

Communications between Forest Managers and Property Owners in Pine Flats, Arizona: A Case Study of Community Interactions in a High Fire Hazard Area



The Ecological Restoration Institute

The Ecological Restoration Institute at Northern Arizona University is a pioneer in researching, implementing, and monitoring ecological restoration of southwestern ponderosa pine forests. These forests have been significantly altered over the last century, with decreased ecological and recreational values, near-elimination of natural low-intensity fire regimes, and greatly increased risk of large-scale fires. The ERI is working with public agencies and other partners to restore these forests to a more ecologically healthy condition and trajectory—in the process helping to significantly reduce the threat of catastrophic wildfire and its effects on human, animal, and plant communities.

Cover photo: Typical scene in the Flat Pines neighborhood in Oak Creek Canyon showing the mixture of homes and heavy forest fuels.

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Introduction

The wildland-urban interface presents a number of challenges for forest managers, particularly in the context of fire-prone ecosystems. Forest restoration and fire protection needs can conflict with the very reasons people have for moving to forested settings. Homeowners often believe that public agencies, rather than the homeowners themselves, should bear the responsibility for fire protection.¹ However, effective communication and education can increase homeowners' acceptability of fuel treatments and encourage them to take personal action.² Conversely, poor communication can lead to feelings of mistrust, frustration, and homeowner reluctance to take personal action.

This case study of the Pine Flats subdivision in Oak Creek Canyon, Arizona analyzes communications between forest managers and property owners in an area of high fire hazard. Pine Flats is similar to many seasonal neighborhoods in the western United States: homeowners use their properties for leisure and relaxation, and amenities such as privacy, proximity to the forest, aesthetics, and exclusivity are highly valued. This study highlights the challenges of communicating fire and forest health information in such a context, and offers recommendations for both forest managers and homeowners.

Pine Flats has long been recognized as a neighborhood with a particularly high threat of devastating wildfire. Residents of the subdivision were apparently not taking the necessary actions to reduce fire hazard, prompting this study which considers whether there were possible miscommunications about fire hazard occurring between property owners and forest managers. Before conducting this research, several hypotheses were created based on preliminary knowledge: 1) Property owners were unfamiliar with forest and fire issues but would be willing to take action if they had a better understanding of fire hazard and forest health; 2) Communication styles and strategies used by forest managers were not compatible with those of homeowners; and 3) While forest experts are the best informed in terms of forest and fire knowledge, they may lack the skills needed to effectively communicate that knowledge to a lay audience.

The research presented here indicates that there is general willingness on the part of forest managers and property owners to improve and expand communication. There are extensive miscommunications about forest management and hazard mitigation. Pine Flats is an excellent example of a community in the wildland-urban interface, and this study illustrates how communications between groups have at times succeeded and other times failed. While the case study is site-specific to Pine Flats, the lessons learned there can be applied to other communities in similar situations.

Methods

The Pine Flats neighborhood, located north of Sedona, Arizona in the scenic Oak Creek Canyon, is situated in a ponderosa pine forest at an elevation of 5,500 feet (see map). There are 60 property owners, the majority (86%) being seasonal residents who spend their time in Pine Flats during the summer months. The subdivision is heavily forested and includes about 50 structures, many of which are close to one another. Pine Flats is surrounded by the Coconino National Forest and, given the current forest conditions, steep terrain and prevailing winds, is considered to be in a high fire hazard zone.

The study design included a mail-in survey to property owners (see Appendix 1); interviews with property owners, forest managers, and forest ecologists (see Appendix 2); and site visits to Pine Flats with forest management experts. The research was all conducted during a time when the community's Firewise application was being processed, and in the midst of an extraordinarily dry winter. Research was concluded prior to the 2006 summer fire season, which saw the evacuation of Oak Creek Canyon due to a nearby forest fire.

Surveys and interview requests were sent to the primary addresses of all 60 property owners during the winter of 2005-06. Thirty surveys (50%) were returned, and many residents agreed to be interviewed, indicating significant interest in this topic. Survey results were analyzed using SPSS statistical software. The survey instrument and summary results are given in Appendix 1.

Ten property owners were formally interviewed, either by phone or in person. These interviews lasted from 20 minutes to more than an hour and were audio recorded and later transcribed. Of these ten interviewees, nine owned homes and one owned property with no structures. Because of this difference, that property owner tends to be an outlier in the interview results. In addition to the ten formal interviews, there were four informal interviews. These were unplanned and occurred by phone or in person while walking through the Pine Flats neighborhood. These informative conversations were added to the overall research analysis, for a total interview group of 14 people (23.3% of Pine Flats property owners). A flexible interview design allowed residents to address issues that were most important to them. As a result, some questions were not asked of all interviewees (see Appendix 2 for a list of interview questions). Most residents believed that survey findings were indicative of their community as a whole, possibly with a few exceptions. However, some opinions may be missing due to the voluntary interview methodology.

In addition to interviews with Pine Flats residents, the research included interviews with three of the key forest managers involved with the Pine Flats subdivision and Oak Creek Canyon. Two interviewees represented the USDA Forest Service and the third represented Sedona Fire Department. All had been in direct contact with the Pine Flats property owners.

For the third portion of this research, several trips were taken to Pine Flats with two forest ecologists from the Ecological Restoration Institute (ERI) at Northern Arizona University. They provided assessments of the fire danger and forest health both inside Pine Flats and on the national forest lands surrounding the subdivision. This third portion of the research incorporated expert opinions on these matters from an outsider's perspective.

Results

The surveys and interviews detected a wide range of issues for Pine Flats residents. This synthesis will describe some of the key concerns. These include the risk fire poses to Pine Flats, fuel reduction activities, the Firewise community program and miscommunications about that program, perceptions of forest health, responsibilities of homeowners and the Forest Service, and views about the national forest that surrounds Pine Flats. These were the key issues that affected property owner action and enthusiasm, and all are greatly affected by communications between forest managers and homeowners. Confusion about these issues occurs among many people involved. The results given on the following pages highlight areas in need of clarification and improvement.

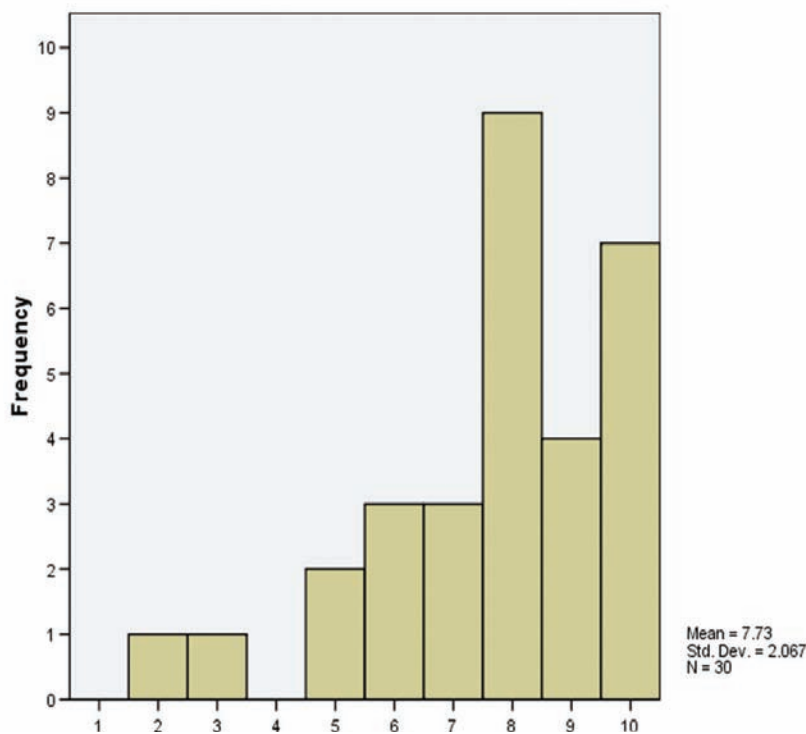


Map of Pine Flats subdivision and vicinity, in north-central Arizona

Fire Risk

Pine Flats residents are aware of the high fire risk in their subdivision and Oak Creek Canyon.

One survey question asked respondents to rate the likelihood of fire in Pine Flats from 1 (not likely) to 10 (very likely). The mean response was 7.7, showing a very high overall level of concern. Only two returned surveys chose a number less than five, and seven surveys said that fire risk was a 10. Respondents from the Sedona Fire Department and Forest Service as well as the forest ecologists from ERI all agree that Pine Flats residents have good reason to be concerned with fire threat, both due to forest conditions and to problems with firefighter access to the subdivision. One forest ecologist noted, “The one-way road [which is the only entrance into Pine Flats], especially as it crosses the creek, is a serious, serious problem for fire suppression in the subdivision.” Pine Flats is also at a disadvantage due to its distance from the nearest fire station along a winding, two-lane road. One forest manager said, “There’s a lot of reasons they should be worried about response time.” The layout of Pine Flats, as well as the zigzag nature of Highway 89A, present possible challenges for homeowner evacuation as well.



Interviews indicated that the Pine Flats Property Owners’ Association initiated formal meetings with the Forest Service in recent years. Forest managers were invited to talk about ways of reducing fire hazard in the neighborhood. Several residents noted that the Forest Service has cancelled these meetings twice, due to fire-related responsibilities. Residents understand these responsibilities, but still desire information and guidance on fire issues from forest managers.

Fuel Reduction

The majority of Pine Flats residents reduce some level of fuels on their property, but there is confusion concerning the means and degree to which fuels should be reduced.

Thirteen of the 14 Pine Flats property owners interviewed said they regularly reduced fuels on their property. The level of activity varied widely, however, and included activities such as raking pine needles off lawns, removal of dead trees and debris from rooftops and gutters, the relocation of wood piles, and thinning live trees on property boundaries. Nine out of 14 interviewees said they were willing to remove live trees; six had already done so, and two said they would if a forest manager suggested specific trees. One property owner said they would only reduce fuels if the rest of Pine Flats did it first. This person was also the only respondent that did not have an actual structure on their property. The person made the argument that “I could go up there and spend thousands of dollars...to clear my lot and if a fire broke out in that thing, that subdivision, the entire thing would burn. And I don’t know why I should have expended that money.” This outlook on fuels reduction was not necessarily unique. Several other homeowners expressed sympathy for this attitude, but articulated that they were willing to take necessary steps to reduce the fire hazard regardless of a neighbor’s inaction.

It is important to note that most Pine Flats residents are retirement age and live there seasonally. Some spend little time in Pine Flats and do not want to spend their visits cleaning up their yards or removing trees. A few more active residents said that some seasonal residents are difficult to get in touch with about fire issues. Most residents interviewed said they attend the annual Fourth of July meeting where they speak with forest managers and talk about proposed options for their subdivision. They said it is difficult to include those who do not come to those meetings in decisions.

One forest manager and the two forest ecologists from ERI agreed that it would likely take every person to be compliant with fuel reductions in order to provide homes with maximum fire protection. It was recognized that because of house and property proximity, if one house caught fire, neighboring houses would likely catch fire. Regardless, most residents were supportive of fuel reduction, though for some this was limited to debris removal rather than the more substantial task of forest density reduction.

One of the interviewed forest managers gave Pine Flats residents credit for improving fuel reduction efforts in recent years. Though some fuels had been reduced in Pine Flats, the community as a whole would require a great deal more thinning in order to significantly reduce fire hazard, according to ERI’s forest ecologists. Several homeowners felt there was a shortage of available workers to perform fuel reduction operations and said they would like to have someone to hire for this purpose. It appears that greater access to resources, including both labor and information, would greatly improve the quantity and quality of Pine Flats fuel reduction efforts.

Firewise Program

Pine Flats residents have become more aware of fire issues in recent years. However, much confusion still exists among property owners about fire hazards and remedies, and many are confused about the Firewise Community Program.

The National Firewise Communities Program (www.firewise.org) is a multi-agency effort designed to involve homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire. The Firewise Communities approach emphasizes community responsibility for planning in the design of a safe community as well as effective emergency response, and individual responsibility for safer home construction and design, landscaping, and maintenance.

Firewise Communities is part of the National Wildland/Urban Interface Fire Program, which is directed and sponsored by the Wildland/Urban Interface Working Team (WUIWT) of the National Wildfire Coordinating Group, a consortium of wildland fire organizations and federal agencies responsible for wildland fire management in the United States. In Arizona, the effort is led by Arizona Firewise Communities in affiliation with the national Firewise Communities programs. Among the state collaborators are the Arizona Fire Districts Association and the Forest Service.

The Sedona Fire Department representative, who is currently processing Pine Flats' Firewise application, describes Firewise as an awareness program that recognizes communities for their effort to reduce fire hazard. For Pine Flats to become "Firewise," a majority of homeowners in Pine Flats would have to show an active attempt each year at making their homes more fire safe. Activities include, but are not limited to, debris removal, limbing larger trees to reduce ladder fuels, and tree removal. Not every home within the subdivision would need to be compliant in order for Pine Flats to be deemed a Firewise community.

While Pine Flats property owners were generally supportive of fuels reduction, their feelings about becoming a Firewise community were more variable. Nine of the 14 interviewees were in favor of becoming Firewise. Three interviewees did not want Pine Flats to become a Firewise community, but the reasons they gave were based on a misunderstanding of the realities of the Firewise community design. Two people were undecided, including one who had never heard of the Firewise Program. Some of these perceptions and misunderstandings are discussed in the following section.

Firewise Misconceptions: Defensible Space, Fuel Reduction

Pine Flats residents have misconceptions about what implications the Firewise Program would have in their community and the effect this would have on their properties.

The most common misconception about the Firewise Program pertained to defensible space. Much of the Firewise literature that Pine Flats residents have seen suggests creating a 30-foot fuel reduction buffer around each home. Most lots in Pine Flats are 50 feet by 100 feet, with only 20 feet or less between neighboring homes. Many respondents argued that they “lived there for the trees” and did not want to “clear-cut” their property. Many residents felt that not only was a 30-foot defensible zone impossible due to the proximity of homes, but they mistakenly understood it to mean that they would have to literally remove every tree and shrub within that zone. According to forest managers, creating defensible space would not require all trees be cut, but in order to fully manage for fire threat and forest health, homeowners would have to reduce both the vertical and horizontal continuity of forest fuels.

The goal of creating a fire-safe community often conflicts with the reasons residents have for owning property in Pine Flats. Some homeowners argued that they live in Pine Flats for the aesthetic value of the forest and in some cases would rather enjoy it while they have it than remove live trees. Others said that while they would prefer to keep all the trees in the subdivision, “[We would] rather have it thin than not have a house at all.”

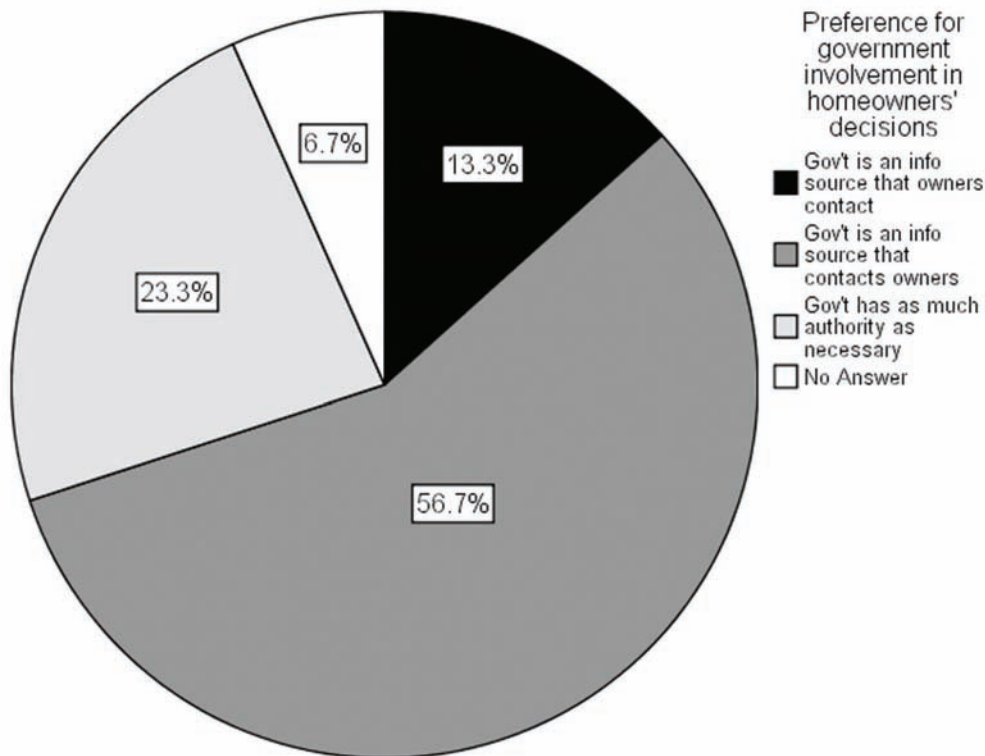
Firewise activities in Pine Flats could include actions such as cutting some live trees, limbing some trees to reduce ladder fuels, and regularly removing pine needles and debris as well as changes to building materials and removal of flammable material around homes. If a homeowner is particularly fond of a tree that is close to their house, they would not necessarily have to cut it, but would consider that tree as a part of the structure and create defensible space around it. Forest Service and Fire Department officials said that the Firewise framework would not require residents to remove old-growth trees as some had thought, but rather remove some of the trees surrounding them as well as their ladder fuels. This would actually have positive effects for the health of some older trees that might otherwise be compromised. One forest ecologist from ERI as well as one of the interviewed forest managers said that some Pine Flats residents were putting their old-growth trees in danger because of crowded forest conditions.

Several homeowners said they had been opposed to the Firewise Program until they spoke with the Fire Department representative in person and better understood exactly what Firewise treatments would look like on their property or that of their neighbors. They often said that it was this contact and site-specific explanation that persuaded them to want to become Firewise and to remove some trees on their property. As one resident with a relatively large lot said after thinning on his property, “What’s interesting is you take a lot of trees out and you’d be surprised how little you miss them.” Six people had already removed trees around their homes based on suggestions from the Fire Department or the Forest Service and two more said they would be willing to take out live trees if it was recommended by a forest manager. In general, residents lacked the knowledge of the specific actions needed. Nobody wanted to remove a tree unless someone with credibility recommended specific action for their land.

Firewise: Government Involvement

Pine Flats residents held a range of opinions on the proper role for government in areas of high fire hazard.

One survey question asked property owners what level of involvement government should have with private property use in areas of high fire hazard. The results showed a majority (56.7%) felt government should act as an information source that actively contacts property owners about fire issues. Another 13.3% said they wanted government to act as an information source, but one that property owners would take the initiative to contact with questions. The most surprising results, however, were that none of the survey respondents chose the option of no government involvement and an unexpected 23.3% said that government should have as much authority as necessary in order to reduce the risk of fire.



One resident remarked that he was not in favor of the Firewise Program because “to me they have you by the bootstraps.” Other residents wanted to see more government control. Some felt that it was frustrating to reduce fuels on their own property if their neighbors did not, and thought it would be good to see mandatory fuels cleanup. One interviewee said, “I want the Fire Department to hand out tickets. That will get people’s attention. And I don’t mean invitations to a meeting. I mean citations for a violation.” The residents who were the most concerned about fire were often the most adamant about government being very strict to get others to comply.

Forest Health and Drought

Most residents could only attribute the poor condition of the forests in Oak Creek Canyon to drought conditions, rather than to changes in forest structure from fire exclusion.

Ponderosa pine forests in the Southwest are ecologically unhealthy due to past forest practices including logging, overgrazing and fire exclusion, and, as a result, are more prone to catastrophic forest fire than they were before European settlement.³ Drought exacerbates existing unhealthy conditions of the forest and leads to heightened fire hazard. It also causes already stressed trees to be more prone to bark beetle attacks which in turn leave more dead fuels in the forest to further increase the fire hazard.

The survey sent to Pine Flats property owners asked them to evaluate the condition of the forest, given the following options: “healthy,” “excessive fuels on the ground,” “bark beetle kill,” “too many trees,” and “other.” The term “healthy” is a charged word that did not necessarily mean the same thing to Pine Flats residents as it did to researchers, as was later realized. Nevertheless, only 16.7% of respondents said that the forest was healthy. Of the 14 property owners interviewed, only four had a concept of general forest health issues, though these understandings were often limited or incomplete. Eight of the 14 interviewees thought that the threat of fire to Pine Flats stemmed only from the current drought conditions. Several believed that fire was not a significant threat during years of higher precipitation. Most interviewees expressed concern about increased tree mortality due to bark beetle attacks.

All three forest managers were asked if they communicated fire hazard to Pine Flats property owners in terms of general ecosystem degradation, attributed fire hazard to the current drought or used a combination of the two factors in their communications. Two forest managers said they focused on drought when speaking with homeowners, while one said that he used both issues to explain fire hazard.

One question worth considering when designing a communication strategy is whether having greater ecological literacy would further encourage residents of the Wildland Urban Interface to reduce fuels and thin trees. While interview results were inconclusive in terms of direct correlation between knowledge of forest health issues and willingness to reduce fuels, the majority of residents did not understand forest health as a benefit of fuels reductions. One interviewed manager said, “Education is a powerful tool. And I think a lot of people don’t realize that the condition of the forest is because of us excluding fire.” While he usually communicated issues of drought only, he thought that homeowners would benefit, and be more willing to reduce fuels, if they had a better understanding of forest health issues.

Aesthetic and visual reactions to the forest may also play an important role in people’s preferences. One forest manager said that homeowners may have an “unrealistic idea of what a forest should look like.” Forest ecologists from the ERI agreed that pre-European settlement forest conditions did not include such dense conditions as occur in the Pine Flats subdivision and outside of the subdivision in the national forest. They said restoring forests to more natural conditions would greatly reduce the wildfire hazard in and around Pine Flats.

Forest Service, National Forest and Responsibility

The central frustration articulated by Pine Flats property owners during their interviews was a frustration with the Forest Service for the condition of the national forest that surrounds their subdivision.

Many residents felt that the “real” fire hazard was in the national forest that surrounds them. They thought that a fire would likely catch or spread in the national forest before it would in Pine Flats. Most people felt that individual managers were personable, but the Forest Service as an institution was a frustrating bureaucracy that “failed to follow through on anything.”

Property owners felt that the Forest Service should prioritize forest management around homes, but that so far the Forest Service had failed to do their part to reduce fire hazard. All of the 13 homeowners interviewed expressed deep frustration with both the condition of the national forest as well as the inability of the Forest Service to visibly follow through with any management plans. While the two forest ecologists from ERI said that structures, such as houses, would likely carry a fire faster than the fuels in the national forest, both agreed that the forests surrounding the subdivision were in very poor condition and needed to be managed for both forest health and reduced fire hazard. Forest managers agreed that the national forest was in poor condition. However, there were some comments that Pine Flats residents needed to take responsibility for their own choice to build or buy a house in the middle of the forest, not the other way around.

Many interviewees expressed strong frustrations with the agency’s lack of action, and some of this ill will apparently affects perceptions of the Firewise Program. Firewise is not a Forest Service program, but it has been promoted to Pine Flats residents by some forest managers. One person tied his initial negativity toward the Firewise Program with his frustration with the Forest Service, stating that “I’m not anti-government, but...when you wonder why people don’t want to jump in and participate with the government [it is] because we see the government do such sorry jobs of things.” Another interviewee commented that “The Forest Service has done nothing, and...since a couple of floods, and since a couple of beetle attacks, I mean you can hardly walk through some of the woods that surround our place.” All Pine Flats interviewees wanted to see the surrounding national forest “cleaned up” and felt that this was by far the most important action to prevent fires in the subdivision.

There was a general agreement within Pine Flats that the Forest Service should be doing their part if they were suggesting to Pine Flats residents to reduce fuels on their private property. One resident commented, “We had a forest guy in there, he gets us all gung-ho and gets us to clean everything up...but they can’t seem to do anything on their own [land].”

Forest Service Plans

The Forest Service does have a plan for a fuels reduction in Oak Creek Canyon, but the plan, as well as its limitations, have been ineffectively communicated to Pine Flats residents.

The project proposal as described in the environmental assessment is to thin national forest land within 200 feet of all private property in Oak Creek Canyon on slopes less than 40%. A large portion of national forest land within 200 feet of the Pine Flats subdivision consists of slopes greater than 40%, which means the project may not accomplish the level of fuels reduction that Pine Flats residents are expecting from the Forest Service. The Forest Service sent letters to all property owners in the fall of 2005 explaining the proposal, and invited residents to an open house. However, only one resident mentioned the existence of this plan during the interviews.

Two respondents were later asked why interviewees failed to mention the Forest Service proposal. They gave different, but insightful, answers to this question. One interviewee had experience with the Forest Service in the past. He said that he got the letter and understood it, but thought the writing was too technical for most other people in the subdivision to understand. He used as an example the term, “prescribed burn,” which he believed most people would not understand. The other interviewee recalled the letter and commented that they thought the reason “no one mentioned it, [is] because they [the Forest Service] have forever said they were going to do things and never followed through....So no one believes them.”

Of the 13 homeowners who expressed frustration with the Forest Service for the conditions in the national forest, four volunteered during the interview to go in and clean up some of the fuels on the national forest themselves on their own initiative. One woman who volunteered suggested, “If they are so tight with money and it is so hard to get things done, let us offer to help them.” All four would-be volunteers said their offers to reduce the fuels themselves had been turned down by the Forest Service. One person said he had been turned down when he applied for a permit to get firewood. Many people recognized this as a concern since they are not allowed to “clean up” the national forest, and yet it is right outside their homes. One resident said, “The Forest Service has a forest. I can understand if we’re not high on their priority. But, we ought to be able to do, you know, take care of ourselves. And it wouldn’t hurt if we went in there and cleaned up the Forest.” Some people said they use neighborhood hoses to water all the trees around the boundary with national forest land on a regular basis because it is all they can think of to do.

Personal Contact

All 14 interview respondents from Pine Flats said they would like to see more in-person contact from forest managers.

One interviewee said that the prospect of having more information and getting more site-specific advice was the only reason he finally agreed to the Firewise community proposal. Another explained that she wanted more one-on-one time with forest specialists, stating “I think they should talk to the individual people rather than hold a meeting, so people can ask their own concerns.” Others wanted forest managers to address their concerns through a combination of annual Property Owners’ Association meetings and one-on-one contact. Because of the seasonal resident status of the majority of Pine Flats homeowners, it is essential that forest managers are available to meet with homeowners when they are likely to be there (during the summer and often on weekends). This is difficult because this is also fire season when personnel from the Forest Service and Fire Department are likely to have other places they need to be.

Forest managers have communicated fire hazard to property owners through three different modes: literature, such as pamphlets and letters; formal meetings; and one-on-one talks with some residents. Pamphlets and letters were rarely referred to during interviews as significant sources of information. Residents recognize and appreciate the value of formal meetings, but all interviewees desired more individual recommendations from forest managers and continued one-on-one contact. The residents that had already received site-specific recommendations on their property felt that the rest of Pine Flats would greatly benefit from the same.

Conclusions

Pine Flats property owners are acutely concerned about the threat that fire poses to their subdivision. Many residents have shown enthusiasm toward fuels reduction and are interested in receiving information about how to be more Firewise in their community. For the most part, residents said they would welcome more contact from forest managers in dealing with their property. While residents are interested in taking action to reduce the threat of fire, they also expressed some apprehension about removing numerous trees from their property. This investigation found that many wildland-urban interface residents were willing to take small steps to reduce fire hazard on their own property (e.g., removal of pine needles and debris), but felt that the larger risk was in the national forest surrounding them, and, therefore, more responsibility falls on public agencies. Some residents wanted site-specific, expert information on how to reduce fire hazard on their property before moving forward with fuel reduction.

The slow pace of fuel reduction in Pine Flats does not appear to be a result of inadequate understanding of fire hazard. It is more likely a combination of personal preferences for dense forest conditions, limited understanding of the local ecology, lack of understanding of what remedial actions to take, a perceived lack of available skilled workers to perform fuel reduction activities, and mistrust of government agencies and programs. Several of these factors can be addressed through improved communication between forest managers and property owners.

These findings highlight the important role of effective communication between forest managers and wildland-urban interface residents. In particular, the following issues should be the focus of communications between managers and residents:

- Hazards of forest fire and property damage resulting from current forest conditions. Residents should understand how both the short-term (e.g., seasonal weather patterns) and longer-term (e.g., changes in forest structure) contribute to fire hazard.
- Specific steps homeowners can take to protect their own property and to minimize the possibility that a residential fire will spread into the neighboring forest.
- Steps being taken by forest managers to restore more natural forest conditions and change fuel arrangements to decrease fire behavior. This should include a realistic appraisal of possible complicating factors including funding, seasonal windows of opportunity, terrain limitations, and compliance with environmental or procedural laws.
- Concerns or limitations homeowners have about reducing fire hazard on their property.

The context of communication is just as important as the content, as was discovered in this study. In the case of Pine Flats, communication has apparently been effective for some residents, but for others the timing, mode, or content of communication has been inadequate. According to residents in this study, communication with forest managers is greatly desired, but it must be done in a way that is accessible, understandable, and useful to residents.

Recommendations for Forest Managers

The following recommendations are based on a combination of opinions expressed by Pine Flats residents and information from forest managers and ecologists. These recommendations are intended to address shortcomings in manager-homeowner communications in Pine Flats, but many may be applicable to similar wildland-urban interface situations across the country.

General recommendations

- Modes of communication should use concepts and terminology that members of the public can understand.
- Further research is needed to determine whether an increased emphasis on educating residents about forest health would increase their willingness to conduct fuels reductions. It is likely that property owners would be more willing to reduce fuels on their property if they believed that doing so would positively benefit overall ecosystem health.

Fuel reductions, Firewise

- Firewise community recommendations should be customized and site-specific. Pine Flats residents had a tendency to take information given to them either verbally or through literature verbatim. Literature describing concepts, such as defensible space, should fit the specifics of a community to avoid confusion and the rejection of programs because of misinformation.
- Since many Pine Flats property owners are older as well as seasonal residents they need a list of recommended and qualified contractors to do fuel reduction work. Several respondents supported the idea of the Property Owners' Association hiring, on a regular basis, a worker or group of workers to work specifically for Pine Flats. Such workers would be advised by forest managers as to what fuels should be reduced with the consent of property owners.

In-person contact

- One-on-one contact with forest managers was reported as useful in clarifying fire and forest issues. All interviewees who had already had the chance to speak in person with forest managers spoke highly of that interaction, and those who had not yet had that opportunity wished to do so. Most property owners felt that while they understood suggestions for fuels management in general, they were not confident enough to undertake actions on their own property. The majority of residents said that they would greatly benefit from site-specific explanations and suggestions and hoped that would be provided.

- One-on-one contact with forest managers is essential to motivate landowners to take precautions against forest fire. The suggestion received a high level of enthusiasm from residents. Contact should be made during times when seasonal residents are at their homes.

Forest Service

Property owners need to see a definite timeline for proposed work. Any delays or inaction in the national forest gives the impression that the Forest Service will not follow through on its proposals, leading to distrust of the Forest Service as an institution. This distrust can cause negativity about the Firewise program.

- Interviewees were universally either unaware or dismissive of the current plan for the national forest surrounding private property in Oak Creek Canyon, indicating a need for better communication between the agency and adjacent property owners.
- The Forest Service should make a greater effort to meet with residents at scheduled times, and to send a replacement representative if agency staff are unable to meet their commitments.
- Fire education and action should go hand in hand. Currently, property owners have been receiving information from forest managers about the high fire hazard of their area and at the same time nothing is happening on the adjacent national forest to reduce that hazard. This creates a higher level of fear and frustration in a group that cannot actively manage locations outside their private property.

Forest managers should review outreach materials to ensure that they are both site-specific and understandable for a lay audience. Plans for fuel-reduction projects on the national forest should include a definite timeline to avoid property owner frustration. Meetings and open houses for these plans should be scheduled for times that a majority of the desired audience can attend, such as during the summer and over weekends in the case of Pine Flats. Outreach should focus on more direct interaction with property owners. Site-specific demonstrations of suggested mitigation activities would be beneficial for gaining property owner acceptance and trust.

Recommendations for Property Owners

Pine Flats property owners could improve their communications between each other and their availability to meet with forest managers during their mostly seasonal residency. Property owners should also take responsibility for choosing to live in a fire-adapted ecosystem and take the initiative to learn more about those areas and about the complexities of federal forest management.

- Property owners should take the initiative to educate themselves about forest health and fire hazard. While residents had a good understanding of drought conditions in Pine Flats, their knowledge of the ecosystem as a whole was fairly limited. Because of their choice to purchase property in a fire-adapted ecosystem, they should make an attempt to better understand how to live in that ecosystem to both promote forest health and reduce fire hazard.
- Property owners should also develop a greater understanding of the constraints and opportunities of federal forest management. Important constraints include staffing, funding for treatments, regulatory compliance, terrain limitations, seasonal limitations, and the need to attend to other high-priority projects. At the same time, several recent policies have created new opportunities for partnerships between communities and land managers, especially in the context of fire and fuels planning.
- Regardless of neighbors' inaction, property owners should make Firewise efforts on their own land. While it is true that a fire could spread between houses in Pine Flats in spite of Firewise activities, fuels reductions still have the potential to reduce fire hazard. Pine Flats residents have a responsibility to manage their land for fire safety regardless of their neighbors' (including Forest Service) actions.
- Property owners could make a greater effort to be available for meetings with forest managers. It may be difficult for residents to be around during necessary intervals for communications with forest managers, but property owners should try to make themselves available during times that managers are able to meet with them.

Endnotes

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Appendix 1. Survey Instrument Administered to Residents of Pine Flats

Note that percentages do not necessarily add up to 100% either because respondents were asked to choose one or more answers or because respondents chose multiple answers despite instructions to choose only one.

- 1) **What, in your opinion, is the condition of the forests surrounding your home? (Circle one or more):** n=30
- | | |
|--|-------|
| a) Healthy | 16.7% |
| b) Lots of bark beetle kill | 53.3% |
| c) Trees are too close together | 56.7% |
| d) Excess pine needles and other dead debris on the ground | 66.7% |
| e) Other _____ | 10.0% |
- 2) **What is your primary source of information about the risk/likelihood of fire in the Pine Flats area? (Choose one):** n=30
- | | |
|---|-------|
| a) Personal familiarity with the issues | 53.3% |
| b) TV/radio/newspaper | 6.7% |
| c) Forest Service | 43.3% |
| d) City officials | 3.3% |
| e) Neighbors and friends | 23.3% |
| f) Other _____ | 6.7% |
- 3) **How would you rate the risk of a forest fire in or near Pine Flats? (Circle a number)** n=30
- | | | | | | | | | | | | |
|--|-----|-----|-----|-----|------|---|------|------|-------|----|---------------|
| 0.0 | 3.3 | 3.3 | 0.0 | 6.7 | 10.0 | 10.0 | 30.0 | 13.3 | 23.3% | | |
| Not very likely | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Very probable |
| <i>(forest fires are not likely to occur here)</i> | | | | | | <i>(forest fires are a very likely possibility)</i> | | | | | |
- 4) **Who do you believe is responsible for procedures to reduce the danger of forest fires in forested residential areas such as Pine Flats? (Choose one):** n=30
- | | |
|---|-------|
| a) Forest Service | 30.0% |
| b) Homeowners | 30.0% |
| c) City Fire Department | 0.0% |
| d) Other _____ | 0.0% |
| [Forest Service and Homeowners] | 26.7% |
| [Forest Service, Homeowners, and Fire Department] | 6.7% |
| [Forest Service, Homeowners, and other] | 3.3% |
| [Homeowners and Fire Department] | 3.3% |

5) **How much involvement should the government have in homeowner's private property use in areas of forest fire danger? (Choose one):** n=30

- a) None at all **0.0%**
- b) As an information resource that property owners can contact if they have questions **13.3%**
- c) As an information resource that actively contacts property owners regarding fire protection issues **56.7%**
- d) As much as is necessary in order to protect people and forests from forest fire risks **23.3%**

6) **What do you feel would be the best approach for homeowners to reduce any danger of forest fire in Pine Flats? (Circle one or more):** n=29

- a) There is no need to change anything **0.0%**
- b) Cutting down some trees **30.0%**
- c) Removing some of the debris around houses that could catch fire **80.0%**
- d) Other _____ **26.7%**

7) **How informed do you think you are about forest health issues? (Circle a number):** n=30

13.3 13.3 20.0 20.0 10.0 0.0 10.0 13.3 0.0 0.0%
 Very aware □--1-----2-----3-----4-----5-----6-----7-----8-----9-----10--□ Not really aware

The following three demographic questions will help the credibility of my research by defining a population:

8) **How long have you lived in Pine Flats?** n=30

- a) 0-3 years **0.0%**
- b) 4-10 years **26.7%**
- c) 11-20 years **33.3%**
- d) 21+ years **40.0%**

9) **Do you live in Pine Flats as a:** n=29

- a) Seasonal resident **86.2%**
- b) Year-round resident **13.8%**

10) **Up to what level of education have you completed?** n=30

- a) Less than high school **0.0%**
- b) High School **16.7%**
- c) Bachelor's degree **53.3%**
- d) Master's degree **20.0%**
- e) PhD **0.0%**
- f) Other _____ **10.0%**



Appendix 2. Interview Questions for Forest Managers and Pine Flats Residents

Note that the interview methodology used a flexible, semi-structured approach as a means of eliciting specific information from the varied interviewees. Therefore, the following questions are not an exhaustive list of all questions asked of all interviewees. Likewise, some of the following questions may not have been asked of all interviewees.

Interview Questions – Forest Managers

- Could you describe your job and how it relates to Pine Flats and Oak Creek Canyon?
- What constitutes the largest fire threat to Pine Flats?
- How do you communicate forest health issues to residents?
- How do you communicate fire risk issues to residents?
- When you talk to residents about fire risk, how do you frame the issue? Do you emphasize forest health or drought?
- What would the Firewise community program entail for Pine Flats?
- In order to be Firewise, would Pine Flats residents have to clear 30 feet of defensible space around their homes?
- If Pine Flats becomes Firewise is there some sort form of enforcement to make sure everyone remains compliant?
- Is there reason for Pine Flats residents to be concerned about fire department response time?
- Has your agency/department actively tried to get Pine Flats residents to thin their properties or do fuel reductions?
- How do you go about contacting residents?
- Have any Pine Flats residents contacted you with concerns about surrounding national forest land?
- How would Pine Flats residents contact your agency/department?
- What kind of risk does the campground pose to Pine Flats in terms of fire danger?
- Have you seen a significant change over time in Pine Flats residents' willingness to accept fuel reductions?
- Have you seen a significant change over time in Pine Flats residents' willingness to become a Firewise community?
- Is your agency/department willing to give one-on-one advice to homeowners on what actions to take to reduce fire danger on their property?
- Is it accurate to say that Pine Flats homeowners have been resistant to taking action to reduce fire danger in their subdivision?
- Is there any other information that you think is relevant?

Interview Questions – Pine Flats Residents

- How much time do you generally spend at Pine Flats?
- How long have you owned your property (in Pine Flats)?
- What is your age (or age range)?
- What is your occupation?
- Do you feel fire poses a large threat to Oak Creek Canyon?
- What is chiefly responsible for the fire threat in the area?
- What does the term fuel reduction mean to you? Does it include removal of live and dead material or just dead material?
- Who approached your community about becoming Firewise?
- What can you tell me about Pine Flats becoming a Firewise community?
- Why is or was there resistance to the Firewise program?
- Do you often talk with your Pine Flats neighbors about fire issues?
- Have you done any tree-thinning or other fuel reduction on your property?
- Has anyone else in Pine Flats done any thinning or fuel reduction?
- Describe the condition of the forest surrounding Pine Flats.
- Do you think people in Pine Flats are well-educated on forest health issues?
- Is forest thinning a forest health issue or mainly a fire risk issue?
- Do you think people are receptive to learning about forest health issues?
- Are there generational differences in views of forest health and homeowner responsibility?
- Do you feel that survey results are representative of most of Pine Flats?
- Would it be beneficial for a forest manager to visit every house to discuss fire issues on that property?
- Are you happy with the communication you've had with forest managers?
- What form of outreach would work well in Pine Flats?
- Do you have any suggestions for forest managers?
- Have you been in contact with anyone from the government concerning fire issues? Who (what department or agency)?
- What is your experience dealing with fire risk in Pine Flats?
- Do you have concerns about the surrounding national forest lands?
- Has the Forest Service contacted you about plans for neighboring national forest land?
- What can you tell me about the risk posed by the campground?
- Is it more important for the Forest Service to manage surrounding forests or for home owners to manage forests on their properties?
- What level of fuels reduction would you be comfortable with on your property?
- Is there any other information that you think is relevant?

ERI White Papers: Issues in Forest Restoration

Ecological restoration is a practice that seeks to heal degraded ecosystems by reestablishing native species, structural characteristics, and ecological processes. The Society for Ecological Restoration International defines ecological restoration as “an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability. . . . Restoration attempts to return an ecosystem to its historic trajectory” (Society for Ecological Restoration International Science & Policy Working Group 2004).

In the southwestern United States, most ponderosa pine forests have been degraded during the last 150 years. Many ponderosa pine areas are now dominated by dense thickets of small trees, and lack their once diverse understory of grasses, sedges, and forbs. Forests in this condition are highly susceptible to damaging, stand-replacing fires and increased insect and disease epidemics. Restoration of these forests centers on reintroducing frequent, low-intensity surface fires—often after thinning dense stands—and reestablishing productive understory plant communities.

The Ecological Restoration Institute at Northern Arizona University is a pioneer in researching, implementing, and monitoring ecological restoration of southwestern ponderosa pine forests. By allowing natural processes, such as fire, to resume self-sustaining patterns, we hope to reestablish healthy forests that provide ecosystem services, wildlife habitat, and recreational opportunities.

The ERI White Papers series provides overviews and policy recommendations derived from research and observations by the ERI and its partner organizations. While the ERI staff recognizes that every forest restoration is site specific, we feel that the information provided in the ERI White Papers may help decisionmakers elsewhere.

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