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March 2008

Twin Skin
Healthy Forests Restoration Act Project
Environmental Assessment

Bonners Ferry Ranger District
Idaho Panhandle National Forests
Boundary County, Idaho

Twin Skin HFRA Project

Photo taken in Unit 5 of the proposed treatment area during the field season of 2006.

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Idaho Panhandle National Forests
Bonners Ferry Ranger District
Boundary County, Idaho

Twin Skin HFRA Project

Environmental Assessment

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Lead Agency:	USDA Forest Service
Responsible Official:	Ranotta McNair, Forest Supervisor Idaho Panhandle National Forests 3815 Schreiber Way Coeur d'Alene, ID 83814 (208) 765-7223
For Further Information, Contact:	Jennifer Borg, Project Leader Bonners Ferry Ranger District 6286 Main ST Bonners Ferry, ID 83805 (208) 267-5561

SUMMARY

The Twin Skin Healthy Forests Restoration Act (HFRA) project proposes fuels reduction treatments on National Forest System lands predominantly in the Lower Moyie River watershed of the Bonners Ferry Ranger District. The objectives of the project are to 1) reduce fuels to create a lower-intensity fire environment within the Boundary County defined wildland urban interface (WUI) area and; 2) trend towards vegetative conditions which are more fire-resilient into the future and that better resist insects and diseases.

Alternative 2, the proposed action and preferred alternative, would reduce surface fuels, as well as ladder and crown fuels to create a fire environment where lower intensity surface fire would be expected over potentially high intensity crown fire as the resulting fuel characteristics would resemble that of a more open timber stand with light surface fuels rather than a dense stand with heavy surface fuels. This would be accomplished across the approximately 700 acre proposed treatment area, utilizing forest products including biomass to the fullest extent possible. The proposed action would also accomplish routine road reconditioning and reconstruction such as brushing, blading, ditch reestablishment, culvert replacements, hazard tree removal along haul routes, etc. on approximately 14 miles of existing roads and construct less than 1.5 miles of temporary roads that would be obliterated following implementation of the proposed action related activities to maintain pre-treatment access levels.

Copies of this Environmental Assessment (EA) are available on compact disc (CD) from the Bonners Ferry Ranger District; and it is posted on the Idaho Panhandle National Forests internet site at www.fs.fed.us/ipnf/eco/manage/nepa/index.html. A limited number of printed copies may also be available.

DOCUMENT STRUCTURE

The Forest Service has prepared this EA in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action. Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Bonners Ferry Ranger District office. The document is organized into three chapters, appendices that include resource specialist reports, analysis, other supporting documentation, and various lists, as follows:

- **Chapter 1 – Purpose and Need for Action:** This chapter briefly describes the proposed action, the need for that action, and other purposes to be achieved by the proposal.
- **Chapter 2 – Alternative 1: No-Action (Current Condition) and Alternative 2: Proposed Action:** This chapter provides a detailed description of the agency's proposed action and how the Forest Service shared information with the public and used a collaborative process to develop the proposed action. Also summarized are the public's responses to the proposed action gathered through the scoping process. The end of the chapter includes a summary table comparing the proposed action to the baseline condition with respect to their differences in management activities.
- **Chapter 3 - Affected Environment and Environmental Consequences:** This chapter describes the current conditions (baseline) of the project area related to the resources and what the resulting potential environmental impacts would be by implementation of the proposed action, as compared to the likely effects from continuing with the current baseline conditions.
- **Map Appendix** (Following the summary at the end of this document): Includes a map of the proposed action showing proposed temporary roads and logging systems, as well as a map of potential haul routes and landings.
- **Appendix A: Alternative-Driving Issue; Detailed Analysis of the Fire Hazard and Associated Risk to Life and Property**, including analysis that provides more detailed information to support that presented in the EA.
- **Appendix B: Other Issues for non-alternative-driving resources,** including analyses that provide more detailed information to support that presented in the EA.
- **Appendix C: Listing of Past, Ongoing and Reasonably Foreseeable activities for consideration of cumulative effects analysis.**
- **Appendix D: Healthy Forests Restoration Act,** Predecisional Administrative Review Process.
- **Appendix E: List of Preparers:** This section provides a list of individuals and the interdisciplinary team of resource specialists involved with this project.
- **Appendix F: List of Persons, Organizations and Agencies Consulted:** This section lists the agencies, persons and organizations that were consulted during the development of the EA.
- **Appendix G: Literature Citations:** Scientific literature and reports, personal communication and other documents which support and aided in the analysis and development of this project are listed by topic (Fire, Botany, Wildlife, Aquatics, Fish, Soils and so on.)

TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER 1 – PURPOSE AND NEED

Section 1.1 Introduction

The Forest Service has prepared this Environmental Assessment (EA) on the potential environmental effects that could result from implementing fuels reduction activities in a location approximately ten miles northeast of Bonners Ferry, Idaho and approximately 1 mile north of Moyie Springs, Idaho (Figure 3). This EA was completed in compliance with the National Environmental Policy Act (NEPA), the Healthy Forests Restoration Act (HFRA) and other relevant federal and state laws and regulations. This EA discloses the direct, indirect and cumulative environmental impacts and any irreversible or irretrievable commitment of resources that would result from the proposed action. It is prepared according to the format established by Council of Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508).

Planning was coordinated with the appropriate federal, state, and local government entities and agencies, and local federally recognized tribes. Additional documentation, including more detailed analyses of project-area resources, may be found in the project planning record located at the Bonners Ferry Ranger District Office in Bonners Ferry, Idaho. These records are available for public review.

Section 1.2 Background

In response to the fires of 2000, one of the worst fire seasons within the last 50 years, President Clinton asked Secretaries Babbitt and Glickman to prepare a report and recommend how best to respond to severe wildfires, how best to reduce the impacts of those fires on rural communities, and how to insure sufficient firefighting resources in the future. On September 8, 2000, President Clinton accepted their report Managing Impacts of Wildfires on Communities and the Environment. Based on this report and from increased concerns of the impacts that fires were having, Congress directed Federal land managers to work in partnership with Western Governors on a long term strategy for the proactive restoration of fire-prone ecosystems. Their strategy set four goals that collectively emphasize measures to reduce the risk to communities and the environment from severe wildfire and that establish an effective framework for collaboration. They are:

1) Improve prevention and suppression.
2) Reduce hazardous fuels.
3) Restore fire adapted ecosystems.
4) Promote community assistance.

Section 1.3 Purpose and Need

Based upon findings from field reconnaissance and information gathering done by Twin Skin Project Team members who specialize in fire and fuels management and silviculture, the existing condition within the proposed project area includes fuel loading and arrangement of fuels on the ground and in the tree crowns that make the area susceptible to intense wildfire behavior that can potentially impact this “at-risk” community (See Fire and Fuels Specialist Report –Appendix A). There exists a need to reduce the heavy fuel loading in order to reduce the surface fire intensity of future fires that may occur in this wildland urban interface area. Reducing expected fire intensity will make it safer and easier for fire fighters to suppress future fires when they occur, thus improving the safety of people, their homes and property, associated access roads and utilities in this affected area.

The proposed Twin Skin HFRA EA Project is designed under the requirements of HFRA and for the purpose of responding to the goals of the National Fire Plan 10-year Comprehensive Strategy and focuses primarily on:

- Reducing surface, ladder, and crown fuels to create a low-intensity and low-severity fire environment in order to:
    - Facilitate fire suppression – the safety of firefighters and the public being the number one priority;
    - Aid FireSafe work that has been completed in the wildland urban interface;

- Protect ingress/egress routes, powerlines, water supplies and other infrastructure that service the adjacent residents;
- Introduce prescribed fire in stands that were historically formed and maintained by fire.

Additionally:

- Create and maintain stands where early seral, more fire-resistant species such as western larch and western white pine dominate over fire-intolerant climax species.
- Provide for tree species and stocking levels on dry forest types that better resist insects, diseases, and wildfire.

The project proposal concurrently addresses identified hazards and vulnerabilities described in the Boundary County Wildland/Urban Interface Fire Mitigation Plan (CWPP). The County Plan was developed in 2003 (amended February 2004) through a collaborative process between Boundary County citizens, federal, state and local agencies, non-profit organizations, and the private sector. The group formed several goals to begin mitigation of fire hazard within the wildland/urban interface. These goals include fuels modification treatments within two miles of homes and associated infrastructure, including roads, in order to protect humans, their habitations and evacuation routes (Boundary County Wildland/Urban Interface Fire Mitigation Plan Amendment 1, 2004). The Twin Skin project area is surrounded by and shares common boundaries with private property, residences and associated infrastructures.

Section 1.4 Proposed Action

The proposed action for the Twin Skin HFRA Project is to implement treatments to reduce forest fuel accumulations on just over 700 acres of National Forest System lands by using a combination of mechanical treatments, hand treatments and prescribed fire. A timber sale contract would be prepared and trees and other biomass (woody debris) meeting specified conditions would be sold or required to be removed from National Forest lands.

Based on suggestions and comments received through the collaborative and scoping processes, the proposed action has been modified from what was originally included in the 'Request for Comments' letter dated September 11, 2007. Modifications have been made to allow for greater residual stand densities and species variability – including the retention of larger trees regardless of species, in Units 1, 3, 6, and 8. Fuels reduction objectives will still be accomplished (these changes have been incorporated into the analysis – see Chapter 3). In the earlier phases of the planning process, a Seed Tree prescription (Unit 1) and Shelterwood prescription (Units 3, 6 and 8) were proposed to accomplish objectives which would have resulted in few large residual trees per acre (approximately 10 large trees) almost entirely comprised of either Douglas-fir or western redcedar. Alternative 2 now proposes to treat these stands using a Free Selection system (uneven-aged management), which will result in the retention of larger grand fir and hemlock (greater than 16" dbh) in addition to the larger Douglas-fir, western redcedar and some western larch. This will be achieved by creating a mosaic of openings and denser patches. Overall, more canopy cover will remain with the less intensive Free Selection prescription. These changes were incorporated based on public comments and interdisciplinary team discussions - analysis concluded project objectives could still be met with Free Selection prescriptions (see Chapter 3 and Appendix A).

The purpose and need addresses treatment of stands damaged by insects and disease – Units 1, 3, 6, 8 and 14 have heavy mortality, specifically in the grand fir from the fir engraver beetle, thus a harvest prescription that allows for the removal of these dead and dying trees that are adding to the fuel hazard while retaining the healthier individuals is necessary for fuels reduction. The proposed action developed through the collaborative process is as follows:

- Shelterwood / Irregular Shelterwood (51 acres) –These treatments would be focused in stands where mature and over-mature grand fir is falling out of the system creating a surface fuels hazard. This treatment will allow for the regeneration of seral species such as white pine and western larch.

- Group Selection (80 acres) –Treatments would be designed to create openings in a mosaic fashion, similar to what historic fire would have done, in order to allow for the regeneration of ponderosa pine to create a multistoried condition in the future. In the long-term, the resulting stand and fuels conditions would be more sustainable – these stands were formed by low to moderate intensity fires, which would be the expected fire behavior after treatment.

- Free Selection (187 acres) – These treatments would be utilized to reduce surface, ladder and aerial fuels while maintaining stand diversity, specifically in residual species, as well as leaving larger diameter trees on site. This treatment will allow for the regeneration of seral white pine and western larch where openings are large enough for them to become established.

- Intermediate treatments (273 acres Commercial Thin w/Sanitation Salvage and 100 acres of Improvement Cut and Weed and Release) – stands that are commercially thinned would have a more closed canopy, as more than ½ the overstory would remain. Those stands that are managed under a weed and release and improvement cut prescription will be thinned in the overstory as well as thinned of undesirable species in the regeneration from the previous entry. Opening up the regeneration will reduce competition to the desired long-lived seral species.

The proposed action includes other features such as road maintenance, slash disposal methods and also project operational features that are designed to protect various resources within the project area. Refer to Chapter 2 and the project file for more details.

Section 1.5 Decision To Be Made

Based on the environmental analyses in this EA, the Forest Supervisor will decide whether or not to reduce fuel loadings as proposed within the project area in accordance with current Forest Plan goals, objectives and desired future conditions. This project is an authorized fuels reduction project as defined by the Healthy Forests Restoration Act of 2003, section 102(a). As such, it is subject to the Predecisional Administrative Review Process (or 'objection process') pursuant to 36 CFR 218, subpart A described in Appendix D. Thus, this project is not subject to notice, comment, and appeal provisions under 36 CFR 215 (see 36 CFR 218.3).

Section 1.6 Project Area Description

The project area includes National Forest System lands in Sections 19, 29 and 30, T63N, R3E, Section 24, T63N, R2E, and Section 2, T62N, R2E of the Boise Meridian, on the Bonners Ferry Ranger District of the Idaho Panhandle National Forests, Boundary County, Idaho. The project area encompasses approximately 4600 acres – there are three distinct proposed treatment areas within the project area as shown in Figure 3 and the Map Appendix.

Section 1.7 Relationship To The Forest Plan

Activities that are planned in the National Forest System involve two different levels of decisions: a general (programmatic) decision for the entire Forest, and a site-specific decision for the project area.

The programmatic decision is the Forest Plan that provides overall direction for land management activities. The Idaho Panhandle National Forests (IPNF) Plan, implemented in August of 1987, is used to guide land management activities on the Bonners Ferry Ranger District.

The IPNF Plan Final Environmental Impact Statement (FEIS) contains a general cumulative effects analysis of anticipated management activities on a landscape level for resource values such as wildlife populations and water quality of major drainages.

The IPNF Plan also establishes standards that preclude or limit activities to protect the environment. These standards are used to develop mitigation measures for the proposed action (project). They are also used to assess an action's effects to ensure that the project complies with the Forest Plan.

The Inland Native Fish Strategy (INFS 1995) amended the IPNF Forest Plan management area direction in August 1995, and added standards and guidelines to protect water and aquatic biota.

This EA is a site-specific decision level document for planning activities. It is tiered to the Forest Plan FEIS to allow the EA to focus on specific resource management issues in the project area. This EA is not a general management plan for the project area or a programmatic environmental assessment. It is a site-specific linkage between the Forest Plan and the requirements established by NEPA. This decision level involves analyzing site-specific proposals as well as disclosing their environmental effects to achieve the general guidelines of the Forest Plan. This information will be used by the Responsible Official to select a reasonable course of action for managing the project area.

Proposed treatment areas have been field verified to be suitable for timber production and the project was designed in conformance with Forest Plan standards and incorporates appropriate Forest Plan guidelines for Management Areas 1, 2, 3 and 4 (IPNF Forest Plan, pages III-2 to III-6; III-7 to III-11; III-12 to III-16; III-17 to III-22 respectively). The appendices and project file contain analysis reports that verify this determination, including reports on soils, hydrology, wildlife, fisheries, botany, fuels management, visuals and silvicultural prescriptions.

Section 1.8 Project Area Current vs. Desired Future Condition (DFC)

The need for the proposed action is generated by the differences between the current condition and the desired future conditions of the forest stand structures, forest composition, and subsequent fuels conditions in the project area. The desired future condition for the project area includes reduced surface fuels to create a condition that lessens surface fire intensity from what is currently expected, removal of ladder fuels to reduce the likelihood of fire moving into the tree crowns and increased crown spacing to reduce the ability of fire to spread between crowns should fire reach the crowns. The DFC would thus provide for increased public and firefighter safety in the event of a wildfire by allowing for direct attack and a higher probability of success during fire suppression actions.

Figure 1: Current Condition

1.8.1 Current conditions

As seen in the photo on the right (Figure 1), the stands in the proposed treatment area are generally dense and overcrowded from years of fire suppression, past activities, altered compositions due to introduced insects and diseases (such as the removal of western white pine due to blister rust), and natural succession. Many of these dense stands are declining in health, making them more susceptible to insects and disease and the large amount of dead and dying trees are adding to the already heavy fuel load and fire hazard. The structures of these stands, such as the layered tree canopies, have created ladder fuels, increasing the potential for crown fire initiation.

1.8.2 Desired Future Conditions

The desired future conditions describe the stand characteristics that would help meet the goals and objectives of the project.

In summary, the Desired Future Conditions of the project area landscape are:

- Decreased surface fire intensity of potential wildfires
- Decreased potential for torching and spotting
- Decreased potential for crown fire

Figure 2: Desired Condition

- Increased potential for successful direct attack fire suppression
- Increase in the vegetation's resilience to fire, insect and disease outbreaks

A forested ecosystem with the desired future conditions would have the following characteristics:

- Reduced surface fuel loading (See Chapter 3 and Table 3 below)
- Minimal ladder fuels
- Spaced tree canopies
- Species composition dominated by more early-seral fire-adapted trees – such as western larch on moister sites and ponderosa pine on drier sites
- In dry forests, stand conditions that resemble natural or historic conditions where low intensity surface fires were more common than would be expected under the current condition. This also will trend the stands towards an improved Fire Regime Condition Class

Section 1.9 Public Involvement And Collaboration

This project has transitioned from the analysis and decision process of a categorically excluded project under 36 CFR 215 NEPA procedures to an Environmental Assessment under the Healthy Forests Restoration Act NEPA procedures described in 36 CFR 218.

Section 104(e) of the HFRA requires agencies to provide notice of the project and conduct a public meeting when preparing authorized hazardous fuels reduction projects. Section 104(f) encourages meaningful public participation during preparation of such projects. Collaboration with communities and the public is also the cornerstone of *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan* (May 2002).

On January 31, 2007, Boundary County Commissioner Dan Dinning facilitated an initial collaborative meeting for two projects - the Templeman HFRA project and the Twin Skin HFRA project. Invited attendees included the presidents of the Bee Line and Skin Creek Water Associations, a representative from the Kootenai Tribe, the mayors of Moyie Springs and Bonners Ferry, the Bonners Ferry City Engineer, the Bonners Ferry USFS District Ranger and two other district personnel.

The purpose of the meeting was to discuss the merits of conducting fuels reduction projects within areas that could affect the Skin Creek and Bee Line Water Associations water supply as well as the cities of Moyie Springs and Bonners Ferry (i.e. power from Moyie Dam). All attendees agreed that there was a need to reduce hazardous fuels within the areas that could adversely affect the community water supplies as well as destroy homes and block evacuation routes if the fuels were ignited. At the close of this meeting, then District Ranger Mike Herrin decided to schedule a public open house in order to form collaborative groups that would help develop proposed actions for the two projects.

On March 8, 2007 a public open house was held at the Bonners Ferry Ranger District. Over 100 invitations to attend the meeting were mailed out to adjacent landowners, other individuals, government entities, agencies and organizations and notice of the meeting was published in the Bonners Ferry Herald. The purpose of this meeting was to build on the previous collaborative meeting and open it up to any and all stakeholders who wanted to be informed about the Twin Skin and Templeman HFRA projects and also to form collaborative groups in order to help develop the proposed actions for the two projects.

Eighteen people attended the meeting. Participants represented the Idaho Department of Lands, the Idaho Conservation League, Riley Creek Lumber Co., Vaagen Brothers Lumber Co., Fodge Pulp, Inc., Northern Lights Utility Coop., one adjacent landowner, Congressman Bill Sali's representative and several Bonners Ferry RD personnel, including Acting District Ranger Don Gunter, the project leaders and other interdisciplinary members from the district.

The general purpose of this group meeting was to start the process of transitioning the Moyie Mine and Porkchop Hazardous Fuels Categorical Exclusions to a "new" Twin Skin HFRA EA project and proceed with further development of a proposed action for the new project. At that time the group agreed that a field trip was necessary to better acquaint people with the project area and project needs and to further discuss and develop a proposed action for the project – the group agreed on the date of May 9th, 2007 to visit the Twin Skin project area.

Invitations announcing the May 9th field trip were mailed out to the collaborative group that was formed at the March 8th open house. The group includes 27 people representing adjacent land owners, government entities, agencies, utilities, forest products businesses and organizations. A news release was also published in the local Bonners Ferry Herald that invited all interested people to attend. Eleven people attended the field trip. Participants represented Boundary County FireSafe, Riley Creek, the Idaho Conservation League, Forest Interface Solutions/Envio Energi (a FireSafe contractor and biomass industry company), and Forest Service personnel, including in-coming District Ranger Linda McFaddan, a sales administrator, the project leader and other interdisciplinary team members.

This field trip focused discussions on historic conditions of dry-sites and potential treatment methods and post-harvest fuels reduction activities to include underburning, as well as treatment opportunities on some of the denser moist sites within the project area to include regeneration harvesting. Also discussed was the need and feasibility for treatment north of the Skin Creek Water Association's intake infrastructure in the area near Solomon Lake.

The group was in general agreement to proceed with a proposed action that included commercial thinning and surface fuels reduction in the area near Solomon Lake, as well as to proceed with the previously proposed treatments from when this project was two separate categorical exclusions, possibly with some minor modifications. However, some group members were unsure if silvicultural treatments that included regeneration harvesting were necessary and wanted to explore the idea of doing thinning only or maybe prescribed fire only without first mechanically treating the stands.

After further reconnaisssance by the Forest Service in the "new" area near Solomon Lake in the summer of 2007, a scoping letter was mailed out on September 11, 2007 to 117 individuals, organizations and agencies to gather comments for the proposed action. A legal announcement for this scoping notice was also published in the Coeur d'Alene Press on September 12, 2007. The comment period ended October 12, 2007, although comments could still be received and considered up to the date of issuing this EA for the 30-day predicisional objection period.

Eleven comments were received during the scoping period. Six of the comments specifically stated support for fuels reduction in the area. Additional comments included concerns over logging traffic, weeds, and effects from proposed actions on project area resources. A detailed summary of the comments received and information regarding the agencies, individuals and organizations that provided comments is available in the project file.

One letter in particular addressed concerns that some of the silvicultural prescriptions selected to implement the project objectives would leave "excessive" spacing and suggested a thin from below prescription that would allow for untreated areas within the units and retention of larger trees regardless of the species. The letter also suggested prescriptions similar to those utilized in previous fuels reduction projects – such as "free thinning". Upon reviewing the current stand characteristics, the interdisciplinary team determined that fuels reduction objectives could still be achieved in Units 1, 3, 6, and 8 while retaining a greater residual stand density of larger trees than originally planned (they will now be treated utilizing a Free Selection prescription rather than Seed Tree or Shelterwood – the proposed action was described above).

The Twin Skin HFRA EA was initially posted in the April 13, 2007 IPNF Quarterly Schedule of Proposed Actions (SOPA) and all subsequent SOPAs.

Section 1.10 Significant Issues

The NEPA regulations specify that the IDT shall "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review..." 40 CFR Sec. 1501.7(3). Through the interdisciplinary and collaborative process the issues were separated into two groups: Significant Issues and Other Issues.

Significant Issues are those resource issues that are determined through analysis and public involvement as having the most significance resulting from selecting the proposed or no-action alternative. The Significant Issues are those issues that the deciding official and the public should be most aware of when weighing the risks to the resources and people that may result from selecting either alternative.

Other Issues are defined as those resource issues that may have potential for direct, indirect or cumulative effects caused by implementing the proposed action or no-action alternative, but not with a level of significance to support altering the proposed action.

The Forest Service used the public involvement process to identify one Significant Issue. Significant Issues display the cause and effect relationship that potential implementation of the proposed action would have on a particular resource. The Significant Issue features one or more indicators that are used to measure the quantitative or qualitative effects to the natural and human environment. Related issues were combined to streamline the analysis.

1.1. Significant Issue – Fire Hazard: Risk to Life, Property and Resources

There is a risk that, by not implementing the proposed activity, a wildfire could threaten the surrounding adjacent residences, evacuation routes, utilities and community water systems (Skin Creek water system and private wells).

Measurement Indicators:

- Fire Intensity (Flame Lengths – based on fuel characteristics and fuel loadings by Alternative)
- Torching Index (winds necessary to initiate torching to the overstory trees)
- Crowning Index (winds necessary to sustain crowning fire)

Section 1.11 Other Issues

Development of the “design criteria and mitigations” for the proposed action as discussed in Chapter 2 effectively eliminated (through avoidance) or vastly reduced the potential impacts (through mitigation) to many of the resource Other Issues. Additional issues not analyzed in detail include those identified as: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; or 3) conjectural and not fully supported by scientific or factual evidence.

Other Issues include the following, and are discussed to the appropriate level of detail in Appendix B:

1) Threatened, Endangered and Sensitive Plants and Forest Species of Concern
   Issue Indicator – Impact on individual species and reduction of suitable habitat.
   a. Botany Resource
   b. Wildlife Resource

2) Soils
   Issue Indicator – Acres of detrimentally disturbed soils

3) Fisheries and Water Resources
   Issue Indicators –
   a. Stream temperature and large woody debris recruitment
   b. Sediment delivery
   c. Water yield and rain-on-snow events.

4) Noxious Weeds
   Issue Indicator – Potential to introduce and spread noxious weeds

5) Allocated Old Growth
Issue Indicator – Acres of Allocated Old Growth affected by project implementation

6) Cultural Resources
Issue Indicator – Number of cultural resources impacted by project implementation

7) Promoting Community Assistance
Issue Indicator – Benefits and costs associated with the alternatives, as well as acres within CWPP identified WUI to be treated, including estimated volume of fuels to be removed and made available for utilization and economic benefits through permits, contracts, grants, agreements or equivalent (10-Year Strategy Implementation Plan Goal #4).

8) Scenery (Visual Quality)
Issue Indicator – Changes to existing visual character

9) Recreation
Issue Indicator – Changes to current recreational activities

10) Air Quality
Issue Indicator – Amount of particulate matter produced from prescribed burning

11) Effects on Minority and Low-income Populations
Issue Indicator – Number of minority and low-income people disproportionately affected

12) Inventoried Roadless Areas
Issue Indicator – Acres in project area

13) Mineral Resources
Issue Indicator – Impacts on patented mining claims

14) Special Uses
Issue Indicator – Impacts on special use permittees

15) Transportation System
Issue Indicator – Miles of new road construction, reconditioning or reconstruction

Section 1.12 Applicable Federal Laws And Executive Orders

Shown below is a partial list of federal laws and executive orders pertaining to project specific planning and environmental analysis on federal lands. While most pertain to all federal lands, some of the laws are specific to Idaho.

- Multiple-Use Sustained-Yield Act (MUSYA) of 1960
- National Historic Preservation Act of 1966 (as amended)
- Wild and Scenic Rivers Act of 1968, amended 1986
- National Environmental Policy Act (NEPA) of 1969 (as amended)
- The Code of Federal Regulations for Forest Planning (36 CFR 219.6)
- Clean Air Act of 1970
- Endangered Species Act (ESA) of 1973 (as amended)
- Forest and Rangeland Renewable Resources Planning Act of 1974 (as amended)
- National Forest Management Act (NFMA) of 1976 (as amended)
- Clean Water Act of 1977 (as amended)
- American Indian Religious Freedom Act of 1978
- Archeological Resource Protection Act of 1980
- Cave Resource Protection Act of 1988
- Healthy Forests Restoration Act of 2003

- Executive Order 11593 (floodplains)
- Executive Order 11990 (wetlands)
- Executive Order 12898 (environmental justice)
- Executive Order 12962 (aquatic systems and recreational fisheries)
- Executive Order 13112 (invasive species)
- Executive Order 13186 (migratory birds)

1.12.1 Healthy Forests Restoration Act

The Healthy Forests Restoration Act (HFRA) was passed in December 2003. It provides improved statutory processes for hazardous-fuels reduction projects on certain types of at-risk National Forest System lands and also provides other authorities and direction to help reduce hazardous fuels and restore healthy forest and rangeland conditions. Specific to HFRA and as described throughout this document, this project was developed through a collaborative process, it is within the wildland urban interface and within one and one-half miles of an “at-risk” community, all of the proposed activities are on National Forest System lands (not in wilderness or wilderness study areas), and are consistent with the Idaho Panhandle National Forest Plan (see Appendix A and B). The act provides expedited environmental analysis of HFRA projects and provides administrative review through an objection process before decisions are issued (USDA 2004). More information related to the objection process is available for review in Appendix D of this document.

Chapter 2 - NO ACTION (Alternative 1 – Baseline) and PROPOSED ACTION (Alternative 2 – Preferred Alternative)

Section 2.1 Introduction

Under HFRA authorities, in order to expedite analyses, proposed projects inside a wildland-urban interface and within 1.5 miles of the boundary of an at-risk community do not require an alternative to the proposed action. However, a no-action alternative is included in order to display the effects (the baseline) associated with not implementing the project. This chapter contains a description of the no-action and proposed action alternatives, a description of mitigation and monitoring measures and a tabular comparison of the no-action and action alternatives.

Section 2.2 Process Used To Formulate Action Alternative

The collaborative group and Interdisciplinary Team (IDT) developed the proposed action to respond to the project purpose and need, the existing Forest Plan objectives, goals, and standards, and public and agency concerns as directed by NEPA. The IDT consisted of Forest Service personnel who have expertise in different natural resource fields in order to provide a diverse, interdisciplinary approach to the project. A list of preparers is included in Appendix E. The final, proposed action was developed through a series of resource evaluations, field visits, IDT meetings, and public interactions. If implemented, the project would be designed and administered in accordance with:

- Forest Plan Standards and Guidelines (USDA, 1987)
- Rules and Regulations pertaining to the Idaho Forest Practices Act (1998)
- INFS Interim Guidelines for Riparian Habitat Conservation Areas (RHCA)
- R1/R4 Soil and Water Conservation Practices Handbook (Forest Service Handbook 2509.22)
- Idaho Water Quality and Wastewater Treatment Requirements (IDAPA 58.01.02) and Clean Water Act
- Forest Service Manuals and Handbooks (FSM and FSH)

Section 2.3 Alternative Descriptions

2.3.1 Alternative 1 – No Action (Baseline)

This alternative reflects the existing condition without any new management activities occurring and provides a baseline for comparing the action alternative. In other words, all current, routine and ongoing management activities would continue to occur under this alternative and no additional action would be taken to respond to the purpose of and need for action identified in Chapter 1.

2.3.2 Alternative 2 – Proposed Action

This alternative references Figure 3 and Table 1 and proposes to reduce ladder and crown fuels through mechanical treatments on just over 700 acres followed by treatment of harvest produced, as well as naturally accumulated, pockets of surface fuel using prescribed underburning on approximately 80-100 acres and grapple-piling followed by pile burning or optional biomass removal on approximately 600 acres within the 700-acre treatment area. The fuels reduction work would be governed by a timber sale to remove dead standing and down timber and live ladder and crown fuels (in some areas this exceeds 40 tons/acre), including sawtimber, pulplogs and other biomass (small trees, tops and limbs) that are excess to other resource needs for maintaining soil productivity, large down woody material for wildlife and to reduce soil disturbance and compaction during treatment activities. Approximately 300 acres would be planted with white pine, as well as western larch and ponderosa pine, long-lived seral species adapted to fire.

Figure 3: Vicinity Map: Proposed Unit Location and Project Area

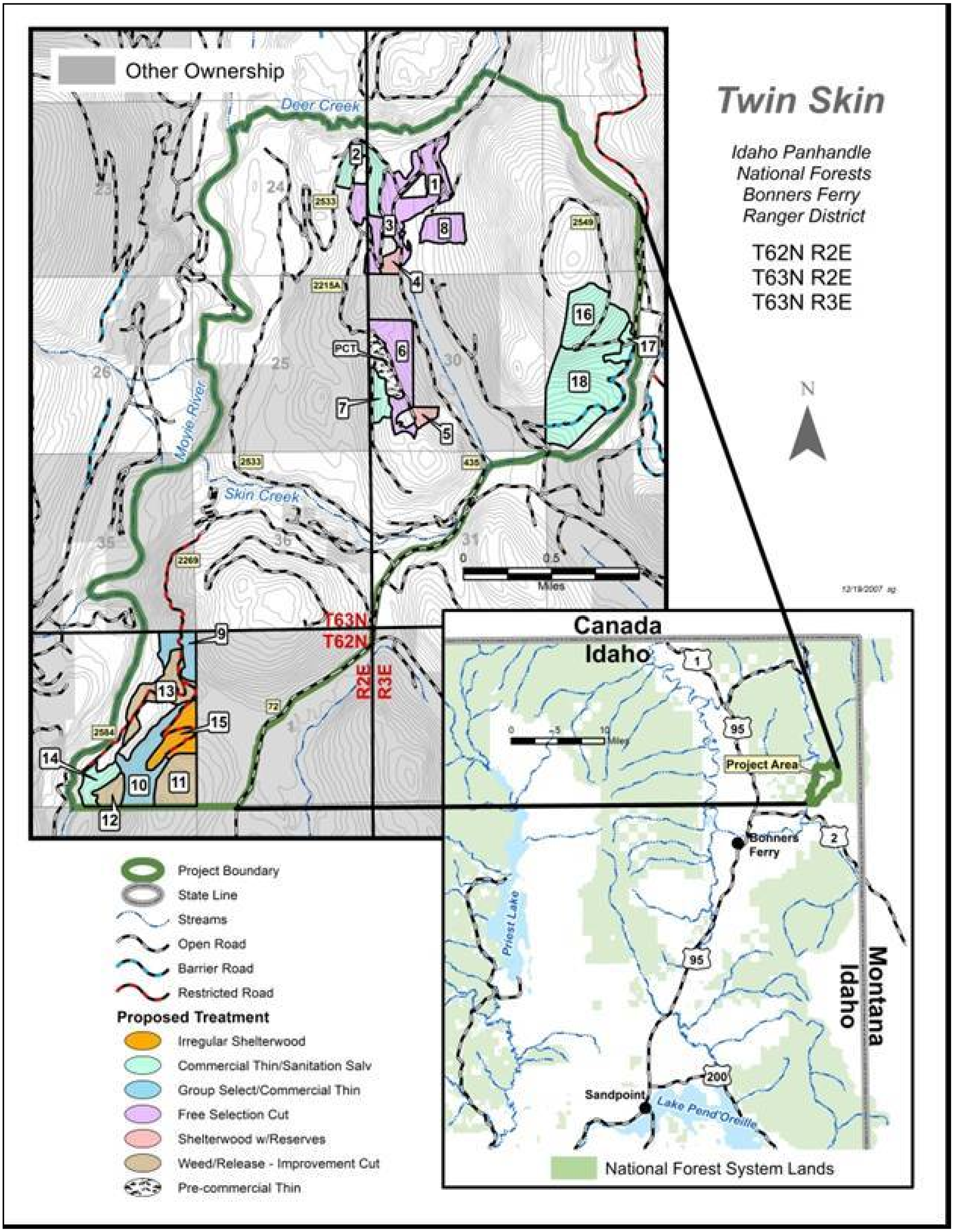


Table 1: Proposed Fuels Reduction Treatments by Unit

Treatment Unit	Silvicultural Rx	Acres	Harvest System	Fuels Rx
1	FS	52	T	GP
2	CT/SS	36	S	GP
3	FS	58	T	GP
4	SW	9	S	GP
5	SW	8	S	GP
6	FS	52	T	GP
7	CT/SS	18	T	GP/UB
8	FS	25	T	GP
9	GS/CT	26	S	UB
10	GS/CT	54	S	UB
11	WR/IC	40	T	GP
12	WR/IC	14	T	GP
13	WR/IC	46	T	GP
14	CT/SS	20	T	GP
15	ISW	34	T	GP
16	CT/SS	42	T	GP
17	CT/SS	11	T	GP
18	CT/SS	146	SSW	GP
PCT	Precommercial Thin	22	-	Scatter*

*Incidental piling where needed.

Table Legend:

Silvicultural Rx = Silvicultural Prescription:
CT – Commercial Thin SS – Sanitation Salvage
SW – Shelterwood GS – Group Selection
ISW – Irreg. Shelterwood WR – Weed & Release IC – Improvement Cut
FS – Free Selection

Fuels Rx = Fuels Prescription:
GP– Grapple Pile UB – Underburn

Harvest System:
T – Tractor S – Skyline
SSW – Skyline Swing

2.3.2.1 Connected Actions

In addition to those listed in the table above, the following activities would also take place:

1) In the event that incidental residual tree mortality occurs after completion of the project as a result of windstorms, ice-damage, fire, insects or disease in the treatment areas and associated roadsides used for hauling, salvage may occur using the existing skid trails and landings while adhering to design criteria established for this project. These activities are consistent with purposes of HFRA and the project purpose and need. This activity could occur until superceded by another management decision in the affected area.

2) Noxious weed treatments have been occurring and will continue in the future in and around the project area as authorized through the Bonners Ferry Ranger District Noxious Weed Management Projects FEIS (September 1995). Noxious weed treatments could be funded by this project through Knutson-Vandenberg (KV) deposits or made a contractual requirement during implementation of this project. The treatments could occur anywhere within the project area that the district noxious weeds program manager determines the need and as funding becomes available.

2.3.3 Detailed Description of Proposed Activities

2.3.3.1 Treatment Methods

Table 2: Alternative 2 (Proposed Action) – Silvicultural and Fuels Treatment Summary

Unit	Acres	General Stand Conditions	Description of Treatment and Residual Stand
Treatment – Commercial Thin w/Sanitation Salvage (CT/SS)			
2 7 14 16 17 18 **Total**	36 18 20 42 11 146 **273**	Generally these are 70-90 year old mixed conifer stands. The primary overstory species are Douglas-fir, with lesser amounts of lodgepole pine and larch. Douglas-fir, grand fir, and some cedar and hemlock (depending on site) dominate the understory. These stands are overstocked and growth is declining.	A combination of commercial thinning and sanitation-salvage would be prescribed to remove most of the ladder fuels in these units and maintain the health and vigor of these stands. Generally, the larger-diameter trees with full live crowns would be retained. Poor quality smaller trees, generally suppressed with little crown, would be targeted for removal. Smaller diameter dead and dying trees not needed to meet snag management requirements would also be removed.
Treatment – Group Selection (GS)			
9 10 **Total**	26 54 **80**	Overstory species such as ponderosa pine, Douglas-fir and larch are common. The understory is composed of mostly thick Douglas-fir which have formed ladder fuels.	Group selection cuts from 1-3 acres in size would be used to regenerate the areas of the stand that are departed from historical stand composition and structure. Openings will encompass overstocked areas and root-disease centers in areas of susceptible Douglas-fir, where there is a hazard for crown fire, allowing for reforestation of relatively root disease resistant species such as ponderosa pine and western larch. Large diameter ponderosa pine, Douglas-fir, and larch relic trees and snags will be left in group selection openings for future stand structure, snags, and genetic seed banks. Commercial thinning would be carried out between the group selection openings to maintain the health and vigor of these trees. Generally, the larger-diameter trees with full live crowns would be retained. Dead and dying and smaller trees that are of poor form or suppressed would be targeted for removal (those not needed to meet snag management requirements). Ladder and surface fuels would be reduced during prescribed underburning.
Treatment – Shelterwood (SW) and Irregular Shelterwood (ISW)			
ISW 15 **SW** 4 5 **Total**	 34 9 8 **51**	These stands have thick overcrowded overstories and understories, dominated by dead and dying grand fir, hemlock, lodgepole. Little larch or white pine is represented in the stands (blister rust and salvage has almost eliminated white pine) and what little there is declining in health and being replaced by climax species. High mortality from the fir engraver beetle, as well as some dwarf mistletoe, root disease, and Indian paint fungus. Surface fuels are heavy and there are abundant ladder fuels.	The objective of these prescriptions is to reduce fuels and favor the development of larch and white pine. Generally, the larger-diameter trees with full live crowns would be retained for seed, shelter and future snags for the new stand. Availability of large-diameter leave trees dictated the intensity of the treatment – Irregular Shelterwood will have patches of where there are leave trees over Shelterwood. The logging slash and undesirable understory trees would be burned using grapple piling followed by pile burning. Units will be reforested with white pine and larch.

Treatment – Free Selection (FS)			
1 3 6 8 **Total**	52 58 52 25 **187**	These stands are dense with many suppressed climax species such as grand fir, cedar, and hemlock in the understory. Much of the overstory is either dead or dying – as pathogens such as the fir engraver beetle and Indian paint fungus is causing moderate to high rates of mortality. These dead and dying trees are adding to the fuel hazard and continuity of heavy fuels within and beyond the extent of the treatment units. Most of the white pine have either fell out of the stands due to blister rust or were removed during salvage treatments in the early 1990s. Very few seral species exist.	The residual stands will have a mosaic of openings next to areas that resemble more of a commercial thin. Live trees and those not considered a hazard to be removed during harvest >20" will remain on site – including cedar, grand fir, and hemlock. Treating the unhealthy overstory trees and removing the suppressed understory will effectively treat the ladder and crown fuel hazards. Follow-up piling and burning will treat the heavy surface fuels. Within each stand, approximately 1/3 of the area will be opened enough to allow for the regeneration of seral species – a combination of western larch and western white pine will be planted in openings. Within Unit 1, an area of approximately 1 acre will be left untreated – necessary to meet buffer requirements for a population of ground pine. This buffered area within the unit will have a side benefit of adding structure and species variability to the residual stand for habitat.
Treatment – Weed and Release w/Improvement Cut (WR/IC)			
11 12 13 **Total**	40 14 46 **100**	These stands were previously treated with a seed tree harvest in the early 1990s. Since that time, much of the previously retained submerchantable trees have become merchantable. This includes undesirable lodgepole, some hemlock, and Douglas-fir that are competing with regenerating larch and white pine. Abundant fine fuels and canopies of the regenerating trees are dense.	Weed and Release and Improvement Cut prescription will favor leaving white pine and larch regeneration over other conifer species on these sites, especially lodgepole pine. Incidental grapple-piling and burning of the piles where necessary for small diameter activity fuels left after harvest and the weeding operations will occur.
Treatment – Precommercial Thin			
PCT	22	These stands were previously regeneration harvested in 1990. This stand is currently in the sapling stage and canopies are dense and undesirable species are competing with desirable larch and white pine.	Activities would include lopping and scattering of the material to create a more fire tolerant stand of seral species in the long term. Incidental salvage of forest products. Residual trees would be spaced to reduce group torching. Incidental piling of slash concentrations following thinning operations may occur to treat surface fuels.

Additional Activities:

Roadside Hazard Tree Removal, as described in the connected action above, could occur on up to 15 acres to remove incidental trees or small groups of trees at any single and scattered location where hazard trees are in striking distance of roads. No off-road equipment necessary – trees could be cable yarded to roadside or removed from road surface if they have fallen on the road – there should be no detectable change from the current condition based on this activity.

Prescribed Underburning would have multiple roles in the treatment units – reduce accumulated surface and activity fuels, recycle nutrients, resprout decadent shrubs (wildlife browse), reduce heavy duff layers around relic trees, prepare the units for natural and artificial regeneration (planting) into seral species, as well as introduce fires on sites where fire return intervals are departed.

Grapple-piling followed by pile burning will help meet surface fuels reduction objectives in a timely manner following harvest of the overstory and removal of submerchantable trees that are contributing to the ladder fuels.

Biomass Utilization will be encouraged in lieu of slashing followed by grapple-piling and pile burning. It will be incorporated into providing forest products rather than piling it and burning it.

Section 2.4 Required Design Criteria and Mitigation Measures

During the design phase of the project various measures were incorporated to lessen potential impacts and to avoid potential resource damage. These measures are detailed in the descriptions below. Specialist reports in Appendix B detail and rate the effectiveness of these design criteria mitigation measures for the proposed action.

1) **No new permanent roads will be constructed**.

Interdisciplinary team meetings, field reconnaissance and a roads analysis process (RAPS meeting on March 8, 2007) determined that existing access roads, including Forest Roads #435, #435UF, #2215, #2215A, #2215B, #2269, #2533, #2404A, #2549, #2584, #2584U, #2549UH, #2549UE and #627 may be used for this project. Segments of these roads (totaling approximately 14 miles) would require maintenance (reconditioning) or reconstruction (#2549UH and #2549UE) prior to use. Related work may include roadside brushing, blading, ditchline cleaning and shaping, spot graveling and culvert installation and replacement at locations recommended by the project IDT and removal of hazard trees along the haul routes. It is anticipated that up to one and one-half mile of temporary roads may be needed to access timber in Units 2 and 10 (See Map 1 - Proposed Action in the Map Appendix following the Chapter 3 Summary). The temporary roads would be obliterated by the contractor following use. The obliteration would restore the segments to their pre-roaded condition and would be revegetated and covered with slash to prevent off-road vehicle use. Existing roads associated with Units 16, 17 and 18 (within the Keno BMU) requiring the removal of vegetation to make them drivable ("reconstruction" of #2549UH and #2549UE) will also require a mechanism (such as the placement of large woody debris or an earthen barrier) to prevent vehicle access after completion of project activities. During project implementation a method to prevent private vehicle use of these reconstructed roads would be necessary (such as using equipment as barriers).

2) **Logging/mechanical treatment mitigations and restricted operations. These include:**

- **Wildlife:**

  In order to minimize disturbance to grizzly bears during project implementation, all timber harvest and road reconstruction and reconditioning that will take place within the Keno BMU (Units 16, 17 and 18) will occur outside the spring bear season (April 1 to June 15). This period will overlap with activity restrictions for gray wolf as follows:

  No timber harvest to occur in Units 16, 17, and 18 from April 1 through August 15 due to their proximity to recent gray wolf sightings in the Solomon Lake area. However, road reconstruction and reconditioning can occur during this time period - outside of the spring bear season (after June 15th).

  In addition, roads 2549UH and 2549UE will be made impassable to public traffic during and after implementation of the Twin Skin project (as mentioned in the previous section).

- **Cultural Resources:**
  For Units 9, 10, and 13: A hydraulic flume extending from the northern boundary of Unit 9, through Units 9, 13, and ending within Unit 10 will be excluded from treatment units by 50 feet on either side. No mechanical activities, including yarding of trees/logs shall take place in the exclusion area. Specified locations for skyline yarding across the flume, where logs are suspended, must first be approved by an archeologist and marked or otherwise designated prior to harvest.

For Unit 14: All identified features of The Moyie Mine resource will be avoided by project actions and buffered outside of treated areas through unit boundary marking. The following standards will be used to ensure the aforementioned areas adjacent to Units 9, 10, 13, and 14 will be excluded:

a. Geomorphic features such as terraces or benches and/or cultural features such as roads and trails that are easily identified on the ground should separate the site from project actions where possible.

b. If natural or cultural buffers are not available, buffer distances used to protect sites should be sufficient to generally preclude inadvertent damage based on the type of planned activity (i.e., 50-foot buffer)

c. A pre-implementation plan-in-hand review of avoidance procedures must be completed involving the implementation staff and appropriate Zone or Forest Archaeologist immediately prior to harvest activities.

- **Sensitive Plants and Forest Species of Concern:**

Field surveys conducted in 2006 identified new occurrences of groundpine in Unit 1 and arrowleaf coltsfoot in Unit 13. Site-specific buffers were established by the project botanists – no project related activities will occur in these buffered areas. The buffer for the groundpine is 120 feet in all directions and 2 tree-lengths for the arrowleaf coltsfoot to provide retention of the canopy cover for the populations and to ensure enough distance from machinery to prevent disturbance – unit layout will be done by the project botanists to exclude these populations outside of unit boundaries.

- **Soils:**

For tractor-yarded Units 1, 3, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17 and incidental tractor in Unit 18:

a. Ground-based yarding, processing, and harvester equipment will operate on slopes under 35% and will utilize existing skid trails and slash mats where possible. Slash mats will be required for operating ground disturbing equipment where the current detrimental disturbance is equal to or exceeds 10%.

b. All new skid trails will be agreed upon and designated on the ground by the Purchaser and the Forest Service before felling begins.

c. Main skid trail spacing will average 100 feet or greater on ground skidded units, except where the trails converge to landings and as terrain dictates otherwise. All other trails will be spaced at maximum reaching distances.

d. Where there is not enough material for an adequate slash mat, mitigation will include winter only harvesting in order to comply with Forest Plan Standards for detrimental disturbance. This would be necessary for the 'Improvement Cut' activities in Units 12 and 13. Any one of the following conditions will be contractually required for tractor-yarded Units 12 and 13:

  - A 24-inch snow layer or 18 inches of settled snow or;
  - A slash mat in combination with 12 inches of settled snow or;
  - Frozen ground to a depth of 4 inches.

e. Post-harvest, all utilized skid trails will be either covered with slash and randomly placed logs (on contour) to increase the microtopography needed to reduce runoff, stabilized with waterbars, or a combination thereof.

f. Operating equipment will avoid moist or wet depression areas unless properly protected by snow or frozen conditions, especially during rain-on-snow events. This specifically applies to units 1, 8, 13, and 17; where wet areas have already been identified on the landscape, they have been buffered out of treatment units.

For skyline-yarding Units 2, 4, 5, 9, 10, and 18 – the leading end of logs will be suspended during skyline yarding.

3) **Additional Mitigation Measures:**

- **Noxious Weed Control:**

  Equipment used for logging and road reconstruction will be required to be pressure-washed prior to being allowed in the project area. Currently suitable timber sale contract provisions for washing equipment for noxious weed control purposes will be used.

- **Soil Compaction:**

  Existing landings will be utilized where appropriate in order to maintain current soil compaction levels (Map Appendix – Map 2). All skid trails utilized will be covered with some residual slash (within guidelines provided by Graham et al. 1994 for coarse-woody debris by habitat type), waterbarred and seeded as needed upon completion of the sale. Grapple-piling equipment would operate from these skid trails or on a slash mat on slopes under 35 percent.

  a. As mentioned, temporary roads constructed for use during project implementation will be decompacted, re-contoured, and seeded following implementation of treatment activities.

- **Soil productivity and nutrient cycling:**

  Based on average results obtained from two separate field surveys conducted for soils and fuels, Forest Plan Standards for maintaining an adequate supply of large down-woody material for soil productivity and nutrient recycling are currently being met in the project area and will be maintained (see Fire and Fuels Specialist Report – Appendix A).

  a. The latest soil nutrient management recommendations from the Intermountain Forest Tree Nutrient Cooperative (IFTNC) and Rocky Mountain Research Station (RMRS) would be applied as appropriate to each activity area where organic material is removed. Slash would be left to recycle nutrients back into the soil until site-prep occurs. Grapple piling equipment would operate on slopes under 35 percent.
  b. Downed woody retention levels will be maintained at the lowest recommended levels due to concern for fire hazard in the interface area. For the moist forest habitat types where harvest is proposed in Units 1, 3, 4, 5, 6, 8, 11, 12, 13, 14, and 15, Graham et al (1994) recommend retaining 17-33 tons of downed woody material greater than three inches in diameter. For the drier habitat types associated with Units 2, 7, 9, 10, 16, 17, and 18 the recommended retention level is 7-13 tons/acre.
  c. As this is a hazardous fuels reduction project within the wildland urban interface, determination of fire hazard where slash is left untreated for prolonged periods of time will be made by the district fire management officer. Where fire hazard is considered high, especially along shared boundaries with private property or heavily-used roads, flexibility will be given to treat slash prior to it being left for several months.
  d. An alternative slash disposal method for units where grapple-piling is proposed to treat activity and natural surface fuels will be to remove slash, excess to the desired Graham guideline levels and following at least one wetting season, at the option of the timber sale purchaser to utilize this material for biomass energy, biofuels, or other uses. The need for post-harvest slash piling and burning may be reduced or even eliminated in these units.
  e. Prescribed underburning and pile burning would take place when the upper surface inch of mineral soil has a soil moisture content of 25 percent by weight. Prescribed underburning generally takes place in the spring while pile burning takes place in the fall.

- **Snag Resource:**

  The District would manage for the snag resource by following the "Regional Snag Management Protocol" (January 2000), which calls for retention of:

1. Moist Forests - 6 to12 snags per acre with 2 to 4 snags/acre greater than 20 inches, as well as 12 live tree replacements per acre of the largest representative trees in Units 1, 3, 4, 5, 6, 8, 11, 12, 13, 14, and 15.
2. Dry Forests – 4 to 6 snags per acre (4 over 20 inches in diameter) and 8 live tree replacements of the largest representative trees in Units 2, 7, 9, 10, and 16-18.

Based on reconnaissance cruises conducted for the project, most of the project units currently have an adequate number of total snags per acre, but are lacking in large diameter snags >20" dbh in some areas – recommendations for wildlife tree recruitment and future snags is described below. Even where adequate snags are present, there is a concern regarding the longevity of the snags – many are a result of mortality related to rot. These snags, such as grand fir, have a high fall-over rate, thus not only losing their quality as snags, but adding to the surface fuels. In addition, during contract implementation, the purchaser must evaluate each snag for safety and therefore, many may be cut to reduce the hazard associated with working around dead trees. Units 11, 12, and 13 currently have less than 1 10-inch or greater diameter snag per acre due to these being 15-year old seed tree units.

The shortage in snags over 20 inches in diameter is likely due to past sanitation salvage and firewood cutting treatments conducted in the area over the past several decades that removed the largest dead and dying trees. The proposed treatment is designed to retain large-diameter live trees and also dead trees over 20 inches in diameter, especially ponderosa pine, western larch, western redcedar, western white pine – if not available, followed by Douglas-fir, and some hemlock, and grand fir. These residual trees can be managed for snag recruitment trees to increase the number of 20-inch-plus diameter snags in the future.

- **Wildlife**:

  All listed species in the Biological Evaluation:
  If any threatened, endangered, or sensitive species are located during project layout or implementation, management activities would be altered, if necessary, so that proper protection measures can be taken. Timber sale contract provisions that require the protection of Threatened, Endangered and Sensitive Species would be included in the timber sale contract.

  The wildlife biological evaluation for this project included the following conservation requirements and/or recommendations, which would be incorporated into project implementation:

a. Goshawk Nest Site Protection (required): Additional nest searches would be conducted during project layout and implementation. Operations and related activities would be suspended within ~ ½ mile of known or discovered nests between March 15 and August 15 to reduce risk of failure. Activity restrictions can be removed after June 30 if nest site is determined by a wildlife biologist to be inactive or unsuccessful. Existing and newly discovered nest sites would be protected by a 30-acre, no activity buffer during any contractual operations (Reynolds et al. 1992).

b. Wildlife Tree Retention (required): Snags and live tree replacements would be retained where opportunities exist in treatment units at levels recommended by the USFS Region 1 Snag Protocol (see previous discussion). While retention objectives are accounted for on a treatment level scale, some snags would be represented on every 10 acres of treatment, in clusters or clumps where feasible, to promote good distribution of snags. Road Design: The location of the temporary roads will ensure, whenever practical, that veteran and relic survivor trees and snags would not be removed during construction. Skid Trail and Cable Corridor Location: The sale administrator will ensure, whenever practical, that the design of skid trails and cable corridors avoid veteran and relic survivor trees and snags. Large diameter snags (greater than 16 inches diameter) that are felled for safety reasons would remain on site to provide for large woody debris recruitment and long-term site productivity. Selection of snags and live tree replacements would emphasize practices that assure the highest probability for long-term retention (Bull et al. 1997). The high hazard snags and snags in the advanced stages of decay would not be used to meet retention objectives. Retention practices would focus on ponderosa pine, western larch, Douglas-fir and western red cedar trees, especially veteran or relic ponderosa pine and western larch trees. Trees killed by root disease should be avoided, where possible, to meet retention objectives because of their rapid deterioration and resulting fall-down rate.

c. Maintain Veteran and Relic Structure and Habitat for Snag-dependent Species: No old-growth stands are proposed for treatment. However, to maintain habitat for snag-dependent species, areas within treatment units that contain small pockets of older, large diameter structure will be thinned from below or not treated. These unique areas would be managed on a case-by-case basis. Vegetation type, moisture regime, logging system, wildlife species suitability and surrounding treatments will all be considered. The tree-marking guide would assure a diversity of snag structural classes and the highest probability for long-term retention.

d. Protection of cedar swales and retention of hardwood trees: Microsites of western redcedar having diameters greater than 12 inches dbh will be retained.

e. Retention of Hardwood Trees: To maintain forest species diversity and wildlife habitat, aspen and birch trees would not be harvested for pulp. If trees of these species needed to be cut for safety reasons, they would remain on site for coarse-woody debris and long-term site productivity.

f. Grapple Piling (recommended): Where grapple piling is prescribed for post-harvest fuel reduction, leave an occasional slash pile (i.e. 1 per 3 acres) where deemed appropriate by the District Fire Management Officer, to provide habitat for small forest animals (e.g. snowshoe hares), while still meeting fuels reduction objectives.

- **Aquatics:**

No-harvest buffer zones for lakes, streams, wetlands and other riparian habitat have been included in and adjacent to harvest units as designed by the project fish biologist, hydrologist, botanist and soil scientist utilizing Inland Native Fish Strategy (INFS) standards and other site-specific recommendations (including BMPs). Treatment area boundaries have been identified to exclude the RHCA (there are no activity units that overlay RHCA areas). RHCA widths are as follows:

a. Fish Bearing Perennial Streams – 300 feet from the edge of both stream channel banks
b. Non Fish Bearing Perennial Streams – 150 feet from the edge of both stream channel banks
c. Ponds, Lakes, Reservoirs, Wetlands greater than 1 acre – 150 feet from the edge of the riparian vegetation or seasonally saturated soil
d. Seasonally flowing or intermittent streams and wetlands less than 1 acre – 100 feet slope distance

No project related activities will occur within these RHCAs (see Fisheries BA/BE in Appendix B) – the fisheries analysis determined that project activities would not have any direct or indirect affect on fisheries habitat including temperature, sediment delivery, large woody debris, or water yield.

Section 2.5 Monitoring

Information gathered before, during and after implementation of activities is used to determine the effectiveness of the project's design and associated mitigation measures. This establishes a feedback mechanism so management can develop and employ an adaptive learning curve. Monitoring is done at recurring intervals as a basis for Forest Plan implementation. Project effectiveness monitoring is done by sampling specific projects at specified time intervals. The activities associated with this proposed action would include monitoring of the following:

Temporary Road Obliteration: The effectiveness of road obliteration and erosion control would be periodically checked by hydrology, soils, road management, or timber personnel.

Soil Compaction: The effectiveness of prescribed Best Management Practices (BMPs) of winter logging and to redistribute residual slash over skid trails to help prevent erosion would be checked by soils, hydrology, timber, or fisheries personnel.

Down Woody Debris: During project contract administration the amount of debris left in the mechanical treatment units needs to meet recommended minimum levels while also being consistent with fuels reduction objectives. Accomplishment of this activity would be monitored by timber, fuels, or soils personnel.

Northern Goshawk: Goshawk surveys for occupied nesting and/or post-fledging habitats were completed in the project area during 2006 and 2007. No currently suitable nesting habitat would be impacted by this proposal and no goshawks were found or are known to be using the project area or immediate vicinity for reproduction. Timber Sale Administration and wildlife personnel would continue to monitor the project area for goshawk presence during project implementation.

Cultural Resources: The project area has been inventoried for Heritage Resources and site-specific exclusion areas have been incorporated into the project design. Monitoring for the effectiveness of the exclusions would continue during and after project implementation by the sales administrator, project leader, and archaeologist.

Noxious Weeds: Monitoring by district personnel (noxious weed program manager, botanist and others) for noxious weed occurrences within the project area would continue during and after project implementation. Any newly discovered noxious weeds would be treated as funding becomes available.

Section 2.6 Alternative Comparison

Table 3 summarizes and contrasts environmental consequences of the alternatives. Potential actions and outputs would cause these consequences. Chapter 3 discusses each environmental consequence in detail.

Table 3: Alternative Comparison of Project Activities

Significant Issue – Fire Hazard **Risk to life, property, and resources**	**No-Action**	**Proposed Action**
High hazard stands receiving treatment (Ac)	0	Mechanical Harvest: 691 Acres *Followed by:* Underburn: 80 Acres Pile Burn: 611* Acres
Fuel loading (down woody fuels tons/ac):		
Existing	28.0 - 41.0	28.0 - 41.0
After Implementation of Proposed Action	28.0 - 41.0	12.0 - 22.0
Fire Regime Condition Class	2 – Moderate risk of losing key ecosystem components	1 – Low risk of losing key ecosystem components
Fire intensity (surface flame lengths)	4.0 feet	1.5 feet
Probable method of spread	Crown fire	Surface fire

*Spot piling may occur in the 22 acre Precommercial Thin Unit as determined necessary by fire managers.

Chapter 3 Affected Environment And Environmental Consequences

Section 3.1 Introduction

The existing condition of resources that would be affected by implementation of the action or no action alternative, and the potential effects of implementing either alternative on these components, are discussed below. Individual analysis areas are described and serve as a basis for the determination and disclosure of the potential direct, indirect and cumulative effects on that resource. Effects are quantified where possible. The means by which potential adverse effects would be reduced or mitigated are described. Past, present, and future activities considered in the cumulative effects analysis are listed in **Appendix C**. Discussions of resources and potential effects take advantage of information included in the IPNF Forest Plan, other project EAs, project-specific resource reports and other sources as indicated. The CEQ regulations implementing NEPA include specific categories to use for the analysis of environmental consequences. The following are applicable to the proposed project and form the basis of analyses.

• Direct, Indirect and Cumulative Effects. Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity, but could be significant in the foreseeable future. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonable foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects could result from individually minor, but collectively significant actions taking place over a period of time.

• Unavoidable Adverse Effects. Implementation of an alternative could cause adverse environmental effects that cannot be effectively mitigated or avoided. Unavoidable adverse effects often result from managing the land for one resource at the expense of the use or condition of other resources. The application of Forest Plan standards and guidelines, BMPs and project-specific mitigation measures usually help to limit the extent, severity, and duration of potential adverse effects. Potential effects are identified and disclosed.

• Short-term Use and Long-term Productivity. Short-term uses, and their effects, are those that occur annually or within the first few years of project implementation. Long-term productivity refers to the capability of the land and resources to continue producing goods and services long after the project has been implemented. Under MUSYA and NFMA, all renewable resources are to be managed in such a way that they are available for future generations. Potential gains and losses in the short term and long term are discussed.

• Irreversible and Irretrievable Commitments. Irreversible commitments are those that cannot be reversed, except perhaps in the extreme long term. A classic example is when a species becomes extinct. Irretrievable commitments are those that are lost for a period of time. If a temporary road is constructed through the forest, the timber productivity of the right-of-way is lost for as long as the road remains. Irreversible and irretrievable commitments are discussed as applicable, although not usually by use of those terms.

• Available Information. There is less than complete knowledge about many resources and their biophysical, social and economic interrelationships. The ecology, inventory and management of wildlands are complex and developing sciences. However, basic data and central relationships are sufficiently well established for resource managers to adequately assess and disclose the possible adverse environmental consequences associated with the proposed project and for the deciding official to make a reasoned choice between the proposed action and no action alternatives. New or improved information would be very unlikely to reverse or nullify these understood relationships.

The following resource topic was analyzed in detail.

Section 3.2 Fire Hazard - Risk to life, property, and resources

3.2.1 Analysis Area

The analysis area for determining the direct, indirect and cumulative effects of potential future wildfire, past fire disturbances, fire suppression, and fuel loading trends and other factors that affect the fire and fuels resource is the 4600 acre Twin Skin HFRA Project Area. This area incorporates areas of previous large fire behavior in extent and ranges of severity, as well as a mixture of Northern Idaho forested landscapes and ranges in historic conditions, thus appropriate for evaluating landscape measures such as Fire Regime Condition Class.

Measurement Indicators:

- Surface Flame Lengths
- Probability of Torching
- Crowning Index

3.2.2 Affected Environment

The current condition of the factors that affect fire behavior, specifically the fuels; as well as the fire regime condition class and current fire suppression capabilities for the Twin Skin analysis area are described below (see Fire and Fuels Report in EA Appendix A for full details).

3.2.3 Fuel Characteristics: fuel loading, canopy characteristics, species composition, structure, continuity, etc.

Due to slope, aspect, and associated terrain and vegetation, it is possible that several different fuel models were present historically in the project area – representing three of the main fuel model groups where grass, shrubs and brush, or timber litter would have been the main carriers of a surface fire.

Moist and dry habitat groups are represented in the project area. Although they differ in species composition, where previously untreated they have the same basic structure and fuel composition – abundant ladder fuels and surface fuels and the potential for extreme fire behavior.

Dry Habitat Groups

Approximately 50% of the project area is considered dry forest habitat. Units 2, 7, 9, 10, 16, 17, and 18 are dominated by dry site vegetation in the surface fuels as well as the overstory trees, occurring on south to west facing aspects where frequent surface fires (approximately 40 year return intervals common for this district) historically kept surface fuels under control (Arno and Fiedler 2005). Surface fuels would have likely consisted of grasses and brush under open-grown ponderosa pine and larger Douglas-fir – occurring now in only small patches, especially in unit 10. Although grass and brush fuels can proliferate into high rates of spread (variable depending on fuel moistures), there is generally no or little post-flaming combustion, thus little severity to soil, water, or wildlife resources. Abundant tall brush, or ladder fuels, increases the fire hazard because it limits the space between the surface fuels and the aerial fuels (tree crowns). Where surface grasses and brush are developed under a canopy of timber, fuel characteristics will change over time – to light timber litter, needle litter, and without management or a fire, eventually the surface fuels become heavy timber litter.

Currently, there are patches of fuel models 2 (grass under open pine), 5 (brush), 8 (light timber litter), and 10 (heavy timber litter) – the amount of dead and dying and ladder fuels contributing to a fuel model 10 (described below). Oceanspray, ninebark, maple, and other shrub and herbaceous vegetation common to south and west aspects dominate the understory fuels, with thick patches of Douglas-fir reproducing successfully in areas. All of these surface fuels (see Table 4 below for averages of fine fuels) are competing with the overstory vegetation for nutrients and available water. Deep duff is accumulating, especially where ponderosa pine needles have collected (due to missed fire cycles duff can be 4 times greater than historic levels) (Smith and Fischer 1997) and will contribute to burn severity by holding heat in the ground fuels close to the base of the trees.

Moist Habitat Groups

The project area is comprised of approximately 50% moist sites that are situated on north to northeast aspects and flat slopes and are dominated by fire-intolerant species. Grand fir especially is contributing to the high aerial and surface fuel loads because so much of it is dying in the project area and across the district. Long-lived seral species (especially white pine that historically comprised approximately 30% of this landscape – now <5% (NZ Geographic Assessment; Smith and Fischer 1997) is being replaced by climax species such as cedar and hemlock - their ability to reproduce successfully on these densely stocked sites, along with the characteristics of low-growing crowns has created abundant ladder fuels. Fuel loadings and coarse woody debris are highest on these sites, thus hot-dry conditions create a fire hazard due to low fuel moistures in large-woody fuels.

Currently, **the untreated moist habitat types in the project area are a fuel model 10**, or timber with heavy surface fuels (this determination was made with data and associated photographs gathered through numerous site visits – field notes in project file). This fuel model exhibits more intense and severe surface fire behavior than does the other timber litter models under high fire danger conditions (Anderson 1982). A dense forest canopy, heavy timber litter, and suppressed regeneration could contribute to a surface fire with high mortality and high severity. Under periods of high fire danger, extreme fire behavior such as torching, crowning, and spotting would likely be observed with the current fuels situation. Due to the continuity of these fuels, this type of fire behavior not only poses a threat to the public, but to fire fighting resources as well. See project file for photographic examples of the described fuel models.

Fuel Model 10

Figure 4: Dry Site – Heavy Fuels

Figure 5: Moist Site – Heavy Fuels

Fuel Loading: Coarse-woody debris and 1, 10,100 hour fuels

Coarse-woody debris (dead standing and downed pieces > 3” in diameter) is an important component of a healthy ecosystem. Animal life processes, site productivity and protection, as well as fire, are important components most commonly discussed by forest managers (Brown, Reinhardt, Kramer 2003). Observations of past fire behavior shows that small woody material, less than 3” in diameter, has the most substantial influence on fire behavior (such as spread rates and fire intensity), which can be accurately predicted with surface fire behavior models. However, large woody fuels can contribute to large fire development and high fire severity. The greater the fuel loading of this large material, coupled with the size and decay rate, can greatly influence fire severity (effects to soil, water, other forest resources) – this is generally due to smoldering and persistent burn periods (Brown, Reinhardt, Kramer 2003).

For the dry sites decay rates for dead, down woody material are generally lower than they would be on moister sites, especially in the absence of fire (Brown, Reinhardt, Kramer 2003). Although the amount of CWD throughout the project area varies quite considerably (field notes available in the project file), the **average is 16.2 tons/acre for the dry habitat groups and 29.5 tons/acre for the moist habitat groups**. Recommendations by Graham et al. (1994) for these sites are 6.6-13.2 tons/acre and 16.5-33.0 tons/acre respectively. Although CWD falls within the recommended range for the moist habitat type, these recommendations are for desirable biological benefits – but there must be a balance as to not create an unacceptable fire hazard (Brown, Reinhardt, Kramer 2003). Crowning out, spotting, and torching are more frequent with heavy CWD leading to control difficulties.

Coarse Woody Debris
>3" diameter material

Forest Type	Ave.	Recommended
Dry	16.2	6.6 – 13.2
Moist	29.5	16.5 – 33.0

Coarse Woody Debris calculated in tons/acre

Fine fuels are continuous throughout, in the form of twigs, small branches, live and dead brush and grasses, and pine needles. As mentioned, these fine materials will contribute to the overall fire spread, especially on the drier sites where the forest floor is littered with ponderosa pine needles and the dominate surface vegetation is pine grass and brush.

Small fuel loads can be summarized by fuel model – the majority of the current untreated portions of the project area can be classified as fuel model 10 (Anderson 1982). The Fire & Fuels Extension to the Forest Vegetation Simulator (FFE-FVS) is also a reliable tool for summarizing fuel loads, as it models data collected from stand exams. In this case, data for small diameter fuel loadings were gathered from the project area in each stand – the following table shows the averages by fuel size class for the current condition.

Table 4: Summary loading of small dead fuels in tons/acre for typical untreated stand in project area

Smaller Surface Fuels (<3" diameter - dead)	(Tons/acre)
1 hr (0-.25")	**1.5**
10 hr (.25-1.0")	**3.7**
100 hr (1.0-3.0")	**6.8**
Total Surface Fuel (<3 inch)	**11.9**
Duff	**22.0***

* Duff values estimated using fuelbeds representative of interior Douglas-fir / ponderosa pine and grand fir sites from the Fuel Characteristics and Classification System (www.fs.fed.us/pnw/fera). Duff levels based on defaults for those forest types and from fuels data gathered in the field.

Canopy Base Heights

Canopy base height (CBH) is the lowest height above the ground where there is a sufficient amount of canopy fuel to transition a fire from the surface fuels into the tree crowns. Therefore, low canopy base heights are a critical factor in determining crown fire potential. Fuels treatments should focus on removing some or all of the ladder fuels and other vegetation that contributes to a low canopy base height, especially where reducing crown fire initiation is a priority. Canopy base heights were determined across the project area from on-site observations, and on **moist sites** they **are as low as 1 foot (see Figure 5).** The structure and species composition of the stands – specifically cedar and hemlock with low

Canopy Base Heights (CBH)

The lowest height above the ground in feet at which there is a sufficient amount of **canopy fuel** to propagate fire vertically into the canopy. It is an effective value that incorportates ladder fuels such as the shrubs and understory trees.

Canopy Bulk Density (CBD)

The mass of **available canopy fuel** per unit canopy volume. It is a bulk property of a stand, not an individual tree. Measured in kilograms per meter cubed – kg/m^3.

growing crowns, as well as dense understory trees – are contributing to the low canopy base heights observed. **Drier sites** in the project area tend to have greater variation in stand structure due to small openings in the canopy, but canopy base heights are still low due to the tall shrubs and understory trees and **average 3 feet** for fire behavior predictions**.** In both forest types, the fuels continuity from the surface fuels to the crown fuels has created the potential for surface fire to propagate to the crowns of the overstory trees.

Canopy Bulk Density

Canopy bulk density (CBD) is the mass of available fuel per unit of canopy volume (kg/m3). It is a bulk property of a stand, not an individual tree. Canopy bulk densities were estimated from a combination of FFE-FVS outputs for representative stands within the project area as well as comparing site-observations to available research such as Scott and Reinhardt (2001). Typical dense, moist stands can have a CBD of 0.30 kg/m^3. It is a difficult canopy characteristic to measure directly (short of cutting down the trees); FVS uses a technique to estimate "effective" CBD in nonuniform stands from a stand inventory that does not assume a uniform vertical distribution of canopy fuel – uniform measurement can be estimated by dividing canopy depth into canopy load (Scott and Reinhardt 2001).

Scott and Reinhardt (2001) describe the criteria necessary for active crown fire: Mass-flow rate is defined by Van Wagner (1977) as the rate of fuel consumption through a vertical plane within the fuel bed and it is a product of CBD and spread rate. CBD affects the critical spread rate needed to sustain active crown fire. If the mass-flow rate falls below a certain threshold, active crowning is not possible. Therefore, the lower the canopy bulk density, the lower the potential for active crown fire. This increases the **crowning index – or windspeed at which active crown fire is possible** – so it would take greater winds to sustain active crown fire once the canopy bulk density is decreased in a stand. The current canopy bulk density is displayed in the table below. It is assumed that treatments that remove overstory trees will also effectively lower the CBD – for example, if 50% of the canopy is removed, then it is assumed the canopy bulk density is decreased by 50% on average. However, this relationship can vary quite a bit depending on species removal, as some species obviously have much more mass in the canopy than others.

Table 5: Current CBH and CBD in the project area (dense stands)

Canopy Base Height (feet)
1 - 3
Canopy Bulk Density (kg/m^3)
0.14 - 0.30

3.2.4 Fire History

Fire is an essential form of disturbance in all western forests. Vegetative structure, function, and processes depend on it. Several conifer species are dependent on fire for regeneration – including ponderosa pine, western larch, western white pine, and lodgepole pine. Dry, moist, and even high elevation forest succession is dependant on fire frequency, fire severity, and fire scale. There are three types of fires that occur in forested ecosystems (Zack and Morgan 1994):

- ***Lethal fires*** *– fires that are stand replacing, removing 90%+ of the live tree dominant upper canopy layer across >90% of the stand across a large, relatively uniform scale. These are commonly crown fires that burn with high severity. Local examples of these types of fires are the Sundance and Trapper Peak fires of 1967 that together burned over 80,000 acres in a short time period during drought conditions*
- ***Non-lethal fires*** *– fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs, and forbs may be burned back to the ground line.*

- ***Mixed severity fires*** *- fires that commonly burn with variable severity across the landscape, producing irregular, patch mosaics; killing more than 10%, but less than 90% of the dominant overstory tree canopy. Fire regimes are considered variable – a short return interval non-lethal fire may occur with occasional long interval lethal crown fires.*

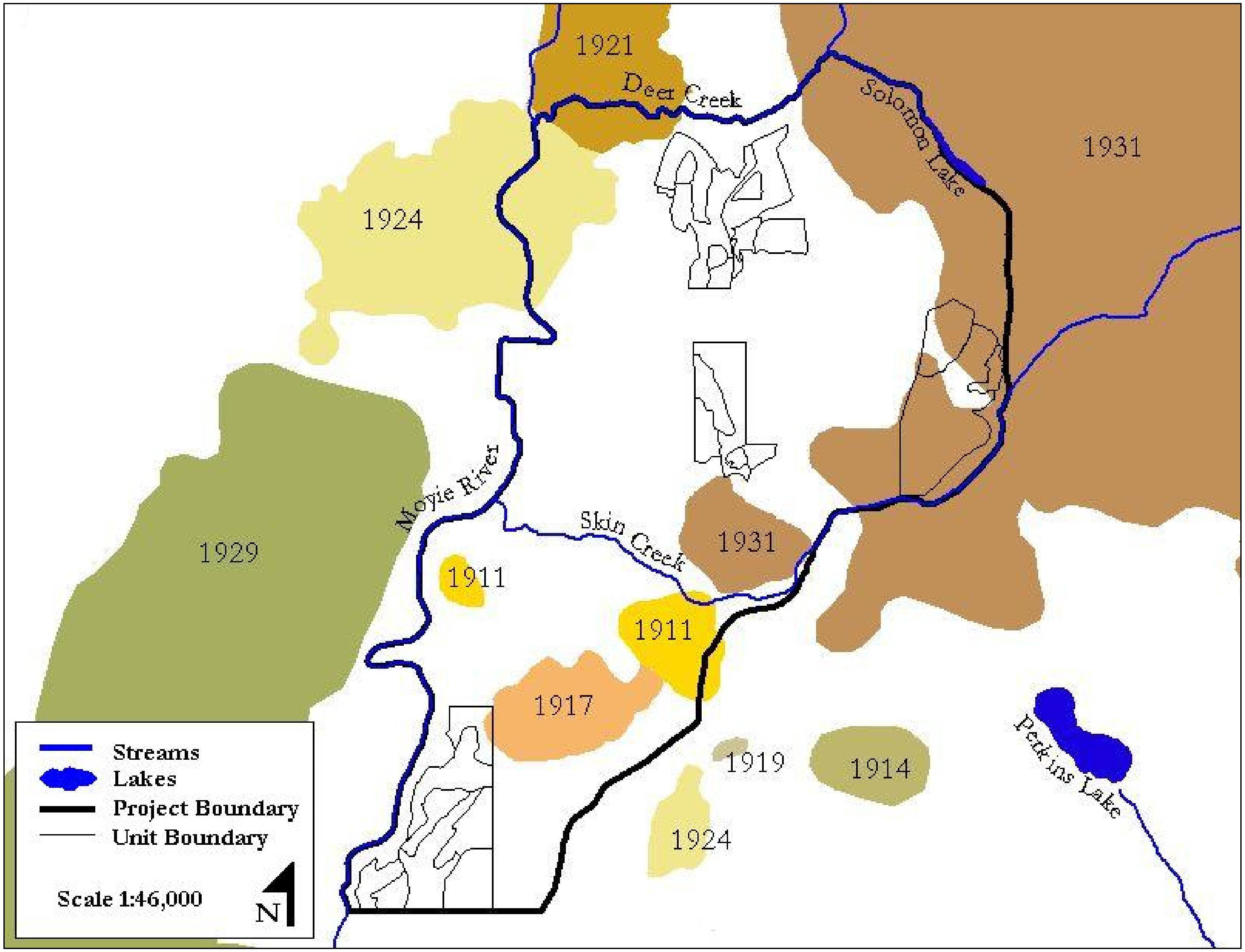
In the Western United States, millions of acres of forests have accumulations of fuels that are much greater than historical conditions – due to various forms of fire exclusion (Peterson et al. 2005). The fuel build-up has led to an increase in catastrophic wildland fire risk (Pollet and Omi 2002). The Myrtle Creek Fire in 2003 is a good example of a fire burning in heavy, abundant, and generally continuous fuels (Fire Behavior and Weather Report – Myrtle Creek Fire 2003). Another local example is the 1967 Sundance Fire which started on September 1st and grew from 4,000 acres to nearly 56,000 acres in 12 hours, burning across the entire Pack River Drainage and other areas of the Selkirk Mountains just missing Bonners Ferry. During the period of the fastest spread, the fire burned at a rate of a square mile (640 acres) every 6 minutes and produced a column of smoke that rose 35,000 feet into the air.

Wildfires are becoming more intense and severe, specifically in areas that did not historically experience landscape scale stand replacing fire, such as dry-site ponderosa pine stands in the western United States (Arno and Fiedler 2005, p. 36). Because of the existing conditions as previously described, there is the potential for wildfires to exhibit a high resistance-to-control – the more intense and severe the fire, the greater the number and type of resources needed to suppress it. These forests generally have vegetative conditions that seem to be fitting for crown fire behavior – low growing crowns and other ladder fuels, dense canopies, large amounts of heavy timber litter, etc.

Large fire events have occurred in the vicinity of the analysis area throughout history –as recent as the late 1920s and early 1930s, when fires burned through much of the forests along the Moyie River. The fire atlas (with records through the mid-1930s) shows larger fires on the district by area burned, but provides very little other information. More recent records provide information on fire size, legal location, and fire cause – there were at least 21 fire ignitions in the project area from 1941-2003. This is approximately 1 *detected* ignition every 3 years. Of these, approximately 60% were known to be lightning caused and 20% known to be person caused (many of these were campfires, as this area is highly accessible).

Although landscape scale fires are known to have occurred in this area (Figure 6) all of the more “recent” fires, those being since the time of more advanced fire suppression techniques have resulted in very little acres burned, thus it is likely that the role of fire suppression has modified this area to some degree. This is especially true in the drier stands where fires occurred on a more frequent basis of approximately 40 years and in those proposed treatment areas that have no record of past fires – large scale mixed and high severity fires are likely overdue on much of this landscape, affecting the Fire Regime Condition Class.

Figure 6: Fire history for the Twin Skin HFRA Project Area. Major events in and adjacent to the area include fires in 1911, 1914, 1917, 1919, 1921, 1924, 1929, and 1931.



3.2.5 Fire Regime Condition Class

Fire Regime Condition Class (FRCC) is a qualitative measure describing the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. Departure can be caused by any number of sources such as introduced exotic species, introduced insects or disease and management activities. Depending on forest type, it can be an indicator for fuel reduction needs and can help prioritize treatments to improve overall landscape condition class (Hann and Strohm 2003).

Although this project is defined as being within the wildland-urban interface, the Healthy Forests Restoration Act also calls for expedited fuels treatments in areas classified as Condition Class 2, Fire Regimes I, II, or III and Condition Class 3, all Fire Regimes.

Fire Regime Definitions:

I 0-35 years and low to mixed severity
II 0-35 year frequency and high severity
III 35-100+ year frequency and mixed severity
IV 35-100+ year frequency and high severity
V 200+ year frequency and high severity

Scale is an important factor when looking at departure of a historic range for any particular value – because in the case of fire – disturbance doesn't occur at the same time on all stands and at the same intensity when it does occur, there is natural variation (Interagency Fire Regime Condition Class Guidebook).

Condition Class	
1 **(0-33% Departure)**	Fire regimes are within natural range, and risk of losing key ecosystem components is low. Vegetation attributes are intact and functioning within historic range.
2 **(34-66% Departure)**	Fire regimes and vegetation attributes have been moderately altered from natural range. The risk of losing key ecosystem components is moderate. Fire frequencies have been departed by one or more intervals.
3 **(67-100% Departure)**	Fire regimes and vegetation attributes have been significantly altered from their natural range. The risk of losing key ecosystem components is high. Fire frequencies are departed by several return intervals.

FRCC was determined at the project area for National Forest System lands (project area is 4600 acres and 3100 acres are NFS lands), most of which is within the Lower Moyie River watershed (6th code HUC). Although roughly 50% of the proposed treatment area is broadly categorized as dry-site and 50% is considered moist, 71% of the larger FRCC landscape is moist site. Fire regimes were determined using habitat groups as the basic level of stratification. Within each of the three strata there is a reference (historic) value for fire frequency, fire severity, and vegetative structure (early seral, mid-seral closed, mid-seral open, late seral open, late seral closed) and the three together make up the weighted strata condition class. The weighted departures of the three strata then determines the overall landscape level FRCC rating. A more thorough explanation of the process and assumptions that went into the FRCC analysis is available in the project file.

Data gathered in the field and knowledge of current frequency of fire and expected fire severity has led to the determination that the **FRCC at the project landscape is moderately altered from the natural range across the Twin Skin Project Area (Condition Class 2)**. The main contributors to this rating are fire exclusion, the reduction in white pine due to blister rust which has affected stand structure and species composition (some moist forests once had white pine compositions of >30% and now it is often less than 6%), and previous timber harvest resulting in uncharacteristic stand structures. Other than the areas that burned in the early part of the 20th century, it was assumed for the FRCC analysis that fire has been excluded from the remainder of the project area for at least 118 years (no records before 1889). As mentioned, this has affected the dry sites where at least two fire cycles have been missed (nearly three where no record of fire history exists) and long-lived seral species such as ponderosa pine are the ecosystem components at moderate risk of being lost due to fire regime condition class departure.

Table 6: FRCC departure by major forest type represented

	Fire Regime*	Condition Class
Moist	III-V	2
Dry	I	2
Landscape FRCC (Weighted) 38% - Condition Class 2		

*The natural Fire Regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning – thus, it is a constant measure for a particular vegetation group and does not change regardless of condition class.

3.2.6 Fire Behavior

The following section summarized the expected fire behavior based on the current condition of the fuels modeled under fire danger scenarios typical of a hot and dry North Idaho fire season. We model it this way because that is the time when fires pose the greatest threats to firefighters and the public and have the greatest potential for spread and extreme fire behavior – in our professional opinion it allows the best opportunity to compare the effectiveness of fuels reduction activities.

Surface Fire Behavior

Under the existing fuel conditions, surface fires in the event of a summer wildfire would exhibit behavior that would limit direct attack to ground machinery and aerial resources only. Expected flame lengths would be greater than the limit that can be safely attacked by handcrews – **predicted flame lengths would be approximately 4 feet (estimated between 3.6 and 4.1) and the limit for safe direct attack by firefighters is 4 feet**. Longer flame lengths generally mean greater rates of spread, especially if the fire moves into the tree crowns. Fast moving fires are generally more difficult to control, and in the wildland urban interface, create an even greater concern as fires may threaten homes and other structures as well as escape times out egress routes.

Similar results would occur in the dry forest types, as fuel structures are generally similar. Although overall fuel loading is generally less in these stands, they are more open to the elements such as solar radiation and drying of fuels due to the generally west to south aspects.

Crown Fire Potential

Crown fire potential is generally based on the amount of surface fuels, the amount of ladder fuels – which serve as the avenue to move surface fire into the tree crowns, and the density and spacing of the overstory. Heavy surface fuels generally contribute to longer flame lengths. As mentioned above, if canopy base heights are low, those surface flames can then carry into the tree crowns. Once there, a crown fire may persist if the structure of the canopy is such to support crown fire. The more spaced the canopy, the greater the wind necessary to move fire from one crown to the next. Dense canopies would obviously require much less windspeed to support crown fire.

3 Key Fuels Factors for Crown Fires

- How much surface fuels?
- How close are the trees crowns to the ground?
- How dense are the tree crowns?

The condition of the project area is such that a crown fire could be supported due to the current surface, ladder, and crown fuels. The predicted flame lengths coupled with the low canopy base heights of 1-3 feet would equate to a **high probability of torching the canopy (60- 80%) and the potential mortality being nearly 100% in some areas (model outputs in the project file).**

Plantations

One moist-site plantation of approximately 22 acres will be precommercially thinned under the proposed action. The current fire behavior in this stand would be much different than would be expected in the mature untreated forests. The regeneration is relatively uniform in size and structure – the species composition is a mixture of mostly seral species such as larch, white pine and lodgepole, though grand fir, hemlock, and traces of other species are present as well. Fire behavior would be similar to that of a fuel model 8 (desired condition fuel model), as much of the surface fuels were removed in the previous entry. From previous modeling done for similar young stands - surface flame lengths would average 2 feet. However, the structure and density of the stand would leave potential for torching and mortality to the regeneration in the event of a wildfire.

Figure 7: Precommercial thin plantation in project area – 22 acres.

The canopy structure of the smaller trees in this forest type is such that crowns are developed down to the surface fuels and much of the regeneration is on a 5-10' spacing, surface fire with some torching would be the expected fire type. Flame lengths of 1-2 feet could move into the crowns of these smaller trees because of the canopy fuel arrangements – some single or group tree torching could occur. The plantation is a mix of conifer species – mostly lodgepole, western larch, western white pine and Douglas-fir.

3.2.7 Environmental Consequences – Effects of the Alternatives

Refer to EA Appendix A (Fire and Fuels Report) and the project file for methodologies related to the environmental consequences, including the direct and indirect affects of the alternatives, as well as fire behavior models used and limitations, capabilities, and assumptions of each.

Three indicators of fire hazard were used to evaluate the changes in fire behavior by alternative. First, **potential flame length** was used to determine surface fire potential and the trends of surface flame lengths over time as a measure of treatment effectiveness over time. Suppression tactics are directly related to flame lengths, as fires with flame lengths less than 4 feet can be attacked using hand crews to construct fire line. Flame lengths greater than 4 feet would require other resources, such as dozers or other mechanical equipment or aircraft carrying water or retardant (NFES 2165, NWCG 2006 p. B-59)

The second indicator for fire hazard in the analysis is the **probability of torching**. A torching situation is generally defined as one where tree crowns of larger trees are ignited by surface fire flames or flames from smaller burning trees reaching the larger trees. Canopy base heights are a critical factor for determining the potential for torching. The torching index is calculated by conditions of surface fuels, fuel moisture, and windspeed. Torching is sensitive to surface flame length, understory development and ladder fuels, and crown structure. Management actions that modify these processes will change the predicted value of the torching index and the probability of torching with a forested stand. As it is a measure for large trees, it was not used in the analysis of the effects of the alternatives on the plantations.

The third indicator of fire hazard is the **crowning index** which is the wind speed, 20 feet above the canopy at which crowning is possible (Duveneck and Patterson III 2007). This index reflects the density of the canopy fuels. It is an important measure for evaluating the effectiveness of fuels treatments because crown fires generally exhibit rapid rates of spread, cannot be attacked directly due to fire intensity and they consume the crowns of trees, they result in nearly complete mortality of the overstory. This

Fire Behavior Indicators:

- Flame Length
- Probability of Torching
- Crowning Index

type of fire behavior may be acceptable outside of the wildland urban interface or in wilderness or back country situations. However, due to the resistance-to-control, unpredictability, resource damage, and especially the danger that crown fires pose to firefighters and the public, crown fires are unwanted in the urban interface and boundary of an at-risk community where people reside.

The crowning index is the point at which active crowning – a solid wall of flame extending from the fuel bed surface through the top of the canopy (Scott and Reinhardt 2001) – is possible, not necessarily the point at which it can be initiated. Passive crown fire usually happens first, where individual or small groups of trees torch out.

All indicators listed above need to be considered in conjunction with one another. For example, over time surface fuels will accumulate at the greatest rates, and therefore predicted surface flame lengths may steadily increase. However, if ladder fuels are not present and the canopy fuels are spaced, the potential for torching and active crown fire may remain low.

3.2.7.1 Effects Common to Both Alternatives

Fuel Accumulation

Regardless of the alternative chosen, fuel build-up will continue indefinitely in the Twin Skin HFRA project area as stands go through succession. An action alternative would reduce fuels in the near-term and an assessment for future entries would be needed as fuel treatment benefits are known to lapse due to surface fuels accumulation and other stand changes (Agee 2002). Obviously forest type and other environmental and human factors will affect the rate at which that occurs. Not all areas will need mechanical re-treatment – some areas may only need a subsequent prescribed underburn to maintain fuels. At any rate, the no action alternative would not address the current fuels hazard and the affected area would be at an elevated potential of a large, uncontrollable (unwanted) wildfire due to increased fire intensity associated with higher fuel loads, which would hamper fire suppression efforts. One of the main objectives for the Twin Skin HFRA project is to protect resources in the wildland urban interface from the effects of intense wildfire behavior.

Probability of Ignition

Probability of ignition is strongly related to fine fuel moisture, air temperature, shading of surface fuels, and an ignition source (Graham, McCaffrey, Jain, 2004). Implementation of the treatment alternative will not affect the likelihood of lightning strikes; however the risk of human caused fires may increase to some degree depending on how completion of the chosen alternative affects public access and use in the area. Regardless of the alternative chosen, ignitions would still be expected across the proposed action area. Altered stand structure can affect stand temperature and humidity – there is generally a warmer and dryer microclimate in more open stands (Graham, McCaffrey, Jane 2004). Dense stands, such as those with no record of past management or fire, generally have more shading of the surface fuels and higher relative humidity and air temperature (thus, higher surface fuel moistures) (Graham, McCaffrey, Jane 2004). An open forest structure would have contributed to the maintenance of ponderosa pine and other fire-dependent forests – where fire starts may have been common due to an increased probability of ignition, but intensities and severities were generally lower due to maintained surface fuels. The proposed action would aim to mimic these surface fuel conditions. Even with a fire start in areas treated under the proposed action, fire spread would be expected to decrease due to projected slower rates of spread and lower flame lengths. In the case there is an ignition and resulting wildfire, spotting that accompanies crown fire will be reduced because of modified surface, ladder, and canopy fuels.

As mentioned, lightning is the main cause of fire occurrence on National Forest System lands on the Bonners Ferry Ranger District – approximately 80% of all fires are ignited this way. When considering the probability of fire, it is better to consider the probability of burning, because that includes fires moving from elsewhere into this particular area. Eight stand altering fires occurred within or very near the project area from 1889 to 1931 – a large fire less than every 6 years. Successful fire suppression began shortly after the fires in the 1930s, thus fires have been successfully suppressed to a relatively small size since then. Even if we include the large gap in large-scale fire occurrence from 1931 to the present, the average interval for expecting a larger fire would only increase to 1 in every 15 years. We are now 76 years since the last sizable fire – recent fire seasons (since 2000) have shown us the potential for large fire growth and behavior in the interior west forests where fire has been excluded. Looking at fire in this way is much different than if we analyzed the probability of fire on any one acre – a number that is rather small and often used to argue that risk doesn't justify fuels treatment. Although a percent probability of fire occurring in the project area was not determined – Dr. Mark Finney (Research Forester at the Rocky Mountain Research Station) summarizes the idea of probability as follows:

> The summation of probabilities must be taken over time – many decades in fact. Probabilities may exceed 100% for a large fire somewhere in the project area if the summation is performed over a few 1000's of acres and one or two decades.
>
> He states there are problems with conclusions based only on the probability of an event. Fire occurrence is the frequency of fires within a specific area and period of time, and implies nothing about the fire size or probability of burning at a given geographic location (Finney 2005). The probability of ignition on any particular acre is clearly not the same as the probability of burning. The probability of ignition is much lower, yet National Forests still require funding for suppression forces. They fight fire because the consequences of having free-burning fires are felt well beyond the immediate ignition location and for reasons that are unrelated to the probability per acre.

The reasons we suppress fires in this wildland urban-interface area are the same reasons fuels management activities to modify fuels are being proposed. Large and intense fires that jeopardize public and firefighter safety are undesirable and a pro-active measure to mitigate the negative effects just makes sense.

Access for Suppression Resources

Success in initial attack relies heavily on arrival time to a fire. Well maintained roads allow for safer travel and allow for a variety of resources to support a fire, including the larger Type 4 engines (750 gallons of water) used on the Bonners Ferry Ranger District. Although road maintenance will be necessary to accomplish treatments, no new permanent roads are proposed for this project, thus access routes for suppression resources will not change. However, an open canopy and reduced surface and ladder fuels allow for quicker and safer foot travel to and from wildfires not accessible from an engine or other vehicle.

Influence of Topography and Weather on Fire Behavior

There are two contributing factors to wildfire behavior that cannot be controlled regardless of the action taken or alternative chosen for this project – the topography (elevation, aspect, parent material, etc.) of the project area and the daily and seasonal weather contributing to fire danger. However, modification of fuels and opening of a stand can affect microclimate, especially wind and solar radiation, influencing surface fuel moistures.

The Twin Skin project area is oriented with the prevailing wind direction - typical winds are light to moderate from the southwest. This orientation to the wind may aid in fire spread and general fire movement is to the northeast. Strong winds are generally associated with cold fronts, which can have an effect on fire behavior due to shifts in wind direction and downdrafts. More open stands created with fuels treatments would generally have greater surface winds than adjacent dense stands, affecting rates of spread and fire intensities based on that factor alone. However, the effect of the increased wind on fire behavior is offset by the reduction in the fuel load.

Slopes in the proposed treatment area range from nearly flat (such as units 1 or 17) to very steep, exceeding 80% slope (such as in unit 9). Slope is a large contributor to spread of a fire – without wind, the greatest fire spread in uniform fuels will be in the direction of maximum slope. The slopes and aspects in the project area will contribute to the general north and east fire spread for this landscape.

3.2.7.2 Direct and Indirect Effects

Fire Regime Condition Class

The following table summarizes the effects of both alternatives on the FRCC departure. The No Action alternative would be the same as the current condition. **Contributors to the improvement overall includes landscape structure and vegetation modifications, including species composition changes (managing for larch and white pine) which will alter fire behavior and expected severities and on dry-sites for the proposed action is due to the use of prescribed fire on a portion of the landscape where the frequency is departed from what would have been historically.**

Table 7: Fire Regime Condition Class departure by forest type within the project area.

	No Action		Proposed Action	
	Fire Regime*	Condition Class & Departure	Fire Regime	Condition Class & Departure
Moist	III-V	2	III-V	1
Dry	I	2	I	2
Landscape Departure (Weighted Average) 38%			Landscape Departure (Weighted Average) 26%	

FRCC 2 means moderate departure (34-66%) from natural range; FRCC 1 means within natural range (0-33%). Scale of the treatment area in relation to the landscape area in which FRCC is evaluated will impact the expected improvement from implementing treatment. Approx. 700 acres of the 3100 acre FRCC landscape will be treated (<23%)

Suppression Capabilities

The proposed action will effectively modify the fuels characteristics of the treated area to be consistent with that of a fuel model 8 (light timber litter – see Figures 8 & 9 below) rather than a fuel model 10 (heavy timber litter) such as the current condition where previously untreated. In some areas that are currently represented by patchy surface fuel models (portions of the dry sites as described previously); effective reduction in expected surface flame lengths will best be achieved by underburning. Fire behavior will also be modified such as in the tables and text that follow.

Table 8: Suppression capabilities based on expected flame lengths by forest type and Alternative.

	Surface Flame Lengths (Feet)			
	No Action	Direct Attack?	Proposed Action	Direct Attack?
Moist	3.8	No*	1.3	Yes
Dry	4.1	No	1.4	Yes

* The currently low canopy base heights could propagate the surface flame lengths into the crowns of trees, thus **overall flame lengths are predicted to be 50-60 feet** with passive crown fire for the No Action Alternative. The same would be true for the plantations due to the low canopy base heights. Direct attack by any means would not be possible under a crowning/torching scenario.

The connected action of salvaging dead and dying trees from events such as windstorms, ice-damage, fire, or insects and disease within the treatment areas would only heighten access for suppression resources and reduce the biomass that could potentially end up contributing to the surface fuels as they accumulate once again into the future.

Precommercial Thin

Precommercial thinning activities on 22 acres would be on schedule with what was planned in the previous silvicultural prescription. The purpose of thinning is to "reduce the number of stems per acre" (Graham et al. 1999) to facilitate the growth and development and promote the health of the residual trees. Thinning lodgepole, grand fir, and other undesirable species to favor larch and white pine would decrease the canopy fuels, reduce ladder fuels by spacing trees, and support a more fire resilient stand into the future – western larch plantations being some of the most fire resistant stands (Myrtle Creek HFRA Record of Decision 2007 - Appendix A, p. 67-68). Thinning will influence fire behavior as species composition, available fuel, fuel arrangement, fuel moisture, and surface winds in the stands will be modified (Graham et al. 1999). Precommercial thinnings are most successful at reducing fire behavior if the surface fuels produced from the thinning are treated as well (Graham et al. 1999). Cut material will be scattered to break up the continuity of the surface fuels, however, options to remove biomass would be encouraged to keep slashed material from accumulating on the forest floor and any additional concentrations of material could be treated utilizing a small excavator to pile the material to be burned later (likely on less than ¼ of the unit overall). Once implemented, the activities associated with a precommercial thin would leave a stand where the expected surface fire behavior remains consistent with a fuel model 8 (slow burning surface fires in light timber litter) while also modifying the structure to prevent group torching. The residual trees, especially larch as mentioned before, will create a more fire resilient stand.

1. *Effectiveness depending on the type of post-harvest treatment*

The effectiveness of treatment in reducing fuels and altering fire behavior is dependant on the type and intensity of treatment. Fuels reduction activities that include the use of prescribed fire are generally the most successful in reducing fuels (Graham et al. 1999). Prescribed fire consumes branchwood, duff and other dead material on the forest floor, as well as brush and other herbaceous material which contributes to fire intensity and severity. Prescribed underburning will be the most useful tool on the drier sites where the stands are already a bit more open and the understory vegetation has become most established – prescribed fire will be effective at reducing the surface fire intensities of a wildfire.

Creating more fire resilient stands implies a three-part process of reducing surface fuels, reducing ladder fuels, and reducing crown density (Agee and Skinner 2005). Harvest alone only treats the ladder and canopy fuels and does little to address the surface fuels. Slashing, combined with biomass utilization or grapple-piling and pile burning are also effective methods of treating surface fuels, both natural and activity created – however it is not as affective in reducing the fine fuel loading (the smallest branchwood material) as is prescribed fire. Some studies, including one that followed The Cone Fire in northeastern California suggests that thinning that reduces ladder fuels and surface fuels have the best chance for tree survival following a wildfire (Skinner and Ritchie 2008). This project proposes to use prescribed underburning on at least 80 acres (units 9 and 10 – unit 7 may be underburned which would add 18 acres) and grapple piling on the remaining harvest acres to address surface fuels after harvest of the overstory.

Fuel Model 8 – Proposed Treatment

Figure 8: Example of treated dry-site on district – fuel model 8 after treatment

Figure 9: Example of treated moist-site on district – fuel model 8 after treatment

The above figures show an example of effectively reducing the surface, ladder, and crown fuels in both dry and moist forest types on the Bonners Ferry Ranger District through mechanical treatment followed by underburning (Figure 8) and grapple-piling and pile burning (Figure 9). These two figures can be compared to Figures 1 and 2 – the current condition of the same forest types within the project area.

Modification of surface fuels through the proposed action, to be more consistent with that of a fuel model 8, will lower the fuel loading for the smaller diameter dead fuels. The table below shows the fuel loading by size class expected following completion of project activities – this is most consistent with what will remain on the forest floor in a treated stand, in the areas between the grapple-piles. After they are burned, almost no fuels, including duff, will remain where the piles were located. Piles generally produce a lot of intensity due to the large jackpots of fuels, thus near complete consumption of the piled woody material is expected.

Prescribed underburning will leave a different array of fuels on the forest floor immediately after implementation than would pile burning because an underburn generally consumes fuels over a larger area within the treated unit. Where activity fuel loads are high, there may be a more continuous fuel bed to burn, though large jackpots of fuels are generally not as frequent. Fire intensity can be controlled to meet objectives based on lighting patterns and lighting intensity, as well as the condition of the fuels when the prescribed underburn takes place (i.e. season of burn, fuel moistures, weather conditions on the day of the burn, etc.). When burn objectives are met for reducing fuels through prescribed underburning, the immediate fuel load for surface fuels may be even less than what is shown in the table below.

Table 9: Expected averages for small fuels after implementation of Proposed Action

Smaller Surface Fuels (<3” diameter - dead)	(Tons/acre)
1 hr (0-.25”)	1.5
10 hr (.25-1.0”)	1.0
100 hr (1.0-3.0”)	2.5
Total Surface Fuel (<3 inch)	5.0

Crown Fire Potential – Probability of Torching and Crowning Index

Fuels treatments will remove the majority of the ladder fuels, thus raising the canopy base heights to greater than 40 feet – a level where surface flame lengths would not be able to move into the tree crowns, except under rare wind scenarios or where individual dead trees or those with very low growing crowns ignite. The key in treating the crown fuels by harvesting overstory trees is to effectively reduce the canopy bulk density to a level where active crown fire is not possible or the chances are significantly reduced (Scott and Reinhardt 2001). In effect, the fire spread rate needed in order to sustain active crown fire is thus at an unrealistically high level.

The direct effects of the harvest treatments as proposed will accomplish this objective. Even if crown fire initiation (torching) were to occur, harvest of the overstory trees will effectively space tree crowns, reducing the likelihood of fire spread from one tree to the next as shown in the increased crowning index (wind necessary to sustain active crown fire) in the proposed action as compared to the current condition (no action). Units 1, 3, 4, 5, 6, 8, 9, 10, and 15 will show the greatest increases in canopy base heights and greatest overall reduction in canopy bulk densities to a level where the probability of torching approaches zero and the winds necessary to sustain crown fire are near unrealistic. The commercial thin units will accomplish this effectively too, however there will be more residual canopy – mostly because the existing stands have a larger percentage of healthy trees to be retained into the future. Both types of silvicultural prescriptions will focus on retention of the largest trees in the stand (which are generally the most fire-resistant (Agee and Skinner 2005)). The No Action alternative will not address low canopy base heights and higher canopy bulk densities, thus the potential for torching and crown fire is expected to remain high.

The following table summarizes the probability of torching and crowning indexes by alternative and forest type.

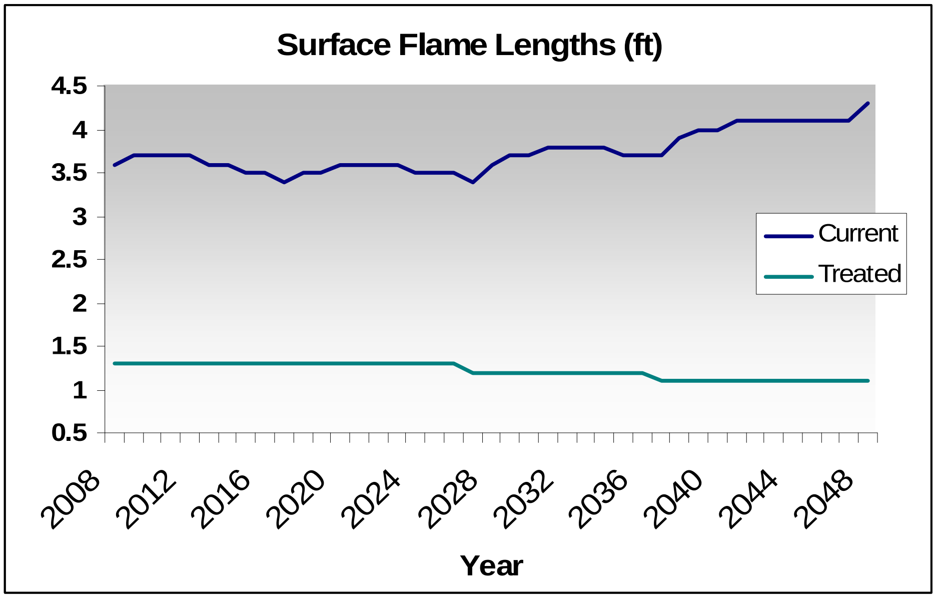
Table 10: Summary: probability of torching and crowning index by alternative – a range that includes moist and dry forest types.

	Probability of Torching	Crowning Index (mph)
No Action	80%	20-35
Proposed Action	0	60-85

Effectiveness into the future

As mentioned, fuels reduction activities are expected to lapse. The following graphs compare the general effectiveness of the action alternative with the no action alternative for the indicators of surface flame lengths, probability of torching, and crowning index into the future. See Appendix A for a more detailed explantation.

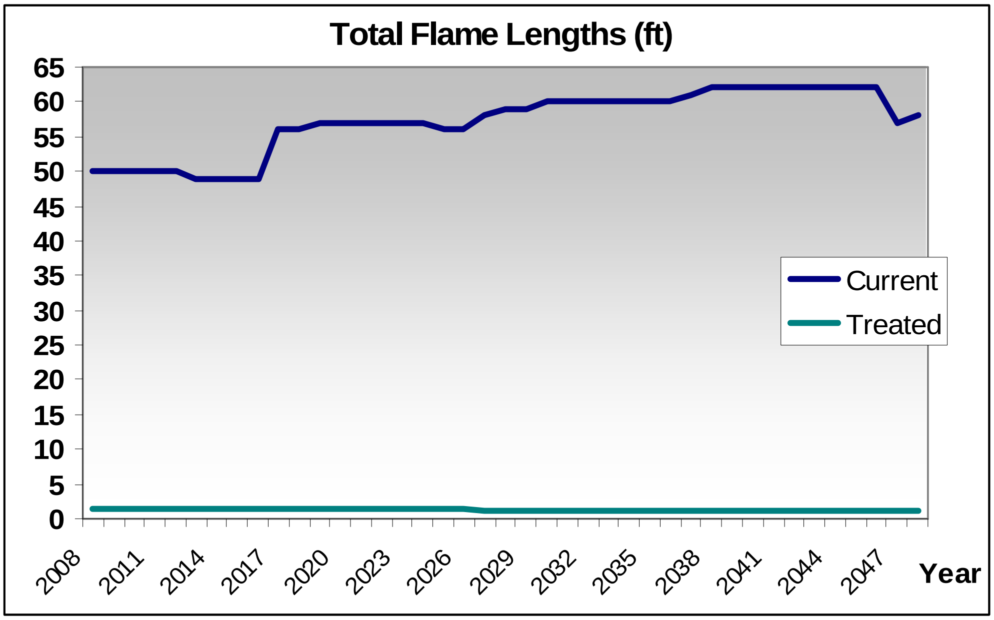
Figure 10: Comparison of expected *Surface Flame Lengths* in the proposed treatment areas for No Action the Proposed Action.



Project related activities would be effective at keeping the expected surface flame lengths under the direct attack threshold for at least 40 years into the future. Without treatment the expected surface flame lengths increases ranges between 3.5 to 4.5 feet for the next 40 years.

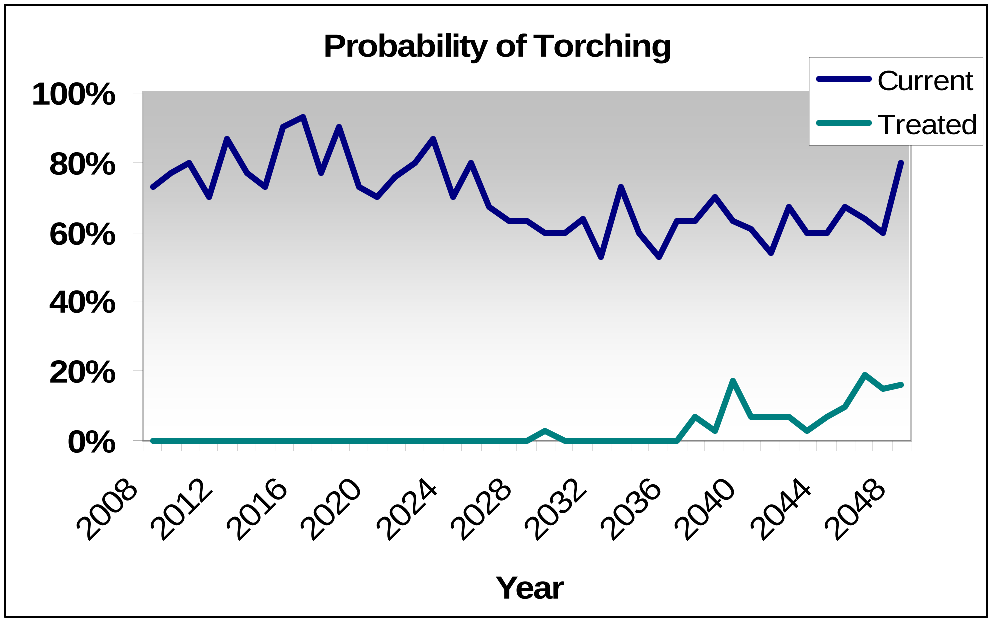
Crown characteristics (crown base heights and canopy bulk density specifically) will influence whether or not a surface fire stays on the surface or moves into the canopy (Pollet and Omi 2002). From outputs derived in FVS, it is likely that the overall flame lengths for the current condition would actually be much greater than what is show in the figure above because a fire would be expected to move into the tree crowns through torching or small crown fire runs through several trees at a time (the above figure shows 'surface' flame lengths – a fire moving into the crowns would result in greater flame lengths). The following figure shows the trend in overall flame length for both the No Action and Proposed Action Alternatives.

Figure 11: Comparison of expected *Surface Flame Lengths* in the proposed treatment areas for No Action the Proposed Action.



When ladder fuels are treated and the canopy base heights raised the probability of torching decreases as shown below.

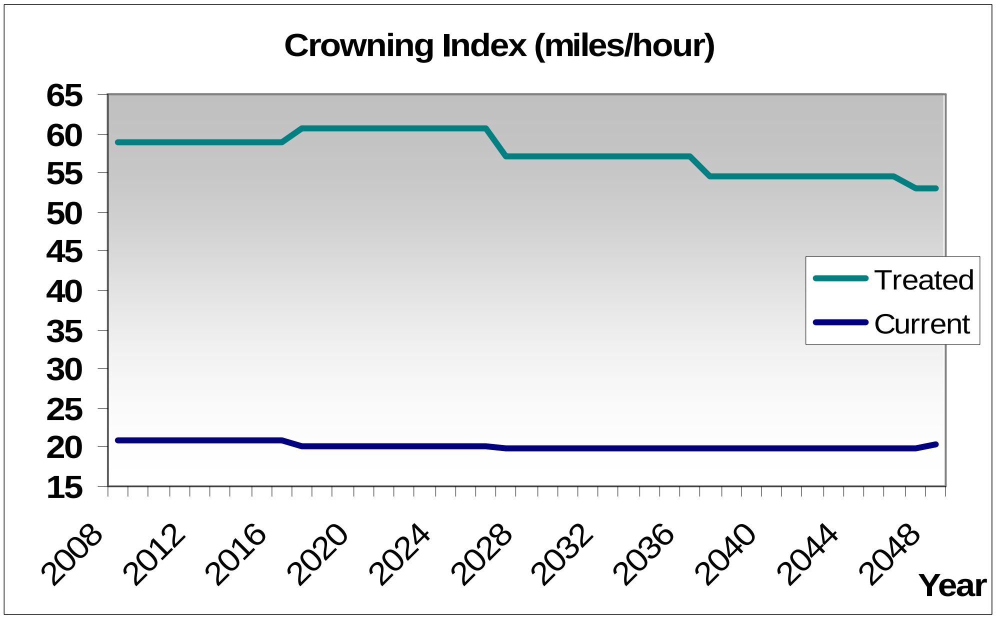
Figure 12: Comparison of the general effectiveness by Alternative on reducing the *Probability of Torching*



The initial entry will have an immediate effect on the probability of torching – reducing it to zero in the treatment year for approximately 20 years because the canopy base heights will be increased so dramatically. It increases to approximately 20% over 40 years - this being a result of regeneration becoming advanced enough to carry fire into the overstory. At this time, and possibly even before, the stands will need to be assessed for additional treatments –

this may include thinning, prescribed fire, etc. With the No Action alternative, the probability would vary somewhat, but stay consistently above 60% for the next 40 years.

Figure 13: Comparison of the general effectiveness of the Alternatives on increasing *Crowning Index* (winds necessary to sustain crowning).



The proposed treatments will focus on spacing the tree crowns to a point where fire spread from one tree to the next becomes virtually impossible, except under the rarest conditions – not just high winds, but sustained high winds of >55 miles/hour. The increase in the crowning index will remain effective for decades into the future, until regeneration becomes incorporated enough into the overstory as to facilitate fire spread. The above figure shows that the No Action alternative will have little beneficial effect on the crowning index – it will take winds of less than 20 mph to sustain crowning into the future.

Use of prescribed fire only

In previous fuels reductions projects, several groups have expressed their support for an alternative that would propose prescribed fire only as a method for achieving fuels reduction objectives. In some cases the task of implementing prescribed fire without any mechanical treatment beforehand would be feasible – with many constraints that would first need to be considered; including:

1. Meeting Project Objectives

   Prescribed fire alone may be successful at reducing surface fuels and increasing stand canopy base heights by scorching the lower crown classes of the stand (Agee and Skinner 2005). However, it is generally less effective at reducing the canopy bulk density because fires that are intense enough to kill the large trees often exceed an acceptable threshold for severity (Agee and Skinner 2005). The initial prescribed underburn would consume substantial biomass, but will also create additional fuels by killing smaller trees so that the surface fuels may return to fuel loadings that equal or exceed the surface fuel loadings that existed prior to the prescribed underburn (Agee and Skinner 2005).

2. Wildland Urban Interface

   The project area is surrounded by private property with some local residences within a few hundred feet of the proposed units. In order for fire managers to consider implementing prescribed fire with the current fuels conditions without first mechanically treating the ladder and crown fuels, extensive control lines would have to be established. These would need to be wide enough to account for single and group torching (and therefore spotting) which would likely occur by trying to use prescribed fire in a crown fire environment (Ron Hvisdak – retired fire manager – 2007). The risk of escape would be high, putting private property, as well as firefighter and public safety at risk.

3. Time of Year / Weather

   In order to meet the objectives of reducing fuels in the surface and ladder fuels using prescribed fire only – while minimizing mortality to the overstory – timing of the burn would have to be done during such a time that the fuel moistures were low enough to consume the desired fuels, yet high enough to prevent extreme fire behavior that could occur due to the fact that fuels are so abundant. Likely, a very small window would exist for meeting the pre-determined parameters of wind, temperature, relative humidity, and fuel moistures. For example, an unpredicted wind gust could create undesired fire behavior by moving fire into the tree crowns. Burn windows are already fairly narrow in order to meet air quality standards. In addition, complexity would be high, and implementation of such a burn would likely have to occur over several days, maybe several burn seasons.

4. Firefighter Safety

   Prescribed fire, although done under a controlled situation within certain parameters of an approved burn plan, can be risky to fire managers – as fire can be unpredictable, especially if there are deviations from forecasted weather and other unexpected environmental factors. Firefighter safety is always the number one goal during burning or suppression activities. Certain hazards – such as falling snags, rolling materials, smoke inhalation, etc – have to be evaluated prior to ignitions. If prescribed fire only were used as the method of fuels reduction, the risk of falling hazard trees would be highly elevated over first treating the stands mechanically. Hazard trees are often removed during harvest activities if the operators feel like they cannot safely be worked around. An untreated stand would have many more hazard trees than a treated stand, as one of the objectives of the proposed action is to remove dead and dying trees. Fire weakens dead trees – falling trees are generally the single greatest threat to firefighters during a control burn. Therefore, the complexity and risk to firefighters would have to be evaluated before ignitions occurred.

Other constraints, such as prolonged smoke impacts, exist for limiting the opportunity to use only prescribed fire as a means of fuels reduction in the wildland urban interface. However, the single most important constraint would be the risk it would pose to firefighter and public safety.

Short term risks of fuels on the ground

Although an immediate decrease in the amount of ladder and aerial fuels will be realized post-harvest, a short-term increase of surface fuels from limbs, tops, and slashed material created from logging activities will increase the surface fire hazard before these fuels can be either grapple-piled or underburned (piling usually occurs within 1-2 years following harvest for fuels reduction projects). This short-term increase of fuels will not occur in units where the purchaser is required to or opts to remove these fuels at the same time harvest takes place.

The fire hazard from untreated activity fuels can be mitigated in several ways, one being that fuels reduction projects in the urban interface are considered high priority for the district fire management organization and treatments of these fuels takes precedence over fuels outside of the wildland urban interface. In addition, time of year of harvest can play an important role in minimizing the lag time between harvest and treatment of the activity fuels. Overwintering of slash fuels is often a design feature to leach nutrients back into the soil. Harvest activities that take place in the late fall or early winter decrease the fire hazard because the activity fuels not only have a chance to overwinter, they are on the ground during periods of very low fire danger and can then be either grapple-piled or underburned come the following spring. At any rate, although an increased short-term fire hazard for high intensity surface fire exists following timber harvest, the chance for crown fire is nearly eliminated, as the other ladder and crown fuels have been removed or at least reduced.

3.2.7.3 Air Quality

Air Quality is considered an "Other Issue." However, because the air resource is so closely related to fire and fuels, air quality was analyzed with those resources. It is included in the fire and fuels specialist report (Appendix A) and therefore, is also summarized here.

Potential smoke impacts from prescribed burn activities and wildfires include reduced visibility and increased levels of particulate matter and other pollutants in the short-term. General winds would be expected to move smoke into Canada and western Montana, though short-term impacts could be realized in the towns of Bonners Ferry and Moyie Springs, Idaho.

The *No Action* alternative proposes no activity for fuels reduction; therefore smoke impacts are not associated with this alternative. The only smoke impacts within the project area under alternative 1 would be those associated with a wildfire burning in the project area – the particulate matter of which is shown below.

The treatment alternative proposes pile burning and prescribed underburning as methods of fuels reduction post harvest. Consumption of fuels due to these activities would release particulate matter into the atmosphere and compromise air quality to some degree. Pile burning generally occurs in the fall, when such activities have less of a negative affect on air quality. Because of the arrangement of the fuels in piles, they tend to burn efficiently which reduces smoldering (a lot of smoke is produced during the smoldering phase of combustion) (Smoke Management Guide for Prescribed and Wildland Fire 2001). Spring burning is generally more limiting and many restrictions make for short burning windows. Smoke impacts from underburns are addressed in the burn plan for each unit – actions to limit smoke impacts include adjusting fuel loads, utilizing the weather (such as desired winds for dispersion), and controlling fuel consumption through fuel moistures, etc.

Table 11: Total smoke emission (PM 10 and PM 2.5) for project related activities by Alternative

Forest Type & Activity	Emission in Tons/Acre	Total Emissions (Tons)
No Action	0	0
Dry / Underburn	1.96	157
Dry / Pile Burn	0.31	103
Moist / Pile Burn	0.38	144

Total Smoke Emissions from Project Activities = 404 Tons

Although it is estimated that approximately 400 total tons of particulate emissions will be produced from project related activities, it is important to note that not all activities occur at the same time and impacts would be spread out over many days and at least 2 burning seasons if not more.

The following table then summarizes the amount of particulate matter (10 and <2.5µm) released from the treatment area during a wildfire by forest type for the no action alternative (if a fire were to occur with the current condition) and also a wildfire burning in the area after the completion of the proposed action.

Table 12: Summary of emissions if a wildfire were to burn in the proposed treatment area by Alternative

Wildfire	Emissions (PM 2.5 and 10) in T/A	Total Emissions (Tons)
No Action		
Dry	1.67	585
Moist	2.04	714
Total Wildfire Smoke Emissions		***1299***
After Implementation of Proposed Action		
Dry	0.70	245
Moist	1.19	417
Total Wildfire Smoke Emissions		***662***

A wildfire with the current condition would produce almost 2 times the amount of total particulate matter than would a wildfire burning in the proposed treatment area after it is implemented.

Obviously, it is very unlikely that a wildfire would burn only the acres associated with the proposed action – no more and no less. Fuels treatments would be designed to slow the spread and intensity of a wildfire so suppression action could be taken and the fire controlled.

Fire extent, therefore smoke emissions, could be markedly different if fire were to burn in the area if the No Action alternative were chosen – especially during a period of very-high to extreme fire danger with the current fuels conditions. As fire knows no artificial boundaries drawn on a map, the chance of a wildfire burning beyond the extent of the project area would be probable with many weeks of burning possible and prolonged impacts to this and other communities down-wind of the fire.

3.2.8 Past, Present, Reasonably Foreseeable

Timber Harvest and Development

The Deer Creek road and FSR #435, in addition to other Forest Service roads, are needed to access all of the Twin Skin HFRA project area. Much of these right-of-ways and adjacent land is privately owned and development has increased in this area over the past few years.

There are several homes and outbuildings within and adjacent to the project area and it is reasonable to assume that development will continue. FireSafe work has been accomplished in the vicinity near Perkins Lake, south of the Solomon Mountain area where treatments would occur in Units 16, 17, and 18. It is reasonable to assume that, as the county population grows and more people move into the forested environment, FireSafe work will continue into the future (as will maintenance of the work already completed).

There are three distinct proposed treatment areas occurring within the Twin Skin project area. Each one is surrounded by private land. Many of the individual private land owners have recently harvested their land. The private land south of Unit 4 and west of Unit 6 has been harvested and the slash fuels treated within the past 5-10 years.

Private industrial land occurs to the south of the Twin Skin project area. This west facing aspect was recently harvested through a regeneration prescription – the area lies between the project area and the town of Moyie Springs.

The last remaining management activities within the project area on NFS lands, pile burning within portions of the Deer Skin Roundwood Timber Sale, occurred in the fall of 2007. Besides this project, which treated approximately 100 acres in the project area, none of the other past activities had fuels reduction as the primary purpose and need. All of the previous harvest activities were a combination of single tree, intermediate and regeneration harvest treatments that generally favored the growth and health or establishment of seral species.

Maintenance of desired fuels characteristics will need to be addressed with this project because fuels reduction treatments decrease in effectiveness over time. If the proposed action is implemented a schedule of maintenance treatments, at anywhere from 15-30 years depending on forest type and fuel accumulation, would be necessary to maintain surface and ladder fuels, as well as species composition, to desired levels. In addition, other areas that move outside the range of desired conditions in the future should be looked at for reducing fuels in order to address a more landscape approach in altering fire behavior.

Fire Suppression

This project is within the wildland urban interface of Boundary County, thus fire suppression is the appropriate management response for unplanned ignitions. Although fire can be a valuable tool for restoring fire adapted ecosystems and as a means for fuels reduction, wildfire is unwanted where the risk to life and property is a realization. Therefore, the strategy of total control fire suppression will continue in this area into the future.

Agricultural and Private Burning

Open burning season is from October 21st to May 9th annually and many rural residents choose this time to burn ditch lines, brush, timber litter and other woody and herbaceous materials on their land; outside of this timeframe, a permit is required from the Idaho Department of Lands. Air quality will continue to be affected by these burning activities into the future. In addition, due to burning when weather conditions are poor (lower than normal spring moisture and high winds), the district regularly takes suppression action on a few fires annually that develop out of private burning activities.

Fire Occurrence

Approximately 80% of all fire ignitions on National Forest System lands managed by the Bonners Ferry Ranger District are lightning caused. Every summer, thunderstorms bring lightning and fires are generally expected across the district. In addition, this area is used by locals and forest visitors for recreation and other purposes – both lightning and human caused fires will likely occur within and adjacent to the project area into the future.

In addition, there is a level of uncertainty that exists in regard to the effects of climate change on forested ecosystems, including the occurrence of fire as well as the intensity and severity of fire if it does occur. Lightning ignited fires in the western United States may become even more prevalent as we experience longer and hotter summers, thus a longer season for thunderstorm development.

3.2.9 Cumulative Effects Related to Fire and Fuels

No Action

Fuels Accumulation and Fire Suppression – Effect on Condition Class Departure

As forests cycle through stages of growth, development, and mortality, fuels are continually accumulating in all vegetative layers. Without treatment, this accumulation will only add to the already heavy fuels within the project area, increasing the fire hazard by more than is already present.

Fire suppression will be a continued reality within the project area regardless of the alternative chosen, as it is in a developed part of Boundary County in the heart of the wildland urban interface and adjacent to completed Fire Safe projects. The appropriate response to wildfire in this area will be full-control suppression for the foreseeable future. As mentioned, without natural or prescribed fire in which some of these stands depend on a rather frequent basis, fuels will continue to accumulate in all layers adding to the fire hazard.

The No Action alternative will have no benefit on Fire Regime Condition Class in the present because it provides no method for moving the landscape towards a natural range of departure. As each year passes from the current, the departure will become even greater, especially on dry sites that are departed from fire frequency. A wildfire event could affect the fire regime condition class, but it is not possible to assume whether a wildfire in the project area would have a benefit or a negative affect on condition class – it would depend on the range of a fire, as well as the intensity and severity to forest resources.

Proposed Action

Fuel Accumulation – Effectiveness of Treatment

The effectiveness of the fuels treatments proposed was discussed previously and additional fuels treatments in the future will be necessary to keep hazardous fuels at a level where low-intensity fire can be controlled by suppression resources. These activities can include precommercial thinning, continued biomass utilization, piling & burning, and prescribed fire, along with many other activities not proposed for this project but could be considered in the future (mastication, chipping, etc.). The silvicultural prescriptions should include a schedule of future entries for fuels reduction purposes.

Effects of proposed action in relation to previous activities and potential future activities including FireSafe

'Fuel break' treatments to reduce home ignitions have occurred adjacent to the proposed treatment area on some of the private land adjacent to the project area through the Boundary County Fire Safe project. These types of treatments include tree spacing, removing ladder fuels, pruning residual trees, and removing brush and other surface fuels. The proposed treatments for this project are outside of the home ignition areas (generally 100-200' from structure) where FireSafe work is focused, but the project will facilitate work that has been done because the potential for an area to burn takes into account fire moving from one area to another, the rate at which fire moves across a landscape, and the intensity at which a fire burns. Patches of vegetation that burn relatively slower or less severely than surrounding patches can reduce fire intensity, severity, or spread rate, or may force the fire to move around them by flanking (at a lower intensity), which locally delays the forward progress of a fire (Graham et al. 2004). This would be important where fires have the potential to move from the project area on to private land and into the home ignition zone.

Vegetation modification has occurred throughout the Twin Skin project area on both National Forest System and private lands generally through timber harvest activities, as described in Section 3.2.8 above. White pine salvage occurred in Units 1-6 and did little to modify fuels, as only selected white pine were removed – not any of the other dead and dying species. The decrease in white pine across the landscape has modified fuel conditions – the stands are dense, susceptible to root diseases and other pathogens and ladder fuels are thick. The precommercial thin unit (22 acres) is a result of the Skin-Perkins-Goat Timber Sale, and Units 11, 12, and 13 were regeneration harvested in the early 1990s with the Moyie Mine Timber Sale (100 acres). All of the previous sales implemented a combination of single-tree, regeneration harvesting, and sanitation treatments followed by fertilizing, yarding topwood, slashing, bucking and grapple-piling and burning slash concentrations. Outside of the proposed treatment units, numerous acres have been harvested through the above methods as well as with uneven-aged and commercial thinning prescriptions (Appendix C). More recent projects in the project area but outside of the proposed treatment units include the Deer Skin Roundwood and Thin Skin Timber Sales (Appendix C) – harvest activities occurred from 2000-2004. Either prescribed underburning or pile burning occurred on all the acres for activity fuels reduction.

Although most of the past activities were not driven by fuels reduction objectives, past harvest activities that reduced canopy, ladder, and surface fuel loadings would have created a discontinuity in fuels thus reducing spread rates and fire intensities. Many previous activities kept the largest trees on site, which are the most fire-resilient trees in the stand – as they have the tallest crowns and thicker bark (Agee and Skinner 2005). In addition, past treatments adjacent to the proposed units, specifically those just north of Unit 9, have maintained more acres in the early seral stages, providing for the regeneration of more fire adapted species such as western larch – which are more likely to survive even intense fires than climax species such as grand fir (Smith and Fischer 1997). However sanitation treatments, specifically those in Units 1, 3, 4, 5, 6, and 8 not only removed several larger trees they did little to aid the development of seral species, as too little of the canopy was removed to allow for them to regenerate.

Fire spread will obviously not be limited to proposed treatment units or project area boundaries delineated by paint on trees. Previous and future treatments that reduced fuels overall while also providing for the establishment of larch will play an important role in how fire will move through this area. As fire moves from stand to stand intensity and crown fire potential will either increase or decrease depending on stand characteristics – if a crown fire moves into a stand that does not have crown structures that can support crown fire, the fire will be forced to drop to the surface fuels. Regeneration harvests that are two or more decades removed from the time of entry have fuel structures that in time will contribute to crown fire potential if left without further management (such as portions of the Lookout Sale, Four Corners and Stinger Road – See Appendix C).

Connected actions to the project may include future salvage activities that take place within the units or along roadsides would, in essence, remove fuels contributing to a fire hazard – salvage activities usually being implemented to remove hazard trees, dead and dying trees, windstorm damage, etc. Salvage activities would only heighten access for suppression resources and reduce the biomass that could potentially end up contributing to the surface fuels as they accumulate once again into the future.

Effects of the proposed action on the cumulative effects of fire suppression

Of all actions taken, fire suppression is the primary action to be considered when evaluating cumulative impacts to the fire and fuels resource. Much research has been done on the effects of fire exclusion, which has been summarized throughout this report.

Fire exclusion on grand fir dominated sites, together with selective harvesting of seral species such as white pine due to blister rust, has likely had a negative effect on the number of conifers resistant to root diseases (Smith and Fischer 1997). This is observable in the project area now – having a cumulative effect on fuels and fire behavior in the stands and on landscapes as the dead and dying trees fall and contribute to heavy surface fuels.

Activities under the proposed action would affect the Fire Regime Condition Class by moving the treatment areas towards a condition class 1 instead of towards a condition class 3. This is due to modification of vegetation composition/structure (towards historic reference conditions), modification of fuels to reduce fire severity, and the introduction of fire where fire return intervals are departed from reference values due mostly to successful fire suppression.

3.2.10 Forest Plan and Other Regulatory Direction Consistency by Alternative

Under Alternative 2 (Proposed Action), Forest Plan compliance occurs through efficient fire protection and fire use to help accomplish land management objectives (Forest Plan, Chapter II, pages 10 and 38). Forest Plan Standards for fire management are listed below:

1. Fire protection and use standards are specified by management area. Cost effective fire protection programs will be developed to implement management direction based on on-site characteristics that effect fire occurrence, fire effects, fire management costs and fire caused changes in values.
2. The Fire Management Action Plan will be guided by the following Forest-wide standards:
    a. Management area standards.
    b. Human life and property will be protected
    c. Fire will be used to achieve management goals according to direction in management areas.
    d. Management area standards will be used in Escaped Fire Situation Analysis as a basis for establishing resource priorities and values.
    e. The appropriate suppression response for designated old-growth stands in all management areas, except in wilderness, will result in preventing the loss of old growth.
    f. Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.
    g. Forest Fuel Management Fund expenditure priorities are:
        i. Natural fuels that pose a threat to human life and property
        ii. Unfounded activity fuel projects
        iii. Areas where fuels/fire behavior is a threat to management area objectives

Following is a description of how each alternative meets Forest Plan standards. Forest Plan standard 2d and 2e relate to wildfire suppression policy and requirements which are not affected by this project, and therefore compliance with these standards is not described. In addition, this project does not determine Forest Fuel Management expenditure priorities, so compliance with standard 2g will not be addressed.

Alternative 1 (No Action)

This alternative would not take any action to protect human life and property within the analysis area from an uncontrolled and unwanted wildfire. The No-Action Alternative would not use prescribed fire to help meet the goals of the management areas within the analysis area. It would not help develop cost-effective fire programs because it is reasonable to expect more intense fire behavior than in treated stands, thus control would be more difficult and likely require a greater number and type of suppression resources.

The continued lack of fuels management would be inconsistent with the Forest plan goals, objectives, and standards because of the continued trend in undesired fire behavior.

Alternative 2 (Proposed Action)

This alternative would be consistent with the Forest Plan as it proposes to use prescribed fire to help meet the goals of the management areas within the analysis area (standard 2a, 2c). This alternative would take action to reduce potential flame lengths and rates of spread – preventative steps towards the protection of human life and property within and adjacent to the analysis area in the event of a wildfire (standard 2b). The reduction of fuels will also help the initial attack organization meet their suppression objectives, as activity fuels will be treated in order to reduce fire intensities that allow for safe direct attack (standard 2f). This alternative would help develop cost-effective fire programs by reducing potential intensities of wildfires and therefore the costs of controlling potential wildfires.

This alternative proposes to reduce fuels across the most acres in the wildland urban interface; therefore, it better meets the goals, standards and objectives of the Forest Plan, as well as meeting the intent of the Healthy Forests Restoration Act of 2003 and the National Fire Plan – as the proposed action specifically addresses fuels reduction through collaboration in the wildland urban interface of an at-risk community, addresses firefighter and public safety be modifying fuels to reduce fire intensities and the potential for crown fire, and promotes community assistance through utilization of the fuels (biomass) removed as a result of project activities.

3.2.11 Summary

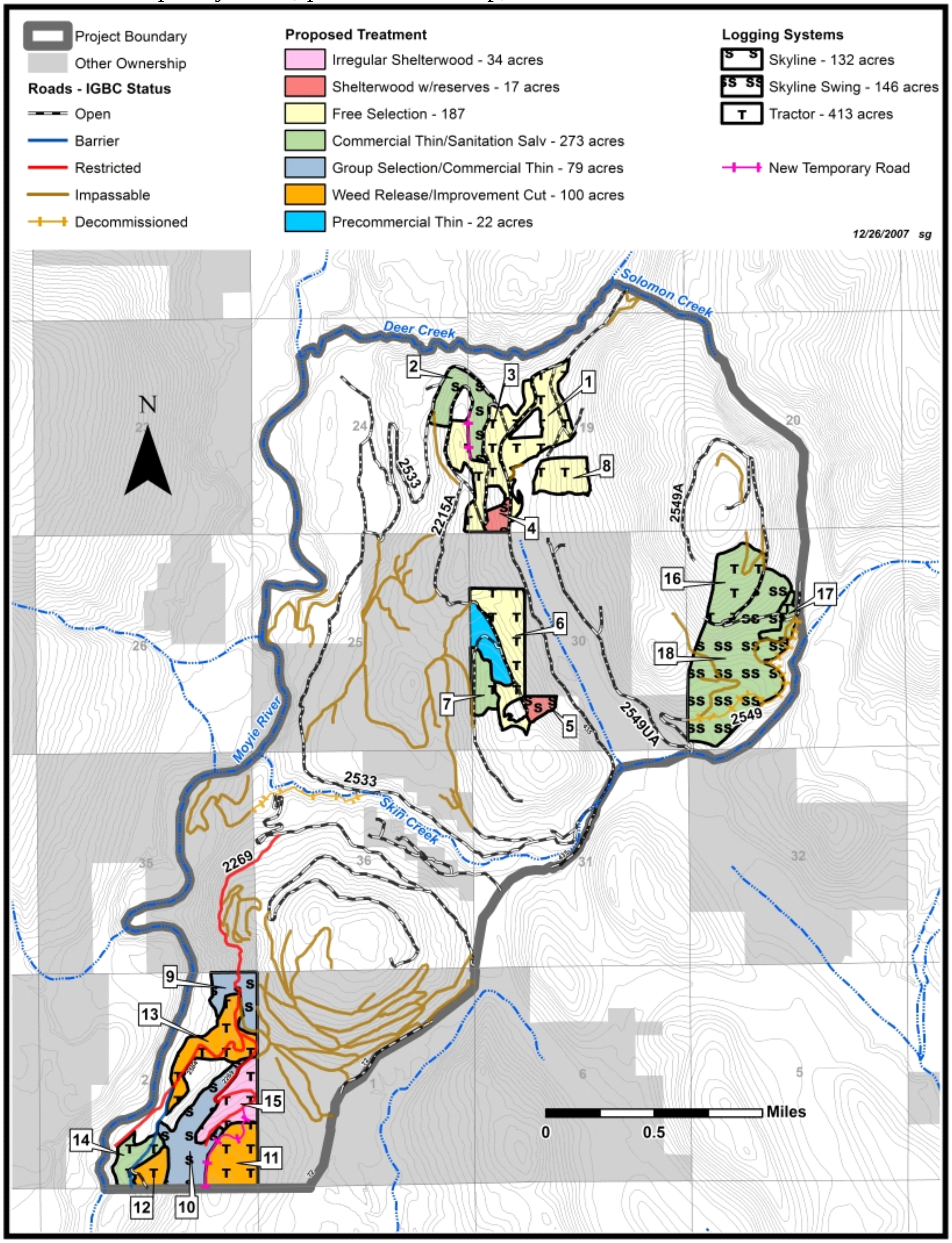
In the wildland urban interface, there is a high level of risk associated with fire. Not from the perspective of fire occurrence necessarily, although if we can learn anything from fire history it should be that all our forests have experienced fire and the next one in this area is only a matter of time. At any rate, the risk has to do with people and safety – the risk to the community in the event that there is a wildfire. When comparing the populations of the at-risk communities – Bonners Ferry and Moyie Springs – against the population of the entire county, it can be inferred that more than 65% of the residents are rural – and as people continue to seek out a private place to call their own – development into the forest will persist. The Moyie Springs and Deer Creek areas are no exception to this, as they are surrounded by private land, residences, and people living and recreating in the forest. Therefore, even 1 fire start in 100 years may be considered too high a risk for forest managers with the current condition of the fuels and associated high fire hazard and expected fire behavior.

There are several purposes of HFRA – the most applicable one for this project being to reduce wildfire risk to communities through a collaborative process of planning, prioritizing, and implementing hazardous fuel reduction projects (project such as this one). The bottom line of the National Fire Plan and 10-Year Comprehensive Strategy is to assist fire suppression efforts to protect communities and the people who live in them. By modifying fuels to reduce fire behavior, the proposed action will help meet these goals. The No Action alternative will not.

Map Appendix

Map 1 – Proposed Action Map

This map displays the proposed treatment units under Alternative 2, logging systems, potential haul routes and temporary roads, private ownership, and streams.



Map 2 – Potential Haul Routes and Landings

This map displays the potential haul routes, which include areas where reconditioning and reconstruction would be necessary. Temporary roads are included, as are potential landings.