COMMUNITY PERCEPTIONS OF WILDLAND FIRE RISK AND FIRE HAZARD REDUCTION STRATEGIES AT THE WILDLAND-URBAN INTERFACE IN THE NORTHEASTERN UNITED STATES

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Abstract: This paper summarizes the results of a research project on community perceptions of wildland fire risk and fire hazard reduction strategies at the wildland-urban interface in the northeastern United States. The research consisted of the completion of a survey of residents and landowners within the Plymouth Pine Barrens of southeastern Massachusetts. The study area is characterized by the presence of inflammable pitch pine-scrub oak vegetation that is capable of supporting intense wildland fires on a frequent basis. The results indicate that residents have a low perception of the risk from wildland fire, but do support the use of fire hazard reduction strategies. The specific strategies include the use of prescribed fire, mechanical removal of trees and brush, and the construction of firebreaks. Respondents believe that the public should be involved in the development of fire hazard reduction plans. A major factor identified as influencing respondents' perception of risk from wildland fire is past experience with the occurrence of wildland fire. Those who reported having experienced fires in the past felt they were at higher risk than those who did not experience fires. Level of knowledge about the use of fire hazard reduction strategies appears to be an important factor in determining level of support for the use of fire hazard reduction strategies. Respondents who reported high levels of knowledge about the use of a specific fire hazard reduction strategy indicated a higher level of support for the use of that strategy than did those who reported a low level of knowledge. Overall, respondents believe that actions should be taken to reduce fire hazard within the study area and would like to be involved in the development of fire hazard reduction plans.

Introduction

During the last two decades, the number of catastrophic wildland fires occurring across the United States has increased. At the same time, an increase in the number of people settling in wildland areas has placed more homes at risk from wildland fires. Since 1990, approximately 9,000 homes have destroyed or damaged by fires (Sampson, 1999). The severe wildland fire season of 2000 resulted in a reexamination of the nation's fire suppression policy and the development of a new National Fire Plan (U.S. Department of Agriculture, 2000). One of the key elements of the National Fire Plan is the reduction of fire hazard at the wildland-urban interface across the country through the use of both prescribed fire and mechanical removal of fuels. Fire managers plan to focus fire hazard reduction work on communities that have been identified as being at high risk from wildland fire. Although wildland fire risk is most commonly associated with the western United States, areas exist in the Northeast that are prone to destructive wildland fires. An example is the pitch pine-scrub oak barrens most commonly found in coastal areas.

This study examines community members' perceptions of wildland fire risk and fire hazard reduction strategies at the wildland-urban interface in the Northeastern United States through the completion of a case study of the Plymouth Pine Barrens located in the towns of Plymouth and Carver, Massachusetts. Pine barrens are one of the most common fire-dependent ecosystems in the Northeast. These barrens are typically found in areas of sandy, acidic soil occurring on glacial outwash and consist of an overstory of scattered pitch pine and an understory of scrub oak and other ericaceous shrubs (Irland, 1999). The Pine Barrens support numerous rare plant and insect species. It is a fire-adapted ecosystem that relies on repeated fries to prevent succession of vegetation to shade-tolerant forest types. The Plymouth Pine Barrens is approximately 50,000 acres in size,

much of which is within the boundary of Myles Standish State Forest. The Forest is a major recreational destination for resident of southeastern New England. A unique feature of the Forest is the presence of 156 leased cottages located around several of the Forest's ponds. Year-round and seasonal homes, agricultural land, camps, and numerous lakes and ponds surround the Forest.

Background

Reduction of wildland fire risk in the wildland-urban interface can be complex. Consensus exists within the fire community that to reduce the risk of catastrophic wildland fires, prescribed fire must be used in combination with the mechanical reduction of fuels (Mutch, 1994; Agee, 1999; Sampson, 1999; Pyne, 2001; and Wilkinson, 2001). Reasons cited for a combined strategy include the overwhelming amount of fuels present in forests and the difficulty of prescribed fire alone to reduce fuel conditions to prevent the occurrence of catastrophic wildland fires. Successful completion of prescribed fires is an inherently difficult task (Pyne, 2001). Proximity to developed areas can increase homeowners' concerns about the use of prescribed fire and mechanical treatments that alter landscapes. Community members' perceptions of fire risk and hazard reduction strategies can vary greatly depending upon geographic location, past experience with wildland fires, residential choice factors and residency status (Gardner and Cortner, 1985; Winter and Fried, 2000; Winter, Vogt and Fried, 2002). Understanding community members' perceptions at a site-specific level can assist land managers in developing and implementing successful fire hazard reduction strategies and fire prevention programs.

Public support for wildland fire management is crucial to the success of current and future management objectives. As "consumers" of wildlands through recreational use or as homeowners residing within wildlands, the public is a stakeholder in the success of wildfire management policies on publicly owned lands. Land managers must propose strategies that the public, especially within the wildland-urban interface, will find acceptable. Unfortunately, to date little is known about homeowners' perceptions of fire management issues in the wildland-urban interface (Winter and Fried, 2001).

Researchers have found that perceptions about fire risk and hazard reduction strategies varies geographically and can depend on factors such as environmental knowledge, past experience with wildland fire and length of residency (Cortner, Gardner, and Taylor, 1990; Winter and Fried, 2001). Manfredo and others (1990) found that the public appears poorly informed on prescribed fire policy and its effects. Researchers in Florida found that residents became more supportive of prescribed fire programs following educational outreach (Loomis et. al., 2001). Public support and preferences for fire hazard reduction strategies can depend upon additional factors such as trust in responsible agencies, whether efforts are well-planned and the mitigation of affects on adjacent homeowners (Winter, Vogt and Fried, 2002). These findings highlight the importance of building local support to ensure the success of wildland fire hazard reduction strategies.

Objective

The objective of this study is to determine community members' perceptions of wildland fire risk, knowledge of fire hazard reduction strategies, support for the use of fire hazard reduction strategies, and opinions about the role of the public in wildland fire management planning in the wildland-urban interface in the Northeastern United States. This information will provide local land managers with insights into public perceptions of fire management issues and will assist them in developing plans for reducing fire hazard. The results were compared with similar studies conducted in other parts of the United States.

Methods

To complete this research, a mail survey was distributed to 500 seasonal and year-round residents and landowners within a two-mile radius of the boundaries of Myles Standish State Forest in Plymouth and Carver, Massachusetts. The survey was sent to 12% of the approximately 4,240 households and landowners located within the study area. The survey contained a combination of Likert-scaled and open-ended questions designed to measure respondents' beliefs and attitudes towards wildland fire management issues. Specifically, the survey questions measured perception of risk from wildland fire, level of knowledge about the use of fire hazard reduction

strategies, level of support for the use of fire hazard reduction strategies, and opinions about the public's role in the development of fire hazard reduction plans.

Response: A total of 153 completed surveys were returned for a response rate of 32%. Although this is a relatively high response rate considering that no follow-up reminder was sent to encourage responses to the survey following distribution, the sample represents a small percentage of the area's population. In total, only 3.6% of the 4,240 households and landowners in the study area completed surveys. This small percentage of the residents of the study area should be taken into consideration when interpreting the results of the survey. Approximately 75% of the respondents are year-round residents of the study area while 25% are seasonal residents.

The demographics of the survey respondents were compared to the demographics of the study area using 2000 U.S. Census data in order to determine the representativeness of the survey sample. Demographic characteristics examined included gender, age, educational attainment, and income. Based on a comparison of demographic data, several differences are evident between the survey respondents and the general population of the study area. The survey respondents are older, more highly educated, and earn a higher income than the overall population of the Plymouth-Carver area. Also, the survey respondents are comprised of a higher percentage of males (61%) than is present in the general population of the study area.

Table 1. — Likelihood of damage/destruction from wildland fire

Wildland fire will damage/destroy property	% of respondents
Very unlikely or unlikely	45.4%
Somewhat likely	40.1%
Likely or very likely	14.5%

Results and Discussion

Perception of Risk from Wildland Fire: To measure community members' awareness of the risk from wildland fire, respondents were asked how likely it was that their property would be damaged or destroyed by wildland fire. A response that it is likely or very likely that a fire will damage or destroy property was considered to be indicative of a respondent having a high awareness of the risk from wildland fire. Responding that damage or destruction was unlikely was considered an indicator of a low awareness of the risk from wildland fire. Site-specific conditions such as surrounding vegetation and the characteristics of buildings can affect the level of risk from wildland fire. Using this rationale, survey respondents did not have a high awareness of the risk from wildland fire (Table 1). Almost one-half of the respondents believe that it is unlikely or very unlikely that their property would be damaged or destroyed. Only a small percentage (14.5%) believe that is likely or very likely that damage or destruction of their property will occur. The survey respondents did, however, demonstrate an understanding of how the surrounding landscape influences risk from wildland fire. Those who had a high awareness of wildland fire risk most often cited as a reason for their belief the fact that their home or property is located in a heavily vegetated area. Respondents who have a low awareness of wildland fire risk often indicated that since their property is cleared of vegetation or surrounded by natural or man-made buffers, fires would not affect their property. In general, respondents perceived clearings and natural barriers such as lakes and ponds as protecting their homes from wildland fire.

The survey results identified several differences in how survey respondents perceived the risk from wildland fire. Respondents who reported past personal experience with wildland fire have a significantly higher awareness of the risk from wildland fire than do respondents who reported no experience with wildland fire (Table 2). These findings contradict the findings of Cortner and others (1985), whose study revealed that residents of a Southern California community that had experienced an intense wildland fire perceived wildland fire as less of a risk following the fire occurrence. Winter and Fried (2001) reported findings similar to this study. They found that residents who had experienced a wildland fire had an increased awareness of the risk and believed that a fire would occur again.

Respondents who own leased-cottages in Myles Standish State Forest have a higher perception of the risk from wildland fire than do respondents

from outside the forest. This difference in awareness is most likely due to past experience with wildland fires and sensitivity to forest management issues. The majority of cottage leaseholders have resided in the area as seasonal residents for several decades. It is likely that fires that have occurred in the forest have affected their perceptions of risk. They are directly exposed to public recreational use of the forest and many of them expressed concern about the careless use of fire by forest visitors.

Almost one-half of the survey respondents reported having personal experience with wildland fire, although the experiences of respondents varied greatly. Most respondents' experience consisted of a fire burning close to their property and seeing smoke. Several respondents reported having memories of the catastrophic 1957 fire. A small number of respondents reported having assisted firefighters in extinguishing fires or having been evacuated from their homes.

Table 2. — Differences in perception of risk from wildland fire

Respondent Category	Mean	SD	t	Sig. (p)
Past experience with wildland fires	2.96	1.13	3.21	.005
No past experience with wildland fires	2.44	0.84		
MSSF Cottage Leaseholders	3.16	0.85	2.67	.01
Non-MSSF Cottage Leaseholders	2.58	1.01		

SD = Standard Deviation

Scale: 1= very unlikely 2= unlikely 3= somewhat likely 4= likely 5= very likely

Knowledge of Wildland Fire Hazard Reduction Strategies: Survey respondents were asked to self-rate their level of familiarity with the use of fire hazard reduction strategies based on a five-point Likert scale. Familiarity was equated with level of knowledge about the use of each strategy. The only information provided to the survey respondents was a brief definition of each strategy. Overall, respondents reported having some knowledge about the use of prescribed fire, mechanical removal of trees and brush and the construction of firebreaks to reduce the chances of a catastrophic wildland fire. Respondents reported slightly higher levels of knowledge about the use of prescribed fire than they did for mechanical removal and firebreaks (Table 3). This difference may be attributed to recent publicity about the use of prescribed fire in Myles Standish State Forest by the Massachusetts Department of Environmental Management and The Nature Conservancy.

Differences in respondents' level of knowledge about the use of fire hazard reduction strategies appear to be influenced by past experience with wildland fires, age and residency status. Respondents who experienced wildland fires had a higher level of knowledge about the use of constructed firebreaks than did respondents that have not experienced fires. Younger respondents reported a higher level of knowledge about the use of prescribed fire than did older respondents. Seasonal residents appear to be less knowledgeable about the use of prescribed fire than year-round residents. Examination of survey respondents about the risks commonly associated with fire hazard reduction strategies indicates that respondents with a higher level of knowledge about strategies are less concerned with the associated risks. Respondents who consider themselves knowledgeable about the use of prescribed fire are less concerned about the effects of smoke on nearby residents, the appearance of burned areas following prescribed fires and the potential damage to wild animals and wildlife habitat. It is likely that those who have familiarity with prescribed fire understand that these risks can be mitigated.

Support for the Use of Fire Hazard Reduction Strategies: Survey respondents expressed support for the use of fire hazard reduction strategies on both public and private land (Table 4). The levels of support for the use of prescribed fire, mechanical removal of trees and brush and the construction of firebreaks were fairly consistent. Respondents did express significantly less support for the use of prescribed fire on privately owned land than for its use on public land.

The lack of difference in the level of support for the use of prescribed fire, mechanical removal, and constructed firebreaks may be influenced by site-specific characteristics. Shindler (1996) found that residents of northeastern Oregon had a higher level of support for the use of mechanical removal of

Table 3. — Knowledge of fire hazard reduction strategies

Strategy			Compared to Mechanical Treatment		Compared to Constructed Firebreaks	
	Mean	SD	t	Significance (p-value)	t	Sig. (p-value)
Prescribed Fire	2.93	1.09	3.832	.000	3.422	.001
Mechanical Treatment	2.60	1.13	--	--	-1.026	n.s.
Constructed Firebreaks	2.65	1.11	-1.026	n.s.	--	--

n.s. = not significant

Scale: 1= none at all 2=a little 3=somewhat 4=a lot 5=a great deal

Table 4. — Support for the use of fire hazard reduction strategies based on land ownership

Item	Publicly-Owned Land		Privately-Owned Land			
	Mean	SD	Mean	SD	t	Significance (p-value)
Constructed Firebreaks	3.75	1.13	3.25	1.33	4.461	.000
Mechanical Removal	3.51	1.17	3.56	1.20	-1.363	n.s.
Prescribed Fire	3.49	1.21	2.99	1.26	4.86	.000
Land Use Regulations	n/a	n/a	2.91	1.37	n/a	n/a
No Action	1.74	1.26	1.90	1.24	-2.771	.01

Scale: 1=none at all 2=a little 3=some 4=a lot 5=a great deal

trees and brush than prescribed fire. This preference was attributed to the importance of the forest products industry in the area and the belief that mechanical removal would spur the industry. The Plymouth Pine Barrens study area is mostly suburban and doesn't have a significant forest products industry. The majority of the land-use surrounding the Forest is residential. A goal of promoting a forest-based economy may not be a consideration for the residents surrounding the Forest.

Respondents were also asked to indicate their level of agreement with the use of fire hazard reduction strategies in various combinations and under certain circumstances (Table 5). Factor analysis of these various fire hazard reduction options was used to attempt to determine if respondents tended to support either prescribed fire or non-prescribed fire management options (Table 6). The analysis revealed that 65% of the survey respondents support (a score of 4 or 5 on the Likert Scale) the use of prescribed fire while 35% support the use of non-prescribed fire based fire hazard reduction strategies such as mechanical removal of trees and brush, the construction of firebreaks and the use of regulations.

Table 5. — Level of agreement with various fire hazard reduction options

Fire Hazard Reduction Option	Mean	SD
More firebreaks should be built around Myles Standish State Forest	3.63	1.25
Prescribed fire should be used in combination with mechanical removal of brush and trees	3.59	1.17
Prescribed fire should be used to improve wildlife habitat and manage forest vegetation	3.55	1.17
It is alright to use prescribed fire close to homes if safety precautions are taken	2.75	1.20
Local by-laws that require homeowners to remove vegetation should be implemented	2.43	1.41
The use of prescribed fire should be allowed on private land by owners	2.39	1.28
Only mechanical removal of brush and trees should be used to reduce fire hazard	2.26	1.35
Prescribed fire is too dangerous and should not be used at all	2.10	1.22

Scale: 1=none at all 2=a little 3=somewhat 4=a lot 5=a great deal

Table 6. — Factor Analysis results for various fire hazard reduction strategies

Fire hazard reduction strategy	Loadings	Mean	SD	Alpha
Support prescribed fire strategies		3.11	0.91	
It is alright to use prescribed fire close to homes if safety precautions are taken	.722	2.89	1.17	.737
The use of prescribed fire should be allowed on private land by owners	.586	2.56	1.33	
Prescribed fire should be used to improve wildlife habitat and manage forest vegetation	.647	3.59	1.18	
Prescribed fire should be used in combination with mechanical removal of brush and trees	.618	3.55	1.15	
Support non-prescribed fire strategies		2.62	0.96	
Prescribed fire is too dangerous and should not be used at all	.607	1.88	1.08	.675
Only mechanical removal of brush and trees should be used to reduce fire hazard	.740	2.25	1.31	
More firebreaks should be built around MSSF	.576	3.51	1.30	
Local by-laws that require homeowners to remove vegetation should be implemented	.520	2.5	1.38	

Scale: 1=none at all 2=a little 3=somewhat 4=a lot 5=a great deal

Table 7. — Differences in support for fire hazard reduction strategies based on level of knowledge of the use of prescribed fire

Item	Level of Knowledge							
	None		Some		A Great Deal			
	Mean	SD	Mean	SD	Mean	SD	F	Significance (p-value)
Prescribed fire on public land	3.05	1.19	3.66	1.09	3.67	1.34	3.701	.05
Prescribed fire on private land	2.56	1.21	3.00	1.18	3.41	1.32	4.366	.05
Mechanical removal on private land	3.14	1.29	3.72	1.09	3.70	1.2	3.105	.05

Scale: 1=none at all 2=a little 3=some 4=a lot 5=a great deal

In addition to supporting the use of prescribed fire for the reduction of fire hazard, respondents also support its use for ecosystem management objectives. The specific ecosystem management objectives included in the survey are the improvement of wildlife habitat and the management of forest vegetation. Although no information was provided in the survey about the role of fire in pitch pine-scrub oak barrens, it is likely that the respondents have some knowledge of its importance. This knowledge is reflected in their support for the use of prescribed fire for ecological benefit.

The most significant factor that determines support for the use of fire hazard reduction strategies appears to be the respondent's level of knowledge about the specific strategy (Table 7). This is most evident in the case of prescribed fire. Respondents who described themselves as knowledgeable about the use of prescribed fire have a higher level of support for its use than do those with little or no knowledge. The finding that support for fire hazard reduction strategies is influenced by level of knowledge about those strategies is consistent with the research results of others. Manfredo and others (1990, p.23) found that as knowledge about wildland fires and fire policy increases, support of prescribed fire policy also increases. This finding was found through the completion of a telephone survey of citizens from throughout the United States. Respondents who indicated that they were knowledgeable about wildland fire and fire management policy were more likely to support the use of prescribed fire.

Opinions about Public Participation in Fire Management Planning: Survey respondents' opinions about the role of public participation in the development of fire hazard reduction programs were examined by asking about their level of agreement with three different statements that described options for public participation.

Table 8. — Level of support for public participation in developing fire hazard reduction plans

	Mean	SD
Public education and outreach should be part of a fire hazard reduction program	4.51	1.15
Residents should take part in focus group discussions to help planners develop fire hazard reduction programs	3.95	1.11
Residents should serve on advisory committees to help develop fire hazard reduction plans	3.86	1.11
State and local officials should have sole responsibility for developing fire hazard reduction plans	2.51	1.28

Scale: 1=none at all 2=a little 3=somewhat 4=a lot 5=a great deal

The options included no public participation, the inclusion of citizens in advisory committees and the use of focus groups to develop plans. Respondents were also asked if education and outreach should be part of a comprehensive fire hazard reduction program.

The results of the survey indicate that there is strong support for the use of public participation in the development of fire hazard reduction programs (Table 8). Significantly less agreement exists among survey respondents that state and local officials should have sole responsibility for developing fire hazard reduction programs than for the participation of residents in developing programs. Strong support exists for the use of either citizens' advisory committees or focus group discussions in the development of fire hazard reduction programs. Survey respondents also indicated strong support for the inclusion of educational programs for residents and property owners as part of fire hazard reduction plans.

Conclusions and Recommendations

The information gathered in this study provides insights into community members' attitudes and beliefs about the risk from wildland fire and options for fire hazard reduction in the southeastern Massachusetts communities of Plymouth and Carver. This information can be useful to local land and fire managers in the development of programs to reduce the chances of catastrophic wildland fires and increase the education of residents about wildland fire risk and hazard reduction strategies.

The results of the survey indicate that community members' perceptions of risk from wildland fire are influenced both by experience and by beliefs about site-specific conditions that affect wildland fire risk. Actual risk from wildland fire can vary greatly over short distances based on factors such as vegetation type, vegetation density and the presence or lack of buffers such as areas cleared of vegetation and waterbodies. The analysis of survey results indicates that survey respondents used these site-specific considerations to justify their beliefs about wildland fire risk.

Due to the constraints of the survey instrument, it was not possible to assess actual risk from wildland fire to the property or home of each survey respondent. It is impossible to determine if respondents who believed that their home or property is not at risk are either 1) not aware of risk from wildland fire or 2) their home or property is actually relatively safe from wildland fire. This underscores the importance of educating homeowners about factors that can affect how vulnerable their property is to wildland fire. Ideally outreach should be conducted that would include assessments of risks from wildland fire. Local land and fire managers can apply the study findings to develop a risk assessment program for the Plymouth-Carver area. Because risk to property from wildland fire is influenced by many factors including topography and vegetation, it is important for managers to assess risks throughout a community to be able to develop effective management strategies. The understanding of how survey respondents perceive risk from wildland fire indicates that this assessment should be done at the individual residence scale. This will allow managers to identify areas at highest risk as well as educate homeowners about the risk and actions that can be taken to reduce it.

The results of this research project reveal that there is support among survey respondents for taking action to reduce the chances of catastrophic wildland fires in the Plymouth-Carver area. Respondents supported the use of prescribed fire, mechanical removal of trees and brush and the construction of firebreaks. Less support existed for

the use of regulations that would require homeowners to take steps to reduce the risk from wildland fire themselves.

A major factor in survey respondents' level of support for fire hazard reduction strategies was their level of knowledge about the specific strategy. Respondents who have a high level of knowledge about a specific fire hazard reduction strategy were more likely to support the use of that strategy. This indicates that the respondents' knowledge about the strategies most likely included positive impressions. Local land managers' could benefit from providing education about the use of prescribed fire, mechanical removal of trees and brush and constructed firebreaks in building support for the development of fire hazard reduction programs.

Respondents that reported past experience with wildland fire exhibit a higher level of support for the use of prescribed fire than do those who have not experienced wildland fires. This higher level of support may indicate that people who have witnessed fires in the past have become comfortable with them. It is possible that the use of demonstration scale prescribed fires that can be viewed by local residents may be helpful in building support for the use of prescribed fires.

Education about the use of fire hazard reduction strategies should include open discussion of the risks and limitations of the various methods. The survey instrument used in this research project did not provide information about the effectiveness of and risks associated with each method. Survey respondents were merely asked to self-rate their level of knowledge about each fire hazard reduction method. Therefore, it is unknown how much specific knowledge each respondent has about fire hazard reduction methods.

Survey respondents support citizen involvement in developing fire hazard reduction programs. As discussed earlier, this finding is consistent with current trends in natural resource management nationwide. It is in the best interests of land and fire managers to involve citizens in all stages of plan development and implementation.

The results of the survey administered for the completion of this research project can be helpful in assisting land managers with developing an effective public participation strategy. Differences in perceptions and beliefs about wildland fire risk and fire hazard reduction strategies appears to be influenced by factors such as age, length of residency, residency status, the town in which the respondent resides and whether the respondent is a leaseholder of a cottage in Myles Standish State Forest. Land managers should develop public participation strategies that will involve stakeholders with diverse backgrounds to ensure that many different viewpoints are included.

The results of the survey indicate that there is little support for land-use regulations among respondents. It may be difficult to implement regulations mandating the use of certain building materials and clearing of vegetation from around buildings may prove to be difficult. Often, support for this type of regulation is highest following the occurrence of a catastrophic wildland fire (Sorvig, 2001). It has been several decades since this occurred in the Plymouth-Carver area.

A workable land-use control alternative may be to implement requirements for new construction. Both Plymouth and Carver officials indicated that they currently negotiate conditions for fire hazard reduction measures with developers during subdivision review. Currently, the success of this method is dependent upon the willingness of developers to agree to conditions. Revision of zoning and subdivision review bylaws may be possible within the study area. These revisions would give officials more power to require fire hazard reduction strategies. Possible requirements might include mandating public water supplies, plumbing connections compatible with fire department equipment, access for fire vehicles around structures, and clearing vegetation from around structures. Implementation of these regulation changes should be based on an assessment of wildland fire risk throughout the communities. The regulations could be applied to areas that are at high risk from wildland fire. Local residents may support these measures, because they would be applied to future development and not existing residents. Fire hazard reduction for existing structures could be done on a collaborative basis as discussed earlier.

The reduction of fire hazard in the Plymouth-

Carver area will be a lengthy process. Current efforts to introduce the use of prescribed fire are in their infancy and are seriously limited by a lack of resources and uncertainty about its effectiveness. Meaningful reduction of wildland fire hazard in the Plymouth-Carver area will require a sustained commitment of resources and public support. This research study indicates that there is currently support for the use of fire hazard reduction programs. It is likely, however, that the residents of the area do not have an understanding of the scope of what may be necessary to significantly reduce the threat of catastrophic wildland fire. Any large-scale efforts to reduce wildland fire risk will require a combination of fire hazard reduction strategies including both prescribed fire and mechanical removal of trees and brush. Public support may be helpful in obtaining additional funding and other resources to expand the use of fire hazard reduction strategies in the Plymouth Carver area.

To date, little work has been done to reduce fire hazard at the wildland-urban interface throughout the northeastern United States. As land managers begin to consider implementing fire hazard reduction projects, the insights provided by this study will be helpful in building community support. The variety of vegetation types found in the region results in the presence of widely scattered areas that are at high risk from wildland fire. Several large areas of pitch pine-scrub oak barrens exist within the Northeast including the New Jersey Pinelands and the Central Pine Barrens of Long Island, New York, which face a similar risk from wildland fire as the Plymouth Pine Barrens. The findings of this research can be useful in predicting community member's perceptions of wildland fire management issues in these areas. The research presented here can also be easily replicated for these areas.

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