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Contract and Federal Wildland Firefighters:

A Review of Local Opportunity, Job Quality, and Safety

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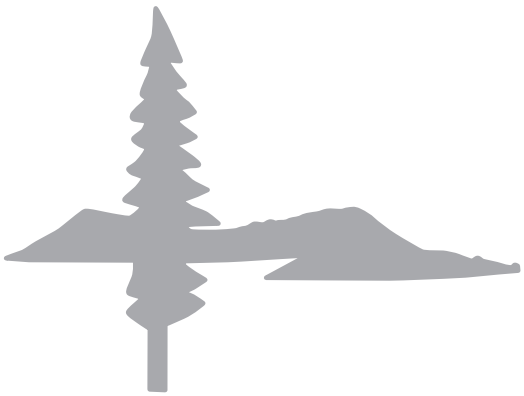

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Contract and Federal Wildland Firefighters:

A Review of Local Opportunity, Job Quality, and Safety

The National Fire Plan was set in motion after the intense fire season of 2000. One of the goals of the Plan is "assuring that necessary firefighting resources and personnel are available to respond to wildland fires that threaten lives and property."[1] The first goal of the 10-Year Comprehensive Strategy for the National Fire Plan is to "improve fire prevention and suppression."[2] Meeting these goals has become increasingly expensive in the last decade.[3] The percentage of the Forest Service budget that goes towards fire suppression has been increasing; "in 2007, the Forest Service will spend 45% of its budget on wildland fire suppression compared to 13% in 1991."[4] It is likely that the resources that are needed to effectively fight fires will continue to grow as wildfires increase in number and intensity, and the number of homes in the wildland-urban interface rise.[5]

Over the last decade, Forest Service firefighting resources have decreased as continuing declines in timber harvests lead to revenue losses and personnel reductions.[6] There are fewer federal management personnel working in the forests that can be called on in an emergency to fight fires, and there are more fires to fight.[7] The Departments of Agriculture and the Interior have made efforts to bolster the shrinking firefighter workforce under the National Fire Plan by recruiting new federal employees and utilizing private contractors.[8] More than 500 people have been trained yearly at firefighting academies since the inception of the National Fire Plan.[9]

One strategy to enhance the firefighting workforce is increasing the use of private contractors to supply fire suppression crews, instead of recruiting more federal firefighters. In an industry where emergency preparedness is crucial, contracting fills an important labor gap. As fire suppression costs increase, there is a trend to use contracted crews because they only have to be paid when there is a fire.[10] Fires can create large economic opportunities for both fire suppression contractors and government employees.[11]

Given the rise of contract fire suppression, many questions arise: Who benefits from the increase in fire suppression contracts? What is the quality of jobs being provided? Are firefighters adequately trained and prepared to fight fires in the most effective and safe manner? This working paper will review what is known about the impacts that rapid increases in fire suppression contracting have had on opportunities for rural communities, job quality, and firefighter safety. It will compare private contract employment and direct government employment of wildland firefighters.

Local and Rural Employment Opportunties

The need for community protection from wildfire in rural areas has increased. Growth in the number of houses in the Wildland Urban Interface prompted the National Fire Plan goal to improve community capacity to deal with wildfire.[12] If the 1990's rate of growth continues, the Wildland Urban Interface will have "8 million new houses in the coming decade."[13] Ideally, increased contracts for fire suppression would create job opportunities for local crews with the capacity and training to act effectively as first responders in an initial attack. The availability of local crews could reduce transportation costs.[14] Their proximity to the fire and knowledge of the surrounding landscape gives them the potential to be more effective than crews that may have traveled long distances, and may not be as familiar with the terrain.[15]

Federal Employment

The National Fire Plan created some local work opportunities in fire suppression. In 2000-2001, for example, 5,500 new federal firefighters were hired for wildfire suppression under the Plan.[16] These were predominantly local jobs where "between one half and two thirds of Forest Service hires for Fire Plan funded work did not relocate for their positions."[17]

Contract Employment

By contrast, private contractors may not provide a large source of local jobs in fire suppression. For example, in 2002 94% of the 20-person wildfire contracting crews in the United States were based in Oregon.[18] It is difficult to determine whether contractors provide local opportunities, because sometimes contractors provide local work, or they may send crews across the country to meet federal needs for firefighting resources. In the Biscuit fire, which occurred in Oregon, many locals were employed because the majority of firefighting crews are based in Oregon. [19]

Barriers to Local Private Contractors

There are barriers to local contracting opportunities in fire suppression. The Watershed Research and Training Center found that many local private contractors were replaced with large contractors hiring crews from urban areas.[20] Research suggests that it may be difficult for locals to compete for labor-intensive work like firefighting, but it may be easier to compete for work involving heavy equipment in the fire suppression effort.[21] Bill Duke, Project Officer for Lake County Resources Initiative, a community-based forestry organization, cited the complexity of standards, certifications and insurance as barriers to entry for local equipment contractors.[22] He also stated that high up-front investments and a lack of local inspection sites make it harder for local contractors to compete in the fire suppression industry.[23]

The National Wildfire Coordinating Group (NWCG) establishes standards to ensure firefighters meet qualifications. The red card system that NWCG uses to ensure firefighters' training and qualifications can be an obstacle to local opportunities in fire suppression. It was "developed to serve federal needs and does not effectively account for the equivalent training and experience of local firefighters."[24] It can lead to the perception that local and rural fire departments' crews are not qualified to fight wildland fires, providing more work opportunities for non-local contractors.

Job Quality

As the private firefighting sector grows, it is important to compare and contrast what is known about the job quality of contracted and government wildland firefighters. Research in this area continues to be thin because firefighters are part of a very mobile, seasonal workforce and there may be varying degrees of job quality depending on the crew, the contract, and the region of the country. Overall, it appears that the job quality of contracted employees tends to be worse than that of government employees, although both types of firefighter face some of the same issues.

Immigrant Contract Firefighters

Use of private contracted crews over federal crews for fire suppression may limit economic benefits to rural communities, but it creates jobs for immigrants.[25] In 2006, "as many as half of the roughly 5,000 private firefighters based in the Pacific Northwest and contracted by state and federal governments to fight forest fires [were] immigrants."[26] Because they make up such a large part of the contract firefighting workforce, it is important to address issues that immigrants face with respect to job quality. An Ecosystem Workforce Program study of 89 contract forest workers, the majority of whom were contract workers, and half of which were Hispanic, gives insight into the ways in which forest workers deal with the seasonal nature of their jobs, and compares job quality across ethnic groups.[27] A review of this study is relevant to this paper because 62% of the forest workers interviewed had participated in fire suppression at some point during the year.[28] The Ecosystem Workforce Program study shows that Hispanic contract workers are less likely to complain about injuries than non-Hispanic contract workers, fearing they will be fired.[29]

Consistency of Work

The sporadic and seasonal nature of wildfires can affect work consistency for both private and federal fire suppression crews. Firefighters may find companies who will employ them in other activities such as tree planting, hazardous fuels removal, restoration projects and thinning when there are no fires to fight. Other employers only offer fire suppression employment. To maintain a steady income, firefighters who are on-call may seek other work when there are no fires to fight.[30]

Merging hazardous fuels reduction with fire suppression contracting has the potential to create greater opportunities for full-time work.[31] During the peak of the firefighting season federal crews are paid to wait on-call for wildfires. They are not involved in project work in between fires, but may work on other projects in the off-season. In between fires, some private employers may attempt to keep their crews busy working on hazardous fuels reduction or restoration projects. Contractors cannot pay their crews to wait on-call, and may use the crew on a government thinning contract until they can move them to a more profitable fire. Keeping a crew together to work on projects when they are not fighting fires may increase the quality of the firefighing by providing stable employment. It increases both job quality and safety because crewmembers know what to expect from their peers, and they learn to trust each other.[32] Although some contractors provide this type of work for their crews, there are concerns that the majority do not. This increases the sporadic nature of the work, and forest workers may work for different contractors throughout the year.[33]

To meet their needs for wildland firefighters, the Forest Service provides several employment scenarios. Some of their firefighters are hired seasonally to work on a wildland firefighting crew, while others are taken temporarily from their jobs in other sectors of the Forest Service, and still others are hired as emergency administratively determined (AD) hires.[34] Different types of government hires experience varying levels of work consistency.

Wages

Federal firefighters receive wages on a graded scale based on experience, and are given paid vacation based on their length of employment. In 2005, "about 85 percent of wildland firefighters [were] classified in grades GS-5 through GS-9."[35] GS wages vary depending on locality and each grade has a series of different steps. In Oregon and Washington in 2007, the wage for a Government Scale (GS) employee in Level 5, Step 1 is $14.44 per hour or $21.66 per hour of overtime.[36] Permanent and temporary federal employees receive overtime, time and a half after 8 hours a day or 40 hours a week, and hazard pay, an extra 25% of their hourly wage whenever they are fighting uncontrolled fires.[37] Unlike permanent or temporary GS employees, AD hires do not receive overtime or hazard pay.[38]

We looked at two of the largest contracts in the U.S. to try to determine contracted firefighters wages. The Interagency Firefighting Crew Agreement Request for Proposal from the Oregon Department of Forestry in 2007, and the National Type II IA Firefighter Crew Contract set by the USDA Forest Service and the National Interagency Fire Center in 2007. Both contracts include a required minimum wage for contracted firefighters set by the U.S. Department of Labor. The minimum wage rate set in 2006 for firefighters in the Western region was $7.39 plus health and welfare benefits, and paid vacation based on length of employment.[39]

Different sources give varying accounts of a comparison between federal and contract firefighter wages. Timothy Ingalsbee, executive director of FUSEE, Firefighters United for Safety Ethics and Ecology, stated that contracted firefighters generally receive a higher base rate than their federal counterparts, but are not given any overtime or hazard pay.[40] Another source states that unlike federal employees, "contractors do not receive premium pay such as overtime, Sunday, nighttime differentials or hazard pay."[41] Although contract firefighters may not receive premium pay as often as federal firefighters, the EWP study revealed that workers received overtime for fighting fires more often than for other activities.[42]

Benefits and Workers Compensation

For the most part, "Forest Service Type II crews receive wages, retirement/health care/social security, workers' compensation cost, human resource support, training, vacation, unemployment, equipment and transportation."[43] Seasonal federal firefighters, which make up the bulk of ground crews, do not receive a health care benefits.[44]

All firefighters working on federal land are required to receive payments in lieu of benefits.[45] In 2007, the payments set by the Service Contract Act were $120.40 per week or $521.73 per month.[46] Research suggests that contract workers may not know about these benefits.[47] Fire suppression crew contracts also require that the government provide workers with workers compensation, but again, the degree to which contract workers know that they are allowed this benefit, or believe that they can request it, is hard to measure.[48]

Health Issues

The long-term health hazards caused by smoke exposure during fire suppression are a concern for both federal and private firefighters. One study of wildland firefighters in the West found that firefighters are not exposed to levels of carbon monoxide and respiratory irritants that are "considered hazardous, but a small percentage routinely exceeded recommended exposure limits at project wildfires."[49] Another study of wildland firefighters involved in prescribed burning in the West showed that "up to 14 percent of the exposures to respiratory irritants (respirable particles, formaldehyde, and acrolein) and 8 percent of the exposures to CO were above limits recommended by occupational health advisory organizations to protect worker health."[50]

Grievance Procedures, Worker Recourse, and Government Oversight

Federal crews have direct access to the Equal Employment Opportunity Commission to ensure freedom of speech and freedom from harassment. Contract crews may not have the same ease of access to this type of advocate.[51] When private contractors do not follow federal standards, immigrant firefighters may have particularly limited opportunities for recourse.[52] One study found that Hispanic contract workers face more verbal abuse from their employers than non-Hispanic contract workers. It also showed that many contract workers, regardless of race, do not think that labor laws are enforced.[53]

There are also concerns over contractors owning certification papers of their firefighters. This could lead to a situation where firefighters who face abuse cannot leave to find other employment because they are reliant on their bosses to release their qualifications to other employers.[54]

Firefighter Safety

Firefighters are highly dependent on their employers for the training that they receive, and their level of physical preparedness. As the demographic of the firefighter

workforce changes and contracted crews become more common, new challenges have emerged surrounding firefighter safety.

Contract Crews

A series of articles in the *Oregonian* in the early 2000s brought attention to contracted crews and a lack of compliance with safety and training regulations by some contractors. In 2002, Oregon investigators showed that untrained and underpaid workers were being sent to fight fires, and spot checks of Oregon contracting crews resulted in the suspension of 10 contracting companies for problems ranging from fake training cards to late fire responses.[55] Crew contracts with the federal government contain many safety provisions covering topics such as training requirements, language qualifications, equipment needs, and mandatory rest time to avoid fatigue. Although many contract companies follow these safety regulations carefully, the *Oregonian* articles raised concerns about the safety of some contracted firefighters and their effectiveness in the field.

Government agencies attempted to step up oversight of their contractors, but problems continued to occur. An investigation of the Biscuit Fire in 2004 showed that the safety of firefighters was jeopardized because of inadequate training, low fitness levels, and language barriers of some contracted crews.[56] Interviews revealed that some crew and squad bosses of contracted teams were unable to speak English. A 2006 USDA Audit Report revealed that many contracted firefighters continued to lack training and English skills.[57] The audit also showed that some of the private contractors that supply the Forest Service with crews also run the training schools, and have an economic incentive to pass students before they are adequately trained.[58]

Policy Steps to Improve Government Oversight

Providing administrative oversight of private contractors has proven difficult because of the rapid growth of the private firefighting sector, and a lack of resources to hire monitoring staff.[59] In the last three years, a series of wildland firefighter safety acts have been introduced in the U.S. Congress. The first bill in 2004, called for tracking the funds spent on firefighter safety training and activities to ensure adequate training.[60] This was met with reservations from the Secretaries of Agriculture and the Interior because of the difficulty in tracking these funds accurately.[61] The most recent bill, the Wildland Firefighter Safety Act of 2007, would require that the Secretaries submit a report to Congress with information on firefighter safety practices, an estimate of the funds spent on firefighter safety, trends, progress made, and a description of the safety practices governing private contractors and the methods in use to ensure compliance with safety standards.[62]

Forest Service Policy Actions

The Forest Service has taken recent steps to address safety issues. In 2006, the Forest Service created experience requirements and a standardized language assessment in their crew contracts for the year. The agency committed to review crew qualifications before awarding contracts.[63] Before they are assigned to crews, all federal employees are registered in an interagency tracking system and database that monitors the qualifications and training of firefighters. The Forest Service is working with the Pacific Northwest Wildfire Coordinating Group (PNWCG), an interagency wildfire management group, to ensure that contract associations' training meets federal standards.[64]

Contract Crews and Firefighter Safety in Oregon

The Oregon Department of Forestry (ODF) is under an agreement with the federal government and the states of Oregon and Washington to provide oversight of the private crew contractors in the Northwest.[65] ODF has had problems maintaining a trained and qualified wildfire workforce because of a failure to replace retirees with new recruits, a reduction of land management personnel in general, larger more severe wildfires, and an increased number of houses in the Wildland Urban Interface.[66]

The ODF website lists a set of "recent rapid improvements" that have been made to improve the quality and safety of contracted firefighters. These include: bringing staff on board to monitor contractors, refining standards, phasing in a language assessment, and using an interagency best value contracting system.[67]

In 2006, ODF estimated that 85 percent of contract firefighters in the Northwest are of Hispanic descent.[68] To ensure firefighter safety and avoid communication failures, in 2007 ODF required that all crew bosses take a language assessment. As long as crew bosses are bilingual, under ODF rules they can lead crews of Spanish speakers. Following failures of the assessment, ODF is now offering language classes at Clackamas Community College to help crew bosses become bilingual.[69]

The ODF Workforce Capacity Workgroup and the PNWCG interagency blue ribbon task group on fire suppression contracting identified best-value contracting as a way to retain quality employees. In the past, low bid single year contracts were going to inexperienced contractors while more experienced crews were not get-

ting enough hours of work to pay for their training costs and the recruitment of qualified employees.[70] The ODF Workgroup and the PNWCG task group recommend best-value contracting and multi-year contracts to promote experienced crews and to build a safer more effective workforce.[71] The 2006 ODF Interagency Firefighting Crew Agreement Request for Proposal includes best-value criteria. ODF reviewed the best-value evaluation criteria in addition to price: past performance, technical capability, safety and training.[72]

The ODF and PNWCG emphasis on best-value contracting may create better quality, safer jobs because it will promote experienced qualified contractors over contractors that try to cut training and other costs to be the lowest bid. There is some concern, however, that there may be unintended consequences of this system, and that meeting best-value requirements could be another barrier to small contractors because of the length and complexity of preparing a technical proposal.[73]

Conclusion

Increased use of fire suppression contracts may be creating some local employment opportunities in rural areas. There is also some evidence that suggests the federal government may provide more local work opportunities than private contractors, but it is difficult to track the firefighting workforce because firefighters are dispatched all over the country. In general, the use of private crews over federal crews creates jobs for certain populations such as immigrants, but seems to decrease the opportunities available to local and rural firefighters.[74] Local contractors may also have a difficult time competing with larger, more mobile, distant competitors.

More research needs to be done, but the current state of knowledge suggests that federal firefighters have greater job quality than contract firefighters. Although the nature of wildfires makes employment opportunities seasonal and sporadic, federal crews seem to stay together to work on restoration or hazardous fuels projects more often than contract crews. The federal government has strong controls in place to discourage abuse in the federal workplace.

In the transition from federal to private crews, it has been difficult to ensure the safety of contracted employees by making sure that they receive adequate training, proper equipment, and language skills. Recently, increased administrative federal and state oversight has made it more likely that both contracted and federal crews meet safety requirements, training and language standards.

As the costs of fire suppression increase, it is important to understand the type and quality of jobs being created in the forests, and the actual cost-savings of utilizing contract forest workers. One of the perceived benefits of using private contractors is that it will save money over direct federal employment. However, the results of a recent study suggest that if federal workers could be employed doing productive activities when not fighting fires, they would cost the Forest Service less money than their contracted counterparts.[75] This study analyzed contractor and federal costs and found that the "cost advantage of federal crews is greatest when non-productive days are minimized."[76]

In conclusion, more research needs to be done to determine the optimal arrangement for developing and maintaining a cost-effective yet equitable, safe, and high-quality wildland firefighting workforce. Along with weighing the costs and benefits of contract and federal employment, federal policies will need to focus on creating effective and enforceable safety, labor rights and grievance procedures for all firefighters. Policymakers could also place emphasis on training and procurement strategies that maximize local employment opportunities, increase job stability of the mobile immigrant workforce, and reward high quality work.

END NOTES

1. USDA and USDOI, "Healthy Forests and Rangelands: Managing Our National Heritage, Overview of the National Fire Plan," June 14, 2007, http://www.forestsandrangelands.gov/overview/index.shtml (accessed November 28, 2007).
2. USDA and USDOI, "A Collaborative Approach for Reducing Wildland Firefighter Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan " (USDA and USDOI, 2002).
3. USDA Office of Inspector General Western Region, "Audit Report: Forest Service Large Fire Suppression Costs," (Washington D.C.: USDA, 2006).
4. National Association of State Foresters, "Budget Reform: Federal Wildland Fire Suppression Costs," (National Association of State Foresters, 2007).
5. USDA and USDOI, "Quadrennial Fire and Fuel Report," (USDA and USDOI, 2005).
6. Pacific Northwest Wildland Fire Coordinating Group, "Wildland Fire Suppression Contracting in the Pacific Northwest," January 2006, http://www.fs.fed.us/r6/fire/pnwcgfiles/Information%20WT/BestValueContractCommunicationPlan.pdf, (accessed September 20, 2007).
7. Oregon Fire Program Review Workforce Capacity Workgroup and the Institute for Natural Resources "Report of the Workforce Capacity Workgroup: 2004 Protection from Fire Program Review," (Oregon Department of Forestry, 2004).
8. USDA and USDOI, Healthy Forests and Rangelands: Managing Our National Heritage, Overview of the National Fire Plan.
9. Ibid.
10. Stuart Tomlinson, "Contract Crews Keep Wildfires at Bay," *The Oregonian*, July 22, 2007.
11. Cassandra Moseley, "Class, Ethnicity, Rural Communities, and the Socioeconomic Impacts of Fire Policy," in *People, Fire and Forests: A Synthesis of Wildfire and Social Science*, ed. Matthew S. Carroll Terry C. Daniel, Cassandra Moseley and Carol Raish (Corvallis: Oregon State University Press, 2007), 171-186.
12. USDA and USDOI, "Managing the Impact of Wildfires on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000," (Washington D.C.: USDA and USDOI, 2000).
13. USDA and USDOI, "Quadrennial Fire and Fuel Report."
14. National Academy of Public Administration, "Containing Wildfire Costs: Utilizing Local Firefighting Forces," (Washington D.C.: National Academy of Public Administration, 2003).
15. Laura Falk McCarthy, "Snapshot: State of the National Fire Plan," (The Forest Trust, 2004).
16. Ibid.
17. Ibid.
18. Alex Pulaski, "State Tightens Fire Crew Enforcement," *The Oregonian*, September 22, 2002.
19. Moseley, "Class, Ethnicity, Rural Communities, and the Socioeconomic Impacts of Fire Policy."
20. Cassandra Moseley and Laura McCarthy, "Small and Local Businesses Cite Barriers to Reaching National Fire Plan Goals," in *Fire Chronicle: Stories of the National Fire Plan*, (The Forest Trust, 2003).
21. Moseley, "Class, Ethnicity, Rural Communities, and the Socioeconomic Impacts of Fire Policy."
22. Bill Duke, telephone conversation with author, August 2007.
23. McCarthy, "Snapshot: State of the National Fire Plan."
24. National Association of State Foresters, "The Changing Role and Needs of Local, Rural and Volunteer Fire Departments in the Wildland-Urban Interface: Recommended Actions for Implementing the 10-Year Comprehensive Strategy, an Assessment and Report to Congress," (National Association of State Foresters, 2003).
25. Moseley, "Class, Ethnicity, Rural Communities, and the Socioeconomic Impacts of Fire Policy."
26. Kirk Johnson, "With Illegal Immigrants Fighting Wildfire, West Faces a Dilemma," *The New York Times,* May 28, 2006.
27. Cassandra Moseley, "Working Conditions in Labor Intensive Forestry Jobs in Oregon," (Eugene, OR: Institute for a Sustainable Environment, University of Oregon, 2006).
28. Ibid.
29. Ibid.
30. Ibid.
31. Moseley and McCarthy, "Small and Local Businesses Cite Barriers to Reaching National Fire Plan Goals."
32. Timothy Ingalsbee (Executive Director of Firefighters United for Safety Ethics and Ecology), in discussion with the author, September 2007.
33. Ibid.
34. Geoffrey H. Donovan, "A Comparison of the Costs of Forest Service and Contract Fire Crews in the Pacific Northwest " *Western Journal of Applied Forestry* 20, no. 4 (2005): 233-239.
35. Acting Associate Director for Strategic Human Resources Policy in the Office of Personnel Management Nancy H. Kichak, speaking on Tension in the Tinderbox: Finding Fairness for Federal Firefighter Compensation, on August 12, 2005 to the Subcommittee on the Federal Workforce and Agency Organization Committee on Government Reform.
36. U.S. Office of Personnel Management, "Salary Table 2007- for the Locality Pay Area of Portland-Vancouver-Beaverton, OR-WA," January 2007, http://www.opm.gov/oca/07tables/pdf/por_h.pdf, (accessed November 28, 2007).
37. Kichak speaking on Tension in the Tinderbox: Finding Fairness for Federal Firefighter Compensation.
38. Donovan, "A Comparison of the Costs of Forest Service and Contract Fire Crews in the Pacific Northwest."
39. National Interagency Fire Center and USDA Forest Service, "National Type II 1A Crew Contract," (USDA Forest Service, 2007).
40. Ingalsbee, in discussion with the author, September 2007.
41. Donovan, "A Comparison of the Costs of Forest Service and Contract Fire Crews in the Pacific Northwest."
42. Moseley, "Working Conditions in Labor Intensive Forestry Jobs in Oregon."
43. Donovan, "A Comparison of the Costs of Forest Service and Contract Fire Crews in the Pacific Northwest."
44. Ingalsbee, in discussion with the author, September 2007.

END NOTES

45. Moseley, "Working Conditions in Labor Intensive Forestry Jobs in Oregon."
46. National Interagency Fire Center and USDA Forest Service, "National Type II 1A Crew Contract."
47. Moseley, "Working Conditions in Labor Intensive Forestry Jobs in Oregon."
48. National Interagency Fire Center and USDA Forest Service, "National Type II 1A Crew Contract."
49. Timothy E. Reinhardt and Rodger D. Ottmar, "Smoke Exposure at Western Wildfires," (Portland: U.S. Department of Agriculture, U.S. Forest Service, and the Pacific Northwest Research Station, 2000).
50. Timothy E. Reinhardt, Rodger D. Ottmar, and Andrew J.S. Hanneman, "Smoke Exposure among Firefighters at Prescribed Burns in the Pacific Northwest," (Portland: U.S. Department of Agriculture, U.S. Forest Service, and the Pacific Northwest Research Station, 2000).
51. Ingalsbee, in discussion with the author, September 2007.
52. Moseley, "Class, Ethnicity, Rural Communities, and the Socioeconomic Impacts of Fire Policy."
53. Moseley, "Working Conditions in Labor Intensive Forestry Jobs in Oregon."
54. Ingalsbee, in discussion with the author, September 2007.
55. Alex Pulaski, "Fire Crew Crackdown Proposed," *The Oregonian*, January 29, 2003.
56. US General Accounting Office, "Biscuit Fire Analysis of Fire Response, Resource Availability and Personnel Certification Standards," (U.S. General Accounting Office, 2004).
57. USDA, "Audit Report: Forest Service Firefighting Contract Crews," (Washington D.C.: USDA, 2006).
58. Ibid.
59. Tom Knudson, "Untrained Migrants Fight Fires: Inexperienced, Undocumented Hired by Private Contractors," *The Sacramento Bee*, May 7, 2006, http://dwb.sacbee.com/content/news/projects/pineros/updates/story/14252714p-15068755c.html, (accessed November 29, 2007).
60. *A Bill to Promote Wildland Firefighter Safety*, S.1152, 110th Cong., 1st Sess., (June 26, 2007).
61. US Forest Service Deputy Chief for the National Forest System Joel Holtrop speaking on S. 906 - Wildland Firefighter Safety Act of 2005 on May 10, 2006, to the Subcommittee on Public Lands, Forest Committee on Energy and National Resources.
62. *A Bill to Promote Wildland Firefighter Safety*, S.1152, 110th Cong., 1st Sess., (June 26, 2007).
63. Joel Holtrop speaking on S. 906 - Wildland Firefighter Safety Act of 2005.
64. Ibid.
65. U.S. Government Accounting Office, "Biscuit Fire Analysis of Fire Response, Resource Availability and Personnel Certification Standards."
66. Oregon Fire Program Review Workforce Capacity Workgroup and the Institute for Natural Resources, Oregon State University, "Report of the Workforce Capacity Workgroup: 2004 Protection from Fire Program Review." (Oregon Department of Forestry, 2004).
67. Oregon Department of Forestry, "Contracting for Wildland Firefighters."
68. Ibid.
69. Ibid.
70. Oregon Fire Program Review Workforce Capacity Workgroup and the Institute for Natural Resources Oregon State University, "Report of the Workforce Capacity Workgroup: 2004 Protection from Fire Program Review."
71. Ibid.
72. Oregon Department of Forestry, "Interagency Firefighting Crew Agreement, Request for Proposal," (Oregon Department of Forestry, 2007).
73. Ingalsbee, in discussion with the author, September 2007.
74. Moseley, "Class, Ethnicity, Rural Communities, and the Socioeconomic Impacts of Fire Policy."
75. Donovan, "A Comparison of the Costs of Forest Service and Contract Fire Crews in the Pacific Northwest."
76. Ibid.

REFERENCES

Donovan, Geoffrey H. "A Comparison of the Costs of Forest Service and Contract Fire Crews in the Pacific Northwest" *Western Journal of Applied Forestry* 20, no. 4 (2005): 233-39.

Duke, Bill. Project Officer of Lake County Resources Initiative, telephone conversation with the author, August 2007.

Holtrop, Joel. US Forest Service Deputy Chief for the National Forest System Joel Holtrop speaking on S. 906 - Wildland Firefighter Safety Act of 2005 on May 10, 2006, to the Subcommittee on Public Lands, Forest Committee on Energy and National Resources.

Ingalsbee, Timothy. Executive Director of Firefighters United for Safety Ethics and Ecology, in discussion with the author, September 2007.

Johnson, Kirk. "With Illegal Immigrants Fighting Wildfire, West Faces a Dilemma," *The New York Times,* May 28, 2004.

Kichak, Nancy H. Acting Associate Director for Strategic Human Resources Policy in the Office of Personnel Management Nancy H. Kichak, speaking on Tension in the Tinderbox: Finding Fairness for Federal Firefighter Compensation, on August 12, 2005 to the Subcommittee on the Federal Workforce and Agency Organization Committee on Government Reform.

Knudson, Tom. "Untrained Migrants Fight Fires: Inexperienced, Undocumented Hired by Private Contractors," *The Sacramento Bee,* May 7, 2006, http://dwb.sacbee.com/content/news/projects/pineros/updates/story/14252714p-15068755c.html, (accessed November 29, 2007).

McCarthy, Laura Falk. "Snapshot: State of the National Fire Plan." The Forest Trust, 2004.

Moseley, Cassandra. "Class, Ethnicity, Rural Communities, and the Socioeconomic Impacts of Fire Policy." In *People, Fire and Forests: A Synthesis of Wildfire and Social Science*, ed. Matthew S. Carroll, Terry C. Daniel, Cassandra Moseley and Carol Raish, 171-186. Corvallis: Oregon State University Press, 2007.

———. "Working Conditions in Labor Intensive Forestry Jobs in Oregon." Eugene, OR: Institute for a Sustainable Environment, University of Oregon, 2006.

Moseley, Cassandra and Laura McCarthy. "Small and Local Businesses Cite Barriers to Reaching National Fire Plan Goals," In *Fire Chronicle: Stories of the National Fire Plan*. The Forest Trust, 2003.

National Academy of Public Administration. "Containing Wildfire Costs: Utilizing Local Firefighting Forces," Washington D.C.: National Academy of Public Administration, 2003.

National Association of State Foresters. "Budget Reform: Federal Wildland Fire Suppression Costs." National Association of State Foresters, 2007.

———. "The Changing Role and Needs of Local, Rural and Volunteer Fire Departments in the Wildland-Urban Interface: Recommended Actions for Implementing the 10-Year Comprehensive Strategy, an Assessment and Report to Congress." National Association of State Foresters, 2003.

National Interagency Fire Center and USDA Forest Service. "National Type II 1A Crew Contract." USDA Forest Service, 2007.

Oregon Department of Forestry. "Contracting for Wildland Firefighters," June 12, 2006, http://www.oregon.gov/ODF/FireCrewLanguageRequirement.shtml, (accessed September 20, 2007).

———. "Interagency Firefighting Crew Agreement, Request for Proposal." Oregon Department of Forestry, 2007.

REFERENCES

Oregon Fire Program Review Workforce Capacity Workgroup and the Institute for Natural Resources. "Report of the Workforce Capacity Workgroup: 2004 Protection from Fire Program Review." Oregon Department of Forestry, 2004.

Pacific Northwest Wildland Fire Coordinating Group. "Wildland Fire Suppression Contracting in the Pacific Northwest," January 2006, http://www.fs.fed.us/r6/fire/pnwcgfiles/Information%20WT/BestValueContractCommunicationPlan.pdf, (accessed September 20, 2007).

Pulaski, Alex. "Fire Crew Crackdown Proposed." *The Oregonian,* January 29, 2003.

———. "Fire Fighting Crews Hired Improperly, State Says." *The Oregonian*, March 17, 2002.

———. "State Tightens Fire Crew Enforcement." *The Oregonian*, September 22, 2002.

Reinhardt, Timothy E. and Rodger D. Ottmar. "Smoke Exposure at Western Wildfires." Portland: U.S. Department of Agriculture, U.S. Forest Service, and the Pacific Northwest Research Station, 2000.

Reinhardt, Timothy E., Rodger D. Ottmar, and Andrew J.S. Hanneman. "Smoke Exposure among Firefighters at Prescribed Burns in the Pacific Northwest." Portland: U.S. Department of Agriculture, U.S. Forest Service, and the Pacific Northwest Research Station, 2000.

Tomlinson, Stuart. "Contract Crews Keep Wildfires at Bay." *The Oregonian*, July 22, 2007.

US Senate. *A Bill to Promote Wildland Firefighter Safety*, S.2410, 108th Cong., 2nd sess., May 11, 2004.

US Senate. *A Bill to Promote Wildland Firefighter Safety*, S.1152, 110th Cong., 1st Sess., June 26, 2007.

US General Accounting Office. "Biscuit Fire Analysis of Fire Response, Resource Availability and Personnel Certification Standards." US General Accounting Office, 2004.

US Office of Personnel Management. "Salary Table 2007- for the Locality Pay Area of Portland-Vancouver-Beaverton, OR-WA," January 2007, http://www.opm.gov/oca/07tables/pdf/por_h.pdf, (accessed November 28, 2007).

USDA. "Audit Report: Forest Service Firefighting Contract Crews. "Washington D.C.: USDA, 2006.

USDA and USDOI. "A Collaborative Approach for Reducing Wildland Firefighter Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan." USDA and USDOI, 2002.

———. "Healthy Forests and Rangelands: Managing Our National Heritage, Overview of the National Fire Plan," June 14, 2007, http://www.forestsandrangelands.gov/overview/index.shtml (accessed November 28, 2007).

———. "Managing the Impact of Wildfires on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000." Washington D.C.: USDA and USDOI, 2000.

———. "Quadrennial Fire and Fuel Report." USDA and USDOI, 2005.

USDA Office of Inspector General, Western Region. "Audit Report: Forest Service