


Concept Paper

Multiple Stories, Multiple Marginalities: The Labor-Intensive Forest and Fire Stewardship Workforce in Oregon

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Abstract: Latino/a/x workers perform labor-intensive forestry and fire stewardship work in the U.S. Pacific Northwest, but are not well recognized in research and practice about wildfire governance. This industry has pervasive issues of unsafe working conditions, inequitable wage practices, violations of worker rights, limited opportunity for advancement, and a lack of recognition and inclusion of workers in decision making. We draw on a literature review and practice-based knowledge to make this workforce's history more visible, from its origins in lumber production and reforestation to expansion into forest and fire stewardship. We suggest a new conceptual framing of "multiple marginalities" that situates this workforce as simultaneously crucial to our future with wildfire and subject to structural, distributional, recognitional, and procedural inequities. We recommend new approaches to research and practice that can better examine and address these inequities, while also acknowledging the persistent and systemic nature of these challenges. These include participatory action research, lessons learned from research and advocacy related to farmworkers and incarcerated workers, and Cooperative Extension and education programs that are learner-centered and culturally appropriate. Multiple interventions of offering education and outreach, enforcing or reforming law, and changing policy and practice must all occur at multiple scales given the many drivers of these marginalities. Study and practice can contribute new knowledge to inform this and expand current conceptions of equity and environmental justice in the wildfire governance literature to become more inclusive of the forest and fire stewardship workforce.

Keywords: workforce; equity; justice; forestry; wildfire; labor/labour; Latino/a/x



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1. Introduction

The Pacific Northwest of the United States is a place of many stories about its lands and forests. One story is about wildfire, told mostly by scholars and those with authority or responsibilities for managing fire risk and impacts. As this story goes, wildfires in this region have increased in frequency and impact, and so too have policies, programs, and practitioner efforts to reduce risk and create fire-adapted communities and landscapes through the governance of wildfire risk [1,2]. Wildfire governance consists of state and non-state actors, processes through which decisions are made, and relationships and power dynamics among institutions that together affect the actions and outcomes of attempts to manage the hazards and outcomes of wildfire [3,4].

Scholarship on this topic is multi-disciplinary and emphasizes several streams. One positions wildfire governance as a complex social-ecological system in need of more cross-boundary and collaborative management, policy reforms and incentives, adaptive multi-scalar networks and processes, and new tools and systems for assessing and acting around risk [5–7]. Others have framed it as an adaptive process contingent on the characteristics and cultures of communities of place [8,9]. A growing theme across this scholarship is that centralized, state-led governance does not adequately address the scale of wildfire

hazard and impacts, inclusion of communities in decision making, human health and environmental justice, or cultural burning and Indigenous sovereignty and rights [4,10–12]. Alongside this are calls for new approaches to governance research itself, namely the co-production of knowledge with managers and practitioners [13].

This story of wildfire governance is thus starting to gather new energy and nuance around questions of equity and environmental justice: who is affected by fire, has the resources to adapt, and has a say in how decisions are made. It is also beginning to be told by more diverse voices. Yet a crucial type of actor often remains “in the shadows” [14]. As policies are made, funding invested, and manuscripts written, all typically far from the woods, workers’ hands are on the land. Their bodies and lives are directly implicated in the physical tasks of cutting trees, clearing brush, implementing prescribed fire, responding to wildfire incidents, and performing other labor-intensive activities to remove hazardous fuels and restore more fire-resilient ecological conditions.

A large component of this workforce in the state of Oregon is Latino/a/x (hereafter “Latinx”). Given that this is a scientific paper, we use “Latinx” as a non-binary inclusive term. However, the terms “Hispanic” and “Latino” have been more commonly used in practice to describe this workforce. These workers include multi-generational U.S. residents and business owners and those on temporary work (H-2B) visas. Southern Oregon is home to a large cluster of “forestry services” businesses that perform this work locally and around the U.S. [15,16]. Latinx people are a core part of communities and labor forces in places like southern Oregon. They revitalize schools, business sectors, and rural places [17,18], but also face myriad inequities and injustices. In the context of forestry and fire, businesses often competitively bid on contracts offered by land managers and rely on Latinx crews to accomplish the work at the costs promised. In recent years, the proportion of these workers in the H-2B program on shorter-term visas has increased [19]. This system has pervasive issues of unsafe working conditions, inequitable wage practices, violations of worker rights, limited opportunity for advancement, and a lack of recognition and inclusion of workers in decision making. These issues can be difficult to identify and address because they stem from many factors, including but not limited to lack of labor law enforcement, federal agency service contracting policies and regulations, labor market segmentation, and systemic racism [20]. Although there are many similarities with conditions for Latinx farmworkers, there are also differences between these sectors. Forest workers have far less visibility, organizing efforts, and resources available. However, they are covered by the Fair Labor Standards Act and therefore have better legal protections and are entitled to overtime pay, unlike farmworkers.

In this concept paper, our goal is to call attention to this workforce as it performs essential stewardship work in a fire-prone region of the United States, but remains undercounted and undercompensated in wildfire governance scholarship and practice. First, we provide a brief exploration of the concepts of equity and intersectionality in relation to wildfire governance. Second, we describe this workforce’s history in Oregon to make its trajectory and importance to Oregon’s forest economy more visible, from its origins in reforestation to expansion into forest and fire stewardship. We suggest a new conceptual framing of “multiple marginalities” that situates this workforce as simultaneously at the crucial intersection of key issues in forest and fire stewardship, yet also marginal. This framing is intended to illuminate why this workforce escapes visibility and resists durable solutions to the inequities present, while also offering ideas for future research and practice that will better support equity, safety, and wellbeing. Importantly, we also make it explicit how these ideas arise from our own experiences, including a multi-year research and practice project. The purpose of this project is to foster equitable employment and entrepreneurship through the new forest economy in the American West by analyzing community, social, and policy factors that drive or inhibit equitable labor and entrepreneurship, and designing educational programming that directly addresses barriers to equitable employment for Latinx forest workers and businesses (Grant ##2021-68006-34030, funded by the USDA Agriculture and Food Research Initiative from 2021–2025). Davis is PI of

the project, and Wilmsen and Machado are project partners. Wilmsen is former director of the Northwest Forest Worker Center, whose programs are now part of the Lomakatsi Restoration Project, a non-profit organization based in Ashland, Oregon, that provides worker training and is a core partner on the project. Project objectives are outlined in more detail in the Supplementary Materials.

We hope that this paper will expand our collective capacity for recognizing and working against multiple forms of marginality within wildfire governance research and practice, including the creation and application of new frameworks for understanding the complex drivers of conditions in the forest and fire workforce. This is not merely a theoretical exercise, however, as we also aim to support and inform the pragmatic and relational aspects of engagement between workers, practitioners, and researchers.

2. Materials and Methods

This concept paper is based on two primary sources: (1) a review of scholarship about the Latinx forest and fire stewardship workforce in the Pacific Northwest and (2) the professional and personal experiences of the authors and two project partners who have worked as a forest worker and worker advocate. We first describe the methods of the literature review initiated by Alessi as a student capstone project. The goal was to identify and examine all the available peer-reviewed or technical literature specific to the Latinx labor-intensive workforce in the Northwest United States performing forest restoration and fire stewardship. We did not formally review all the literature on related topics, such as the history of forest management and wildfire in the Northwest, the non-timber forest product workforce, occupational health in wildland firefighting, social vulnerability to wildfire, worker vulnerability to wildfire and smoke, equity and environmental justice, community-based forestry, or workforce development. This is because our intent was to examine and review current knowledge about the Latinx workforce in this specific geographic and occupational context. However, we draw on relevant material from those broader topics for necessary framing and history.

We used a purposeful approach that, while not an entirely formal systematic review, was the most effective way to identify the literature about this topic, which is limited in extent but scattered across disciplines [21]. This involved the following steps:

- Stage 1: We reviewed the abstracts and introductions of references for our project proposal and selected those that appeared to meet the criteria of being topically concerned with the labor-intensive workforce performing forest stewardship work within the U.S. Pacific Northwest, which we defined as Washington, Oregon, or California. The proposal reference list offered a starting point of the foundational literature for a specific topic, akin to the method used by [22].
- Stage 2: For each article identified in Stage 1, we searched Google Scholar and created a list of all that had cited it, resulting in 157 additional citations. We categorized and recorded the number of articles that did or did not meet the criteria.
- Stage 3: We conducted keyword searches using the search engines Google Scholar and Connected Papers. Connected Papers is a tool that creates webs of articles related to a source paper and provides numerical ratings for its degree of similarity to the source paper. The results were tracked in an Excel database, where search terms, combinations, and connected articles were recorded. Keyword searches were as follows: [occupational health AND safety AND forestry AND migrant]; [Latinx/o/a AND forest management]; [migrant labor AND forestry workforce]; [undocumented forest worker AND national forests]. Papers were identified and reviewed to ensure topical and geographic relevance to the criteria, and additional checking for further literature was performed using Connected Papers. Stages 1–3 took place between September 2021 and January 2022, and a total of 28 papers were identified and used in Alessi's capstone project.
- Stage 4: Articles identified in Stages 1–3 were then re-reviewed in detail in April–May 2023 to ensure topical and geographic relevance to this concept paper. We then

repeated the prior keyword searches using Google Scholar to check for any new literature published since the time of the first search. We then searched again, encompassing additional terms related to wildfire stewardship and governance and the Latinx workforce. New keyword searches at this stage were all cross combinations of the following: [wild/fire stewardship, wild/fire governance, wild/fire management] AND [occupational health, Latino/a/x/e, migrant, migrant labor, undocumented, H-2B, forest worker, wildland firefighter]. In total, in Stage 4, we identified 19 publications about the Latinx forestry services workforce in the geographic area of the Pacific Northwest that form the basis of our conceptual review for this paper. A further 15 articles addressed the Latinx forestry services workforce in the U.S. generally or in the Southeast and were reviewed for additional context, and 3 new papers that discussed workers in the context of wildfire since 2022 were also identified; however, they were not specific to this workforce and to the Northwest. The limited number of articles about this workforce is not surprising, given the limited past interest and investment in this as a topic of research, and because there are substantial challenges to engaging workers as research participants or partners, which we address later.

In addition to the literature review, we engaged in dialogue and shared learning to draw out the authors' perspectives and experiences, and collectively identify needs for future research and practice. The direct roles of the authors and partners in forest work and worker advocacy allowed us to use grounded knowledge to generate practice-based insights [23]. We reviewed materials created throughout the course of our project to date, including meeting notes, input from our project advisory committee, and grant paperwork. We also held several discussion sessions among authors and our two project partners to share situated experiences and sensemaking, allowing us to build collective practice-based knowledge. We discussed the challenges and opportunities that we have experienced in conducting research about this workforce, and in partnering with non-academic organizations and individuals. Importantly, although two of our partners who are closely connected to the forest and fire workforce contributed to the ideas of this paper, we were unable to include them as authors given *Fire's* authorship policies, particularly with language barriers and limits on their time to participate at the level required of authorship. We include a selection of their perspectives in English within the paper, and offer additional accounts of their experiences in their words, in both English and Spanish, in the Supplementary Materials.

3. Conceptual Basis: Equity and Environmental Justice in Wildfire Governance

Equity and environmental justice (EJ) are complex and interrelated concepts. Recent federal definitions have been offered in the Biden–Harris administration's Executive Order on 'Advancing Racial Equity and Support for Underserved Communities Through the Federal Government': "The term 'equity' means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities . . . the term 'underserved communities' refers to populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life" [24]. Additionally, the United States Environmental Protection Agency identifies environmental justice as " . . . the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" [25]. Importantly, fairness must be recognized as a morally, culturally, and politically contextual concept, in which what is fair and just depends on the setting and involved populations.

While these definitions emphasize procedural justice as the equitable treatment of all people under the law, scholars and activists propound and operationalize broader definitions. Delegates to the first People of Color Environmental Leadership Summit adopted 17 principles of EJ in 1991 that broadly entailed mutual respect and justice for all peoples, the absence of discrimination and bias of any kind toward any people, the right

of all peoples to self-determination, and sustainable stewardship of land and resources in the interest of all humans and other living things [26]. Bunyan Bryant's 1995 definition embodies these principles: "[E] refers to those cultural norms and values, rules, regulations, behaviors, policies, and decisions to support sustainable communities, where people can interact with confidence that their environment is safe, nurturing, and productive" [27]. Especially relevant to our work is EJ principle number 8, and Bryant's mirroring of it, which "affirms the right of all workers to a safe and healthy work environment".

Here, we do not offer a comprehensive review of all research on equity/EJ or engage in definitional queries about the two concepts, but treat them together and seek to briefly identify the aspects most relevant to wildfire governance. Following the work of [28] and others on equity, we distinguish distributional, structural, procedural, and recognitional dimensions. Distributional equity is concerned with how costs, resources, benefits, and outcomes are allocated or shared among individuals or groups. Structural equity addresses the institutions, dynamics, and social structures through which privilege and disadvantage are experienced and reinforced. Procedural equity focuses on who is represented in deliberation, dialogue, and decision-making processes, and recognitional equity on the acknowledgement of and respect for identity, values, and associated rights [28,29].

The majority of wildfire scholarship that does address these topics is about distributional equity, with some acknowledgement of how structural and institutional dimensions drive the distribution of benefits, outcomes, and costs. This includes access to fire preparedness and mitigation resources: information, knowledge, financial means to prepare structures and vegetation, who assumes the costs of protection and preparation, financial or capacity supports such as grants, and where fuels treatments are located [30,31]. Within this, some studies have explored "who gets the work", or which communities are home to businesses that tend to capture federal contracts for restoration and fuels reduction work and where they perform that work [32]. Some community-based forestry efforts have increased access to employment and business growth opportunities through collaboratively planned projects, but on scales that do not alter power relationships in the existing political economic order [33]. Other research about distributional equity in wildfire concerns social vulnerability to wildfire and smoke impacts. This has focused on populations that are disproportionately vulnerable due to social determinants, including determinants of health, and that may lack resources to prepare for and recover from fire events, including workers who labor outdoors [10,34]. This work has origins in the broader disaster literature and development of measures and indices to characterize social vulnerability [35,36].

Procedural and recognitional equity in wildfire are more difficult to study as they cannot be readily quantified, and there has been less research directly on this topic to date. An exception is recent work on incarcerated firefighters, noting the "experiential paradox" of their visibility and the support they receive from the public in this role [37]. Another example considers how criteria for grantmaking to disadvantaged communities in California were not inclusive of rural forested communities [38], affecting the distributive outcomes of the studied program. Others have suggested limits on the ability of local forest collaborative groups, many of whom work on issues of wildfire resilience, including the prioritization or planning of fuels reduction treatments, to include a diversity of relevant perspectives in their processes [39]. There is even less study of how identities and values are centered in discourse about fire and its impacts, and who is recognized, valued, and targeted in policies and governance arrangements. However, practitioners and applied academics in Extension and similar positions are raising these topics in a diversity of fora beyond the academy, including the need to "reimagine" workforces that are supported with care, equity, and justice [40,41].

4. Context of the Labor-Intensive Forestry and Fire Stewardship Workforce

To reimagine the future of the forestry and fire stewardship workforce, it is necessary to first recognize its long history in the Northwest. This workforce has largely been absent from prior stories of forests and places (with exceptions; for example, [20]). Instead,

emphasis has been on the rise and fall of the timber economy, subsequent economic impacts for forest-based communities, effects on logging employment, and social and political conflict associated with the Northwest Forest Plan. We offer a necessary retelling that centers this workforce, offering new perspectives on its historic and current diversity.

In the past decades, the restoration of forest health has become a goal equal to or perhaps even greater than production of timber, as ecosystem management became a favored approach in the early 1990s and the increased intensity and severity of wildfires became a national concern very quickly thereafter. Changes in the workforce have accompanied these changes in approach to management. In the late nineteenth and much of the twentieth centuries in the Pacific Northwest, the forest workforce consisted largely of loggers. Today, the workforce has changed to such an extent that forestry services workers outnumber loggers during peak season. However, these workforces share many commonalities: (1) they were (and are) diverse and made up of marginalized people; (2) the labor market in which they were/are situated is segmented; (3) the segmentation of the labor market was/is based on race; (4) the work was/is dangerous; and (5) the prevention and/or control of wildfire was/is a major driver of forest policy affecting their livelihoods.

4.1. Logging and Lumber Production

The late nineteenth century saw the establishment of industrial-scale lumber production in the eastern and midwestern U.S., with giant sawmills capable of producing tens of thousands of board feet of lumber per day as well as the vertical integration of larger companies. These changes led to an ever-increasing demand for cheap labor, which was met by large numbers of non-English speaking, European immigrants, joining the already diverse lumbering labor force [42]. As large, capitalized lumber firms migrated to the Pacific Northwest, they brought experienced workers from the regions from whence they came: workers with diverse backgrounds, including African Americans from the Southeast. Vernonia and Maxville are two towns in Oregon where African Americans joined the lumber workforce despite Jim Crow laws passed by the territorial legislature as well as the state's constitution prohibiting the settlement of Black people in the state. These Black workers were joined by Greek, Japanese, and other immigrants, as well as Native Americans and native-born white workers [43].

Working conditions in lumber production were poor. The work was dangerous; job-related injury and death rates were high. The workday was 10 to 12 hours long, and living conditions were substandard. There was continuous struggle over wages. Employers devised various strategies during different stages of development of the PNW's lumber industry to keep wages low. These included (1) company towns, in which every aspect of workers' lives was controlled and/or surveilled by the company, with the goal of instilling fear and submissiveness to prevent protest over wages and working conditions, (2) using immigrant workers as strike breakers, and (3) cutting wages [44].

As the industry became more capital-intensive, technological changes enabled access to timber in more remote areas of the mountains. This led to the establishment of logging camps far from urban centers and further degeneration of living conditions. The logging workforce became almost entirely young, unmarried men, many of whom were immigrants. Negative views of the labor force emerged at this time as well. Loggers were described as "timber beasts" and millworkers "sawdust savages" [44] (p. 338). Throughout this period, logging and millwork were also racialized. The labor market was segmented into skill-based hierarchies defined by race. White workers generally filled the "skilled" positions with higher pay, such as fallers and supervisors. Workers of color carried out the "unskilled" work that paid less and was often more dangerous [45]. This segmentation of the labor market was to continue throughout the twentieth century and into the present day.

As life in the logging camps deteriorated, and employers continued to make wage cuts, loggers organized into labor unions. The Holy Order of the Knights of Labor made a marginally successful unionization effort in the 1880s. Later, the International Workers of the World (IWW), commonly referred to as the "Wobblies", achieved greater success,

leading 75% of the logging workforce out on strike in 1917. At the behest of employers, the federal government intervened in the strike. It persuaded firms to establish an eight-hour workday, accept wage floors, and improve living conditions in the logging camps in exchange for aggressive action against the strikers. That action included military repression, prosecution of IWW leaders, and the creation of the Loyal League of Loggers and Lumbermen (the “4Ls”), a “union” that included both employers and employees as members. Lumber firms took advantage of the outbreak of World War I to depict labor strikes as sedition and the Wobblies as serving German and Soviet interests [44,46]. Severely weakened by these developments, as well as a schism within its own ranks, the IWW’s size and power declined dramatically in the 1920s. In the 1930s, the International Woodworkers of America (IWA), and to a lesser extent the United Brotherhood of Carpenters, organized the logging workforce. The IWA was the major logger union until 1993, when the decline in union membership of the previous 20 years caused by automation, log exports, and capital divestment finally forced it to close and merge with the International Association of Machinists [46].

4.2. Reforestation

In the 1920s–1930s, economic conditions in the lumber industry set in motion research and decisions that ultimately led to the creation of the reforestation (or forestry services) sector in the Northwest. By the mid-1920s, lands that had been clear cut were not successfully regenerating commercial Douglas fir due to competition with brushy and noncommercial species, and impacts of landslides and soil erosion. New research and experiments with replanting using nursery stock started in the 1930s but were largely unsuccessful. Momentum and investment around reforestation did not accelerate until the 1940s, following the initiative of the Weyerhaeuser Timber Company to establish the region’s first industrial tree farm on a portion of its fire-affected lands in 1941. The West Coast Lumberman’s Association also championed tree farming and established a Tree Farm certification program in that same year. The ultimate success of the regeneration of Douglas fir on tree farms led other companies to establish tree farms and drew small landowners into the orbit of tree farming as well [47].

This investment in tree farming required workers to plant the trees. The workforce remained small, and tree planting on private and public land was relatively limited until the 1970s. Only a few contractors planted trees in the 1940s–1960s, but this changed in 1971 when Oregon passed its Forest Practices Act. The first of its kind in the nation, the act stipulated adherence to strict environmental quality standards and required replanting of forest lands within two years of harvest. Suddenly, there was demand for large numbers of workers to plant trees as contractors sought reforestation contracts on public and private lands. The policy and business context of the reforestation industry easily led to the abuse of workers as well as inferior-quality work. Entry requirements into the industry were low: a pick-up truck, the ability to post bond, and a crew of at least six workers. The Forest Service did not enforce labor laws and emphasized quantity of acres planted over quality of planting. Workers were paid by the piece (number of trees planted). It was not uncommon for contractors to refuse payment to workers after a job was completed. Some contractors would avoid paying undocumented workers by turning their crews into immigration authorities before paying them [20].

Improvements to planting practices and tree survival accompanied the rise of worker-owned forest labor cooperatives. The first such cooperative, the Hoedads, was founded in 1971 by a group of tree planters seeking to capture full payment for their tree planting work and escape exploitation by unscrupulous employers [48]. The forest labor cooperative movement grew rapidly, peaking in 1980 with the existence of numerous independent cooperatives boasting a total of some 700 worker members [20,46]. Cooperative members were largely well-educated, idealistic, white youth who took pride in performing high-quality work and valued (at least in principle, if not in practice) egalitarian social relations. Ultimately, the cooperatives were not successful in changing working conditions and likely

played a role in depressing wages in the reforestation industry. Because their workers were members, not employees, the cooperatives were not required to pay minimum wage. Taking advantage of the ability to legally pay substandard wages, cooperative crews underbid on competitive contracts to secure work for themselves, contributing to wage exploitation in the entire industry [20]. In addition, contractors who operated as businesses began hiring undocumented workers in increasing numbers, driving wages down further. This led to a schism within the cooperatives' professional association, the Northwest Forest Workers Association (NFWFA), with one faction supporting solidarity among all workers and another taking a hard stance against undocumented workers, whom they saw as threats to their livelihood. Although the NFWFA collaborated with the Latinx-led Willamette Valley Immigration Project to win an important court victory for forest workers in the early 1980s, ultimately, it adopted an anti-immigrant stance and lobbied for protectionist legislation [49].

However, the cooperatives faced greater threats to their existence than the hiring of undocumented workers by other contractors. Believing that the cooperatives enjoyed unfair advantages, a group of labor contractors, operating through a professional association, the Associated Reforestation Contractors (ARC), formed explicitly to level the playing field in contracting, succeeded in convincing the Oregon state legislature and federal Department of Labor (DOL) to require worker-owned cooperatives to carry workers' compensation insurance, pay payroll taxes, and pay at least minimum wage [20,46]. These changes undercut cooperative members' ability to exploit themselves and put them in even more direct competition with contractors.

At the time that the Hoedads and other cooperatives were at their peak, most private sector reforestation contractors were white. Although the workers they employed came from a variety of backgrounds, there were large numbers of white workers as well. That began to change in the 1980s. Many labor contractors promoted Latinx workers to supervisory positions, which often included responsibilities for recruiting new workers. These supervisors turned to their own social networks, recruiting family members and friends from their home communities in Mexico or elsewhere in Latin America. In addition, many erstwhile undocumented forest workers who gained legal immigration status through the Immigration Reform and Control Act of 1986 started their own businesses and also turned to kinship networks for recruitment. As this was happening, many older white labor contractors began to retire. In addition, set asides of federal lands contracts for minority-owned businesses and other government programs helped some Latino contractors establish businesses. By 2000, Latinx contractors accounted for 76 percent of the forest labor contractors in southern Oregon and the vast majority of workers were Latinx as well [20].

4.3. Forest Health and Hazardous Fuels Reduction

Also in 2000, President Clinton directed the secretaries of the Departments of Agriculture and the Interior to develop a response to the increasing severity of wildfires through the implementation of the National Fire Plan. Soon after, in 2003, President George W. Bush launched the Healthy Forests Initiative. Both policies called for the reduction in hazardous fuels, rehabilitation (including reforestation) of burned-over lands, control of forest insects and diseases, improved suppression, and creation of economic benefits for rural communities and businesses [50]. These required labor-intensive activities and prompted a dramatic increase in the forestry services workforce. By 2004, the number of forestry services workers in Oregon had reached 8000 at peak season [51], and this number is roughly the same today [52]. In addition, many businesses and workers expanded from forestry services into wildland firefighting at this time, extending the skills of their hand crews, and one study noted that "although businesses with hand crews may not be in the same segment of the wildland fire market as equipment contractors, the geographic overlap of historical federal timber harvest concentrations, current and historical forestry services contractors, wildfire hand crews, and wildfire equipment contractors suggest that there may be some sort of history-driven market cluster that is sustaining these concentrations" [53] (p. 6). To date,

however, there has been no specific study of how Latinx businesses and crews engage in wildfire response activities.

In the ensuing decades, as wildfires set new records in acreage burned and impacts, state and federal governments continued to appropriate more funds for fuels reduction and establish new policies and programs for fire prevention, mitigation, and response. Federal spending on labor-intensive wildfire fuels reduction work nationwide increased from USD 1.6 million in 2001 (adjusted for 2020 dollars) to almost USD 4.7 million in 2020 [15]. In the Northwest, each state has also invested in new policies and programs, including plans and strategies to greatly increase the acres treated. Despite growing recognition of safety and wellbeing issues in fuels reduction and fire response workforces, such as in the 2023 addendum to the National Cohesive Wildland Fire Strategy, there is increasing concern about the projected demand for this workforce without means to address its foundations of unsustainable, inequitable, and racialized labor, which motivated the development of our project.

4.4. Working Conditions in Forestry Services

While the occupational hazards of wildland firefighting are routinely studied and acknowledged, those of forestry and fire stewardship are not. Throughout shifts from reforestation towards forest health and fuels reduction, working conditions in the forestry services sector have remained poor. Workers face high rates of wage theft; job-related injury, illness, and death; and workers' compensation fraud. They are often also placed in sub-standard housing. Although it is difficult to determine the extent of these issues, multiple studies have consistently found forest workers to be victims of wage theft, suggesting that it is likely widespread [14,20,54,55]. A total of 46 percent of workers interviewed in one study said they had not been paid for all hours they worked during the previous twelve months in one or more pay periods, and 48 percent said they were not paid overtime wages for hours exceeding 40 in a work week [14].

Safety and health are often given inadequate attention as well. Workers frequently report not receiving safety training for hazards including falling trees and branches, chainsaw kickback, pesticide exposure, extreme weather, and steep slopes [14,44,56]. Workers have also described being denied rest breaks and failure of their superiors to take safety precautions such as inspecting work sites, flagging hazards, or holding safety meetings. In addition, many injured workers attribute their accidents at least partly to being pressured to maintain an unsafe pace of work [56].

Job-related injury, illness, and death rates are correspondingly high. Official statistics suggest that forest workers in Oregon are three times more likely to be injured on the job than the average worker in the state and nine times as likely to die on the job [57]. When workers are injured, they may encounter difficulties in receiving medical attention and may suffer consequences on the job. One of our project collaborators, a former forest worker, stated that, "The trees pose huge risks and so many times I've seen trees fall on workers. Some are now in wheelchairs. I remember one worker who was hit by two trees and they crushed his abdomen and broke his ribs. No one wanted to take him to the doctor so I ended up taking him. There was another worker that had a laceration but instead of taking him to the doctor, they grabbed clumps of dirt and rubbed them over the wound to stop the bleeding." A study that examined 23 injured worker cases found that two thirds involved neglect, workers' compensation fraud, and/or wrongful discharge [56]. Several workers described enduring pain while waiting hours or days to receive treatment for their injuries. Four workers were prevented from receiving workers' compensation benefits because they did not file the paperwork to be entered into the system. In three of these cases, they were specifically instructed to deny that their injury was job-related. Seven workers were fired for being injured on the job. One struggled with his injury for months, and, we later learned, ultimately committed suicide.

There are many interrelated reasons why Latinx forest and fire stewardship workers face such poor working environments. In addition to the segmented labor market in which

they tend to do lower paid, more dangerous work [58], immigration policy and the agricultural lobby influence conditions. Industrial-scale farming requires workers who are compelled to accept whatever wages are offered due to their “induced immiseration” [59] and are simultaneously compelled to stay in agriculture either through being undocumented or through the terms of temporary work visas [60]. Forestry services employers benefit from immigration policies designed to meet these objectives because they recruit workers from essentially the same population of immigrants as agricultural employers.

Undocumented workers and workers on temporary work visas are also vulnerable to workplace abuse because they are deportable [61]. Although the latter are legally authorized to work in the United States, their fear of retaliation is as much of a deterrent to speaking out about poor working conditions as it is for undocumented immigrants. Workers on temporary work visas are tied to the employer who brings them to the U.S. and are aware that they may not be rehired the following season if they speak out or exercise their workplace rights. This means that working conditions are equally poor for viséd workers and Latinx workers with any other immigration status [14,51]. Over eleven years of directing the Northwest Forest Worker Center, Wilmsen encountered U.S. citizens and legal permanent residents who were unwilling to pursue remedies to workplace inequities or violations of labor laws out of fear of jeopardizing undocumented or viséd relatives. One of our project partners stated that “Many [forest workers] are afraid of missing work for a day and then losing their jobs . . . They feel really frustrated by this. Many workers have said, ‘When we finish work, we’re dead tired. When we arrive at the hotel, we pass out from exhaustion. Many times we have to fake our wellbeing and force ourselves to push through the exhaustion to make it through the day. If not, they threaten us and say they won’t give us work and they’ll take away our visas and refuse to pay us.’” Furthermore, kinship ties may contribute to expectations and pressures for workers to maintain good relations with family members [20]. For example, one worker who sought the assistance of the Northwest Forest Worker Center in filing a complaint against his job foreman ultimately decided not to pursue the claim because he did not want to get in trouble with his aunt, who was the company owner.

Finally, unlike loggers, forestry services workers have never been unionized. When the Hoedads’ members voted down unionization in 1978, the United Farm Workers had already abandoned Oregon, and the Willamette Valley Immigration Project (WVIP) had decided not to organize a union due to the contemporaneous anti-immigration stance of many unions, including the United Farm Workers. In 1985, WVIP became *Pineros y Campesinos Unidos del Noroeste* (United Forest and Farm Workers of the Northwest), which focuses its unionizing efforts on farmworkers [49]. The Northwest Forest Worker Center (NFWC), which was established in 1997, explored unionization of forest workers in the 2010s, but did not pursue organizing due to lack of worker interest. Instead, NFWC continued employing *promotoras* (community health workers) to inform workers of their workplace rights, provided training in occupational safety and health, assisted individual workers with wage theft and workers’ compensation claims, and advocated for stronger legal protections and better enforcement of existing labor laws. NFWC also collaborated with farmworker advocates on issues that affected both the forestry and farm workforces.

This situation, and working conditions in general, are not likely to improve due to the increasing use of temporary foreign labor in forestry services. Workers on temporary work (H-2B) visas have comprised almost the entire forestry services workforce in the Southeast for decades [51] and the Pacific Northwest is moving in that direction. The number of H-2B workers in forestry services has increased by 650% in the last ten years in the region [62].

4.5. Multiple Marginalities

As we have described, much existing knowledge about equity/EJ in wildfire has focused on populations vulnerable due to where they reside and their social characteristics, and tends to situate these issues within the wildland–urban interface [63], so the locus of concerns and investment has been around structures and community values. However,

workers are implicated not only personally as residents of places affected by fire events, but also professionally as they work performing wildfire risk reduction, wildfire response, and/or postfire recovery and rehabilitation activities, and often do so while physically outside of the WUI (i.e., as they work in more remote areas). This is a key dimension of marginalization, as workers' bodies and labor have also been positioned outside dominant values and locations of concern about wildfire impacts. Thus, although they are central by virtue of being uniquely situated at the intersection of both living and working with fire, they are also marginalized—physically, figuratively, and structurally. This marginalization also results from and reinforces their longer-term status in the social order as racialized minorities, immigrants, and “unskilled” subordinate workers. These multiple marginalities intersect in the ways in which power is exercised to maintain their status as a compliant, accessible workforce [64]. Alternately celebrated as ideal workers, and demonized as undesirable, “illegal”, criminal elements, or “unskilled”, these workers are subject to intersecting erasures and disempowering structures and practices. This intersectionality functions through different norms and valuations assigned to social and non-human categories being deployed in daily interactions in the workplace [65] and the courts [66] to produce and reproduce relationships of power. The multiple identities ascribed to forest workers, as well as the provisions of immigration and labor law that apply to them, are selectively used, depending on the circumstances, by employers, government officials, and citizens at large to ensure that they do not rise above their subordinate social position. For example, immigrant Latinx workers are often praised for being hard working and skilled in the use of chainsaws and other hand tools, but when it comes to setting wages the work they do is categorized as unskilled, thereby justifying lower pay.

The disempowerment of workers begins before they even arrive in the U.S. The American development of railroads in Mexico and investment in Mexican mining, oil, and agriculture in the late nineteenth century led to the largest displacement of rural Mexican workers off the land in Mexican history. Once dispossessed, these people had little choice but to work for American mining, oil, and agricultural companies in Mexico and in the United States for substandard wages. U.S. government policy aided and encouraged this exploitation of Mexican labor, and subsequent policies have continued the same. In the 1970s and 1980s, maquiladoras along the Mexican–U.S. border did not pay a living wage, contributing to more migration of Mexican workers to the U.S., and the North American Free Trade Agreement of 1994, and its successor, the U.S.–Mexico–Canada Agreement, lead to further migration into the U.S. due to agricultural and other imports outcompeting domestic Mexican production [67]. The ultimate effect of neoliberal free-trade policy is to create economic hardship for Mexican and other Latin American people while offering them few alternatives to realize their aspirations. Forest workers in the U.S. are drawn from this population of people.

The Latinx workers who make up the vast majority of the forestry workforce today are stereotypically racialized as people who are willing to do hard work under harsh conditions for low pay, will not question the material conditions of their existence, and conveniently “disappear” (back to their home countries) when the work is complete [68]. Any attempt on their part to challenge their subordinate position is met with the full force of immigration law through threats of, or actual, deportation or denial of rehire for the following season (and consequent loss of a temporary work visa). This reality disempowers workers regardless of their immigration status.

The stereotyping of Latinx workers also contributes to narratives in which forestry services work is regarded as less prestigious and less valuable than logging. This is reflected in popular media coverage, in which loggers receive much more press than tree planters and ecosystem restoration workers [20]. Latinx contractors, in addition to the workers they employ, occupy a subordinate position within forestry writ large. Workers are also absent from forest policy debates and collaborative planning venues, which typically focus on fuels treatment effectiveness, the role of active forest management in reducing fire risk, and other issues concerning forest and fire ecology. Forest workers are not mentioned, or

their issues are treated as separate from management questions, and they are not part of decision-making processes [69]. Finally, these issues are elided in the academy as well. Due to immigration status, fear of retaliation at work, and intimidation in the community as well as the workplace, forest workers are a “hidden” population [70] who generally cannot be reached through quantitative research protocols, and qualitative research traditionally receives less funding and prestige. Engagement in research also may offer real harm to participants. In Wilmsen’s work at the Northwest Forest Worker Center, there was at least one case of workers being fired for participating in interviews with social science researchers. These issues, along with practical matters of access and language and a historical lack of funder and institutional interest, have further limited academic engagement.

5. Research and Practice for a More Just and Equitable Future

The state of “multiple marginalities” that we have described inhibits distributional, structural, procedural, and recognitional equity for the Latinx forest and fire workforce. Concurrently, this workforce also possesses assets and cultural capacities needed for a more fire-adapted future. These include workers’ on-the-ground, pragmatic knowledge of forest and fire management activities; their experiences with navigating multiple cultural and economic settings; their ability to draw on networks and relationships to pursue opportunities; and their contributions to placemaking where they live and work [71,72]. Given these multiple marginalities and assets, and how they overlap and intersect, a multi-pronged and integrated approach is needed to address equity in forest and fire stewardship. New dialogue and action are necessary along with multiple forms of expertise, knowledge, and lived experiences, and across sectors and life paths. We offer ideological and pragmatic suggestions about how researchers and practitioners may foster this through two interrelated and mutually reinforcing strategies.

5.1. *Re-Envision Collaborative Processes of Research and Practice*

First, there is a need to build and elevate more knowledge and experience to inform more consideration for workers in the development, implementation, and enforcement of law and policy. This is because substantive policy and legal issues clearly shape conditions for the Latinx forest and fire workforce: forest and fire management policies that drive demand for this workforce, labor laws that are not consistently enforced, and federal contracting practices and agency roles that create gray areas for legal compliance and management of violations. These issues intersect with structural drivers, including labor market segmentation, economic and political situations in home countries, immigration law, networks and kinship ties, and systemic racism, together acting to drive people into this workforce but limit their opportunities to earn income, develop careers, or be valued.

Despite the serious complexity and scope of these dynamics, more knowledge and testimony will help make them and the people who experience them more visible, and can support demands for change. We encourage researchers and practitioners in wildfire governance to explore topics including labor law enforcement, barriers and opportunities for solidarity and unionization, and working conditions on projects funded by state and federal investments in wildfire resilience—all with the aim of better understanding the manifestations of structural inequities and how they may be dismantled. Exploration of distributional equity alone (e.g., which populations and communities receive resources or are harmed by wildfire hazards and impacts) cannot completely or directly address forms of inequity such as those experienced by workers. Indeed, these are difficult subjects, and obtaining funder and institutional support for studying them will require new commitments and approaches. Grant funding for these topics has been historically limited to a few sources. We have focused on the repeated sharing of key messages about needed policy and legal changes, and the importance of research on these topics, through a diversity of platforms such as policy and practice networks (i.e., the Rural Voices for Conservation Coalition and the Rural Coalition), input to state and federal agencies, and legislative hearings and briefings.

As we encourage more research and exploration, there must be even more attention paid to how this research and other forms of engagement with this workforce and related practitioners are conducted. There are several considerations at hand. The first is that power dynamics or disparities of and between researchers and participants, particularly what each stands to gain and lose from the research process, must be a fundamental factor in conceiving any project. Workers may face consequences for participating in research such as retaliation that could include the loss of their job. Participatory action research methods and related practices such as involving participants throughout all stages of research, compensating their time, design to maximize the safety of research encounters, working through a community-based organization or network, and designing research led and conducted by that organization or workers all may be helpful in some circumstances [73,74]. Other relevant examples of studies involving Latinx communities on farmworker and health issues highlight the inclusion of coauthors/study partners residing in these communities, designing and carrying out studies with local farmworker organizations, and the use of archival analysis [75,76]. Lessons learned from these studies as well as those with incarcerated workers [37,77] offer many insights relevant to this workforce. Importantly, such participatory research must be oriented around true participation of communities, supporting the self-advocacy of research “subjects”, strengthening their access to resources, or other outcomes that directly benefit those involved—not merely inserting the researcher into the setting as an observer [78]. However, workers may not want to or be able to participate, could receive more harm than benefit, and/or not receive any benefit from participation in research. Participatory action research is also often difficult for researchers to act on, particularly students, as they may lack sufficient resources, status, or flexibility within the hierarchy of the academy to take on this type of project. In our project, we collaborated with the Lomakatsi Restoration Project and funded their staff’s participation as collaborators. We sought worker interviews through existing contacts and relationships, and advertising our project in locations that workers frequent in the community. This required multiple longer-duration trips and additional data collection with a partner who is a local community member. We also offered participants stipends. A further best practice would be to consider remuneration that compensates workers for time away from the job if interviews occur during their normal work hours.

Second, for wildfire practitioners who want to include workers in their efforts (e.g., in collaborative groups or providing input on projects) and pursue procedural and recognition equity, the same types of challenges apply. Instead of desiring worker voices to come to their tables, practitioners could explore workers’ needs and interests, support other venues that center those, and seek ways to value and integrate worker knowledge and observations into monitoring and learning [79]. Furthermore, practitioners and researchers can do more to acknowledge how their participation in discourses around forest and fire management, including those that Davis has engaged in throughout her career, emphasize “family wage and local jobs” as part of “healthy forests and communities”, implicitly or explicitly excluding Latinx workers from being recognized and valued [80].

Third, we also note that there is an experiential gulf between the disembodied work of most academics and some practitioners, and the physical conditions for workers in this sector, as one of our partners notes: “I’d like them [researchers, academics, practitioners, policy-makers] to consider the worker and the work they do . . . in very low temperatures—freezing, snowing—so they may see the sacrifice that a worker makes in the mountains. On the other hand, when it’s very hot, I’d like them to see that the workers are still up there working. I’d like to see them work alongside the workers so they can feel what it’s like”. This inherent abstraction of the worlds of scholarly analysis and writing from this physical experience is a challenge with our own project, and with this very paper. Going to the field to observe working conditions and meet with workers on site may allow some sense of this, but also can create logistical, safety, and cost issues for organizations or businesses to facilitate; and care would need to be taken to not engage in harmful observation approaches steeped in colonial anthropological methods [78].

Finally, barriers to solidarity are created by the structural inequities and disconnects that many of us operate within. These can manifest as false dichotomies, such as local organizations resisting wage requirements, fearing it will make planned fuels reduction efforts financially and administratively infeasible. Instead, governments and grantors should be investing in elevated capacity for local organizations through longer, larger, and more flexible funding opportunities that allow all involved to truly value all forms of labor and engagement [41]. The separation of wildfire mitigation and response may also inhibit parallels and shared commitments to job quality with the wildland firefighting workforce, even as some of its members perform both types of work, further suggesting the need for boundary spanning across these arenas [22].

Policy and legal changes to further address structural inequities could include comprehensive immigration reform, reform of the H-2B visa program to allow workers to switch employers, enforcement of labor laws, review of state and federal agency contracting standards and practices, improved collaboration and communication between land management agencies and the Department of Labor, and legislative efforts to improve pay equity and housing access [81]. Support for these efforts could include solidarity and partnership between forestry and farmworkers and advocates.

5.2. Invest in Extension and Education

Given the multifaceted dynamics surrounding this workforce, Cooperative Extension and other forms of education have considerable potential to support worker safety and equity, and to be key components of research and practice projects with workers. This is not to say that the onus of responsibility to ensure a safe workplace and comply with labor laws should fall squarely on the shoulders of workers to seek out education in order to receive appropriate rights and opportunities. It is also important to note that not all of these issues can be solved through a strictly instructional approach. Extension and education efforts must consider the interplay between instructional and non-instructional interventions to effectively address the varied drivers of conditions for forest and fire workers.

One such instructional intervention is the *promotora* program of the Northwest Forest Worker Center and now the Lomakatsi Restoration Project, which employs *promotoras de salud* (community health workers) to deliver trainings and offer resources in Spanish about safety and workplace rights. These exchanges are not reliant on the employer, occur outside of work hours, and are held in locales that workers frequent in their communities. Typically, workers are completely dependent on their employers not only for their jobs, but also for occupational safety and health training, personal protective equipment and work supplies, information about labor and immigration rights, and guidance on how to access social services and related resources [14]. In addition, the legal conditions surrounding this work are inherently complicated because it does not occur in a single location. Pay scales, local labor laws, and type of work frequently change depending on which state, county, or municipality the work occurs in [54]. For H-2B visa workers, knowing their rights and the specific laws where they are working becomes a significantly more complicated task because they are working in a foreign country with different labor laws and regulatory agencies. The *promotora* program offers workers the opportunity to access information about their legal rights without fear of retaliation and provides consultation on how to proceed. Our project has recently developed a series of brochures as well to expand access to this information. Our project partner who works as a *promotora* in the Medford community notes: “Even if they (workers) can’t attend a meeting, they can read about it any time they’re free and without the fear that a coworker or crew boss will see them and report them to their employer”.

Instructional interventions that foster entrepreneurship can also support de-segmentation of the labor market and improve economic outcomes for this workforce. Forest and fire workers already possess a variety of land management skills, and entrepreneurship training programs or on-the-job learning opportunities can allow them to pursue career paths that may lead to less dangerous and better-paying work [54]. Workers may be interested in

diversifying their work, but unaware of paths outside their immediate working conditions. Practitioners and instructional interventions should raise awareness about the different types of careers available in forest and fire management where state and federal funding is high but workforce capacity is low. In partnership with Lomakatsi and Rural Development Initiatives, we are developing worker and business training programs that will offer these opportunities. Similarly, nonprofits such as California's Forestry and Fire Recruitment Program are beginning to offer training for incarcerated workers to find careers once they complete their sentences, and may be potential partners or sources of insight for creating pathways in the forestry and fire workforce more broadly.

Useful educational or informational materials and training programs created for Latinx forest and fire workers should take a learner-centered approach through all phases of instructional design. This means understanding the unique learner characteristics of this workforce and anticipating the barriers they face. Limited English proficiency is likely the most recognized barrier to education for Latinx forest and fire workers [54], as they and especially newly recruited H-2B visa workers speak more Spanish than English [55]. All materials and training programs should be available and delivered in Spanish and contain culturally appropriate language, photos, and graphics.

Other barriers to accessing education for this workforce can include tuition fees and other training costs, loss of economic opportunity from taking time off work to attend a class or training session, travel to and from the instructional site, lodging if attending a multi-day program, and accommodations for childcare. Logistical considerations include when education is offered and its duration, particularly when workers have little time outside of long shifts or travel for work to pursue their personal and family needs. All these considerations factor into a worker's decision to pursue education or training. Instructional interventions can help ameliorate these by offering stipends, apprenticeships, or on-the-job training and by scheduling opportunities on the weekends and in convenient locations.

Lastly, it is important to consider how these interventions are implemented, since trust is a major factor in whether workers will participate. Reaching out to workers requires sensitivity, as one of our project partners notes: "[Researchers and practitioners] shouldn't look like investigators because many of the workers, when you say, 'I'm a researcher from this university, or I'm from this agency that protects workers', many workers feel—not all of the workers—but maybe 6 out of 10 feel afraid . . . Why? Because from the moment they start working they are told that they shouldn't speak to anyone, they're threatened". This observation highlights the importance of building trust with workers and their communities before asking them to participate in research or educational activities. The *promotora* program has been successful at engaging the Latinx forest and fire workforce because it employs two-way communication and culturally competent, local liaison workers who have shared experience with their communities [73]. Future Extension efforts seeking to support this workforce should look towards similar models of communication and relationship building within the communities where forest and fire workers reside. Practitioners may also seek and nurture partnerships with established local organizations and use existing channels of communication.

6. Conclusions

In telling a little-told story of how Latinx forest and fire stewardship workers occupy a liminal space, we have pointed to both their celebration as ideal workers and demonization as undesirable, "illegal", and "unskilled". These workers are subject to forms of intersecting erasures and disempowering structures and practices that act on their conditions, and keep them invisible in management, research, and practice. Although we have sought to work closely with workers and community organizations in our careers, projects, and on this paper, we still are facing and embodying these structural issues, and must realistically acknowledge the gulf between this workforce and academic, management, and practitioner institutions. These inequities are obdurate problems that have persisted for generations, and there is no single grand solution. Rather, interventions in many areas and

on multiple scales are necessary. Improving access to resources through education and outreach (such as Extension and community organizing), enforcing or reforming law, and changing policy and practice must all occur on multiple scales. The study and practice of wildfire governance can contribute new knowledge to inform this, and to expand conceptions of equity and environmental justice to become more inclusive of the forest and fire stewardship workforce.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/fire6070268/s1>: Perspectives from forest worker and *promotora* partners, and USDA AFRI Project Overview and Objectives.

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