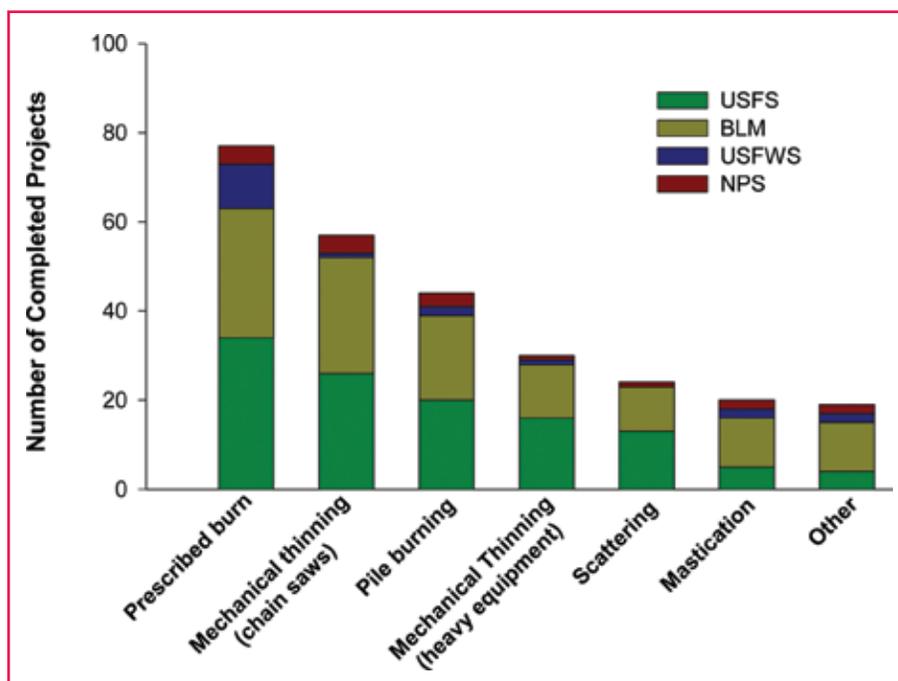


Figure 2—Number of projects that used different types of treatments. Most projects used multiple treatments, all of which are tallied here.

objectives rather than on ecological impacts of the treatments. The most common ecological variables monitored in the completed projects were vegetation attributes and fuels, both before and after treatment implementation (see the table). Terrestrial wildlife was monitored by 40 percent of the respondents. More than half of the respondents did no monitoring of water quality, erosion, or stream biota.

The most common monitoring methods were qualitative rapid assessment techniques and comparison of pre- and post-treatment photos. Only about one-third of the monitored projects actually collected samples for laboratory analysis (e.g., surface water or aquatic

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biota) or quantitatively sampled fuels and vegetation attributes. For most projects, duration of monitoring was limited to the first few years following treatment. Several respondents explicitly noted lack of resources (funding and staff) to support more extensive monitoring in the “comments” section.

Constraints To Conducting Fuels Treatments

Managers face multiple challenges when planning and conducting

fuels treatments in all vegetation types, but wetlands and riparian areas pose additional concerns (fig. 4). Responses to the survey indicated that the most significant constraint for all agencies was the potential presence of threatened, endangered, or sensitive species in the project area. While this is also a major concern for upland fuels projects, inclusion of aquatic and riparian obligate species increases the number of species of concern.

Cultural resources were also an issue in planning fuels projects in riparian areas, particularly in the Great Basin region, where archeological sites are concentrated along stream-riparian corridors. BLM and Forest Service respondents from Nevada and Utah most frequently noted this constraint. Administrative policies, resource management plans, and lack of agreement among resource specialists were commonly encountered constraints among Forest Service, BLM, and NPS respondents.

Approximately 19 percent of the respondents, evenly divided between BLM and the Forest Service, recorded potential litigation as a constraint to riparian fuels projects. Limited support from line officers was the least common constraint noted (3 percent of survey respondents).

Survey respondents recorded several additional constraints, most notably funding. Budgets generally do not target vegetation treatments in riparian areas as a priority, so managers interested in treating

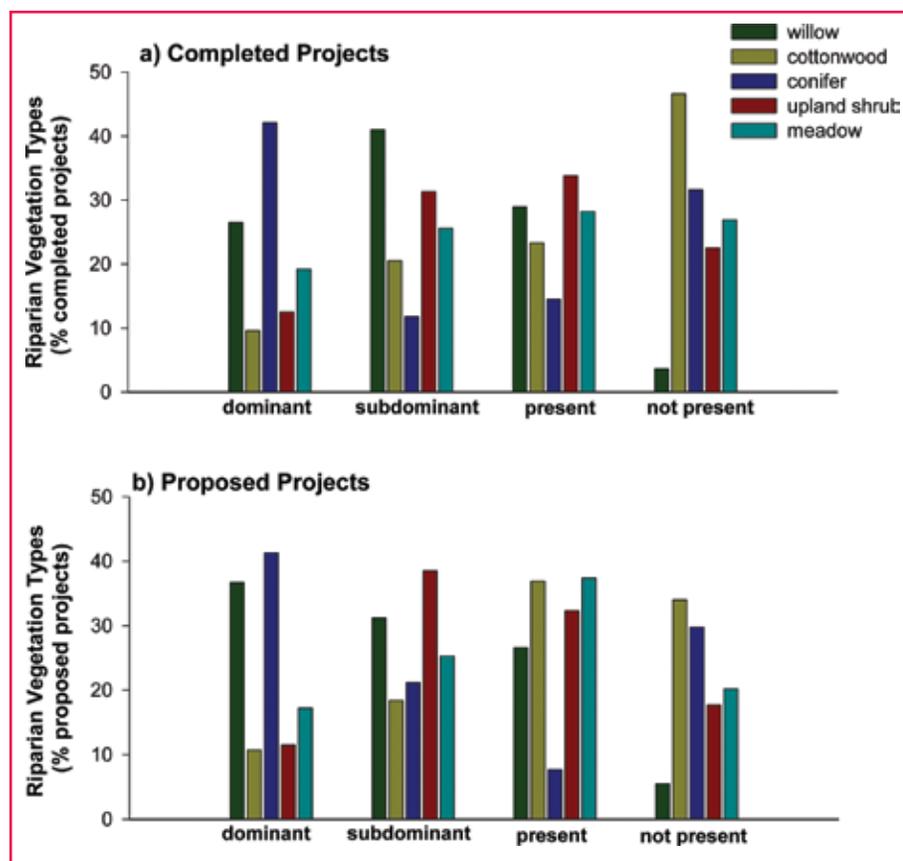


Figure 3—Percentage of projects (a) completed or (b) proposed in five different riparian vegetation types. The categories for estimating abundance of riparian vegetation types within the study area were (1) dominant, > 50 percent cover; (2) subdominant, ≤ 50 percent cover; (3) present, occurred within the project area; (4) not present, did not occur within the study area.

Summary of responses from the online survey to questions regarding project-related monitoring. Values are expressed as percentages of completed projects. (Note: Percentages do not add to 100 percent because some survey participants responded “not sure” and others did not respond to all monitoring questions.)

Ecological Variable	Monitoring? (Percent of Respondents)		Type of Monitoring (Percent of Respondents Who Conducted Monitoring)			
	Yes	No	Pre- and Post-Treatment Monitoring	Visual Rapid Assessment	Sample Collection	Quantitative Data Collection
Water quality and/or quantity	27	54	51	25	10	5
Erosion/runoff	29	56	59	61	0	6
Stream biota	19	62	29	20	33	0
Vegetation attributes (e.g., rare plants, invasives, utilization)	87	8	76	34	4	36
Fuel types and loads	71	21	76	40	5	21
Terrestrial wildlife	40	38	61	39	13	26
Other	26	60	27	50	0	17

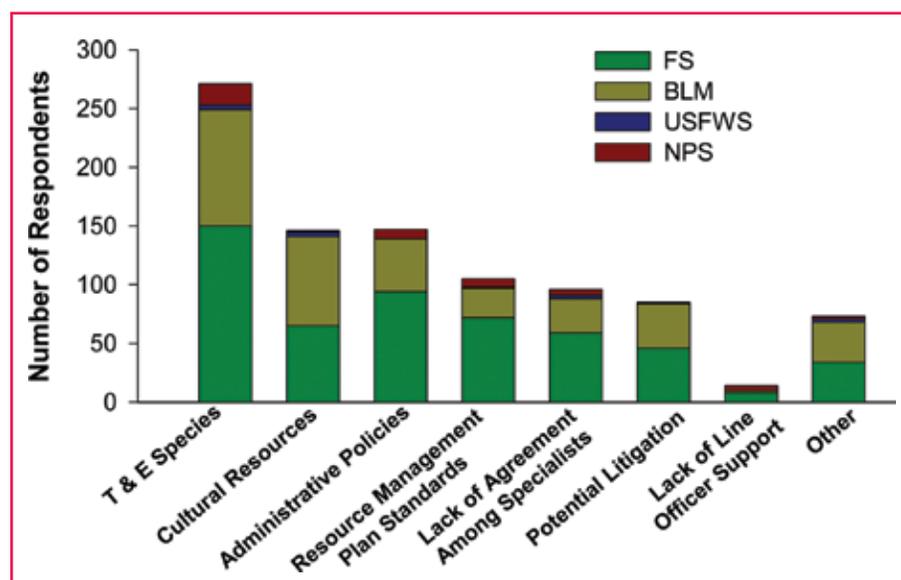


Figure 4—Number of respondents (by agency) who recorded different constraints to planning and conducting fuel reduction treatments in riparian areas.

Budgets generally do not target vegetation treatments in riparian areas as a priority, so managers interested in treating riparian fuels include streamside area treatments as part of larger projects.

riparian fuels include streamside area treatments as part of larger projects. As noted above, approximately 70 percent of the projects (completed and planned) were part of predominantly upland projects.

Much of the funding available for fuels treatments is focused in the WUI. This was reflected in the survey results: 56 percent of the completed and planned projects reported by respondents are located in the WUI.

Other constraints noted by respondents included challenges in attaining the appropriate window of season and weather conditions conducive for prescribed burning; availability of adequate fire staff and equipment support; landownership patterns around riparian areas; visual and recreation conflicts; local environmental issues, politics, and public perception; and limited scientific information on effects of fuel treatments on riparian and aquatic ecosystems.

The Future of Riparian Treatments

Results from both the 2007 phone survey and the online survey show that most riparian treatments were part of predominantly upland projects that focused on larger scale, fuel-reduction efforts across portions of managed landscapes. This active management of riparian vegetation and fuels implies a trend toward incorporation of riparian corridors into broader scale (watershed-scale or larger) treatments. This has likely resulted from recent information on landscape-scale fire behavior, fire return intervals, and greater appreciation of linkages between riparian areas and uplands.

Managers are concerned about riparian fuel loads and perceive them to be high along many streams in the Interior West. They are reluctant to leave high-stream-side fuel loads untreated while uplands are treated, so the managers include these areas to protect them from a potential high-severity fire and to exert some influence on fire behavior. In many cases, managers are also using fuel treatments as restoration projects both in uplands and riparian areas. This may be a consequence of funding—i.e., funds are available for fuel reduction, so managers make use of these resources to simultaneously restore habitat and historical fire regimes and, in some locations, to control invasive plant species. In these cases, prioritization of objec-

tives is necessary, as some may be achieved more effectively than others (see fig. 1).

Despite increased level of interest in treating riparian areas, numerous constraints were identified in the online survey (fig. 4). Noteworthy concerns include the unknown or unpredictable effects of treatments to riparian and aquatic habitat, during both treatment and recovery phases, and the limited scientific research that has been conducted on the topic. Research results on the impacts of

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fire and fuel treatments on riparian functions and characteristics are restricted to a few localized studies in the Pacific Northwest in a small range of vegetation types (Arkle and Pilliod 2010, Beche and others 2005, Bisson and others 2003, Dwire and Kauffman 2003).

Limited scientific knowledge restricts the ability of managers and resource specialists to justify the need for riparian treatments

and to make informed decisions when planning projects. Potential effects of prescribed fire and other treatments in riparian areas include reduced water quality due to erosion and sedimentation, decreased shade, spread of invasive species, loss or alteration of riparian habitat, and slow rates of riparian recovery. Our survey results indicate that the state of the practice has preceded the state of the science with regard to riparian fuel treatments, and that more sharing of experiences, “lessons learned,” and communication of what measures worked and what measures failed would be beneficial for practitioners.

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