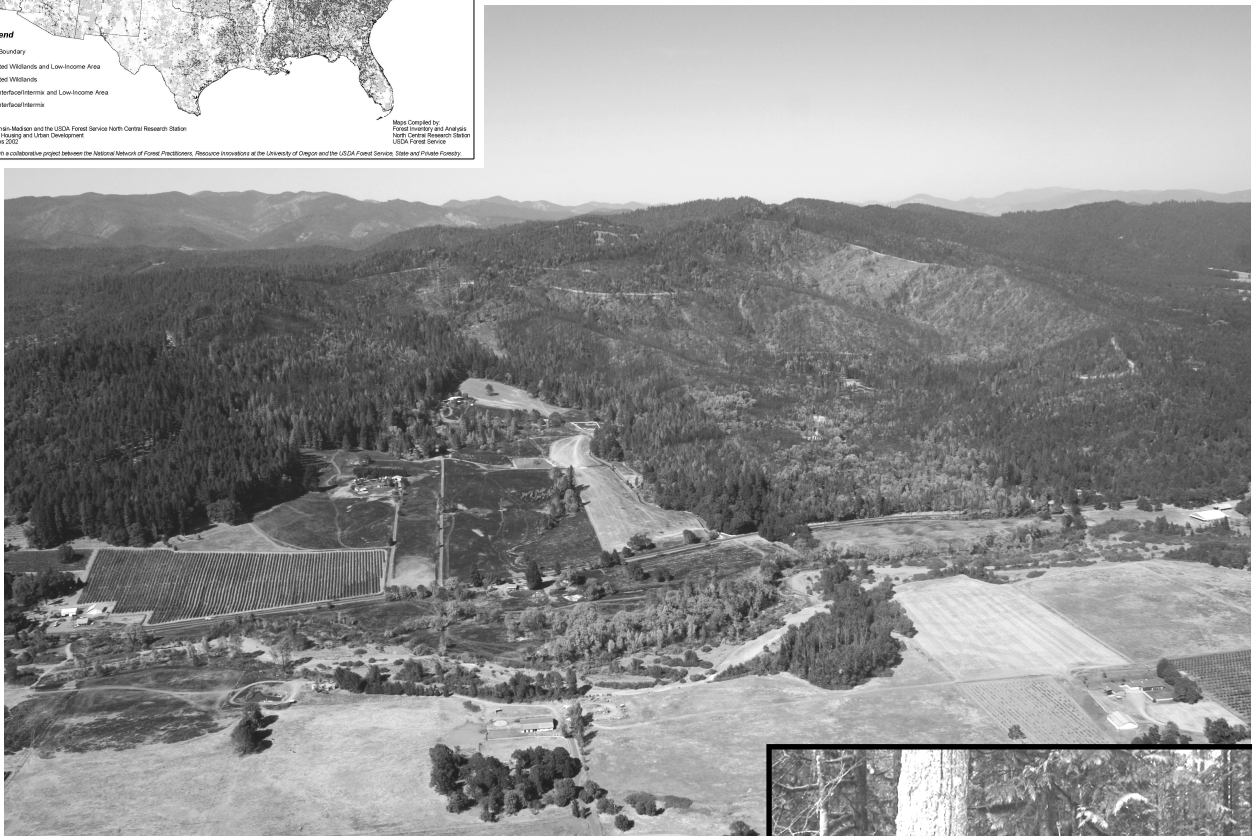
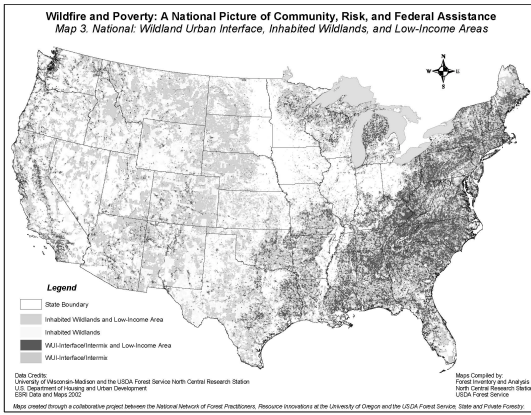


Mapping the Relationship between Wildfire and Poverty



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A collaborative project between the National Network of Forest Practitioners, Resource Innovations at the University of Oregon, and the United States Department of Agriculture Forest Service State and Private Forestry, Cooperative Programs and Research and Development

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EXECUTIVE SUMMARY

Wildfires and the related government roles and responsibilities for federal wildland management are prominent in our national consciousness because of the increased severity in the last decade of fires on and around public lands. In recent years, numerous laws, strategies, and implementation documents have been issued to direct federal efforts for wildfire prevention, firefighting, and recovery. Reliable national-level information and monitoring are essential to ensure good decision making and agency accountability.

Social and economic information about communities at risk from wildfire is critical to these decisions. Despite the indispensable nature of this information for understanding communities, wildfire risk, and cooperative efforts, there is a void in policy direction within the federal agencies to collect, understand, and utilize social and economic information in wildfire management programs.

This research project uses the concept of community capacity – a community’s ability to protect itself, respond to, and recover from wildfire – and examines socioeconomic indicators (one component of community capacity) as elements of wildfire risk. Utilizing socioeconomic information, as well as ecological factors, this study set out to investigate, through a geographical-information-systems approach, whether communities most at risk from wildfire are able to access and benefit from federal programs established to serve these communities. In other words, are the dollars, assistance, and fuels-reduction projects hitting the ground in the areas throughout the country that are most at risk?

This research project found that federal agencies do not have the information and data necessary to answer this question. Spatial data to inform every aspect of this research – including data regarding the ecological conditions of federal lands, wildfire protection capability in and around communities, and the federal expenditures under the national fire plan – are unavailable and/or inadequate.

Using the limited data that are currently available, this research focused primarily on the relationship between poverty and populated areas at risk to wildfire. Our research indicates that there is a relationship between poverty and federal land ownership, and that more poor households are located in close proximity to federal lands. Perhaps more significant, the research shows a higher percentage of poor households in inhabited wildland areas that are not considered part of the Wildland Urban Interface – the areas that federal agencies and Congress have prioritized to receive the majority of funds for activities under the national fire plan. The research also indicates that, in the one state analyzed, poor households are more likely in areas with low or no fire response capabilities than are non poor households.

This research should be seen as a first step to document the importance of social and economic information and community capacity in wildfire policy and implementation. The lack of information about wildfire risk, including ecological conditions, socioeconomic indicators, and resource allocation convinced us to focus our recommendations on improving federal agency understanding and use of social and economic factors through national inventory and monitoring efforts. Specific recommendations include developing a method for measuring community capacity in the context of wildfire and using this methodology to redefine the concept of risk for implementation priorities at the national level and in state, regional, and local planning and risk assessment. Federal land management agencies must also improve systems for monitoring national fire plan expenditures and the datasets that support the prioritization of these funds.

Understanding the social and economic dynamics of communities is critical for providing federal assistance that will help communities protect themselves from wildfire and respond to and recover

from an event. We encourage others to build on this effort to understand the complex social, economic, and ecological factors that influence wildfire risk. Specifically, we encourage federal agencies to take steps to understand the social and economic indicators that are necessary to understand and serve our nation's communities.

The report includes a series of recommendations to improve federal agency understanding and use of social and economic factors through national inventory and monitoring efforts, and to increase and improve assistance for low-income and low-capacity communities. A summary of these recommendations follows. The final section of the report includes a description of each recommendation and specific actions.

1. Redefine the areas prioritized for federal assistance to include rural areas with lower residential density (e.g., inhabited wildlands).
2. Improve systems for monitoring and evaluating the National Fire Plan and other federal fire-related program implementation by including social and economic, as well as ecological, information.
3. Immediately develop nationally consistent standards for monitoring National Fire Plan expenditures that will enable assessment of outcomes over time.
4. Develop a method for measuring community capacity in the context of wildfire.
5. Provide clear direction to federal and state land management agencies for determining "at risk" communities, giving equal consideration to social and economic factors. Target assistance and federal programs, based on community needs.
6. Integrate indicators of community capacity into state, regional, and local planning and risk assessment.
7. Increase federal support and funding to programs that target assistance to "at risk" communities.
8. Conduct case studies in high wildfire risk areas to gain more in-depth knowledge about the relationship between wildfire, poverty, and community capacity.

Study Maps

This report includes maps that illustrate poverty data, wildland urban interface and inhabited wildlands data, protection capability data, and federal land ownership boundaries. The analysis seeks to provide information on a national scale. Spatial information included in this report is provided at the county and census-block level. Therefore, the visual analysis is, in many cases, more meaningful on a state level. Consequently, the researchers have included more detailed maps and analysis for the states of Washington and Oregon as state-level examples. More information about data selection and analysis is included in the methodology and findings sections of this report.

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I. INTRODUCTION

As catastrophic wildfires continue to affect communities across the nation every year, public agencies, academic institutions, and other organizations are finding ways to assess risk and reduce potential losses posed by severe wildfire. Recent federal wildland fire policies and legislation emphasize collaborating with communities to reduce wildfire risk and serving those communities at greatest risk.

To fulfill these political mandates, implementing agencies must understand the complex relationships between communities and wildland fire. There is a particular need to better understand what factors contribute to community wildfire risk. Ecological conditions play a large part in determining relative risk. However, communities may be at an increased risk to losses from severe wildfire because of social and economic factors that contribute to a lack of capacity to address wildfire risk. Poverty and other factors, such as age, disability, ethnicity, geographic isolation, and other elements related to the capacity of an individual or a community, may contribute to the “risk” a community faces from wildfires. The National Network of Forest Practitioners, Resource Innovations at the University of Oregon and the USDA Forest Service, State and Private Forestry initiated this research project as a first attempt to understand how socioeconomic factors relate to community wildfire risk.

The original purpose of this research was to conduct a national-level analysis that (1) examines socioeconomic indicators that contribute to community risk from wildfire; (2) identifies those areas at greatest risk through spatial analysis; and, (3) investigates current federal wildfire resource allocation through the National Fire Plan. Utilizing geographic maps and related analysis, the study was intended to examine whether resources are being targeted to those communities most at risk from wildfire due to socioeconomic as well as ecological factors.

A primary concern of this study is to understand the role of community capacity in determining community wildfire risk. Community capacity in relation to wildfire is defined as the collective ability of a community to mitigate wildfire threats, respond to active wildfire, and mitigate post-fire damage. Traditionally underserved and low capacity communities may have few internal resources available to prepare for and respond to crisis and change. Efforts that seek to provide community assistance may fail to succeed in low capacity communities because those communities may require different types of assistance. Even programs specifically designed to reach underserved and low capacity communities often miss their target population because they fail to understand the dynamics at play in the community. The challenges of reaching these communities make it vitally important that there be high quality, easy-to-implement mechanisms to track investments and evaluate impacts on all communities. Understanding the capacity of a community to address the economic, social, and environmental costs of wildfire will lead to more directed policies and programs and a more efficient use of resources that may provide more appropriate assistance to low capacity communities.

Need for this Research

In 2000, the USDA Forest Service developed a *Strategic Public Outreach Plan* with the goal of ensuring that all Americans, including the underserved, participate in natural resource management and benefit from agency programs and services.¹ This strategic plan acknowledges the needs of underserved populations and communities and identifies strategies to ensure that ecosystem-based activities, Forest Service programs, research and development, and public service reflect the needs and conditions of the underserved.

There are several key areas of the Forest Service Strategic Public Outreach Plan that provide a foundation for this study of wildfire, poverty, and building community capacity in wildfire-prone areas. Implementation actions called for under this plan include the following actions:

- Guide and direct the integration of social information with land and resource management for all units through a national cross-deputy area team;
- Ensure that oversight and monitoring are done by a national team reflecting all deputy areas;
- Each Forest Service unit will develop an outreach analysis and plan for underserved communities.

The *Strategic Public Outreach Plan* also recommends strategies to assist underserved populations and communities. The findings and recommendations included in this report seek to highlight indicators of community capacity that may be indicative of underserved communities and assist in implementing the strategies outlined in the *Strategic Public Outreach Plan*.

Recent legislation and guidance for states and communities have prioritized communities most “at risk” from wildfire. Therefore, it is even more essential to understand the connections between wildfire and the social and economic factors that contribute to community capacity and to integrate strategies for assisting these communities into local, state, and federal fire programs. A lack of awareness about these factors (such as poverty) and how they relate to wildfire risk limits the ability of federal programs to address the needs of very specific populations.

Federal wildfire management guidelines, program practices, and project implementation continue to define “at risk” and “greatest need” with ecological definitions, even though community risk is broader than ecological condition alone. Currently, there is limited policy direction at the national level to weigh social and economic indicators in natural resource agency program implementation.

Recent guidance for community wildfire protection plans that allow communities to define high-risk areas has resulted in prioritized areas for funding. However, even this guidance may be misguided because it fails to recognize that the lowest capacity communities may not have sufficient resources to put together any plan at all – again leaving those most in need out of prioritized funding. It is time for Congress and agency leadership to incorporate social and economic information into program design and execution. To ensure access to those most in need, public agencies, decision makers, and communities must begin to understand the social challenges faced in some areas and take steps to ensure that funds and other agency assistance to communities will be effective for developing community fire plans and reducing wildfire risk in all communities – especially those most at risk. It is our hope that this research will be seen as a first step toward this goal.

¹ USDA Forest Service, Interim Strategic Public Outreach Plan, *Reaching Out to America*, April 2000, FS-655

Report Organization

This report is organized in five sections:

- The **introductory section** provides an overview of the study purpose and need for this type of research.
- **Section two** provides background and information on federal policies related to wildfire and community assistance.
- **Section three** is a summary of research methods and a synopsis of available data and data limitations.
- **Section four** includes findings that indicate it is essential to address the needs of poor communities in wildland urban interface and inhabited wildland areas. The mapping component of this study (included within the findings) presents a visual, geographically oriented picture of some risk indicators, using the best available data and Geographic Information System mapping.
- **Section five** includes recommendations for future efforts: to examine the role that socioeconomic factors and community capacity play in community wildfire risk, to assist federal agencies and other institutions in understanding the role that social and economic information play in wildfire-related programs, to strengthen national wildfire programs, and to build a record of accountability through improved monitoring of federal agencies' activities to serve communities at high risk to wildfire.

II. BACKGROUND AND POLICIES

To assess how well the federal government is serving communities at highest risk from wildfire, it is essential to understand the current policies and programs related to wildfire and community assistance. The following section provides an overview of the history of federal land management service to rural communities and the current federal government policies that prioritize limited wildfire funds and assistance. These policies provide assistance in the management of wildland fire funds, the reduction of hazardous fuels on both public and private lands, planning for community wildfire protection, and business assistance for forest restoration related businesses.

History of Federal Agency Cooperation with Rural Communities

The responsibility of federal land management agencies to neighboring rural communities has long been recognized by the federal government. Among the federal land management agencies, the U.S. Forest Service has the richest history and most legislative support for its cooperative work with private landowners and rural communities. In addition to technical assistance to private landowners, the Forest Service responsibility to and mutual interests in adjacent rural communities have been recognized over the years in many different areas. They include the impact of federal land ownership on county and state revenues; a mutual interest in fire protection; the impact of federal timber management on local communities dependant on related industries; and the cross-boundary nature of ecosystem management (forest health, wildlife populations, water resources, etc.).

The impact on adjacent rural communities that resulted from federal ownership of land was present in the minds of many as the U.S. government began establishing forest reserves in the late 1800s and early 1900s. In 1908, three years after the official establishment of the Forest Service, Congress passed the Agricultural Reapportionment Act, which directed the agency to provide 10% of all revenue from National Forests to states (this was later increased to 25% in the Weeks Act of 1911). The funds were to be used for public roads or public schools in the counties where National Forests existed. Several additional programs that compensated rural counties for “lost” tax revenues due to federal land ownership, covering many different land management agencies, were subsequently instituted. The most recent was the Roads Secure Rural Schools and Community Self-Determination Act of 2000 (PL 106 393). The purpose of the Act was to stabilize payments to counties that help support roads and schools, provide projects that enhance forest ecosystem health and employment opportunities, and encourage cooperative relationships among federal land management agencies and those who use and care about the lands the agencies manage.

One of the earliest official legislative actions to direct Forest Service work with rural communities is the 1911 Weeks Act, which was passed in support of collaborative fire suppression work. The 1924 Clark McNary Act established seedling nurseries and tree distribution on private lands. These authorities have been amended and expanded numerous times over the past century, (including the 1937 Norris—Doxey Cooperative Farm Forestry Act and the 1950 Cooperative Forest Management Act). The Cooperative Forestry Assistance Act of 1978 repealed and replaced many of these earlier separate pieces of legislation and consolidated a broad range of cooperative forestry program authorities involving fire, forest management, forest health, wood utilization, urban forestry, and organizational management assistance to state forestry agencies. The 1990 Food, Agriculture, Conservation, and Trade Act contained new authorities for economic revitalization assistance to National Forest-dependent rural communities.

Congress has determined that the protection of rural areas and rural communities from fire is of national interest, and, therefore, there is a federal responsibility to assist these communities. The current Volunteer Fire Assistance Program was originally authorized in Title IV of Public Law 92-419, "The Rural Development Act of 1972." The Act authorized funding to organize, train, and equip local fire forces to prevent, control, and suppress fires in rural areas. (Title IV was later replaced by the Cooperative Forestry Assistance Act of 1978 [CFAA]), but the substance of the program did not change.)

Over time, under the constraint of limited federal funds and tremendous needs among rural communities, the notion of targeting services to communities that are in greatest need of assistance emerged. The Rural Development Act of 1972 directs the agency to provide fire-fighting funding assistance, based on the population size of the rural fire district. Only fire districts with a population of fewer than 10,000 people are eligible for funding. The 1990 Food, Agriculture, Conservation, and Trade Act contains some of the first Congressional language for land management agencies to direct assistance to rural communities "in greatest need." Economic revitalization assistance under this Act is prioritized specifically to "economically disadvantaged communities." Recent attempts to prioritize assistance and federal fire prevention to those "in greatest need" under the National Fire Plan created the Wildland Urban Interface (WUI) definition, utilizing the proximity of communities to wildland vegetation and population density as measurements of need. The Healthy Forest Restoration Act of 2003 expanded the concept slightly to allow communities to define local areas that fall within the WUI.

Federal Wildfire Planning Policy

In 2000, an especially severe wildfire season spurred a national focus on the health of the nation's forestlands that resulted in increased legislation and planning to improve ecosystem health and reduce risk from wildfires. The various national plans, strategies, and legislation place a high emphasis on protecting "at-risk" communities, community collaboration, community assistance, and public participation. Legislative authorities and funding for these various national plans come primarily through annual appropriations bills. The following section summarizes the most significant federal efforts and highlights their community-based aspects.

National Fire Plan

The report *Managing the Impacts of Wildfire on Communities and the Environment: A Report to the President in Response to the Wildfires of 2000*, the National Fire Plan (NFP), was issued in October 2000 as the administration's response to a severe wildfire season. The plan's key elements include 1) "integrated fire-fighting management and preparedness; 2) reducing hazardous fuel accumulations; and 3) local community coordination and outreach." The five-part plan calls for supporting fire-fighting resources, restoring landscapes and rebuilding communities damaged by fire, treating forests through thinning and prescribed fire to reduce the future risk of fire, working with communities to restore fire-damaged landscapes and reduce fire risk, and creating a Cabinet-level coordinating team to be accountable for carrying out the plan.

Community well-being, safety, and involvement are significant concerns represented in the nine operating principles that guide NFP implementation within the Forest Service (USDA Forest Service 2000b). Fire-fighting and risk reduction, particularly within "at risk" communities adjacent to federal lands, are prioritized, as well as assisting state and local partners to take actions to reduce fire risk to homes and private property through education/outreach efforts. Activities to reduce hazardous fuels are given highest priority in and around "communities at risk". Community

collaboration is expressly mentioned in two of the nine operating principles in terms of planning for the desired future conditions of national forests and getting the hazardous fuels reduction work done on the forests. The operating principles include an economic development mandate for encouraging new stewardship industries.

Congress allocates funding for the NFP through annual appropriations bills in the form of increased budgets to existing relevant Forest Service programs and additional emergency funding. The specific programs and budget areas related to community wildfire protection are described in Appendix D.

Ten-Year Comprehensive Strategy

A key tenet of the National Fire Plan is coordination between government agencies at the federal, state, and local levels to develop strategies and carry out programs. Building from this basis for cooperation, in the FY 2001 Interior and Related Agencies Appropriations Act, Congress directed the Secretaries of Agriculture and the Interior to work with state governors and other stakeholders on developing the *10-Year Comprehensive Strategy – A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment*.

The 10-Year Strategy, which was completed on August 13, 2001 and endorsed by the Western Governors' Association, the National Association of Counties, and the National Association of State Foresters, generally supports the goals of the National Fire Plan. Central to its development were the following objectives:

- Reduce risk to communities and the environment from wildland fires for the long-term.
- Promote a collaborative, community-based approach to address wildland fire issues that recognizes the importance of making key decisions at the local level.
- Support the primary goals of the National Fire Plan: improve prevention and suppression, reduce hazardous fuels, restore fire-adapted ecosystems, and promote community assistance.
- Hold the core guiding principles of collaboration, priority setting, and accountability.

Healthy Forest Restoration Act

The Healthy Forest Restoration Act (HFRA) was passed by Congress and signed into law in 2003. The Act includes streamlined procedures for certain forest management projects and authorizes funding for grant programs and research related to forest health and biomass energy. Title I of the legislation focuses on fuels reduction projects on federal lands, with the express purpose of reducing the wildfire risk to communities, as well as municipal water supplies and other at-risk federal lands. The Title specifies guidelines for planning, prioritizing, and implementing hazardous fuel reduction projects. It requires the U.S. Forest Service and the Bureau of Land Management to spend half of the authorized funding for hazardous fuels reduction projects in the Wildland Urban Interface (WUI). It also directs the agencies to prioritize funds to communities that have adopted a community wildfire protection plan or have taken proactive measures to encourage landowners to reduce fire risk on private land.

Federal Emergency Management Agency (FEMA) Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 is administered by the Federal Emergency Management Agency (FEMA) and reinforces the importance of pre disaster mitigation planning. In February 2002, FEMA published an Interim Final Rule (see 44 CFR Part 201), which specified criteria for state and local hazard mitigation planning and required all states to develop and adopt by November 2004

Natural Hazard Mitigation Plans (NHMPs) that meet the FEMA criteria to maintain eligibility for certain categories of federal disaster assistance. In addition, local and tribal governments must develop and adopt NHMPs that meet FEMA standards to be eligible for certain hazard mitigation grant funding programs. These plans may be for a single jurisdiction or county, or they may be multi-jurisdictional. FEMA requires that all jurisdictions adopt the NHMP and that the NHMP address the specific natural hazard risks and needed actions for each jurisdiction. Activities eligible for funding include management costs, information dissemination, planning, and technical assistance.

Tribal Forest Protection Act

President George W. Bush signed H.R. 3846, the Tribal Forest Protection Act of 2004, into law in the summer of 2004. The law establishes a process for tribes to work with federal agencies to reduce the threat of catastrophic wildfire on federal lands adjacent to tribal lands. The bill is intended to improve the ability of tribes and federal agencies to protect tribal lands by addressing fire, insect infestation, and other threats on federal lands. To do so, the Forest Service and the Bureau of Land Management would be permitted to contract with tribes to undertake those projects. The bill complements the objectives of the Healthy Forest Restoration Act of 2003 for reducing wildfire risk across lands of multiple ownerships and jurisdictions and includes a preference for tribal participation on federal lands neighboring reservation trust lands.

Federal Prioritization for Wildfire Treatments and Assistance

The federal government, recognizing there are only limited resources for hazardous fuels reduction, forest restoration, and wildfire fighting assistance, has made various attempts to prioritize the distribution of funds available for these activities. One of the nine operating principles directed by the chief in implementing the National Fire Plan states that the agencies will “assign highest priority for hazardous fuels reduction to communities at risk, readily accessible municipal watersheds, threatened and endangered species habitat, and other important local features, where conditions favor uncharacteristically intense fires.” The associated 10- Year Comprehensive Strategy includes an objective to “reduce risk to communities and the environment from wildland fires for the long-term,” stating that the “initial emphasis is on protecting communities and municipal and other high priority watersheds at risk.”

Shortly after the drafting of the NFP, in Title IV of the FY 2001 Appropriations Act for the Department of the Interior and Related Agencies (Public Law 106-291), Congress directed the Departments of Interior and Agriculture to identify “communities within the vicinity of Federal lands that are at high risk from wildfire.” States and tribes submitted lists of communities, and a comprehensive national list was published in the Federal Register on January 4, 2001 [Volume 66, Number 3].² The states and tribes received little guidance or criteria to use in drafting the lists, resulting in substantial confusion and uncertainty about the methodology used to generate them. Consequently, the lengthy list of communities appears to be relatively unused in present-day agency decision making.³

² A subsequent community list was published in the Federal Register / vol. 66, no. 160 / Friday, August 17, 2001.

³ In June 2003, the National Association of State Foresters directed states to identify and prioritize communities at risk; this was done as a follow-up to the Federal Register list of Communities at Risk developed in 2001 (National Association of State Foresters). NASF recommended four criteria to accomplish this: risk, hazards, values, and protection capability.

The same Federal Register notice contained a definition of “urban wildland interface” communities.⁴ *“The wildland interface community exists where humans and their development meet or intermix with wildland fuel.”* The federal register goes on to identify three categories of communities that meet this description and states that federal agencies will prioritize assistance to categories one and two.

Category one, the interface community *“exists where structures directly abut wildland fuels. There is a clear line of demarcation between residential, business, and public structures and wildland fuels. Wildland fuels do not generally continue into the developed area. Development density for an interface community is usually 3 or more structures per acre, with shared municipal services. Fire protection is generally provided by a local fire department with the responsibility to protect the structure from both an interior fire and an advancing wildland fire. An alternative definition of the interface community emphasizes a population density of 250 or more people per square mile.”*

Category two, the intermix community, *“exists where structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres. Fire protection districts funded by various taxing authorities normally provide life and property fire protection and may also have wildland fire protection responsibilities. An alternative definition of intermix community emphasizes a population density of between 28-250 people per square mile.”*

The Healthy Forest Restoration Act (HFRA) uses the Wildland Urban Interface (WUI) concept to prioritize assistance to “at-risk” communities. HFRA requires that at least 50% of the dollars allocated to hazardous fuels reduction projects be used to protect areas adjacent to communities “at risk of wildland fire.” HFRA defines “at risk community” as an area that is comprised of a wildland urban interface community as defined in the federal register or as “a group of homes and other structures with basic infrastructure and services (such as utilities and collectively maintained transportation routes) within or adjacent to Federal land; in which conditions are conducive to a large-scale wildland fire disturbance event; and for which a significant threat to human life or property exists as a result of a wildland fire disturbance event” (HFRA 2003 and USDA Forest Service and US Department of Interior, Bureau of Land Management 2004).

HFRA defines the wildland urban interface as an area within or adjacent to an at-risk community that is identified in a community wildfire protection plan; or, in the case of an area for which a community wildfire protection plan is not in effect, an area extending 0.5-miles from the boundary of an at-risk community; an area within 1.5 miles of the boundary of an at-risk community, including any land that: (1) has a sustained steep slope that creates the potential for wildfire behavior endangering the at-risk community; (2) has a geographic feature that aids in creating an effective fire break, such as a road or ridge top; or (3) is in condition class 3, as documented by the Secretary in the project-specific environmental analysis; or 4) an area that is adjacent to an evacuation route for an at-risk community that the Secretary determines, in cooperation with the at-risk community, requires hazardous fuel reduction to provide safer evacuation from the at-risk community (ibid).

Discussions with federal agency personnel and a review of the federal agency performance measures for wildland fire indicate that the Wildland Urban Interface (WUI) concept is how agencies are currently defining “at-risk” communities in an effort to prioritize scarce federal resources for wildland fire projects and protection. However, the precise methodology used to determine areas within the WUI among different land management agencies is not well defined.

⁴ The Federal Register uses a definition modified from “A Report To the Council of Western State Foresters--Fire in the West--The Wildland/Urban Interface Fire Problem,” dated September 18, 2000.

III. RESEARCH METHODS

This study examines the relationship between wildfire and community risk through the concept of community capacity. For purposes of this research (and because of limited data), two indicators were used as a first step to measure community capacity as it relates to wildfire: (1) socioeconomic elements that influence a community's ability to respond to and recover from wildfire and (2) protection capability - systems that are in place that influence a community's ability to protect itself from an actual wildfire. As previously stated, a true assessment of community capacity would include a much broader array of social and cultural information; however, this information was not readily available at the time that this research was undertaken. The research also attempted to analyze federal resource allocation in conjunction with data indicating relative risk. To examine these issues, the project team conducted background research to identify indicators and nationally consistent data for each element of the project. The team also facilitated internal and external data review, mapped indicators once data had been collected, and reexamined and reported findings through the mapping process.⁵

To illustrate the study elements, we sought data to use as indicators of community capacity and wildfire risk. This process was iterative, investigating potential datasets, summarizing the benefits and drawbacks of each, and obtaining feedback from an advisory committee. We also presented preliminary findings of the study at two community meetings in southern Oregon and central Oregon.

In general, research indicated a lack of available data to represent many of the elements this study intended to examine. This section provides a description of the data we initially sought to examine community capacity, wildfire risk, and federal resource allocation. It includes the limitations of the best available data, and a summary of how we use the data in this study.

National-Level Data

This report is a national-level analysis that seeks to provide information on a national scale. The spatial information included in this report is provided at the county and census-block levels. Therefore, the visual analysis is, in many cases, more meaningful on a state level. Consequently, the researchers have included more detailed maps and analysis for the states of Washington and Oregon, as state-level examples.⁶ The maps and analysis shown for these two states are also available, upon request, for other states.

This study focuses on national-level data to understand how well underserved populations are being reached through federal fire programs nationwide. Decisions about agency funding and program direction are made at the national level by Congress and agency leadership. To make informed decisions and hold the agencies accountable for these decisions, information must be available at this level to assist these decision makers.

Identifying indicators that provide consistent and meaningful information for a nationwide study became the first challenge. Although some poverty data exist on a national scale (from the Census

⁵ See Appendix C of this report for a summary of the review process

⁶ These states were chosen as examples based initially on several factors: 1) Forest Service Region 6 (OR and WA) had a level of information on NFP grants that was not available for other states, and 2) fire protection capability data were available for the state of Washington and not for other states.

and Department of Housing and Urban Development), it was more difficult to find consistent national data on community capacity, protection capacity, wildfire risk, and federal resource allocation. The researchers encountered major challenges in finding spatial data, especially in a format conducive to national-level modeling. Specifically, there is a lack of suitable data in the areas of: (1) community capacity/protection capability (2) ecological conditions on federal lands/populated areas at risk from wildfire; and, (3) federal resource allocation.

In conducting research about communities, social science generally recognizes the need to combine secondary data with primary data gathered at the community level (Donoghue and Sutton, forthcoming). Applying national data to community-oriented research issues is not ideal because it does not adequately capture local needs and issues. For example, local and regional agencies and organizations may have more resources to invest in risk assessment or collecting data on local poverty and capacity issues. To mitigate this limitation, we used datasets that were reliable at the census block, or, at the very least, county level. Recognizing that the finer analysis of these issues is more reliable, the project team developed recommendations to use the principles of this study at the local level in risk assessment and community fire planning (see recommendations section).

The aim of this study is to understand wildfire and poverty at a national level. Because of the nature of a national-level analysis, this research uses data relevant to place-based communities. A regional or national mapping approach, or one using geopolitical boundaries, may leave out specific types of communities, such as mobile workers and people living in unincorporated areas. The study does use some local data from Oregon and Washington on National Fire Plan grant allocation, as well as the national-level data on wildfire, poverty, and federal land ownership within these two states. In a local-level analysis, using state specific-data on risk, poverty, and other indicators would result in a more precise understanding of the relationship between wildfire, capacity, and poverty.

New efforts are currently underway within the federal land management agencies to compile spatial information regarding both ecological wildfire risk and federal government resource allocation. The Landscape Fire and Resource Management Planning Tools Project, or LANDFIRE Project, is intended to provide the spatial data and predictive models needed by land and fire managers to prioritize, evaluate, plan, complete, and monitor fuel treatment and restoration projects essential to achieving the goals targeted in the National Fire Plan. In addition, in June 2003 the National Association of State Foresters directed the states to identify and prioritize communities at risk.

As states complete these assessments and as many communities collect new data and conduct assessments as part of community wildfire protection plans, a growing level of data on wildfire risk is becoming available nationwide. This reinforces the need for communities to understand the principles behind the data explored in this study and to utilize appropriate locally available data in community efforts for risk assessment and planning. This report makes recommendations to ensure that the data collected and utilized for these purposes include social and economic factors (in addition to ecological measures).

Indicators and Data

The following section provides information about the purpose of each indicator, the data initially sought, the limitations encountered, and the data ultimately selected.

1. Community Capacity

Examining community capacity requires understanding a complex set of issues and indicators that are not easily summarized by a single set of data. Below, we explain the purpose for using the concept community capacity, existing definitions of community capacity found in published research, the limitations we encountered in identifying data, and the indicators we ultimately chose for this research.

Purpose

Community capacity can be used to assess the relative risk that a community faces from wildfire. Well defined, community capacity will provide the social information to tell us which communities are at a greater risk -- less ready to protect themselves from wildfire, and less able to recover from the impacts of a fire. Understanding the capacity of a community to address the economic, social, and environmental costs of wildfire will lead to more directed policies and programs and a more efficient use of resources. Following are two definitions of capacity that we used to help frame the study and the indicators we sought to use for the research.

- Kusel (1996) defines community capacity as “the collective ability of residents to respond...to external and internal stresses; to create and take advantage of opportunities; and to meet the needs of residents, diversely defined”.
- A response by American Forests to the 2001 Federal Register notice *Urban Wildland Interface Communities within the Vicinity of Federal Lands that are at High Risk from Wildfire*, defines community capacity as the collective ability of residents in a community to respond to external and internal stresses, to create and take advantage of opportunities, and to meet local needs. Community capacity in relation to wildfire addresses a community’s ability to mitigate wildfire threats, respond to active wildfire, and mitigate post fire damage. This includes the ability to implement risk-reduction strategies, including hazardous fuels reduction, firefighting, and restoration activities (American Forests 2001).

Limitations

This research encountered limitations in determining the methodology to measure community capacity and accessing suitable datasets for such measurements. There are methods to measure (or map) community capacity at a local level by identifying physical, financial, organizational, and cultural assets and vulnerabilities (McKnight and Kretzmann 1996). It is more difficult, however, to measure community capacity or social, human or physical capital with secondary data (Donoghue and Sutton, forthcoming) or indicators of community capacity that can be used comparatively across a national scale.

In addition, no previous attempts to measure community capacity in the context of wildfire were found in the course of this study. Determining an established method to measure community capacity on a national scale in the context of wildfire was beyond the scope of this research. Nevertheless, developing such a method would be useful for future efforts to understand these elements.

Data Selected

The scope of this research led us to focus on two elements of community capacity: socioeconomic elements that influence a community’s ability to respond and recover from wildfire, and protection capability – systems that are in place that influence a community’s ability to protect itself from an actual wildfire. We use national poverty data as a reflection of socioeconomic status. We use data that measure the fire-fighting protection capabilities of fire districts to indicate protection capability.

Poverty

Data used:	Housing and Urban Development Income Limits
Date:	2003
Produced by:	Department of Housing and Urban Development
Purpose:	To illustrate earnings and employment data, median family income data, and fair market rents
Resolution/Spatial Characteristics	1: 100,000

The study uses 2003 Housing and Urban Development (HUD) Income Limits, at a comparable census block group level, as the primary layer for poverty. HUD Income Limits reflect income, earnings and employment, and housing affordability. The Median Family Income Limit estimates are based on the U.S. Census Bureau median family income estimates with an adjustment using a combination of earnings and employment data, median family income data, and fair market rents. Data are available nationally. HUD Income Limits describe family sizes of one to eight persons, and a formula is provided to calculate income limits for larger family sizes. Income limits are adjusted for family size and areas with unusually high or low family income or housing-cost-to-income relationships (Housing and Urban Development). Income limit groups include:

- Low income: families whose incomes do not exceed 80 percent of the median family income for the area,
- Very low income: families whose incomes do not exceed 50 percent of the median family income for the area,
- Very, very low income: families whose incomes do not exceed 30 percent of the area median income.

Although some studies use census data on the federal poverty level, background research indicated that a more comprehensive poverty indicator would provide more information on the financial capacity of an individual. We identified 185% of the federal poverty level as an indicator commonly used by social service programs (such as the federal food stamps program) to determine eligibility for federal assistance. We compared HUD Income Limits with various percentages of the federal poverty level, as shown in Table 1 below. Based on this comparison, we chose to use the very low-income limit category (50% median family income) and the very, very low-income limit category (30% median family income) as the primary poverty data for this study. All maps produced for the report use the 50% median family income). Some illustrate the 30% median family income category.

Table 1. Poverty Guidelines and HUD Income Limits Compared

Poverty Guidelines		HUD Income Limits (Douglas County, OR)	
<i>Family of 1</i>		<i>Family of 1</i>	
Poverty Guideline	\$8,980	Very, very low income limit	\$9,600
185% Poverty Guidelines	\$16,613	Very low income limit group	\$16,000
200% Poverty Guidelines	\$17,690	Moderate income limit group	\$ 25,600
<i>Family of 4</i>		<i>Family of 4</i>	
Poverty Guidelines	\$18,400	Very, very low income limit	\$ 13,700
185% Poverty Guidelines	\$34,040	Very low income limit group	\$ 22,850
200% Poverty Guidelines	\$36,800	Moderate income limit group	\$ 36,550

Source: US Census Bureau, 2003 and US Department of Housing and Urban Development (HUD), 2003.

Limitations of the dataset

Project partners did not find significant limitations with this dataset. During the review process of possible poverty indicators, project partners and advisors agreed that the HUD Income Limits were a good indicator for this study because they provide a more comprehensive dataset than looking only at the federal poverty level. The Income Limits are available nationally and can be used down to the census-block level.

Protection Capability

Data used:	Fire Hazard Ratings
Date:	2004
Produced by:	Washington State Independent Rating Bureau
Purpose:	Illustrate protection capability (high, medium, low and no fire response capabilities)
Resolution/Spatial Characteristics	

Fire Hazard Ratings

This report utilizes fire hazard ratings, used by both public and private sector organizations around the nation, as indicators of the capabilities of fire districts to protect their communities from wildfire. The Fire Suppression Rating Schedule is a common method used by the insurance industry in reviewing the firefighting capabilities of individual communities. The schedule measures the major elements of a community's fire suppression system and develops a numerical grading called a "Public Protection Classification." Ten percent of the overall grading is based on how well the fire department receives and dispatches fire alarms. Fifty percent of the overall grading is based on the number of engine companies and the amount of water a community needs to fight a fire. Forty percent of the grading is based on the community's water supply, which focuses on whether the community has sufficient water supply for fire suppression beyond daily maximum consumption.

This report uses data from the Washington State Independent Fire Hazard Rating Bureau to assess the relationship between fire hazard ratings, poverty, and potential wildfire risk. The Washington State Rating Bureau provides data for all of the fire protection ratings for fire districts in Washington State. The Rating Bureau uses a 1-10 system for rating each fire district. This study synthesized these ratings into 5 categories:

- 1-4: High Fire Response Capability and Water Supply
- 5-7: Medium Fire Response Capability and Water Supply
- 8b: High/Medium Fire Response Capability and No Water Supply
- 8-9: Low Fire Response Capability and No Water Supply
- 10: No Fire Response Capability and No Water Supply

There were no districts with the 8b rating in wildfire-prone areas, so this study illustrates High, Medium, Low, and No Fire Response Capability.

Limitations of the Dataset

Data exist for fire departments throughout most of the nation through the Insurance Services Office. However, we were unable to obtain these data because of privacy concerns. States that use an independent rating system include Hawaii, Idaho, Louisiana, Mississippi and Washington.

The fire hazard rating is only an indicator of *structural* fire protection. Wildland fire capabilities of a community are not represented by these fire hazard ratings. Finally, there are many communities throughout the nation that are outside of a tax-based fire district. These areas, sometimes identified as “unprotected,” may be without structural fire protection and consequently have no rating about the level of protection capability applied to their community.

2. Ecological Risk/ Populated Areas at Risk from Wildfire

Purpose

The research intended initially to examine ecological wildfire risk – the likelihood of fire occurring in different areas and the potential damage such a fire would pose -- through spatial data that would indicate, on a national level, the relative risk status of wildlands across the country. This indicator was intended to provide information about the ecological condition of lands. When it became apparent that there was insufficient consistent and up-to-date data on the ecological conditions of lands, we focused the study on the potential risk of fire to populated areas.

This study focuses on two distinct elements of the Forest Service study and data on wildland urban interface. The first data set that we examine is the *Wildland Urban Interface* as defined above. The second set of data that we use is the *Wildland Intermix* – less densely populated areas in wildlands, which enabled the study to include significant portions of inhabited land in areas vulnerable to wildfire.

Limitations

There are a few national-level attempts to characterize ecological wildfire risk at a landscape level, including the Forest Service Fire Regime Condition Class System. Limitations related primarily to the coarse scale of the data, which makes them unsuitable for fine scale analysis, such as county or census block, led to their exclusion as datasets from this study. Researchers also considered the Federal Register list of “at risk” communities. However, as discussed earlier, the Federal Register list of “at risk” communities is not considered a reliable source of information about the level of actual risk in any area. After considerable review, the researchers concluded that federal agencies currently

lack the information necessary to determine the ecological risk from fire at a scale usable for a national analysis of community-scale conditions.

Data Selected

Data used:	Wildland Urban Interface and Inhabited Wildlands (Wildland Intermix) data
Date:	2000
Produced by:	USDA Forest Service North Central Research Station – Wildland Urban Interface (WUI) (University of Wisconsin, Madison, Silvis Research Lab) http://www.silvis.forest.wisc.edu/pubs.asp
Purpose:	To illustrate populated areas (urban and rural) at risk to wildfire
Resolution/Spatial Characteristics	1: 100,000

To illustrate areas with potential wildfire risk, this study uses data collected in a research effort led by the USDA Forest Service North Central Research Station – Wildland Urban Interface (WUI) (University of Wisconsin, Madison, Silvis Research Lab).⁷ The WUI is determined by overlaying the National Land Cover Dataset (NLCD) to assess “wildland vegetation” and Census of Housing data to determine residential housing density. These maps illustrate the location of the WUI in 2000.⁸ The definition used to map the WUI originated in the Federal Register report (2001, 66:751) on WUI communities at risk from fire (USDA and USDI, 2001), and Teie and Weatherford’s report (2000) to the Western Governors’ Association on WUI fire risk. The Forest Service study maps two types of WUI: intermix and interface. Intermix WUI are areas where housing and vegetation intermingle; interface WUI are areas with housing in the vicinity of contiguous wildland vegetation.⁹

Housing density information was derived from U.S. census data. Analysis was conducted at the finest demographic spatial scale possible, census blocks, from the 2000 census. All measures of housing density are reported as the number of housing units per square kilometer. The analysis used the National Land Cover Dataset (NLCD), a satellite data classification produced by the United States Geological Survey (USGS) with 30m resolution based on 1992/93 imagery and available for the entire United States (Vogelmann et al. 2001) to identify “wildlands”. The definition of

⁷ Because we began this project in 2004, we have continued to use Version 1 of the study data, which uses housing densities from the year 2000 and National Land Cover Data from 1992/1993. Version 2, which is currently available, uses these data sets but also includes reconfigured housing data for 1990 to provide an opportunity to compare changes with the 2000 housing density data. When the 2001 National Land Cover data are available nation-wide and the WUI data/classifications are re-assessed, the maps from this study could be updated.

⁸ WUI is composed of both interface and intermix communities. In both types of communities, housing must meet or exceed a minimum density of one structure per 40 acres (16 ha). Intermix communities are places where housing and vegetation intermingle. In intermix communities, wildland vegetation is continuous, with more than 50 percent vegetation, in areas with more than 1 house per 16 ha. Interface communities are areas with housing in the vicinity of contiguous vegetation. Interface areas have more than 1 house per 40 acres, with less than 50 percent vegetation, and are within 1.5 miles of an area (made up of one or more contiguous census blocks) over 1,325 acres (500 ha) that is more than 75 percent vegetated. The minimum size limit ensures that areas surrounding small urban parks are not classified as interface WUI.

⁹ Using geographic information systems (GIS), the University of Wisconsin study integrated U.S. Census and United States Geological Survey National Land Cover Data, to map the Federal Register definition of WUI (Federal Register 2001, 66:751).

“wildlands” encompasses a range of management intensities. NLCD classes that are included as “wildlands” are forests (coniferous, deciduous, and mixed), native grasslands, shrubs, wetlands, and transitional lands (mostly clear-cuts). Excluded are orchards, arable lands (e.g., row crops), and pasture.

The California Fire Alliance (2001) defined "vicinity" as all areas within 1.5 mi (2.4 km) of wildland vegetation, roughly the distance that firebrands can be carried from a wildland fire to the roof of a house. It captures the idea that even those homes not sited within the forest are at risk of being burned in a wildland fire. This buffer distance is used to identify interface areas.

3. Federal Ownership and Poverty

Purpose

Because of the limitations for examining ecological fire risk in relation to populated areas, the project researchers decided to examine low-income communities in areas adjacent to federal land. We include federal land ownership to see how poverty relates to public land. This data layer was added after researchers realized the significant degree to which socioeconomic information was excluded from federal agency decision making. The use of this indicator is intended to show the relationship of social information to federal land management.

Limitations

The dataset had no known limitations. However, limitations emerged about how to use the federal land ownership data in combination with the poverty data. To produce numerical results, the authors had to select a proximity to federal lands in which to measure poverty. To determine proximity to public land, we reviewed literature on demographics and community well-being in the Wildland Urban Interface and on public lands. In a study of socioeconomic trends for communities in the Northwest Forest Plan Region, 1990 to 2000, E. Donoghue and N.L. Sutton utilize proximity as a way to illustrate some of the relationships between communities and forests. After testing buffers of five miles and ten miles and discussion with Forest Service managers, they chose a five-mile buffer to represent proximity.¹⁰ Based on their research, we adopted a five-mile buffer to explore the relationship between federal land and poverty.

Data Selected

Data used:	Federal land ownership boundaries
Date:	2002
Produced by:	ESRI
Purpose:	To illustrate poverty in populated areas adjacent to federal land
Resolution/Spatial Characteristics	1: 100,000

¹⁰E. Donoghue and N.L. Sutton, “Socioeconomic Conditions and Trends for Communities in the Northwest Forest Plan Region, 1990 – 2000,” Chapter 2, vol. 3, *Northwest Forest Plan: The First Ten Years, Socioeconomic Monitoring Results*, ed.S. Charnley.(Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, forthcoming).

Federal land ownership data include lands owned by USDA Forest Service, DOI Bureau of Land Management, Bureau of Indian Affairs, National Parks Service, and Fish and Wildlife Service, as well as Department of Energy, Department of Defense, and Bureau of Reclamation, among others. Data are from ESRI Data and Maps.

4. Federal Resource Allocation

Purpose

Initially, this study intended to include data detailing all federal expenditures under the National Fire Plan, including grants to communities and hazardous fuel reduction projects on private and public lands and spatial information that would indicate where the activities took place. These data would provide a roadmap to track where federal funding was being spent, which would allow researchers to examine these data with the data layers indicating capacity and wildfire risk. The combination of these layers would provide information about how well the federal agencies were serving the areas most at risk from wildfire.

Limitations

The paucity of spatial data on federal grant allocation and hazardous fuels reduction projects became a major limitation for achieving the study's goals to examine how well federal agencies are currently serving communities most at risk from wildfire due to socioeconomic factors. The project team contacted each Forest Service region to identify data availability. The majority of the regional offices had no data at all or did not have data available in a format conducive to mapping or tracking National Fire Plan resource allocation. Region 6 did provide a multi agency database that detailed assistance grants provided to communities with National Fire Plan funds. Although Region 6 provided the only data on allocation of National Fire Plan grants, the database lacked information about project locations and outcomes. Most grants did include location information (latitude/longitude) for the grant applicant, but did not necessarily provide where the grant funds were actually expended. When the grant applicant was a state or regional agency applying on behalf of a local community, there were no specific data to identify the communities that actually benefited from the grant.

The Region 6 database also lacked information about specific project outcomes or benchmarks (e.g., acres treated for fuels reduction, jurisdictions involved in planning or education, scope of utilization efforts). Without understanding how a grant benefits a community, it is difficult to assess whether the community is receiving services and increasing its protection.

The project team explored the National Fire Plan Operations and Reporting System¹¹ (NFPORS) database as a source for federal fuels reduction projects and grant-tracking information but was informed that location information for Forest Service projects was not currently available. NFPORS

¹¹ The National Fire Plan Operations and Reporting System (NFPORS) is an interagency system designed to assist field personnel in managing and reporting accomplishments for work conducted under the National Fire Plan. NFPORS was developed after the National Fire Plan was put in place. The primary purpose for NFPORS was implementation/accomplishment tracking of the National Fire Plan, including hazardous fuels reduction (including reduction accomplished with other funds not associated with the "fire" program), wildfire burn area restoration and rehabilitation, and community assistance programs. NFPORS does not track fuels data (tons/acre). <http://www.nfpors.gov>

is the official reporting system for all hazardous fuels reduction activities for the Department of Interior (DOI) and the USDA Forest Service. The National Interagency Fire Center provided data on interagency fuels treatment projects from 2003 and 2004. Data were broken down by acres treated and by agency. Agencies in this report include the Bureau of Land Management, Bureau of Indian Affairs, National Parks Service, and Fish and Wildlife Service. Latitude/longitude data for each treatment areas are derived from NFPORS. These data illustrate the number of projects and acres treated from the National Fire Plan Operation and Reporting System. However, reviews with agency personnel raised serious questions about the accuracy of the location information contained in this dataset. Because of the limitations of the DOI data, the authors decided not to use the data at this time.

In the course of this research, we found no current source of information for an accounting on a national basis of dollars spent and/or acres treated with reliable location information. Without consistent or complete data on where the grants have been allocated and projects completed, it is not possible to provide clear findings about these service provisions. To address the limited data on grant and resource allocation through the National Fire Plan, this report provides specific recommendations about monitoring and evaluation of federal grant allocation and hazardous fuels reduction efforts.

Data Selected

Data used:	Region 6 (Oregon and Washington) National Fire Plan Grant data
Date:	2003 and 2004
Produced by:	Region 6 USDA Forest Service and Bureau of Land Management
Purpose:	To illustrate location and type of grants allocated to communities in Oregon and Washington through the National Fire Plan
Resolution/Spatial Characteristics	Latitude/longitude in decimal degrees (+/- 0.000001 degree)

National Fire Plan Grants

National Fire Plan data for Region 6 are available in a multi-agency database (projects funded by BLM, Bureau of Indian Affairs, USDA Forest Service, and Fish and Wildlife Service). They include zip code and latitude/longitude information for each grant, based on the location of the grant recipient, and a designation for the type of project funded (fuels reduction, fire prevention, planning and education, small-diameter marketing and utilization). Because of the limitations of the grants data, the decision was made not to analyze the data numerically. This report does include maps that illustrate the allocation of National Fire Plan Community Assistance grants in Oregon and Washington in comparison with poverty and WUI and Inhabited Wildland areas.

Table 2 summarizes the data layers identified for each project element, including community capacity (poverty and protection capability), populated areas at risk from wildfire, federal land ownership, and federal resource allocation.

Table 2. Summary of Mapping Elements

Indicators	Layer	Data Availability	Source
1. Community capacity	Poverty	<ul style="list-style-type: none"> Housing and Urban Development Income Limits (HUD) census block group (national data) Median family income Earnings and employment Fair market rent 	HUD - http://socds.huduser.org/chas/index.htm
	Protection capability	<ul style="list-style-type: none"> Fire hazard rating by fire district (<i>Assessment of community fire suppression systems, fire departments, and community water supply.</i>) 	Insurance Services Office http://www.isomitigation.com/fire5.html DATA NOT AVAILABLE
		<ul style="list-style-type: none"> Independent State Fire Hazard Ratings for Washington (<i>also in Hawaii, Idaho, Louisiana and Mississippi</i>) 	http://www.isomitigation.com/rpc1.html
2. Populated areas at risk from wildfire	Wildland Urban Interface designation	<ul style="list-style-type: none"> National data - Wildland Urban Interface and Inhabited Wildlands 	Forest Service NCRS/University of Wisconsin
3. Federal ownership	All federal land	<ul style="list-style-type: none"> National data (<i>Dept. of Interior, Bureau of Land Management, Bureau of Indian Affairs, National Parks Service, Fish and Wildlife Service, Dept. of Agriculture, Department of Energy, etc.</i>) 	ESRI Data and Maps
4. Federal resource allocation	National Fire Plan grants and interagency fuels treatment data	<ul style="list-style-type: none"> NFP grants for OR and WA, 2002, 2003, and 2004 (<i>Project type, location, amount funded, and agency funding source</i>) 	Region 6 Forest Service - http://www.fs.fed.us/r6/fire/
		<ul style="list-style-type: none"> National Interagency Fuels Treatment Data, 2003 and 2004 (<i>treatment by agencies & acres, DOI agencies</i>) 	National Interagency Fire Center, Boise, ID

IV. FINDINGS

When we began this study, we anticipated that findings would focus on the provision of services (or gaps in services) to at-risk communities. Actual findings are considerably different from this original intent, due largely to the limited availability of data and lack of monitoring information.

Overall, the findings indicate that using national datasets to illustrate the complex social and ecological factors influencing wildfire risk is limited by the very nature of these elements. Datasets available for social and economic and ecological factors are more refined and meaningful on smaller scales. Locally specific data and information provide a better indication of the relationship between wildfire and poverty and how well services for fire protection are being provided to at-risk communities. This is apparent in the data we reviewed, as well as from comments from public meetings held in southwest and central Oregon and through dialogue with national partners.

Despite these challenges, specific research findings include:

- 1) a slightly higher percentage of poor households in inhabited wildland areas that are not considered part of the WUI;
- 2) poor households in Washington State are more likely to be in areas with low or no fire response capabilities than are non poor households;
- 3) households in close proximity to federal lands are generally poorer than households that are further away; and
- 4) federal land management agency information about grants to communities and hazardous fuels reduction projects is insufficient to allow an analysis of areas served or improved.

The following section describes these findings in more detail.

Poverty and Wildland Urban Interface and Inhabited Wildland Areas

The first set of findings is related to the incidence of poverty in the wildland urban interface and other inhabited forested land areas. Initial analysis using the WUI dataset resulted in maps that showed a small portion of the total forested land area, particularly in the western United States. Further investigation indicated that the federally defined “*Wildland Urban Interface*” is based on residential density that excludes many inhabited forest areas. Expanding the analysis to include wildland intermix, the less densely populated areas that are not included in the WUI, which we refer to from here on as “*Inhabited Wildlands*”, allowed us to include significant portions of rural, inhabited land in areas vulnerable to wildfire.

Table 3 illustrates the percentage of households in Oregon, Washington, and nationally in WUI and Inhabited Wildland areas and compares non poor, poor, and very poor households. These percentages illustrate a trend in the Northwest and nationally of a greater number of poverty areas in inhabited wildland areas than in the states or nation as a whole, or in WUI areas or non forested areas.

Table 3. Household Location by Poverty Level and Wildland Urban Interface Designation¹²

Income Level	Location	Fire Hazard Designation			
		Overall	Not Vegetated	WUI	Inhabited Wildlands
Non Poor	National	77%	79%	81%	76%
	Oregon	79%	78%	83%	77%
	Washington	79%	79%	83%	78%
Poor	National	23%	21%	19%	24%
	Oregon	21%	21%	17%	23%
	Washington	21%	21%	17%	22%
Very Poor*	National	12%	10%	9%	12%
	Oregon	10%	10%	8%	11%
	Washington	11%	10%	8%	11%

Results from this analysis indicate that, in general, there are more households in poverty in inhabited wildland areas than there are in the Wildland Urban Interface or in areas outside of the vegetated wildlands in the rest of the state. The researchers held regional meetings to share preliminary findings with community organizations, agencies, and citizens in poor areas to examine data at a local level. These meetings reinforced the finding that the inhabited wildland areas that do not fall within the federal WUI definition are areas with a greater number of households in poverty.

The maps of Oregon, Washington, and the United States on the following pages illustrate the data described above and provide a visual representation of the relationship between wildfire and poverty. The maps illustrate HUD units where 20% of households or more are low-income households in Wildland Urban Interface and Inhabited Wildland areas.

The study maps of Oregon and Washington clearly indicate a tremendous amount of inhabited wildland, particularly in the western United States, that is not considered part of the WUI under the Federal Register definition. There is a relatively high level of poverty in the non-WUI rural areas (areas where the housing density is too low to be included in the WUI).

WUI/Inhabited Wildlands and Poverty Maps:

- **Map 1. Oregon: Wildland Urban Interface, Inhabited Wildlands, and Low-Income Areas**
- **Map 2. Washington: Wildland Urban Interface, Inhabited Wildlands, and Low-Income Areas**
- **Map 3. National: Wildland Urban Interface, Inhabited Wildlands, and Low-Income Areas**

The maps of Oregon and Washington illustrate a strong relationship between poor areas and the communities in the Inhabited Wildland areas. The national numbers support this relationship as

¹² Most of the queries included in this section are based on averages. For example, results are found by dividing the average number of households that are very low income and within the WUI by the average number of total households that fall in the WUI. All queries in this section are sourced from data described in the methodology section. USDA Forest Service conducted all of the queries in collaboration with National Network of Forest Practitioners and Resource Innovations and produced all of the maps.

well. However, more detail is evident from the national map, which illustrates that, although there may be more poverty in the inhabited wildlands in some regions, such as the western United States, other regions may have more households in poverty in the WUI, as appears to be the case in the Southeast.

If agencies are following the Federal Register definition, the strategy to prioritize WUI lands for hazardous fuels reduction work and the funding reserved for those areas means that fewer resources are being allocated in some regions to the poorest citizens in communities that may need the most assistance.

Poverty and Protection Capability

This study provides data about the level of fire district capabilities, which is only one indicator of the capacity of a community to reduce wildfire risk. This information is provided for the state of Washington.¹³

Table 4, below, illustrates the percentage of poor and non poor households in each of four fire response categories in Washington. A small area in the west-central portion of the state did not fall under a particular response category but showed that 33.1% of households are poor. Although there are low-income populations with all levels of fire protection, the map illustrates the visual relationship between the Wildland Urban Interface and Inhabited Wildland areas, as well as poverty and protection capability. In general, a higher percentage of poor households live in areas with no or low fire response capability than do non poor households.

Table 4. Washington Households, Poverty Level and Fire Protection Capability

Income Level	High Fire Response	Medium Fire Response	Low Fire Response	No Fire Response
Non-Poor	82%	85%	79%	77%
Poor	18%	16%	21%	23%
Very Poor	8%	7%	10%	12%

Map 4 illustrates the level of fire protection capability in relation to the Wildland Urban Interface and poverty data in the state of Washington. The map shows a relationship between high poverty areas that overlap with areas with limited to no protection capability.

Protection Capability and Poverty Map

- Map 4. Washington: Fire District Rating and Low-Income Areas
- Map 5. Washington: Fire District Rating and WUI/Inhabited Wildlands

Federal Land Ownership and Poverty

The data on WUI and Inhabited Wildlands provide one perspective on the relationship between poor communities and the potential impact of wildfire. After research into potential datasets and indicators, we identified a general lack of acceptance of the importance of socioeconomic factors in agency decision making about land management issues. To gain another, more general perspective on the relationship between federal land management and poverty, researchers created a federal land

¹³ Section III above provides information about data limitations, including that data were not publicly available for most of the United States through the Insurance Services Office.

ownership layer with the HUD poverty data. As mentioned in the methodology section, this study uses a five-mile buffer as the basis for proximity, as was used in a study of socioeconomic trends for communities in the Northwest Forest Plan Region, 1990 to 2000.¹⁴

The research shows the percentage of low-income households that fall within five miles of federally owned lands. Tables 5 and 6 illustrate the percentage of poor and very poor households within five miles of federally owned land and compare them to the state as a whole and to areas outside the five-mile buffer. This research indicates that households within a five-mile buffer of federal lands show higher poverty levels than households with less proximity. This finding is consistent with another recent study; Donoghue and Sutton (forthcoming). They found that a greater percentage of communities close to public lands (in the Northwest Forest Plan area) had socioeconomic scores in the lowest categories compared to communities farther away from public lands. (The proximity for their study used a 5-mile buffer.)

Table 5. Percentage of Oregon Households Within Five Miles of Federal Land

Income Level	Statewide	Inside 5-mile buffer	Outside 5-mile buffer
Non Poor	79%	78%	81%
Poor	21%	22%	19%
Very Poor	10%	10%	9%

Table 6. Percentage of Washington Households Within Five Miles of Federal Land

Income Level	Statewide	Inside 5-mile buffer	Outside 5-mile buffer
Non Poor	79%	78%	80%
Poor	21%	22%	20%
Very Poor	11%	11%	9%

Table 7. Percentage of Households Nationally Within Five Miles of Federal Land

Income Level	Statewide	Inside 5-mile buffer	Outside 5-mile buffer
Non Poor	77%	77%	80%
Poor	23%	23%	20%
Very Poor	12%	11%	10%

The following maps illustrate households within a five-mile buffer of federal lands that are generally poorer than households with less proximity to federal land.

Federal Land and Poverty Maps:

- Map 6. Oregon: Federal Land and Low-Income Households within a 5 mile Buffer
- Map 7. Washington: Federal Land and Low-Income Households within a 5 mile Buffer
- Map 8. National: Federal Land and Low-Income Households

¹⁴ E. Donoghue and N.L. Sutton, “Socioeconomic Conditions and Trends for Communities in the Northwest Forest Plan Region, 1990 – 2000,” Chapter 2, vol. 3, *Northwest Forest Plan: The First Ten Years, Socioeconomic Monitoring Results*, ed.S. Charnley.(Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, forthcoming).

Federal Resource Allocation and Grants

The original goal of this study was to examine the provision of fire-related services and resources to low-income, low capacity communities in high-risk wildfire areas. Because of limited data about actual grant and resource allocation, it is not possible to draw reliable conclusions about resource allocation in and around poor communities. Consequently, our findings are limited to the discovery that there is inadequate monitoring of NFP expenditures and program implementation at the national level to ensure the accountability of federal programs to the goals and priorities set forth in the National Fire Plan, Healthy Forest Restoration Act, and related wildfire programs.

National Fire Plan Grants

Data about fire and aviation community assistance grants obtained through the National Fire Plan office in Region 6 (Oregon and Washington), produced maps that reflect areas that have received grants that relate to the poverty data in WUI and Inhabited Wildland areas.

The limitations of these data, as described in the research methods section, above, restricted our ability to provide percentages of poor communities that have received (or benefited from) National Fire Plan grants. The points on the map illustrate where grant funds have been received, not where grants were actually expended. In some cases, grants may have been received by agencies and organizations in county seats or municipalities that have higher income levels than the more rural areas where the funds were expended. The point data also lack information on the type and amount of treatment that occurred and the extent to which fire and fuel conditions, and community capacity have changed in low-income areas.

The following maps illustrate the areas in Oregon and Washington that have received National Fire Plan grants compared with the WUI and Inhabited Wildlands and areas where 20% or more of households are very low-income (within the 50% median family income category). A map of southwest Oregon is included as an example of a more locally scaled map. As mentioned above, point data for all of the National Fire Plan grants are indicators of the locations of grant applicants, not necessarily where the grants were implemented. The data also lack an indication of how the grant funds were used, the population affected, or whether grants were successfully implemented.

Although there are limitations to these data, the visual illustration of grant allocation in relation to poverty and populated areas at risk to wildfire provides a sense of the necessity to have an accurate understanding of whether grants are being awarded to and are effective in communities with low capacity or in socioeconomic distress. The maps of Oregon and Washington illustrate a high percentage of poor communities at risk to wildfire, although they do not provide a reliable indication of whether poor communities are benefiting from the grants. However, the map of southern Oregon shows that the poorest areas in WUI and Inhabited Wildlands may not be receiving the same number of grants as non poor communities in similar areas. This map shows how similar data that are more locally accurate might help decision makers assess where the greatest need exists in areas with high risk to wildfire.

National Fire Plan Grant Maps

- Map 9. Oregon: NFP Grants, WUI, Wildland Intermix, and Low Income Areas
- Map 10. Washington: NFP Grants, WUI, Wildland Intermix, and Low Income Areas
- Map 11. Southern Oregon: NFP Grants, WUI, Wildland Intermix, and Low Income Areas

V. RECOMMENDATIONS

Due to the limited availability of data and the limitations of the existing data, we have focused our recommendations on improving federal agency understanding and use of social and economic factors through national inventory and monitoring efforts, and on increasing and improving assistance for low-income and low capacity communities.

1. Redefine the areas prioritized for federal assistance to include rural areas with lower residential density (e.g., inhabited wildlands).

Prioritize inhabited wildlands (Wildland Intermix) communities, not just WUI communities, for federal assistance. Because agencies and others are utilizing (although inconsistently) the WUI designation/definition, consider revisions to the national register definition of WUI that move beyond residential density as the determining factor.

2. Improve systems for monitoring and evaluating the National Fire Plan and other federal fire-related program implementation by including social and economic, as well as ecological, information.

Understanding the relative risk that communities face from wildfire and prioritizing restoration activities and community assistance require accessible and usable data for social, economic, and ecological factors. Federal agencies currently have an abundance of monitoring and tracking systems. However, these systems seem to be unable to produce usable information to answer questions about performance and provide information for decision making. Indeed, individual agencies are not always able to use many of the information systems they have to measure the accomplishments of their own performance measures.

We found that reliable and usable information is needed for: (1) forest and relative ecological conditions that contribute to the risk of wildfire;¹⁵ (2) fire response capability in a given area (including structural and wildland fire-fighting capacity); (3) social and economic conditions affecting the ability of a community to protect, respond to, and recover from wildfire; and, (4) a system to track where assistance is provided. The federal land management agencies currently do not have the ability to provide nationally reliable information for any of these elements. Failure to track these basic elements could contribute to ineffective use of resources, inability to assess progress, and a resulting lack of ability to recognize or advocate for successful programs.

¹⁵ A number of federal programs are currently aimed at monitoring spatial data on risk.

- The Landscape Fire and Resource Management Planning Tools Project, or LANDFIRE Project, was initiated by a request from federal land agencies asking the principle investigators to develop maps needed to prioritize areas for hazardous fuel reduction. The objective of LANDFIRE is to provide the spatial data and predictive models needed by land and fire managers to prioritize, evaluate, plan, complete, and monitor fuel treatment and restoration projects essential to achieving the goals targeted in the National Fire Plan. These spatial data and predictive models will be hierarchically designed so that they can be used at the national, regional, and local levels. <http://www.landfire.gov>.
- National Fire Plan Operations and Reporting System (NFPORS) is an interagency system designed to assist field personnel in managing and reporting accomplishments for work conducted under the National Fire Plan. <http://www.nfpors.gov>.
- Fire Effects Monitoring and Inventory Protocol (FIREMON) provides a system for monitoring the effects of wildland fire to (1) document fire effects, (2) assess ecosystem damage and benefit, (3) evaluate the success or failure of a burn, and (4) appraise the potential for future treatments. <http://fire.org/firemon/default.htm>

Actions:

- a) Enhance federal agencies' approach to collecting information and monitoring wildfire-related programs so that it is meaningful to communities and other interested parties at the local level. In the case of ecological data, this may not mean collecting more information, rather systematic changes to make the data more accessible and usable to people inside and outside of the agency.
- b) Develop relevant social and economic indicators in wildfire-related monitoring efforts. Make improvements to existing information systems to ensure that the necessary socioeconomic information is collected and used in decision making. Include social scientists and community-based forestry representatives in the development and implementation of agency monitoring programs.
- c) At present, federal land management agencies are engaged in developing a national monitoring protocol. This national monitoring protocol should include social and economic indicators as an integral part of its design. Begin a process to ensure collaboration among agencies, researchers, and organizations that can help to identify and evaluate social and economic indicators within that national monitoring protocol.

- 3. Immediately develop nationally consistent standards for monitoring National Fire Plan expenditures that will enable assessment of outcomes over time.** Include social scientists and community-based forestry representatives in the development and implementation of agency monitoring programs. Include hazardous fuels reduction projects on public and private lands and grants for community fire plans, education, biomass utilization, etc. Current monitoring and performance measure designations are focused on outputs rather than longer-term outcomes. Monitoring must go beyond a yearly "acres treated" total to indicate improvements in forest condition, community risk, and protection capabilities over time and by specific location. Improvements overtime are key to understanding whether conditions are being improved on federal lands and community risk is being reduced.

Actions:

- a) Work with federal agencies to ensure that reliable spatial information is provided for grants and hazardous fuel reduction projects to ensure agency accountability to national goals. Include Forest Service and Department of Interior Agencies, all programs providing grants to communities or performing hazardous fuels reduction projects and FEMA Assistance to Firefighter grants.¹⁶
- b) Enhance methods to track outcomes for national fire plan expenditures that enable measurement of change over time in both ecological condition and community wildfire risk.

¹⁶ The FEMA Assistance to Firefighter Grant Program provides data on grant awards made nationwide. Information is available online for 2004. This grant program awards funds to fire departments for emergency medical services, fire operations, fire prevention, and fire vehicles. Data available online, however, are only available with location information by fire district. To use this data in the current analysis, latitude/longitude information is needed.

4. Develop a method for measuring community capacity in the context of wildfire.

Conduct further research on indicators of community capacity in relation to wildfire to illustrate the needs of rural communities and identify strategies to build capacity within those communities to reduce wildfire risk. Indicators that could be used to measure community capacity and socioeconomic conditions include: educational attainment, income inequity, employment diversity, unemployment, and travel time to work. County revenues could also be used to indicate the level of resources within counties, the incidence of poverty in a region, and the ability of communities to protect, respond, and recover from wildfire. County revenue data can be used with county population to give per capita revenues and compare increases and decreases in county revenue over time.

Actions:

- a) Conduct further research to understand community capacity in relation to wildfire.
- b) Use this understanding to improve federal efforts to serve at-risk communities, as outlined in recommendations 1 – 3 above.

5. Provide clear direction to federal and state land management agencies for determining “at risk” communities, giving equal consideration to social and economic factors.

Target assistance and federal programs based on community needs. “At risk”

determinations will be more accurate when made at a local level; however, some level of national consistency is key to a successful risk assessment protocol.

Actions:

- a) Reference the *USDA Forest Service Interim Strategic Public Outreach Plan: Reaching Out to America* (2000a) as a way to bolster guidance to the federal agencies on working with underserved populations and communities.
- b) Encourage states to use a collaborative process to identify relative levels of wildfire risk, utilizing social and economic indicators (along with traditional indicators). States should provide guidance on using socioeconomic indicators in risk assessment to communities, and use information from local-level planning processes (such as Community Wildfire Protection Plans) wherever possible. Ensure that local and state risk determinations are tracked and included in national-level mapping efforts in a consistent manner.
- c) Increase the funding and technical assistance available for communities to complete Community Wildfire Protection Plans (CWPPs) so that communities can define areas at risk at a local level. However, funding should not depend on whether communities have developed a CWPP. Low capacity communities that have not had the resources or capacity to develop these plans will still need assistance in reducing wildfire risk.
- d) Ensure that risk is not principally determined by economic value of property or structures, because that would limit funds and assistance to poorer communities.
- e) Establish different levels of “at risk” communities and the unique assistance needs that different levels of “risk” may necessitate in wildfire program implementation. For example, low capacity, poor communities may lack the means to create a community wildfire protection plan, so that a monetary grant is insufficient to encourage its creation.

Technical assistance, training (e.g., leadership development, community organization), or more significant agency support may be necessary in these communities.

6. Integrate indicators of community capacity into state, regional, and local planning and risk assessment.

Communities across the nation are in the process of developing community wildfire protection plans under guidance from the Healthy Forest Restoration Act. States have also received direction from the National Association of State Foresters to identify and prioritize communities at risk. With the current emphasis on risk assessment, now is an opportune time to include poverty and other social and economic indicators as factors of risk.

Actions:

- a) Identify indicators of community capacity for state, regional, and local wildfire assessments.
- b) Support further study of the integration of socioeconomic and ecological conditions into wildfire risk, including case studies of local areas that have strong risk assessment data; integrate indicators of poverty and protection capability.
- c) Recognize the contribution of socioeconomic factors to community wildfire risk and reflect these indicators within community wildfire risk assessments. Use social and economic factors (and protection capability) to refine a definition of “at risk” communities for prioritizing treatments and assistance.
- d) Provide direction and support to communities about including indicators of poverty and protection capability in local, regional, and statewide wildfire risk assessments, community fire planning, project monitoring and evaluation. Identify local data that can be integrated into community risk assessment (*see Appendix C*).
- e) Provide specific recommendations and work with national associations (e.g., National Association of State Foresters, Society of American Foresters, National Association of Counties, Western Governors’ Association) to refine the definition and field guidance to states and communities.
- f) Build on the National Association of State Foresters field guidance for identifying and prioritizing communities at risk to ensure that federal agency personnel have the information and skills needed to incorporate all four elements, including socioeconomic values and protection capabilities, into state and local hazard assessments.¹⁷

¹⁷ In June 2003, the National Association of State Foresters developed field guidance for identifying and prioritizing communities at risk. This guidance included a methodology for Wildland Urban Interface Fire Hazard Assessment, established by the National Wildfire Coordinating Group. This methodology focuses on fire occurrence (historic fire occurrence records and other factors assess the probability of a wildfire ignition in the vicinity of a community or landscape); hazard (fuel conditions on the landscape and surrounding the community); values protected (the human and economic values associated with the community or landscape, such as homes, businesses, community infrastructure [e.g., water systems, utilities, transportation systems, critical facilities, schools, industrial sites, and manufacturing, etc.] as well as high value commercial timber lands, municipal watersheds, and areas of high historical, cultural, and spiritual significance; and protection capabilities (the wildland fire protection capabilities, including the capacity and resources to undertake fire prevention measures, of all agencies or organizations with jurisdiction: federal, state, tribal, and local.)

7. Increase federal support and funding to programs that target assistance to “at risk” communities.

This recommendation is based on the recognition that a large percentage of low-income and low capacity communities face wildfire risk nationwide. Although there are limited data on the extent to which grants have been received or successfully implemented in low-income and low capacity communities, agencies should take into consideration that financially stressed communities may need additional resources and distinct program design to reduce wildfire risk. This may include a review of how well underserved, impoverished, or lower capacity communities are being helped to develop community wildfire protection plans and a review of the implementation of new methods or programs to assist these communities.

Actions:

- a) Support local-level planning, such as community wildfire protection plans and community fuels reduction projects, especially to low-income, low capacity communities.
- b) Review how well agencies are currently able to assist low-income, low capacity communities – particularly in the area of community wildfire protection planning. Revise implementation strategies as appropriate to ensure that these communities are accessing resources they need to complete plans and progress toward wildfire prevention and protection goals.
- c) Encourage agencies to provide technical assistance (beyond financial grants) to ensure that low-income communities have the ability to be successful in implementing grants.
- d) Encourage and provide assistance to low capacity communities to take advantage of biomass utilization opportunities under the Healthy Forests Restoration Act and stewardship contracting authorities that may assist in increasing revenue for fire protection and local employment opportunities.

8. Conduct case studies in high wildfire risk areas to gain more in-depth knowledge about the relationship between wildfire, poverty and community capacity.

Conduct case studies in different regions of the United States in high wildfire risk areas to gain a stronger understanding of the relationship between wildfire and community capacity. Because of limited data available on a national (or even statewide) scale, in-depth analysis of wildfire risk, poverty, and the capacity of local communities will provide more information on how well grants and resources are assisting low-income communities.

During the initial analysis of maps and data, we examined two high wildfire risk areas in the state of Oregon and presented preliminary findings to community groups and public agencies in those areas. In examining poverty indicators in two counties in Southern Oregon and five counties in central Oregon, we recognized the need to conduct more in-depth analysis at a local level. Using lessons learned from this study, we recommend developing a case study methodology that documents and examines issues and indicators relating to history, ecological wildfire risk, community capacity and poverty, federal resource allocation and federal land ownership. Case studies that draw on the experiences and issues facing diverse communities in different regions could be conducted as pilots across the United States.

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APPENDIX B: INDICATORS OF POVERTY, CAPACITY AND RISK

In 2003, Resource Innovations (formerly the Program for Watershed and Community Health) conducted research to examine the role community capacity plays in meeting fire protection goals and reducing fire risk within a community, neighborhood, or at an individual level. The study specifically focused on documenting indicators of poverty used by various agencies and organizations. The report also included recommendations on identifying gaps in fire protection services among low capacity communities and developing strategies to help meet the needs identified by low capacity communities.

Report overview

To build capacity for communities to access resources, action must occur within the agencies and organizations responsible for allocating and administering grant programs. Communities must also state their need and desire for assistance and willingness to collaborate. The current mechanisms for decisions about where grant funds go may favor communities with high value homes, better fire protection services, and, generally higher capacity to implement projects that reduce the risks to homes and communities. High capacity communities have greater property values at risk, experience managing grants and programs, and past successes in implementing fire protection programs.¹⁸

Low capacity communities may not have the organizational structure to successfully compete for grants or the financial resources to meet cost-shares often required with these types of programs. Furthermore, while there are some grant programs that provide assistance to poor communities, the determinants of poverty are not consistent among agencies. Therefore, a community member who does not fall below the federal poverty level but does not have the financial resources to protect their home is not eligible for assistance programs.

Identifying a set of indicators to use in determining the relationship between wildfire and poverty will help a number of agencies and organizations, as well as the communities at risk:

- Federal and state agencies making decisions about how funding priorities are set can recognize the limited capacity of different rural communities.
- Community forestry, emergency management, and other organizations can find common ground to address community capacity and fire protection.
- Rural communities with limited capacity will have a stronger voice in advocating for their needs because their status will be recognized by federal and state agencies and organizations.

This background report also provides definitions for terms commonly used in this report as well as background and explanation of the primary data layers used in this study, including the Housing and Urban Development Income Limits, Insurance Service Office Fire Hazard data and the USDA Forest Service North Central Research Station – Wildland Urban Interface (WUI) Project Data. Definitions of poverty and wildland urban interface are below.

¹⁸ (Wildfire and Poverty Report, CWCH 2001)

Poverty

Under the U.S. Census, poverty is determined by comparing pretax cash income with the poverty threshold, which adjusts for family size and composition. However, this measure of poverty does not necessarily provide an accurate representation of the resources an individual or family may need. The poverty measure does not take into account family resources, defined as cash receipts, and does not reflect in-kind benefits a family might receive, such as food stamps. Likewise, housing allowance and other subsidies received by families on assistance that represent economic value are not included in the formula for deriving the poverty measure.¹⁹ In the context of this study, we recognize that there are individuals and families above the Federal poverty level that do not have the resources to engage in fire protection activities. This study uses the Housing and Urban Development income limits as the primary indicator for poverty.

Wildland-Urban Interface

1. "The urban-wildland interface community exists where humans and their development meet or intermix with wildland fuel." This definition is found in the Federal Register Vol.66, Thursday, January 4, 2001, Notices; and in "Fire in the West, the Wildland/Urban Interface Fire Problem", A Report for the Western States Fire Managers, September 18, 2000.

- *"The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel." This definition is found in the National Wildfire Coordinating Group Glossary and the 10-year Comprehensive Implementation Plan.*

In summary, this paper provides a summary of poverty indicators used by various agencies and organizations as well as definitions for low capacity communities and rural/urban classifications. We conclude with recommendations for indicators that will identify low capacity communities that could be used by agencies and organizations making decisions about how grants are allocated and how communities at risk are prioritized.

To read this paper, visit

http://cwch.uoregon.edu/CCWP/PWCH/Attachment/PWCH_poverty_indicators_9-23-03.doc.

¹⁹ Ohio State University Extension, Poverty Fact Sheet Series - Defining Poverty, <http://ohioline.osu.edu/hyg-fact/5000/5700.html>

APPENDIX C: METHODS FOR DATA ANALYSIS

The following summary describes the methods used to analyze the data highlighted throughout this report. Dacia Meneguzzo, Forest Inventory and Analysis, North Central Research Station, USDA Forest Service developed this summary.

Objective: find percentages of low-income households relative to various indicators

Queries:

- Low-income households in the WUI and wildland intermix areas
- Low-income households and fire protection capability in Washington
- Low-income households and federal land ownership

Challenges/limitations: The data did not provide spatial locations of households in the HUD dataset, so it was not possible to get an exact count or percentage of low-income households within each of various indicators (WUI and wildland intermix areas, fire protection capability rating, and within a 5 mile buffer of federal land ownership). Since exact numbers could not be obtained, averages were used; therefore, the results in Tables 3, 4, and 5 are based on averages.

Solution: Zonal statistics were used to find the mean number of households, for the various income levels, within each indicator.

Data Layers Used (originally in shapefile format) and Attributes of Interest:

- **Poverty** (HUD data) – in the attribute table, there is a count of very poor, poor, non-poor, and total households for each HUD unit, which are comparable to census block groups.
- **Fire protection capability** in Washington – in the attribute table, there is a numerical fire protection capability rating for each fire district.
- **Wildland Urban Interface** designation – in the attribute table, there is a WUI code number for each of the WUI polygons, which are based on census blocks.
- **Federal Ownership** – all federal land ownership.

Summary of Steps:

1. Where necessary, new fields were added to shapefile attribute tables from which new rasters were created.
2. Created a 5-mile buffer around federal land ownership.
3. Converted the shapefiles discussed above to rasters with a cell size of 30 meters.

4. Reclassified the new WUI raster from the original 14 categories into just two classes: WUI and wildland intermix.
5. Used zonal statistics to find the means needed to do the calculations.
6. Calculated the percentages of households in poverty relative to the specified indicators (WUI and wildland intermix areas, fire protection capability in Washington, and federal land ownership).

Methods:

Where necessary, new fields were added to shapefile attribute tables from which new rasters were created. **(Step 1)** New fields had to be added and their values calculated in order to create some of the necessary rasters. Here is a summary, by data layer, of the fields used to create the rasters.

Poverty (HUD) data

The “very poor” category in this report is defined as households whose income is less than 30% of the median family income. The “lessthanth” field represents this category, so this field was used to create the “very poor” household raster.

The “poor” category in this report is defined as households whose income is less than 50% of the median family income. However, there was no field in the attribute table that represented this category so one was added. To calculate these values, the “lessthanth” field and the “thirtytofi” fields were added together. This “poor” field was then used to create the “poor” household raster.

The “non-poor” category in this report is defined as households whose incomes are greater than 50% of the median family income. Again, there was no field in the attribute table that represented this category so one was added. To calculate these values, the “poor” field was subtracted from the “totalhouse” field. This “nonpoor” field was then used to create the “nonpoor” household raster.

Finally, the last raster created from this shapefile was one that represented the total number of households in each HUD unit. The “totalhouse” field was used to create this raster.

Fire Protection Capability in Washington

A new field called “rating” was added to the attribute table. The new ratings were determined from the “classlo” field which had 10 different categories. The new values are found below.

“Classlo” Value	New “Rating” Value	Category Name
1 – 4	1	High Fire Response Capability and Water Supply
5 – 7	2	Medium Fire Response Capability and Water Supply
8b	No fire districts had this value	High/Medium Fire Response Capability and No Water Supply
8 – 9	3	Low Fire Response Capability and No Water Supply
10	4	No Fire Response Capability and No Water Supply
Values other than those above	5	Other

The “rating” field was then used to create the fire protection capability raster.

Wildland Urban Interface designation

Made a raster based on the “wui_code” field in the attribute table.

Federal Ownership

First, a 5-mile buffer was created, using the Buffer Wizard in ArcMap, around all federal ownership (**step 2**). Next, a new field called “zone” was added to the new buffer shapefile and values of 1 (within buffer) or 2 (outside buffer) were calculated. This field was then used to create the federal land buffer raster.

Converted the shapefiles listed above to rasters with a cell size of 30 meters. (**Step 3**)

- The Spatial Analyst extension in ArcMap was used to complete this step. From the Spatial Analyst menu, select Convert → Features to Raster.
- Reclassified the new WUI raster from the original 14 categories into just two classes: wui and wildland intermix (**Step 4**)
- Again, the Spatial Analyst extension in ArcMap was used. From the Spatial Analyst menu, select Reclassify.

Used “zonal statistics” to find the means needed to do the calculations (**Step 5**)

- The zonal statistics function in the Spatial Analyst menu calculates the mean of the desired “value raster” for the zones specified in the “zone dataset.” The value raster contains the input values used in calculating the output (mean, in this case) for each zone, e.g. the mean number of “poor” households. The zone dataset defines the zones, e.g. the four levels of fire protection capability in Washington. The resulting raster after running the zonal statistic (mean) function in this example would contain the mean number of poor households for each of the four levels (zones) of fire protection capability.
- Overall, since poverty is what is of interest in this report, the various poverty categories (very poor, poor, and non-poor) rasters as well as the total household raster are the value rasters. The other rasters created in step 3 are the zone rasters that define the zones of interest, e.g. fire protection capability rating or wui and wildland intermix areas.
- For this step, use the Spatial Analyst extension in ArcMap. From the Spatial Analyst menu, select Zonal Statistics and select Mean from the last drop-down menu. The “Zone dataset” is used to define the size, shape, and location of each zone. The “Zone field” is the field from which the zonal statistic (mean in this case) is calculated. The “Value raster” is used to identify the values to be used in the calculations within each zone.

Calculated the percentages of households in poverty relative to the specified indicators (wui and wildland intermix areas, fire protection capability in Washington, and federal land ownership) (**Step 6**) To do this, take the resulting rasters from the zonal mean calculations and divide each of the poverty categories by the mean number of total households raster for that zone. In other words, find the mean number of households for each poverty category in each zone and then divide each by the mean number of total households in the corresponding zone.

APPENDIX D: REVIEW PROCESS AND COMMUNITY MEETINGS

Resource Innovations and NNFPP distributed a background paper describing the indicators being considered for use in this study to community forestry organizations, state and federal agency representatives, and local community members in the fall of 2003. Sharing the draft background paper provided an opportunity for diverse perspectives and comments that informed the selection of indicators. Existing national datasets have many limitations, particularly in depicting poverty among rural inhabitants. Following is a summary of key issues encountered in the review process.

- **Avoid traditional indicators of poverty:** Reviewers suggested that typical indicators of poverty such as a percentage of per capita income or poverty guidelines could distort the actual levels of poverty in a given area. For example, per capita income does not take into account that wealthy new comers may distort an average per capita income in a community with a high level of poverty. Additionally, transfer payments (e.g., welfare, medicare/medicaid, unemployment, pensions, investments, and dividends, etc.) are considered income, masking the level of poverty.
- **Include a measure of housing price to wage:** Several reviewers commented that housing and wage indicators would “help tell us how hard it is for people to meet basic needs like housing.”
- **Consider scale:** Use census data at the tract or block group level, not the county level. This will distinguish the rich town/cities from the outlying rural areas.
- **Do not limit the definition of “capacity” to protection capability.** Because of limited data, this study only uses indicators of protection capability, which is only one indicator of the capacity of a community to respond to wildfire. Reviewers recommended more in depth study of capacity in relationship to wildfire and to be explicit in referring to protection capability as the capacity of a fire agency to respond to a fire event.
- **Identify alternative methods to identify fire risk or wildland-urban interface:** Several reviewers commented that the Federal Register “Communities at Risk” list was not an appropriate layer to determine risk on national scale as each state used their own criteria to identify communities at risk.
- **Integrate indicators related to social vulnerability within wildfire risk assessments.** Communities can identify local indicators on community capacity and factor the data into wildfire risk assessments. Possible indicators include:
 - Housing and Urban Development Income Limits (HUD)
 - Elderly and disabled population (Census Data)
 - Single-female headed households (Census)
 - High School drop-out rate (Census)
 - Fire Protection Capability (Insurance Services Office Fire Hazard Rating or other)
 - USDA housing data on poverty
 - Head Start and/or Participation in school lunch programs
 - State-by-state indicators for child poverty (available from Annie E. Casey Foundation)

In late 2004 and early 2005, NNFPP and PWCH co-hosted community meetings in Southern and Central Oregon to present maps and preliminary findings. The purpose of the meetings was to examine study findings with regional government, community-based organizations and fire officials, and identify opportunities to use this data as part of wildfire risk assessments. Participant input helped inform the findings of this study, particularly those related to using local data on poverty, risk and resource allocation in community wildfire protection plans and risk assessments. A summary of these meeting notes can be found at <http://ri.uoregon.edu>.

APPENDIX E: FEDERAL AGENCY WILDFIRE PROGRAM IMPLEMENTATION

There are several programs administered by the Federal land management agencies that provide direct and indirect support to rural communities for wildfire related risks and prevention. Many of these programs were in existence prior to the National Fire Plan, but receive additional funding for wildfire related activities under the plan. The following are brief descriptions of the most relevant community assistance programs. These programs are the current delivery mechanisms for federal agency wildland fire assistance to rural communities.

USDA Forest Service, State and Private Forestry

These programs provide a coordinated effort for management, protection, conservation education and resource use that helps facilitate stewardship across lands of all ownerships. State and Private Forestry programs build community capacity to care for our public resources, while building the economic strength of rural areas. Several programs within State and Private Forestry were provided funding under the National Fire Plan to address community assistance and collaboration.

Cooperative Fire Protection contributes important funds to build local wildland firefighting capacity through the *State Fire Assistance* and *Volunteer Fire Assistance* (VFA) activities. *State Fire Assistance and Volunteer Fire Assistance* provide funds in preparedness and hazardous mitigation to States and local fire fighters. These programs fund implementation of hazardous fuels treatment, fire prevention, education campaigns, personnel training, equipment, and personnel availability in local communities. This program is the primary contributor to the national Firewise program that supports work to ensure that states and local communities can reduce hazardous fuels in and around communities. It also supports strengthening voluntary fire departments in small, rural communities. The VFA Program provides nearly 80 percent of initial attack on wildland fires in the United States.

The rural fire departments that these programs assist are charged with the protection of lives, homes, and business investments in rural America. Their presence enhances rural development opportunities and economic vitality, thereby improving standards of living in rural areas. Rural fire departments also provide major assistance to State forestry agencies in the suppression of wildland fires and, in some States, rural fire departments suppress all such fires. They save taxpayers an estimated \$37 billion annually by providing fire protection services at little to no cost.

Rural Fire Departments also play a major role in suppressing wildfires on Federal lands. The USDA Forest Service and various U.S. Department of the Interior land management agencies have entered into cooperative agreements with many rural fire departments. These agreements enhance the protection of both communities and natural resources. A level of fire protection is attained that would be impossible without such cooperation. Interagency agreements provide a cost-effective means of enhancing fire protection. In fiscal year 1995, 7,713 applications were received from rural fire departments and fire academies nationwide for Volunteer Fire Assistance financial assistance totaling \$30,009,487; 3,085 of these applications were approved for \$3,361,000.

The Forest Stewardship Program provides technical assistance to private forest landowners to develop forest plans and reforestation and hazardous fuels reduction resources. *Economic Action Programs* build capacity within natural resource-dependent rural communities to strengthen their economies and to work in collaboration with federal agencies on federal lands restoration/maintenance. The programs provide funding, training, and technical assistance to local communities to identify, develop and expand economic activities related to materials and wood removed through hazardous fuel reduction

treatments, such as value added utilization of materials from fuels reduction projects. The program targets small, locally owned businesses and funds community wildfire risk assessments, community plans, and defensible space.

Community and Private Land Assistance (CPLFA) was authorized by Congress in 2001 with \$35 million annually under the Farm Bill. The program is intended to improve landscape level protection on Federal and non-federal lands by expanding outreach and education programs directed at homeowners and communities. This program uses existing authorities under State and Private Forestry to provide assistance to nonfederal entities affected by fire. It includes funding for fuels management and defensible space development, reconstruction of fence, multi-resource stewardship planning in the wildland/urban interface, pilot projects for improved utilization of removed fuel, and community planning in high-risk areas of the urban/wildland interface. The **Forest Health Management – Cooperative Lands** program provides technical and financial assistance to states to control damaging pest populations on forestland owned by states, local governments, private organizations, and individuals in high fire -risk or previously burned areas. Other programs include:

- **The Hazardous Fuels Reduction** program funds hazardous fuel reduction treatments in the wildland urban interface (WUI) and on other National Forest System lands in order to reduce the risk of catastrophic wildfire. Funds are provided to plan, implement and support fuel management activities including inventorying and mapping hazardous fuels, prioritizing areas for treatment, analyzing treatment alternatives, determining and applying fuel treatment, and monitoring and evaluating fuel treatment accomplishments.
- **Forest Land Enhancement Program** (FLEP) is a landowner assistance program that provides assistance to family forests in sustainable management activities. It helps family forests reduce fire risk, and restore and recover damage by fire, insects, invasive species, disease, and weather.
- **Payments to States – County Projects** are authorized under the Secure Rural Schools and Community Self-Determination Act of 2000, under Title II and Title III, which allow counties to utilize 15-20 percent of their payment amounts for forest restoration, maintenance, stewardship, or county projects under the auspices of a Resource Advisory Committee. The program is collaborative, and the funds, if a county elects to utilize them, are for project-oriented work. Many communities nationwide are using these funds for CWPPs or hazardous fuel reduction projects.

Bureau of Land Management

- **Rural Fire Assistance** funds capacity building for local fire-fighting efforts including technical assistance, training, supplies, equipment, and public education support to rural fire departments.
- **Hazardous Fuels Reduction** funds fuels reduction projects on both the BLM Wildland/Urban Interface (WUI) and non-WUI lands.

FEMA Assistance to Firefighter’s Grant Program/Fire Prevention and Safety Grants

FEMA’s Assistance to Firefighter’s Grant Program funds essential basic needs of fire departments in operations and firefighter safety, fire prevention, and firefighting vehicles. The Fire Prevention and Safety Grants help firefighters provide fire safety education and conduct other activities to protect children, families, and communities from fires and other hazards and fund projects related to fire prevention. The Grant Program will award over \$700 million to firefighters this year to help fire departments purchase equipment, fund health and safety programs, enhance emergency medical services programs, and conduct fire education and prevention programs.