Collaboration on Hazardous Fuel Treatment Projects for Community Protection—Incline Village, Nevada

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Collaboration on Hazardous Fuel Treatment Projects for Community Protection—Incline Village, Nevada

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Abstract

This report evaluates the collaborative efforts behind the early 1990s hazardous fuel treatment project in Incline Village, Nevada; it describes the process and accomplishments, and lessons that can be used as a guide for the development of similar cooperative programs. From 1990 to 1992, with the support of the community, a hazardous fuel treatment project was implemented in Incline Village to reduce the risk of fire and provide defensible space in and around the community. This 1,000-acre project removed usable timber by helicopter logging and treated the remaining fuels on site by piling and burning. To increase the likelihood of success, extensive community education and outreach occurred, and partnerships were developed prior to beginning the project.

1. Introduction

1.1. Background

Incline Village is located in the northeastern portion of the Lake Tahoe basin in Washoe County, Nevada (*Fig. 1*) at an elevation of 6,200–7,500 ft above sea level. The topography surrounding the community consists of steep slopes that are generally greater than 30%, with six major drainages crossing the town. Average annual precipitation is 23.6 inches, with the majority falling as snow in the fall and winter. The dominant vegetation layer is a tree overstory of Jeffrey pine (*Pinus jeffreyii*) and white fir (*Abies concolor*) with scattered incense cedar (*Calocedrus decurrens*) and sugar pine (*Pinus lambertiana*). Willow (*Salix* spp.), aspen (*Populus* spp.), and alder (*Alnus* spp.) are the dominant tree species in the riparian habitat. The shrub layer (typically 4–10 ft tall) consists of manzanita (*Manzanita* spp.), snowberry (*Symphoricarpos albus*), bitterbrush (*Purshia tridentata*), huckleberry oak (*Quercus vaccinifolia*), bitter cherry (*Prunus emarginata*), chinkapin (*Chrysolepis sempervirens*), mountain whitethorn (*Ceanothus cordulatus*), and currant (*Ribes* spp.) (NLTFP 2004).

In the early 1990s, Incline Village had about 4,500 housing units with a year-round population of approximately 5,000. Median home prices at that time were about $300,000, with some homes valued at well over $1 million. The 2000 census showed the population had grown to 9,639 with 7,674 housing units. By 2004 the median home price in Incline Village had climbed to $806,000

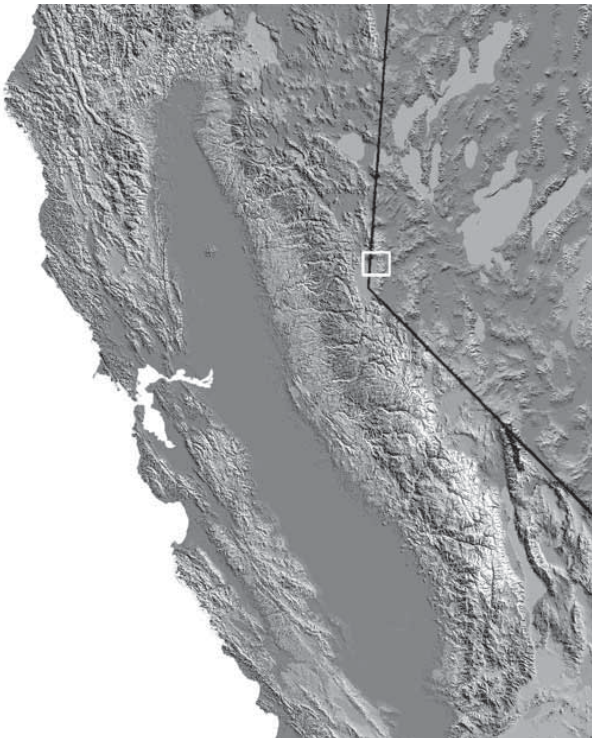

Figure 1—General location of the Incline Village project near Lake Tahoe in Nevada.

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(North Lake Tahoe Bonanza 2005). Numerous second-home residents and heavy recreation use mean that the population in the town can more than double during winter and summer tourist seasons. The majority of homes are constructed on ridge tops with greenbelt land located in the drainages below (*Fig. 2*). Greenbelts consisted of overstocked coniferous forest stands (basal area of 400 ft^2 per acre) and riparian vegetation. The Incline Village General Improvement District (IVGID) owns and manages approximately 700 acres of greenbelt land.

IVGID is a municipal, public service corporation established under Nevada State Law and chartered to provide basic utility and recreation services to the communities of Incline Village and Crystal Bay. It is governed by a popularly elected board of trustees. IVGID owns approximately 1,350 acres of property, including golf courses, beaches, tennis courts, sewer and water pump stations, a ski area, and greenbelt land.

Historical data suggest that large, catastrophic wildfires may occur in the area of the Incline Village community (NFTLP 2004). Ignitions are common but generally do not expand into sizeable wildfires. The relatively short response times of the North Lake Tahoe Fire Protection District (NLTFPD) have been effective in keeping fires controllable and short-lived. Good access to paved roads helps shorten the response time. To date, fire suppression measures have been able to stop ignitions from becoming large fires.

Research at Pennsylvania State University (Taylor et al. 2000) suggests that below 8,000 feet, in warmer, drier areas, such as the Tahoe Basin, frequent ignitions would have occurred naturally prior to early settlement and resulted in consumption of fuels. This constant consumption of fine fuels kept fuel loadings and fire intensity low. Altered plant communities and fuel conditions and 20th-century fire-suppression policies have affected natural fire regimes. Areas that formerly burned with high frequency but low intensity (fires more amenable to control and intervention) now have large accumulations of unburned fuel, which, once ignited, will burn at higher intensities (NLTFP 2004).

To add to the already hazardous fuel conditions, drought in the late 1980s resulted in pest infestations and high tree mortality in the coniferous forest (*Fig. 3*). Mortality rates were as high as 80% in some stands around the lake. By 1990 on IVGID land, 40–50% of the white fir was dead or dying and 20–25% of the Jeffrey pine

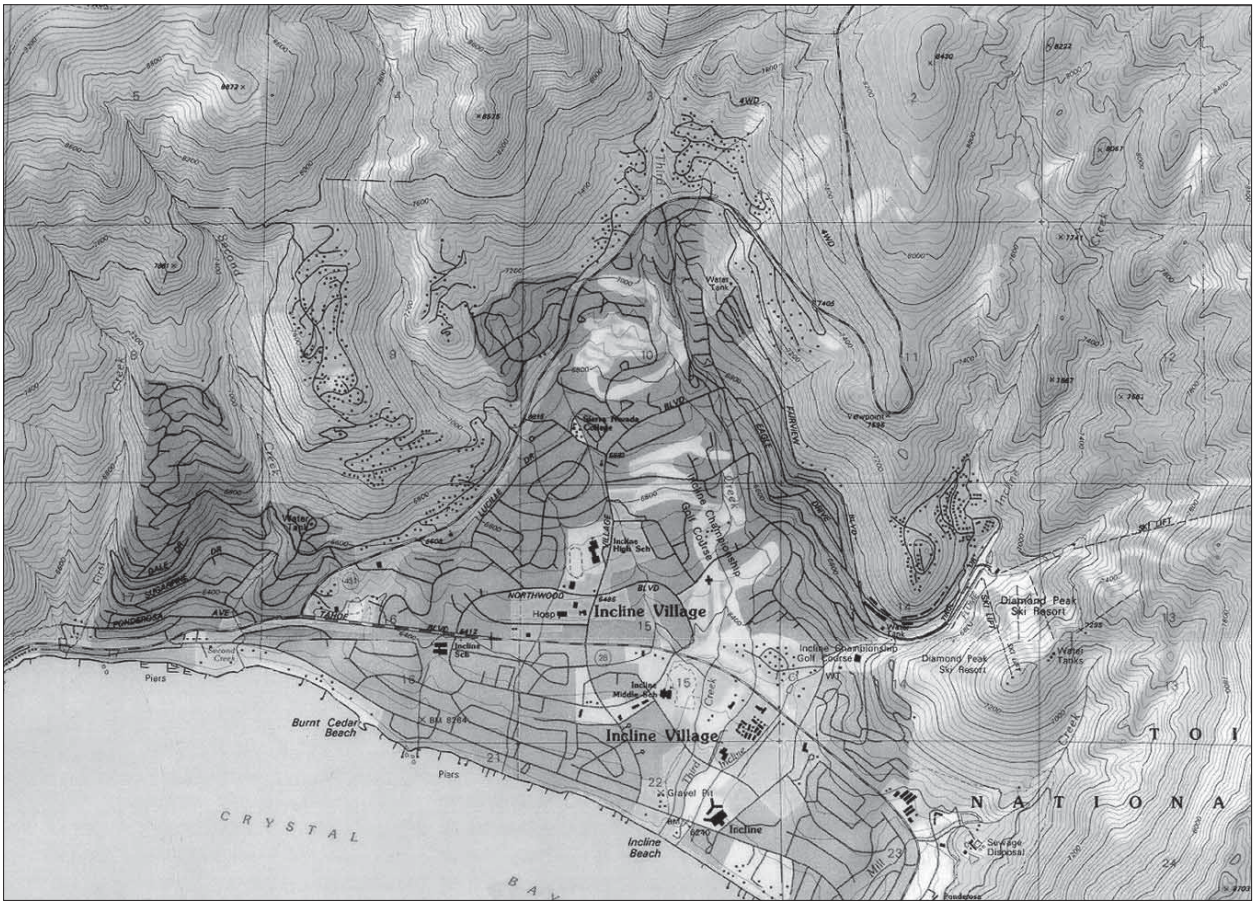

Figure 2—Topography and general layout of Incline Village, Nevada.

Figure 3—Tree mortality in and around Incline Village, 1990. Photo provided by Pat Hovland.

was affected. Overall, approximately 35% of the timber within the greenbelt was dead or showed signs of stress (IVGID 1991).

1.2. Impetus for the Initial Fuel Treatment Project

In the mid-1980s, Fire Marshal Jerry Adams became aware of the wildfire risk to the community of Incline Village. He saw the need for action but believed the problem was too big for the North Lake Tahoe Fire Protection District (NLTFPD) to solve alone. He brought partners together (e.g., University of Nevada, Reno, Cooperative Extension [UNRCE], IVGID, Tahoe Regional Planning Agency [TRPA], Nevada Division of Forestry, environmental groups, community representatives) to discuss the problem and develop a solution. Partners discussed the need to remove the fuel that had built up in the greenbelt in order to help protect the community from a catastrophic wildfire. The group agreed to implement a 20-acre test plot in one of the IVGID drainages in which the stand would be thinned, the accumulated ground fuel would be removed and the remaining trees would be pruned. Based on the success of the initial test plot and the community's concerns about fire safety, in 1990, the Board agreed to fund a large-scale hazardous fuel treatment project that would include harvesting timber and treating the remaining hazardous fuels.

2. Goals and Objectives

The goals for the initial large-scale hazardous fuel treatment project were to reduce the chances of destruction from a catastrophic wildfire and to increase public and firefighter safety during a wildfire event. The IVGID Board of Trustees adopted four primary objectives for the program, targeting the overstocked greenbelt:

1. Improve forest health and vigor.
2. Reduce fuel loading and fire hazard.
3. Protect the highly sensitive environment of the Lake Tahoe basin and enhance property values.
4. Consider an economical approach without unreasonable financial risk.

3. Process

3.1. Partners and Roles

The Fire Marshal began the educational process related to hazardous fuel management in the community of Incline Village in the mid-1980s. With assistance from UNRCE staff, the outreach program became very active in 1988. UNRCE involved the members of the community in developing solutions, met with service clubs and community groups, and held public meetings and forums. They ensured that all government agencies were sharing a consistent message about the danger of

wildfire given the current forest conditions and the need for the community to be involved in measures to lower the risks. This information was shared multiple times, from multiple entities, in multiple delivery methods. In a public meeting and handbook (Smith et al. 1991), a graphically simulated fire (using the program FARSITE) for this area showing the destruction of 120 homes in 1.5 hours was presented. Based on these initial efforts, a Defensible Space Program was developed for Incline Village, and a team (the Defensible Space Group) was formed with leaders from 20 neighborhood zones. By 1990, when planning for the hazardous fuel reduction project began, the community understood the need to treat hazardous fuels in their area, and several community members were strong advocates for the IVGID project.

The IVGID Project Leader, Bill Quesnel, provided educational material, met with community service groups, held workshops, scoping meetings, and a public hearing, and discussed the timber and fuel management project with the Defensible Space Group. The project received coverage in the local newspaper during both planning and implementation. IVGID formed a Technical Advisory Committee to provide input and review the program. Members included professionals in the fields of forestry, fire ecology, land-use planning, fire science, and engineering.

Permitting agencies included TRPA and the Nevada Division of Forestry. Additional permitting agencies involved later, when the prescribed-fire program was implemented, included Washoe Air Quality District and Nevada Environmental Protection Agency. Partnerships were formed with the U.S. Geological Survey to monitor the streams within greenbelt land and the U.S. Forest Service for timber and scenery-management skills. NLTFPD worked with graduate students who analyzed their hazardous fuels program.

3.2. Initial Timber Harvest and Hazardous Fuel Treatment

IVGID led the initial helicopter logging and fuel management project. Quesnel, an engineer working in the public works section of IVGID, was also a forester and became the project lead. He hired two California Registered Professional Foresters for planning and implementation and several resource consultants to assist with the project. Originally the project was not proposed as a helicopter-logging operation, but after considering the numerous environmental protection measures in the Lake Tahoe basin, it became the preferred alternative. In February 1991, IVGID completed an environmental assessment, a timber harvest plan, and a fuels management plan for their land (Timber and Fuels Management Plan for Incline Village General Improvement District Greenbelt and Diamond Peak Ski Area, 1991). During the analysis, it was decided that the land of the Diamond Peak Ski Area should be included in the project. *Figure 4* shows the location of the project area in relationship to Incline Village.

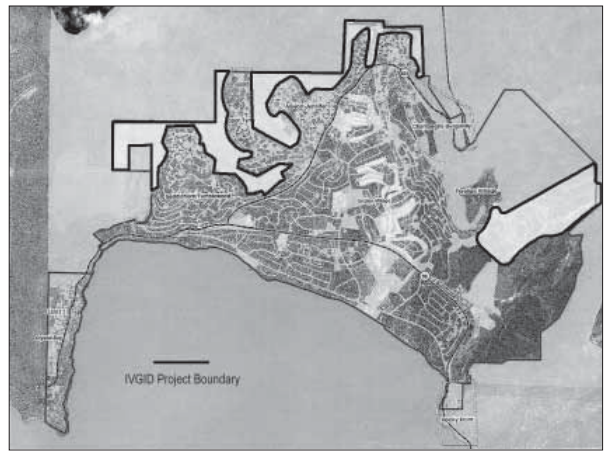

Figure 4—Project area boundaries for the Incline Village General Improvement District project. Map base provided by Resource Concepts from the North Lake Tahoe Fire Plan.

On the timber harvest plan, four treatment zones were identified (with the same treatment prescribed for the Secondary Buffer and Remote Area):

1. Defensible Space: the first 200–500 ft from a property boundary. Here dead, dying, and high-risk trees were removed, pre-commercial thinning of understory trees was performed, remaining trees were pruned up 10 ft, brush was cut or pruned to create mosaics and discontinuities, and slash was completely removed by piling and burning.

2. Buffer: the first 200–500 ft along major access routes for fire control and emergency escape or evacuation. Dead, dying and high-risk trees were removed, and slash was completely removed by piling and burning.

3. Secondary Buffer and Remote Area: interior areas more than 400 and 800 ft, respectively, from property boundaries. Commercial-size dead, dying and high-risk trees were felled (here, only those of commercial value were removed), slash was lopped and scattered and remaining logs were bucked to 8- to 10-ft lengths. (The Diamond Peak Ski Area was included in this zone).

The treatment prescribed in the Fuels Management Plan for the Defensible Space and Buffer Zones included the following:

- Slash should be piled by hand for burning.
- Pile sizes should be limited to reduce damage to the mineral soil caused by excessive heat.

- Burning should occur during the winter months when proper moisture, temperature, and wind conditions exist, in order to ensure safety and to adhere to air-quality regulations.

Environmental mitigation measures included prohibiting activity in the Stream Environment Zones or within sites that are sensitive cultural resources, leaving one or two snags per acre for wildlife, and prohibiting construction of new permanent roads.

Because of the community outreach that Fire Marshal Jerry Adams and UNRCE Area Natural Resource Specialist Ed Smith carried out, the local community was supportive of the project. Prior to Adams and Smith's efforts, the community members had been concerned about the impacts of vegetation being removed—the residents had moved to the forest to live in the woods with nature and were hesitant about changes to the landscape. IVGID employees continued to work with residents and attempted to resolve potential problems. Community members were concerned about aesthetic changes (individual views), catastrophic wildfire as a result of prescribed burns in the area and the potential effect on water quality, noise, safety during helicopter operations, and smoke. TRPA had concerns about impacts on visual quality (at the landscape scale), water quality during implementation, and risks to cultural resources.

The IVGID staff met with concerned landowners during the entire operation and incorporated public comments and concerns into the design of the project.

- Adjacent landowners were consulted about the specific trees that would be removed.
- The logging season was moved to the end of the summer tourist season when there were fewer people living in and visiting the community.
- The time of the logging operation during the day was limited.
- The helicopter log line was modified to decrease the noise at ground level.
- The helicopter did not fly over homes, businesses, or roads.
- The size of the slash piles was kept small to minimize the chance that the remaining trees would catch fire.
- The piles were burned in stages when air inversions were minimal.

IVGID did not follow a linear process. Because of the short time frame to complete the project, planning, preparation, request for proposal bids, and approval from regulatory agencies occurred during the same time period. TRPA required a National Environmental Policy Act (NEPA) document and the Nevada Division of Forestry required a timber management plan. As a condition of approval, TRPA required that a landscape architect monitor the tree removal to ensure the landscape would not be drastically altered. They also required a $60,000 bond to plant seedlings should the openings from tree removal be too large.

IVGID solicited bids and advertised the project to timber operators; they received one bid. Erickson Aircrane was hired to complete the logging operation, pile slash, and prune the remaining trees. Erickson worked willingly with IVGID and the community to address their concerns. IVGID worked with the community to minimize impacts during the pile-burning operations.

3.3. Development of Prescribed-Fire Maintenance Plan

With the success of the initial fuel reduction project, NLTFPD in cooperation with IVGID, developed a 7-year prescribed-fire plan to reintroduce fire into the ecosystem. Prescribed broadcast burning on the treated land began in 1995 (*Fig. 5*). The prescribed burn program is still active. The NLTFPD carries out the burns through an agreement with IVGID. The burning is now funded by a number of sources including IVGID, NLTFPD, the National Forest System, and grants. The program includes land in addition to that owned by IVGID. NLTFPD has three 10-person crews to treat fuels within their protection area.

Figure 5—Prescribed fire being reintroduced to IVGID lands that had been treated earlier. Photo provided by UNRCE.

3.4. Costs

The cost to plan, prepare, and implement the initial helicopter logging and fuel treatment project was entirely

borne by IVGID and was approximately $1.3 million. Implementation of the project cost approximately $1.2 million and included the logging operation, slash piling, pruning the remaining trees, and pile-burning the slash; the work was carried out by Nevada State inmate crews and NLTFPD staff. The remaining costs (approximately $100,000) were for planning and preparation (e.g., marking trees, and flagging boundaries and treatment areas). The cost for the initial project averaged $1,200 per acre.

Because of the scale of the initial work and because the program was new, the prescribed-fire program costs were high. In the first year, 1995, 70 people were hired to ensure the prescribed burn of a 3-acre site ran smoothly. After 10 years, NLTFPD has further developed the program to minimize costs while continuing to minimize risks. Over the past four years, the average cost for prescribed burning has been approximately $1,000 per acre. Costs include pre-treatment (e.g., handline construction, hose lays) and staff labor for 36 hours after ignition (Szczurek, personal communication). At present, 10–20 acres are burned at a time by NLTFPD, for an average of 40–50 acres per year (including other land). IVGID pays for the cost of the treatment on its own land, approximately $25,000-$30,000 annually.

4. Accomplishments

4.1. Time line

Planning for the initial treatment began in 1990, approvals from regulatory agencies were completed in 1991, logging occurred in the summer and fall of 1991, and all piles from the project were burned by the spring of 1992. Because of the emergency situation on the land (heavy dead fuel loads adjacent to and below homes), planning, preparation, and implementation occurred quickly. The areas requiring the heaviest treatment, where logging, brush piling, and burning took place, were as close as 100 ft to homes. The logging of approximately 700 acres of greenbelt and an additional 300 acres of ski area was completed in 5 weeks, and over 15,000 piles of slash were burned during the following winter.

4.2. Utilization

The cost of implementing this project was partially offset by allowing Erickson Aircrane to retain the logs. The noncommercial (e.g., cull) logs were sold as fuel to a biomass power plant, and commercial logs were sold as lumber. The average tree removed was approximately 80 years old, and 80–100 ft tall with a 16- to 24-inch diameter at breast height. Erickson Aircrane removed approximately 1.5 million board feet from the project area. *Figures 6, 7*, and *8* show some of the logging operations that occurred during this project.

Approximately 15,000 slash piles, spread over approximately 420 acres, were generated during the project (*Fig. 9*). It was not cost effective to remove this smaller material for use.

Figure 6—Bucking and limbing logs to be removed by helicopter from the project area. Photo provided by Pat Hovland.

Figure 7—Erickson Aircrane helicopter removing logs from project area. Photo provided by UNRCE.

Figure 8—Hauling logs from project area. Photo provided by Pat Hovland.

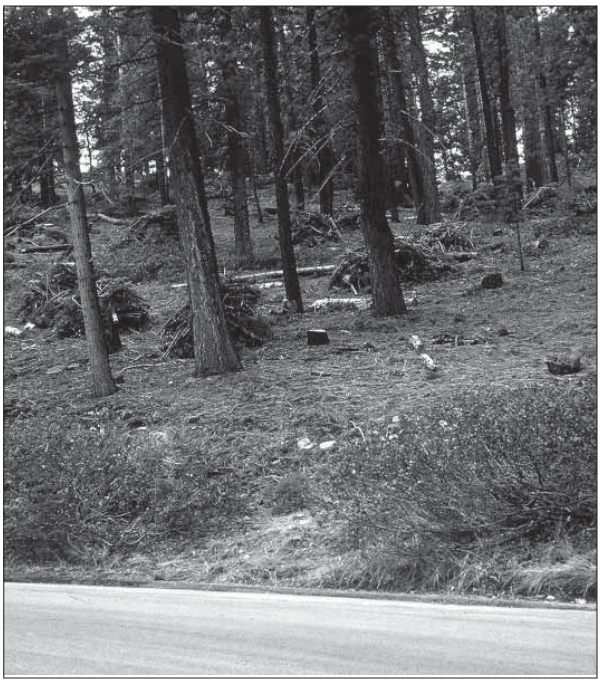

Figure 9—Slash piles generated during the project. Photo provided by Pat Hovland.

4.3. Potential Savings and Effectiveness of Treatment

NLTFPD Fuels Officer Norb Szczurek was unaware of any previous fires within or near IVGID land that would help quantify the effectiveness of these treatments.

The fire simulation for this community, created using the program FARSITE in 1991, estimated that within 1.5 hours over 120 homes could be destroyed, covering a total of 582 acres. The simulation demonstrated to the community the potential wildfire risk prior to treatment. Considering the median price of a home in the area is $806,000 (North Lake Tahoe Bonanza 2005), the simulated destroyed houses had a value of over $96 million. This is one method for estimating potential savings due to hazardous fuel treatment. The actual value of the treatment is impossible to predict exactly because by nature the location and spread of fire are unpredictable and depend on ignition source, location, and weather. In addition, although it is probable that the treatments would reduce the likelihood of loss of some homes, without spatial fire-behavior analysis, it is not possible to quantify the actual risk reduction.

The initial hazardous fuel treatment project effectively met its goals and objectives (see Section 2 of this report). The hazardous fuel level was reduced enough to bring fire back into the ecosystem, forest stands have remained relatively healthy since initial treatment, adverse effects on the environment were minimal, and although the costs were high, costs from a catastrophic wildfire would have been exponentially higher. *Figure 10* shows a portion of the project area after treatment.

The North Lake Tahoe Fire Plan has recently been approved. The Plan proposes additional thinning treatment for some areas. On average, the basal area of the forest is 200 ft^2 per acre, and the proposal is to reduce that to 80–100 ft^2 per acre. This proposed treatment is based on research indicating that crown fires are not likely to occur at this density.

5. Lessons Learned

5.1. Conservative Treatment

Because of the concerns raised by TRPA and the community, IVGID decided to prescribe a conservative treatment in the greenbelt. The goals and objectives of the project were met, but reducing the density of the stand further could have extended the time before tree removal needed to take place again.

5.2. Collaboration

The following advice was provided by the people interviewed for this report:

- Knowledge of the community is the most important aspect (e.g., what are the values and priorities of the community? What knowledge exists that can be made use of?). Do not always consider the logical approach without considering the emotional approach. Keeping this in mind, educate the community on the dangers of wildfire. Include all stakeholders and encourage partnerships early and throughout the process. Look at needs, benefits, and risks. Provide choices: "Need to educate the community (and regulatory agencies) on the cost of doing nothing or the cost of doing something."

- Convey a sense of responsibility to the members of the community. Have them play a role in fixing the problem. Successful projects are ones where the community

Figure 10—A portion of the project area after treatment. Photo provided by Pat Hovland.

was provided the freedom to develop and implement a program and to make use of the supporting agencies as a resource to get things done.

- The way to success is education and cooperation. Education was provided to the public about wildfire, defensible space, helicopter logging, and treating the remaining slash. It was implemented through meetings and presentations, publications, partnerships with other groups and agencies, demonstration projects and with the help of neighborhood leaders. The community was supportive of the project with only a few objections.

- Collaborative leadership is very important to success. Leaders in this project were dynamic, proactive, and highly motivated, and they believed in the project. They looked for solutions to problems ("can't do it" was turned into "can do it"). The leaders were honest and up front with good listening skills.

- Stakeholders include regulatory agencies and other public agencies. Work with regulatory agencies should begin early in the process, through education and communication. Involve them in the process and encourage them to develop streamlined processes. Coordinate with other agencies on common issues.

- This is a long-term commitment and investment. Education, cooperation, and partnerships are on-going and require continued maintenance. Ten years of education, cooperation, and pre-treatments took place before the first prescribed broadcast burn occurred. These processes continue and are a key to NLTFPD's successful prescribed-fire program.

- Education includes visual representations. The FARSITE fire simulation for the town was highly effective in increasing the community's understanding of the likely consequences of taking no action.

5.3. Other Key Points

Additional advice provided by interviewees included:

- Recognize that there are solutions, but these solutions could be risky and costly. The risks to the community should be considered over the costs of treating hazardous fuels.

- When working on a project that may be politically sensitive, have someone available to answer concerns and questions within a reasonable time frame (within 48 hours). Be willing to modify the project based on these concerns. Invite concerned individuals and agency

representatives out into the field to gain a visual understanding of the project.

- Burning hazardous fuels will become more difficult in the future due to tighter air-quality restrictions. Burning slash piles and carrying out prescribed burns involve numerous difficulties including air quality, limited number of days available, smoke, public fear of escaped fire, and initial appearances after a burn. Continue to find solutions to these concerns.

- Find time to research existing information, think of solutions, and look for new partnerships. Have a dream of what could be and have a vision of what it will look like. Information exists to help with the process (e.g., papers and reports from Forest Service research stations, university research, cooperative extension programs).

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