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Idaho Panhandle National Forests
Coeur d'Alene River Ranger District

Twomile Resource Area
REVISED Environmental Assessment

Copies of this REVISED EA are available on compact disk (CD) or in paper format from the Coeur d'Alene River Ranger District Office at the address above, and on the Idaho Panhandle National Forests' internet website:

(www.fs.fed.us/ipnf/eco/manage/nepa)

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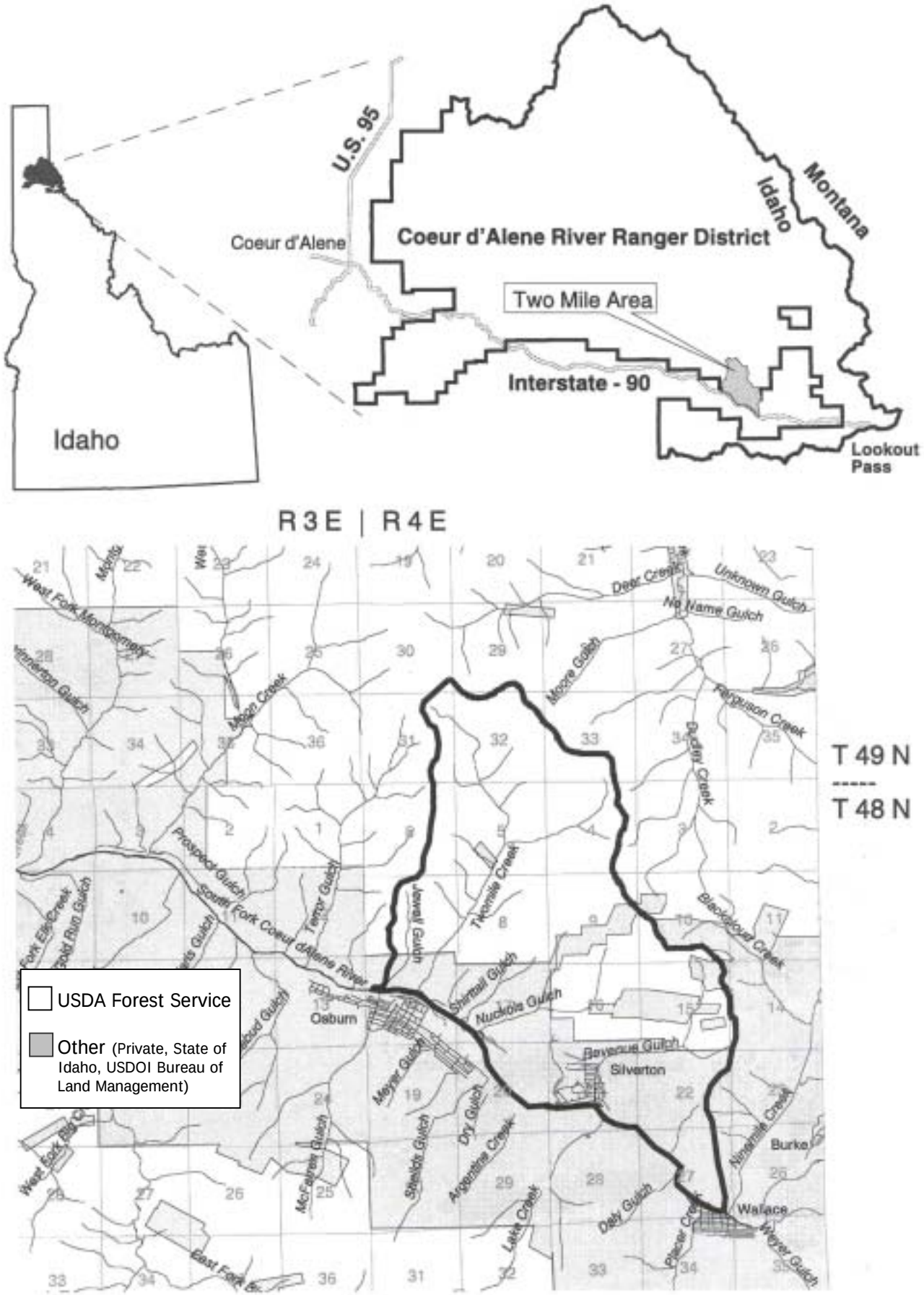
REVISED CHAPTER 1 – PURPOSE & NEED, PROPOSED ACTION
1.0 Need for Revision ..... **Page R1-1**
1.1 Introduction ..... **Page R1-2**
1.2 Purpose and Need for Action ..... **Page R1-3**
1.3 Proposed Action ..... **Page R1-6**
1.7 Opportunity to Comment on the Revised Analysis ..... **Page R1-7**

REVISED CHAPTER 2 – ISSUES & ALTERNATIVES
2.0 Overview of Revisions to Chapter 2 ..... **Page R2-1**
2.2 Scoping and Alternative Development ..... **Page R2-1**
2.2.10 Conclusions Regarding the Revised Analysis ..... Page R2-7

REVISED CHAPTER 3 - EXISTING CONDITIONS & ENVIRONMENTAL CONSEQUENCES
3.0 Overview of Revisions to Chapter 3 ..... **Page R3-1**
3.2 Forest Vegetation
3.2.2 Vegetation Analysis Methodology ..... Page R3-2
3.2.3 Affected Forest Vegetation Environment ..... Page R3-2
3.2.4 Environmental Consequences to Forest Vegetation ..... Page R3-4
3.2.5 Consistency With Forest Policy and Legal Mandates ..... Page R3-5
3.3 Fire/Fuels
3.3.3 Existing Fire/Fuels Conditions ..... Page R3-8
3.4 Aquatic Resources
3.4.2 Affected Aquatic Environment ..... Page R3-10
3.4.3 Environmental Consequences to Aquatic Resources ..... Page R3-13
3.4.4 Consistency With Forest Policy and Legal Mandates ..... Page R3-14
3.5 Soil Productivity
3.5.2 Methodology Used for the Soil Productivity Analysis ..... Page R3-15
3.5.3 Existing Soil Productivity Conditions ..... Page R3-19
3.5.4 Environmental Consequences to Soil Productivity ..... Page R3-21
3.5.5 Consistency With Forest Policy and Legal Mandates ..... Page R3-25
3.6 Wildlife
3.6.2 Methodology ..... Page R3-28
3.6.3 Affected Environment and Effects to Wildlife ..... Page R3-30
3.10 Threatened, Endangered & Sensitive (TES) Plants
3.10.3 Existing Plant Conditions ..... Page R3-35
3.10.4 Environmental Consequences to TES Plants ..... Page R3-36

Figure 1-1. Twomile Resource Area Vicinity Map.



1.0 NEED FOR REVISION

The environmental assessment (EA) for the Twomile Resource Area proposal was released to the public in May 2004. Legal notice of the Decision Notice was published in the newspaper of record (*Spokesman-Review)* on June 22, 2004. The Decision was appealed in August 2004. Following administrative review, the decision was affirmed and the appellant's requested relief was denied by the Appeal Deciding Officer for the Northern Region of the USDA Forest Service on September 20, 2004, with the following statement:

> *"I find the Forest Supervisor has made a reasoned decision and has complied with all laws, regulations and policy. After careful consideration of the above factors, I affirm the Forest Supervisor's decision to implement the Twomile Resource Area project. Your requested relief is denied. However, because of the recent 9th Circuit Opinion in Lands Council vs. Powell, I am directing the Forest to delay implementation of this project until further notice."*

The Court of Appeals for the 9th Circuit decision affects the analysis and disclosure of environmental impacts. Revisions to the environmental assessment have been prepared to document **additional** analysis required by the 9th Circuit Court of Appeals, disclose the results to the public, and assist the decision maker in reaching a reasoned and informed decision in light of the additional information. The additional analysis relates to the following information:

A. Cumulative Effects of Past Activities: Past activities and their effects must be described in suitable detail to promote an informed assessment by the public and agency personnel. Included are the type of activity, the scope of the activity, the timeframe in which it occurred, and consideration of the effects of the activity. ***Discussions in Chapter 2 (Section 2.2) have been revised to address these past activities.***

B. Soils Analysis: The soils analysis includes information related to on-site inspection and/or verification of predictions made by the spreadsheet model. ***Discussions in Chapter 3 (Sections 3.5.1 through 3.5.5) have been revised to provide this soils analysis information.***

C. Limitations of the WATSED Model: The discussion of analysis methodologies includes an appropriate discussion of the limitations of the computer-generated WATSED model. ***Discussions in Chapter 3 (Section 3.4.2) have been revised to provide this WATSED model information.***

D. Accuracy of the Database Used for Old Growth Calculations: The timber stand database (TSMRS) was not the only source of information for old growth calculations and conclusions. Field visits and other information used to verify or update the database and verify the old growth analysis are disclosed. ***Discussions in Chapter 3 (Sections 3.2.2 through 3.2.5) have been revised to provide the old-growth review information.***

E. Data Used for Wildlife and Fisheries Analyses: Information about field verification is provided to verify accuracy and timeliness of data used in the wildlife and fisheries analyses. ***Discussions in Chapter 3 (Sections 3.4.2 and 3.6.2) have been revised to address field verification of data for these analyses.***

F. Forest Plan Fry Emergence Standard: Project-level analysis addresses the IPNFs' Forest Plan fry emergence standard in addition to using the Inland Native Fish Strategy standards. ***Discussions in Chapter 3 (Section 3.4.4) have been revised to address this standard.***

Also disclosed are changes that are pertinent to this project since the release of the 2004 environmental assessment. These included an analysis of the Fire Regime Condition Class (FRCC) for the Twomile Resource Area, and additional analysis related to Threatened, Endangered and Sensitive species. The U.S.

Fish & Wildlife Service updated the list of Threatened, Endangered and Sensitive species, and the Regional Forester updated the list of Sensitive species and Forest Species of Concern. ***Discussions in Chapter 3 (Sections 3.3.3, 3.6.3, 3.10.3 and 3.10.4) have been revised to provide this information.***

Chapter 1 of the Twomile EA describes the purpose and need for action in the area, as well as process information. The status of each section in Chapter 1 is provided in the table below. Those sections identified in **bold** have been revised based on the 9th Circuit Court opinion; the new information is provided in this Chapter as noted, with supporting information provided in the Project Files.

Table 1-1. Status of Information Provided in Chapter 1 of the Twomile Environmental Assessment.

Information Provided	Status
Section 1.1 Introduction	Incorporated*
Section 1.2 Purpose and Need for Action	Incorporated*
Section 1.3 Proposed Action	Incorporated*
Section 1.4 Scope of the Proposal	Incorporated*
Section 1.5 Decisions to be Made	Incorporated*
Section 1.6 Organization of the Document	Incorporated*
Section 1.7 Opportunity to Comment on the Revised Analysis	**Added – See page R1-7**

** Sections of Chapter 1 have been provided below to provide the background and setting for this project.*

Changes to Chapters 2 and 3 are identified in a table at the beginning of each chapter, specifying which sections of the EA have been incorporated, revised, or added. The four alternatives considered (including Alternative 2, the Proposed Action) remain as described in the Twomile EA. **All of the appendices provided with the 2004 Twomile Environmental Assessment are incorporated in their entirety.**

1.1 INTRODUCTION

The 7,600-acre Twomile Resource Area is located north of Interstate 90 and the communities of Osburn and Silverton, Idaho, on public lands administered by the Coeur d'Alene River Ranger District (Figure 1-1). There are an estimated 4,650 acres (61%) of National Forest System lands within the Resource Area, with approximately 2,950 acres (39%) of privately owned lands or Bureau of Land Management lands. The Forest Service boundary is just over one-half mile from Osburn and less than 250 yards from the Silverton city limits. Most visitors to the Twomile Resource Area are local residents of the Silver Valley. There are no developed campgrounds, picnic areas or other structural recreation developments in the vicinity of the Twomile Resource Area. Two designated trails traverse the area. Roads are used for sight seeing, hunting access, gathering berries, mushrooms and Christmas trees. The Twomile Resource Area is partially visible from Osburn, Silverton, and parts of Interstate 90 (Figure 1-2).

Figure 1-2. View from Revenue Gulch in the Twomile Resource Area, overlooking the community of Silverton, Idaho.

Elevations in the Twomile Resource Area range from 2,600 feet at the lower end of Twomile Creek to 5,300 feet at the summit of Capitol Hill. The majority of the area burned in large fires during the late 1880's and early 1900's. The current stands are composed primarily of Douglas-fir, with ponderosa pine and lesser amounts of white pine and grand fir, in the 90 to 110-year age range. Commercial harvest on National Forest

System lands in the Resource Area have been limited due to terrain, access, and close proximity to local communities. Timber harvest has occurred on private ownership within the area.

There are few wildlife species for which the Resource Area provides quality habitat, primarily due to low elevations; proximity to communities; and tree species composition, age and size. However, the ponderosa pine and Douglas-fir stands in the Resource Area appear to provide some of the District's best habitat for flammulated owls. White-tailed deer, moose and elk also inhabit the area. Nearly all of the Twomile Resource Area provides big-game winter range habitat.

The Twomile Resource Area is located within three major subwatersheds (Twomile, Nuckols, and Revenue Gulch) and one small face drainage (Silverton). None of the streams within the Resource Area are identified as water quality limited (303d); none are listed for any pollutant. Beneficial uses include spawning and rearing habitat, cold-water biota, primary and secondary contact recreation, drinking water, and agriculture water supply. All of the streams in the area flow through lands under other ownership (private or Bureau of Land Management) in their lower reaches before flowing into the South Fork Coeur d'Alene River. The river itself is identified as water quality limited due to both metals and sediment.

These subwatersheds (and the entire South Fork Coeur d'Alene River drainage) are identified as "functioning, at risk" under the Geographic Assessment of the Coeur d'Alene River Basin (referred to in this document simply as the "Geographic Assessment"). A watershed system that is functioning at risk is one that is essentially still properly functioning, but may have known risks or exhibit trends that are likely to compromise its ability to fully support beneficial uses in the future. Such systems are the first priority for watershed system restoration and improvement programs.

The Land Management Plan for the Idaho Panhandle National Forests (referred to throughout this EA simply as the "Forest Plan") identified the following management area (MA) designations for National Forest System lands within the Twomile Resource Area (USDA 1987, PF Doc. REF-1):

- ***MA 1*** *lands are suitable for timber production, to be managed for the long-term growth and production of commercially valuable wood products*
- ***MA 4*** *lands are to be managed for big-game winter range and to produce wood products*
- ***MA 9*** *lands are unsuitable and/or non-forest*
- ***MA 16*** *are streamside areas for managing riparian-dependent resources (fish, water quality, vegetation and wildlife communities) while producing other resource outputs at levels compatible with the objectives for dependent resources*

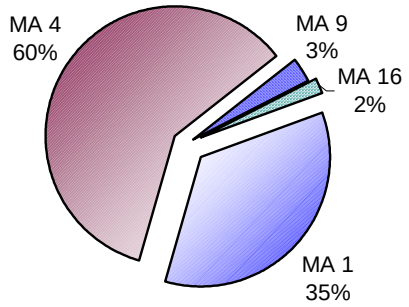


Figure 1-3. IPNF Management Area (MA) distribution within the Twomile Resource Area.

The Twomile Resource Area does not include any designated wilderness or inventoried roadless areas. There are no grazing allotments within the Resource Area, and it is unlikely that grazing will occur in the area in the future, due to the steepness of terrain and limited access to the area. The Twomile Resource Area includes all or portions of T48N, R4E, sections 3-11, 15, 16, and 29-33, Boise Meridian (Figure 1-1).

1.2 PURPOSE AND NEED FOR ACTION

Activities are proposed in the Twomile Resource Area at this time to respond to goals and objectives of the National Fire Plan and Shoshone County Fire Mitigation Plan, and to help move the resource area towards desired future conditions described in the Forest Plan. The proposed activities are also responsive to recommendations made under the Interior Columbia Basin Ecosystem Management Project and the Geographic Assessment for the Coeur d'Alene River Basin. All four of these are discussed below.

1.2.1 National Fire Plan and Shoshone County Fire Mitigation Plan

Hazardous fuels reduction activities are proposed in the Twomile Resource Area to reduce fire intensities and restore fire-adapted ecosystems in the wildland urban interface.

The purpose and need for these activities in the Twomile Resource Area are in accordance with the National Fire Plan, which represents a strategy to reduce wildland fire threats and restore forest ecosystem health in the interior West. The strategy builds on the premise that reducing fuel levels and using fire at appropriate intensities, frequencies, and time of year within fire-adapted ecosystems is key to restoring healthy, resilient conditions; sustaining natural resources; and protecting life and property.

Figure 1-4. Accumulation of dense fir trees amongst mature ponderosa pine trees in the Twomile Resource Area.

Under the National Fire Plan (PF Doc. FF-20), activities focus on wildland urban interface areas to reduce risk to people and property. There is a high priority to treat areas where human communities, watersheds, or species are at risk from severe wildfire.

A comparison of *existing* conditions in the resource area and *desired* conditions described in the Forest Plan indicates a need for:

- *Reduced forest fuels loadings;*
- *Reduced ladder fuels;*
- *Reduced risk of uncharacteristically intense fire;*
- *Reduced risk to life, property, and natural resources;*
- *Increased safety to fire suppression crews;*
- *Development of sustainable forest conditions;*
- *Restoration of natural ecological systems.*

Wildland Urban Interface

The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels

(USDI and USDA 2002, PF Doc. REF-2)

Shoshone County developed a Wildland Urban Interface Fire Mitigation Plan (PF Doc. FF-36) to aid in the protection of the communities within the county. The Fire Mitigation Plan describes the entire perimeter of the community of Silverton (adjacent to the Twomile Resource Area) as being at high risk to wildfire loss, and recommends, "Federal land managers responsible for the management of adjoining lands should consider forest management activities on the surrounding hillsides targeted at improving forest health and reducing fire risks to the community." The plan has the following objectives:

- *Identify high risk areas for fire ignition*
- *Locate landscape features with a high risk for rapid fire spread*
- *Search out significant concentrations of home sites and other buildings*
- *Determine areas where initial efforts should be concentrated*
- *Develop risk reduction activities*

1.2.2 Forest Plan

The Forest Plan identifies the desired condition as a sustainable forest system that has the ability to maintain diversity, productivity, resilience to stress, health, and yields of desired values, resource uses, products, or services over time in an ecosystem while maintaining its integrity (USDA 1987, PF Doc. REF-1). In terms

of fire management, the desired condition is one where both wildland and prescribed fires are of low intensity and leave sufficient levels of large woody debris to promote soil productivity (Figure 1-5). This would increase safety for the public as well as for neighboring private lands and property. The Forest Plan provides guidance regarding efficient fire protection and the use of prescribed fire to help accomplish management activities.

Figure 1-5. Example of a dry-site ponderosa pine stand on the IPNF, managed to resist low intensity fire disturbance.

Large fire disturbance has been excluded from the Twomile Resource Area for nearly a century. This has provided an avenue for shade-tolerant vegetation to continue to grow and create pathways that fire can now travel to the top of the canopy. Fire exclusion has contributed to the accumulation of dead and down woody debris. The combination of dead and down fuels and dense multi-layered stands increase the risk that a fire will transition from fire behavior that burns on the forest floor to fire behavior that consumes tree crowns. The accumulation of vegetation is the setting for a potentially intense and severe stand-replacing fire. The forested stands adjacent to the community of Silverton, Osburn, and rural residents of Twomile and Revenue Gulch, are now composed of dense uniform Douglas-fir and grand-fir trees amongst long lived ponderosa pine. When a fire is initiated in the analysis area, given extreme environmental conditions, the fire behavior and flame lengths associated with it would be catastrophic. Extreme fire behavior is a threat to life, property, and key ecosystem components. Area residents have expressed concerns about this potential. Area resident Charles Kishbaugh commented, "If a wildfire were to start or spread in these hillside areas, many homes would undoubtedly be lost." Comparison of the existing condition of the resource area and the desired conditions from the Forest Plan indicates a need to reduce forest fuel loadings and ladder fuels, which would help to reduce risk of uncharacteristically intense fire and associated risks to life, property, and natural resources; and reduce the danger to fire suppression crews.

1.2.3 Interior Columbia Ecosystem Management Project

The Interior Columbia Basin Ecosystem Management Project (ICBEMP, 1996, PF Doc. REF-3) was guided by Congressional direction to develop a scientifically sound and ecosystem-based strategy for forest management. At the Interior Columbia Basin scale, the findings show that river basins in the IPNF have a low composite ecological integrity, primarily due to past alterations. Further findings reported mixed low to moderate aquatic integrity, and mixed low, moderate and high integrity hydrologic conditions on the IPNF. The Twomile Resource Area is located in Forest Cluster #4, which emphasizes reducing risk to ecological integrity and species viability. The primary risks to ecological integrity within this Forest Cluster are risks to hydrologic and aquatic systems from fire potential, risks to late and old forest structures in managed areas, and risks in forest compositions that are susceptible to insect, disease and fire (Quigley et al. 1996, p. 113; PF Doc. FF-16).

1.2.4 Assessment of the Coeur d'Alene Basin

An assessment of current and historical conditions in the Coeur d'Alene River basin was conducted to gain a better understanding of large-scale resource conditions across the Forest in relation to those at the Upper Columbia River Basin scale (Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin, USDA 1998, PF Doc. PROC-2). For clarity, that document is referred to as the **Geographic**

Assessment. The findings of the Geographic Assessment complement those found in the Interior Columbia River Basin report (USDA 1998, PF Doc. PROC-3):

- *Ponderosa pine, white pine and western larch have declined in range throughout the Forest and individual stands are dense compared to historical conditions.*
- *Dry, south facing slopes once containing mixed, open stands of ponderosa pine, western larch and Douglas-fir having a sparse understory, now have more dense tree cover with a higher component of Douglas-fir, grand fir, and dense understories of shrubs and shade tolerant reproduction.*
- *Shade tolerant vegetation that historically suffered mortality from low intensity underburns is now actively competing with the more disease resistant seral species. This trend creates a change in forest species that are susceptible root diseases and insect outbreaks.*

These assessments provide guidance for project level planning. A consistent theme throughout all of the documents indicates that the current state of forested ecosystems is dense with species that have not adapted to frequent fire disturbances, resulting in attributes supporting catastrophic fire behavior. Site-specific information indicates that these conditions exist in the Twomile Resource Area.

The Geographic Assessment classifies the Twomile Resource Area as a "Condition 2" landscape (not to be confused with the condition classes established by the National Fire Plan). "Condition 2" landscapes have high road densities and undesirable terrestrial conditions (such as high-graded stands of medium sized trees of poor quality). Condition 2 landscapes are the highest priority for aggressive vegetation restoration. The Geographic Assessment further classifies the watershed as functioning, but at risk, and directs that these areas will be among the highest priority for watershed and aquatic restoration. On drier habitat type Condition 2 landscapes, the Geographic Assessment recommends thinning from below and using shelterwoods with reserves and group selection regeneration harvests to restore open stand structures dominated by large fire-resistant early seral tree species (ponderosa pine and western larch).

1.3 PROPOSED ACTION

Alternative 2 represents the proposed action. This alternative would include fuel reduction treatments on a total of approximately 1,103 acres (less than 15% of the Twomile Resource Area). Treatments would be accomplished by means of precommercial and commercial thinning, regeneration harvests, underburning, slashing, and chipping activities. Logging systems would predominately include the use of a helicopter, but ground-based systems would be used where applicable based on road access and terrain features. The proposed action includes treatments on both moist and dry sites. The proposed action implements a strategy that focuses on connectivity of treatments throughout the wildland urban interface to meet the purpose and need of the project. The proposed action would create large enough openings to provide the opportunity for successful restoration of long-lived seral species (ponderosa pine and western larch). Individual treatments were identified based on their ability to meet the purpose and need of the project. The fuel treatments are focused on the effectiveness of supporting desired fire behavior, rather than the quantity of products removed from the area. In some circumstances where the purpose and need dictates, there would be no removal of forest products, but slashing of unmerchantable material and underburning would occur.

For more specific information about proposed activities, please refer to the Alternative Descriptions in the Twomile EA (Chapter 2) and the Alternative maps.

As recommended by The Lands Council/Ecology Center, a Roads Analysis Process (RAPs) has been completed for the resource area and the recommendations incorporated in the proposed action (PF Doc. TRAN-1). RAPs helped identify and prioritize prospective changes to access in the Twomile Resource Area. Specific recommendations include approximately 1.9 miles of new road construction (to access treatment units), decommissioning 3.4 miles of roads that are encroaching on stream channels (to improve aquatic resources), trail repairs (for resource protection), adding approximately 0.4 miles to the single-track trail system (with blocks established to prevent ATV's from accessing single-track trails), and expansion of the ATV trail system by utilizing approximately 9.5 miles of old logging roads (to accommodate ATV travel and link to trails outside the Resource Area). In addition, an existing parking site would be improved to provide trail access. These activities are included in the proposed action.

1.7 OPPORTUNITY TO COMMENT ON THE REVISED ANALYSIS

Comments should be provided within 30 days of the notice of availability published in the newspaper of record (Spokesman-Review). Comments can be submitted several ways: Please **send written comments** to NEPA Coordinator, Coeur d'Alene River Ranger District - Fernan Office, 2502 East Sherman Avenue, Coeur d'Alene, Idaho 83814-5899. Written comments may be **faxed** to the NEPA Coordinator at the Coeur d'Alene River Ranger District office, at (208) 769-3062. Written comments may also be **hand-delivered** to the District's Fernan or Silverton Offices. Office hours are 7:30 a.m. to 4 p.m., Monday through Friday. **Electronic comments** may be submitted to *comments-northern-idpanhandle-cda@fs.fed.us*. The subject line must contain the name of the project for which you are submitting comments. Acceptable formats are MS Word, Word Perfect, or RTF. Regardless of the method used to submit comments, it is the sender's responsibility to ensure timely receipt. Comments received, including names and addresses of those who comment, will be considered part of the public record and will be available for public inspection.

Forest Supervisor Ranotta K. McNair is the responsible official for this proposal.

For further information or to review project files, please contact District Ranger Randy Swick (208-769-3001) or Ecosystems Staff Officer Sherri Lionberger (208-769-3022).

2.0 OVERVIEW OF REVISIONS TO CHAPTER 2

Chapter 2 of the Twomile EA describes the potential management alternatives that would achieve the objectives identified for the Twomile Resource Area. The status of each section in Chapter 2 is provided in the table below. Those sections identified in **bold** have been revised based on the 9th Circuit Court opinion; the new information is provided in this Chapter as noted, with supporting information provided in the Project Files.

Table 2-0. Status of Information Provided in Chapter 2 of the Twomile Environmental Assessment.

Information Provided	Status
Section 2.1 Introduction	Incorporated
Section 2.2 Scoping and Alternative Development	**Revised – See page R2-1**
Section 2.3 Alternative Descriptions	Incorporated
Section 2.4 Features Common to the Action Alternatives	Incorporated
Section 2.5 Opportunities	Incorporated
Section 2.6 Mitigation	Incorporated
Section 2.7 Monitoring	Incorporated
Section 2.8 Alternatives Considered But Eliminated	Incorporated
Section 2.9 Comparison of Alternatives	Incorporated
Section 2.10 Conclusions Regarding the Additional Analysis	**Added – See page R2-7**

2.2 SCOPING AND ALTERNATIVE DEVELOPMENT

Past activities and their effects must be described in suitable detail to promote an informed assessment by the public and agency personnel. All of Section 2.2 from the Twomile EA is incorporated into this revised EA with the exception of the section called "Ongoing and Reasonably Foreseeable Activities." This particular section has been revised to provide suitable detail of past activities and the effects they had on resources in the Twomile Resource Area, and provide additional details to the description of ongoing and reasonably foreseeable activities that was provided in the 2004 Twomile EA.

Past Harvest Activities

Description of Past Activities

This discussion includes past activities on National Forest, Bureau of Land Management, and privately owned lands in the cumulative effects analysis area for the Twomile project. The scope, timing, and analysis impacts of each activity are described in the following table, with additional information provided in the EA (Chapter 3) and the project files as noted. Past activities on National Forest System lands in the Twomile Resource Area were queried from the District's Timber Stand Management Record System (TSMRS) database and checked against timber maps, aerial photographs, and ground surveys (EA, p. 3-115; PF Doc. VEG-36e). The timber stand management resource system (TSMRS) database provided some information about management and harvest in the Twomile Resource Area from 1960 to present. Although some scattered harvest did occur prior to 1960, there are no harvest records available prior to 1960 so specific information related to those activities could not be included (EA, p. 3-13). While trees were likely cut to clear land for agricultural and mining uses, past harvest has been limited due to the steep terrain, difficult access, and close proximity to communities (EA, p. 3-13).

Timing and type of timber harvest on other ownerships in the Twomile Resource Area were estimated using past aerial photographs and personal observations by Forest Service personnel. The degree of regeneration and amount of ground cover in the harvested units were estimated from observable evidence in aerial photographs. Ground scars seen in the photographs were also used to determine harvest methods on private

lands. For example, skid trail scars could be observed in the photographs to help determine if a particular area was tractor logged, and skyline corridors were observed to help determine that a unit might have been skyline logged (EA, p. 3-78). No other information exists or is available regarding past activities.

Table 2-1. Past management activities in the Twomile Resource Area.

Type of Activity	Project Name	Time-frame	Location	Scope
Timber harvest	1. Montgomery Moon Timber Sale	1998-1999	Brown's Ridge, Twomile Saddle	88 acres commercial thinning, 6 acres seedtree, 32 acres shelterwood. Included site prep and planting on the regeneration harvest areas, as well as 88 acres of prescribed burning.[1]
Timber harvest	2. Dago Seed Production Area (SPA) Timber Sale	1991	Twomile Unit 11 (proposed for underburn)	24 acres shelterwood and site prep as part of the tree improvement program
Timber harvest	3. Unknown name	1960s	Portion of Twomile Unit 11 (proposed for underburn)	8 acres liberation harvest
Timber harvest	4. [None]	1970 - 2000	Private lands in Revenue Gulch	45 acres clearcut 66 acres seedtree 244 acres shelterwood 72 acres thinning 52 acres salvage
Timber harvest	4. [None]	1998 – 2004	Private lands in Nuckols Gulch	235 acres shelterwood 84 acres seedtree
Timber harvest	4. [None]	2000	Private lands in Twomile Creek	47 acres salvage
Prescribed fire	5. [None]	1981-2000	Twomile drainage	121 acres of ecosystem/wildlife habitat burning
Brush field Planting	6. [None]	1980, 1982	Twomile drainage	40 acres
Road construction	7. [None]	1890s – 1990s	Throughout the analysis area on NFS & private lands.	Existing National Forest System roads (classified) totals 30.3 miles; private roads are 5.8 miles and county roads are .6 miles.
Mining	8. [None]	1890s-1900s	Predominantly Twomile and East Fork Twomile drainages.	Twomile was the site of exploratory tunnels, jammer roads at mid-elevation and headwater area, and adits built during the turn of the century. The Hudlow Adit was abandoned during the early 1900s, re-opened in the early 1980s, and then closed and gated after exploration. The Silver Rock Prospect mine, located in the Twomile Creek watershed, was explored in the late 1960s and early 1970s, and the Silver Rock Mining Company did some diamond drilling in 1972
Fire suppression	9. [None]	1910-present	Twomile Resource Area	Lightning or man-caused fires were initial attacked and suppressed as soon as possible following detection.

[1] The underburning and planting that was listed as Ongoing & Reasonably Foreseeable in the original Twomile Environmental Analysis have been completed and are now considered as past activities under Montgomery Moon.

Effects to Resources from Past Activities

The level of effects of each type of activity varied due to location and implementation standards that were in place at the time. The following describes the effects each type of activity had on key resources. It is important to remember that the design and implementation of management activities is quite different today than in the past, especially in terms of timber harvest and road construction.

The harvest proposed under the Twomile EA is similar to the past harvest that has occurred in this drainage with respect to trending the species composition toward longer-lived seral species. The majority of the past harvest has occurred since 1998 and utilized the same resource protection measures that are proposed with Twomile, such as the use of Region 1 snag guidelines, INFS (1995) standards and guidelines, down woody

debris guidelines. One aspect that is different under the Twomile EA is the size of areas being treated are larger, to better represent patch sizes that were historically present in the area. Logging systems for the Twomile proposal is predominantly helicopter (600 acres), some skyline (193 acres,) and minor tractor (6 acres), which limits impacts to soils tremendously (see Soils Analysis pgs R3-15 through R3-27).

The majority of existing roads in Twomile were constructed well before 1970, prior to adoption of the Idaho Forest Practices Act, which required the use of Best Management Practices (BMPs). New road construction standards under the Twomile proposal are significantly different than these earlier roads. For example, roads are being constructed near ridges and well away from perennial streams instead of up the stream bottoms, culverts are designed to pass 100 year flows, roads are designed with minimum grades and grade breaks to reduce erosion from the road surfaces, and roads are located to avoid landtypes with high potential for mass failure or erosion.

1. Montgomery Moon Timber Sale (See Table 2-1; total acres = 126)

A. Effects on Vegetation: Small unit sizes contribute to fragmentation of forest structure, trending away from the larger patch sizes that were present historically. The commercial thinning acres promote and maintain the longer-lived seral species; in this case ponderosa pine. Regeneration harvest was done to initiate and manage new stands that were planted with root disease-resistant species (including western larch, western white pine, lodgepole pine, western red cedar and ponderosa pine) which will further promote the resiliency of these stands

B. Effects on aquatics: This harvest opened up the canopy enough to cause a slight increase in peak flows in Twomile Creek (less than 1 percent). There was also a slight increase in sediment yield from this timber harvest. This increase generally abates after about six years. INFISH (1995) standard and guidelines were in place during this timber sale and were used to ensure protection of fish and other aquatic resources.

C. Effects on soils: No new roads were built during this timber sale. All units were harvested with skyline and cable yarding systems, which require machinery to stay on existing roads and typically lift the leading edge of the log off of the ground. Based on years of monitoring on the District and throughout the Panhandle Forest, an estimated 1 to 3 percent soil compaction or displacement resulted from this harvest and follow-up burning for each unit; well under the regional and forest plan guidelines.

D. Effects on wildlife: This harvest reduced the occurrence of large snags and down woody debris. However this sale was recent enough that Region 1 snag guidelines were in place to retain adequate snags per acre on site, and down woody debris guidelines from Graham et al. (1994; PF Doc. SOIL-32) were also in place. Small unit sizes contribute to fragmentation, but they better support big game foraging due to close proximity to cover.

E. Effects on fire/fuels: The thinning units reduced the tree density (spacing of the tree crowns), thereby reducing the potential for crown fires to occur in this area without high winds to carry it. The regeneration harvests reduced canopy substantially (below 35 percent canopy closure) and treated the surface fuels, including logging slash, prior to planting of more fire resistant species.

2. Dago SPA Timber Sale (See Table 2-1; Total acres = 24)

A. Effects on Vegetation: This seedtree unit was designed as a seed production area for ponderosa pine primarily and some Douglas-fir. Although limited in scale, it does trend the area toward a more resilient species composition.

B. Effects on aquatics: This small harvest near the top of the drainage had negligible effects on water yield, sediment, and consequently aquatic resources.

C. Effects on soils: The unit was harvested using a skyline system that would result in a 1-3 percent increase in soil compaction or displacement.

D. Effects on wildlife: On a very small scale, this unit provided improved habitat for species requiring dry site ponderosa pine habitat. It provided a small increase in forage for big game species, but it also fragmented the landscape for those species that require contiguous blocks of old and mature stands of interior habitat.

E. Effects on fire/fuels: This activity occurred on a small scale, so benefits are minor. The harvest reduced the fuel loading, ladder fuels, and opened the canopy sufficiently to maintain a ground fire only.

3. Unknown Name Timber Sale (See Table 2-1; total acres = 8)

This was an 8-acre liberation harvest near the top of Dago Peak that became part of the seed production area under the Dago Spa sale. There were minimal effects from this harvest on any resource due to the limited acres, cable harvest system, no road construction and low volume per acre removed.

4. Private Timber Harvest (See Table 2-1; total acres = 845)

A. Effects on Vegetation: There is no effect to National Forest System vegetation due to harvest on private lands.

B. Effects on aquatics: This harvest has opened the canopy enough to increase peak flows as well as lead to increased sediment to the stream channels. There are no regulations (such as those provided by the Inland Native Fish Strategy) to preclude harvest on private lands adjacent to live streams; however, they must comply with State of Idaho standards for Class I and Class III streams. This results in increases in stream temperatures, loss of woody debris recruitment and a reduction in fisheries habitat on the lower portions of the streams.

The effects of past harvest activities on aquatic resources are more quantifiable when considering the combined effect of all past harvest activities (on both NFS lands as well as private) than by breaking it into individual harvests. All major streams in the Twomile Resource Area have experienced increased sediment yield from past timber harvest activities (EA, p. 3-78). Harvest activities in the early 1980's and again in 1998 opened up some canopy to cause a 3% increase in peak flows in Twomile Creek (EA, p. 3-73), a 14% increase in Nuckols Gulch (EA, p. 3-76), and a 9% increase in Revenue Gulch (EA, p. 3-7). Sediment yields are elevated as a result of past activities, as demonstrated by existing bedload movement and high deposition in downstream reaches (EA, p. 3-78). Lands in the Silverton face drainage that are under private or BLM ownership have also been intensively managed and developed, particularly in the mid- to late-1990s (EA, p. 3-79). On privately owned lands, there are varying levels of disturbance that are difficult to account for in the WATSED modeling. Aerial photographs were used to estimate location and types of vegetative management on non-forest lands so that all land management activities could be accounted for in the cumulative effects analysis areas (EA, p. 3-68). Intensive management and development has occurred on private lands on about 35% of the Nuckols Gulch drainage (EA, p. 3-76), 63% of the Revenue Gulch drainage (EA, p. 3-77), and approximately 75% of the Silverton Face drainage (EA, p. 3-77).

C. Effects on soils: Activity on lands other than National Forest System lands do not contribute to effects of soils within National Forest System lands.

D. Effects on wildlife: Lower elevation private lands had more ponderosa pine habitat that has now been lost through harvesting. This has led to a decrease in habitat for sensitive species such as flammulated owls. There has been a loss of old structure, snags and down woody debris that contributes to wildlife habitat, including management indicator species on private lands. For analysis purposes, private lands are not considered to provide wildlife habitat because there is no assurance the land won't be harvested or developed.

E. Effects on fire/fuels: Timber harvest on private lands tends to remove trees of highest economic value and typically removes large fire-resistant seral species. Natural regeneration is relied on to fill created openings, which usually favors shade-tolerant Douglas-fir and grand fir over early seral species such as ponderosa pine and western larch, which are more fire resistant. Logging slash can remain untreated on the site, contributing to higher fire intensities should a wildfire occur.

5. Prescribed Fire (See Table 2-1; 121 acres)

A. Effects on Vegetation: These prescribed burns were conducted in dry-site stands that had ponderosa pine and Douglas-fir components, as well as shrubs. The units were burned during the spring under moist conditions, so there was little effect on the stand component. A minor regeneration component was lost in the burning.

B. Effects on aquatics: There were minimal effects on aquatic resources because the prescribed burning occurred in the spring while soil moisture content was high. This keeps the duff layer from burning completely, which can cause increased erosion.

C. Effects on soils: Based on implementation and monitoring of similar burning in similar situations in the past, there is minimal risk to soils when burning is done with soil moisture content above 25 percent. The prescribed fire was done in the spring months when moisture content is high, so there was little effect to soils in the treatment units.

D. Effects on wildlife: One of the purposes of these burns is to create better wildlife browse by burning back older, decadent brush and creating more palatable forage for big game species. Wildlife burns, or eco-burns as they are sometimes called are beneficial to many wildlife species for this reason. This type of burning would decrease the complexity of vegetation on the forest floor, as well as cover and shelter for some non-game species, forcing them to look for other suitable habitat.

E. Effects on fire/fuels: Prescribed fire in brush fields would temporarily reduce fuel loading from the older decadent brush and replace it with lower, more palatable (higher moisture content) brush. This would result in lower flame lengths should a fire occur in the area and allow for easier fire suppression.

6. Brush Field Planting (See Table 2-1; 40 acres)

A. Effects on Vegetation: Ponderosa pine was planted, which leads to an increase in acres of long-lived seral species in the area, which is more resistant to fire, insects and disease over the long term.

B. Effects on aquatics: There were no effects to aquatic resources from this activity.

C. Effects on soils: Planting was done by hand crews (foot traffic and no machinery), with no effects to soils.

D. Effects on wildlife: Over the long term, planting ponderosa pine will provide habitat that is currently in short supply.

E. Effects on fire/fuels: There would be no direct effects in the short term from planting on fire/fuels. Long-term benefits would result from a more fire resistant species on the landscape.

7. Road Building (See Table 2-1)

A. Effects on Vegetation: There are minimal effects to vegetation with regard to stand species composition or structure due to road building

B. Effects on aquatics: Roads have resulted in a high amount of riparian disturbance throughout the resource area, including increased sediment yields. Encroaching roads contribute sediment in the East Fork Twomile Creek on an ongoing basis with frequent bank erosion. The low and mid-

elevation riparian roads have altered stream channel function and morphology, which long with riparian large woody debris reduction has reduced available aquatic biota habitat.

C. Effects on soils: All past roads built for either timber harvest or mining have an irretrievable effect on soil productivity due to compaction and displacement.

D. Effects on wildlife: Roads dissect wildlife habitat causing fragmentation. They lead to a loss of security during denning/calving season as well as hunting/trapping seasons. Roads themselves can affect movement patterns of some species and have caused direct mortality from vehicle collisions.

E. Effects on fire/fuels: Roads provided access and quick response for fire suppression activities.

8. Mining (See Table 2-1)

A. Effects on Vegetation: There would be minimal effect on the vegetation from mining beyond some localized minor harvest to create supports for mine tunnels. This would not have contributed to changes in structure or composition overall.

B. Effects on aquatics: Past mining operations near the channel of Twomile Creek has resulted in considerable bedload being stored in and adjacent to the channel. This bedload is beginning to erode and scour the channel, resulting in downstream fish habitat and aquatic biota function loss. The only toxic sediment source known in the area is an abandoned mine site in the East Fork Twomile Creek watershed, as described in the Twomile EA (pages 2-15, 3-75, 3-93).

C. Effects on soils: There are approximately 30 abandoned hard rock prospect locations within the Twomile Resource Area (Hobbs et al., 1965; PF Doc. SOIL-34). The waste rock features associated with each location vary from 50 square feet to nearly one acre in size. These locations represent an irretrievable disturbance to soil productivity due to compaction and displacement.

D. Effects on wildlife: Mines have actually created habitat for bat species in the area. Open adits on private and BLM lands have provided potential habitat for both the Townsend's Big-eared bat, as well as the fringed myotis.

E. Effects on fire/fuels: There are no known effects on fire/fuels from past mining. It is possible man-caused fires occurred near the turn of the century when mining was active, but there is no data to support that.

9. Fire Suppression (See Table 2-1)

A. Effects on Vegetation: Stands have become overcrowded and overstocked with shade tolerant species. Root diseases, insect infestations and other diseases are at unnaturally high levels in many stands. Douglas-fir now dominates the drier sites where ponderosa pine used to dominate. Root diseases now play a more major role in the successional development of the area due to less long-lived seral species and more shade tolerant species.

B. Effects on aquatics: There have been no effects due to actual fire suppression activities. However, this has caused a trend toward more shade tolerant species that are more susceptible to insects and disease. Since changes in water yield are associated with vegetative conditions, the existing trend would eventually have an effect on water yield.

C. Effects on soils: Fire suppression activities have been limited to hand-tools on small Type A fires with insignificant impacts on soils.

D. Effects on wildlife: Fire suppression has led to a decrease in available habitat for wildlife species that rely on more open grown ponderosa pine and larch (flammulated owl, goshawk, pileated woodpecker, pygmy nuthatches, as well as those species such as black-backed woodpecker that thrive on burned areas.

E. **Effects on fire/fuels:** Fire suppression in the dry habitat types in the Twomile Resource Area has altered the fire regime significantly from the historical range and the risk of losing key ecosystem components in a wildfire is high. Moist habitat types are also highly altered from historic conditions and fuel loadings are much higher than would have occurred if fires were not suppressed. Both these habitats are at high risk of high severity and intensity wildfires.

Ongoing and Reasonably Foreseeable Activities

The Twomile EA (page 2-3) identified ongoing and reasonably foreseeable activities on lands within and adjacent to the Twomile Resource Area. As described for Table 2-0 earlier in this section, some of the burning and planting that was listed as Ongoing & Reasonably Foreseeable in the original Twomile Environmental Analysis has been completed; those activities are now considered to be past activities.

Eight months have passed since the original Twomile Decision Notice was issued so another review was done to determine if there are additional harvest activities proposed on BLM or private lands in the analysis area. A search of the Forest Practice Notices filed with the Cataldo District for the State of Idaho Department of Lands found only one additional harvest proposal. This proposal is for a small harvest of less than 25 mbf in Section 21, T48N, R4E, which lies in a subdivision within the city of Silverton. No additional effects to resources would occur from this minor activity.

The Idaho Panhandle National Forests has issued a Fry Emergence Amendment Environmental Analysis for public comment. As proposed, this would amend Forest Plan objectives, standards and monitoring requirements for fry emergence. The amendment represents a programmatic decision and therefore will have no direct effects on forest resources, including water quality, fish and other aquatic biota, and their habitat. Due to the performance based direction in INFISH, and protections provided by other policies, laws and direction, there will be no indirect effects to forest resources, including water quality, fish and other aquatic biota, and their habitat. Based on no direct and indirect effects, there will be no cumulative effects due to the Fry Emergence Amendment.

This Revised EA provides additional information regarding past activities within the assessment area and discussion of the types of effects that have occurred over time. The review of these activities did not change the existing condition disclosures or determinations of effects for the resources.

2.2.10 Conclusions Regarding the Revised Analysis

A. Cumulative Effects of Past Activities

Forest Vegetation: As explained in the EA (EA, pages 3-1 through 3-14), past activities that were relevant to the forest vegetation cumulative effects analysis were included. The activities on private lands were considered; thus there are no changes to the cumulative effects conclusions between the Twomile EA and this revision.

Fire/Fuels: As explained in the EA (EA, pages 3-39, 3-48), past activities that were relevant to the fire/fuels cumulative effects analysis were included. The activities on private lands were considered; thus there are no changes to the cumulative effects conclusions between the Twomile EA and this revision.

Aquatics: As explained in the EA (EA, pgs 3-69 through 3-100), past activities that were relevant to the watershed and fisheries cumulative effects analysis were included. The activities on private lands were considered; thus there are no changes to the cumulative effects conclusions between the Twomile EA and this revision.

Soils: The soils analysis by its very nature and design includes past activities that have occurred on a given location. See the Soils section in Chapter 3 for information on how the methodology utilizes knowledge of past activities.

Wildlife: Effects of past activities on National Forest System lands in the project area including past timber harvest, mining, fire suppression and road building are factored into the baseline condition for the analysis of

effects on impacted species. Wildlife habitat selection is almost entirely based upon existing conditions, rather than the disturbance history of an area. The environmental baseline condition incorporates the sum total of habitat changes through the years, and is therefore an accurate reflection of current habitat conditions. As discussed in the EA (EA, pgs. 3-68) non-Federal ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to harvest, rural development, or other irretrievable alterations. Although these other ownerships may provide suitable habitat for some species analyzed, we lack data to adequately assess these areas, and therefore conservatively assume that they are providing no habitat for these species.

B. Soils Analysis

Soils analysis should not rely solely on spreadsheet models and database information for analysis of current conditions and probable effects. Information should be verified by field inspections of the soils and on-site verifications of the modeling results.

The soils analysis for the Twomile EA did not rely solely on models or database information. Areas proposed for timber harvest that had past activities were inspected on the ground to verify the existing conditions. All units meet or exceed the Forest Plan soil standards.

C. Limitations of the WATSED Model

The discussion of analysis methodologies needs to include appropriate discussion of the limitations of the computer-generated WATSED model.

The limitations of the models used for analysis within the project area is . It also explains other methodologies and references used to assist in the analysis. The WATSED model was used to measure anticipated sediment and water yield modifications in the Twomile Creek watershed, which was divided into the following subwatersheds: Twomile Creek, Nuckols Gulch, Revenue Gulch, and the Silverton Face Drainages.

Further clarification of the appropriate uses and known limitations of the model are provided to help the public and the decision maker better understand this model and how it is used in the overall aquatics analysis for this project. This information is summarized here, with more detailed explanation in Chapter 3.

The watershed response model, WATSED, used on the IPNF is designed to address the *cumulative* effects of timber harvest operations, roads, and fire. It does account for drought or flood years and rain-on-snow events when those phenomena are part of the long-term climatic record for a region.

It does not attempt to analyze the effects of grazing, mining (other than vegetation removal and road construction), or other non-silviculture practices. It does not attempt to simulate watershed response for any individual or episodic storm (including “rain-on-snow” events), mass erosion events, or extreme drought or flood years.

WATSED was designed to objectively compare relative differences between alternatives in terms of changes in trend, risks, and regiment; rather than to predict precise sediment and water yields that might occur as a result of stochastic events or non-forest related actions. The IPNFs frequently validate the WATSED coefficients and estimates using long-term water quality monitoring networks on the IPNF. Forest Plan monitoring reports (USDA 2000, 1999, and 1998b; PF Doc. AQ-5 through AQ-7) describe how the calibration and validation of WATSED has been an annual process on the Forest and where changes have been made.

D. Accuracy of the Database Used for Old Growth Calculations

The timber stand database (TSMRS) should not be the only source of information for old growth calculations and conclusions. Field visits should be used to verify or update database information and verify the old growth analysis and compliance with Forest Plan standards.

The Ninth Circuit Court's decision raised questions about the use of habitat data as a "proxy on proxy" approach for population trends, as required by the National Forest Management Act (NFMA). This approach operates on the assumption that as long as species habitat is maintained, the species will likewise be maintained. In the case of Iron Honey the court believed the proffered data was about fifteen years old, with inaccurate canopy closure estimates, and insufficient data on snags. According to the decision, the results generated by the proxy on proxy approach were thus unable to satisfy the requirements of NFMA. Since the Iron Honey decision, the Coeur d'Alene River Ranger District has undertaken an extensive validation of data used for analysis and a review of all old growth stands in the Twomile analysis area. Please refer to the Revised Chapter 3 (Forest Vegetation) for more discussion.

The Forest Plan (Standard 10b) calls for maintaining "10% of the forested portion of the Idaho Panhandle National Forests as old growth". The Forest Plan identified 2,310,000-forested acres on the Idaho Panhandle National Forests. Therefore, the forest plan standard requires maintaining 231,000 acres of old growth on the forest. Forest plan standard 10a incorporates the definitions of old growth developed by the Regional Old Growth Task Force, documented in Green et al (1992; errata corrected 2004). For distribution purposes, the Forest Plan directs Districts to select and maintain at least 5% of the forested portion of those old-growth management units (OGMUs) that have 5% or more old growth.

The Revised EA discloses the review of the district's old growth allocation in the Twomile Resource Area. ***Based on the review, none of the alternatives or their prescriptions were changed; there is more old growth allocated than required and the intent of actions in old growth are to improve the overall quality and integrity of old growth stands.***

E. Data Used For Wildlife And Fisheries Analyses

The 9th Circuit Court ruled that westslope cutthroat trout habitat data that was used in the Iron Honey project on the Coeur d'Alene River Ranger District was too outdated to carry the weight assigned to it, thereby preventing the Forest Service from making an accurate assessment of cumulative impacts on habitat and population of the westslope cutthroat trout.

Disturbance is the biggest factor determining whether habitat data is stale; not time. For example, if a habitat survey was completed in a stable B channel 15 years ago and no disturbance of consequence has affected the stream, the data would not be stale or inaccurate. However, if a flood, debris torrent, stand-replacing fire, or some other disturbance has occurred (including chronic disturbances), the data needs to be re-evaluated. In 2002-03, fisheries habitat data was collected and electrofishing conducted in the Twomile area to determine fish density, presence and absence data.

The alternatives included in the Twomile Resource Area contained features and design criteria (EA, pgs 2-20, through 2-28 and Appendices A & B) that would be used to avoid, or to the fullest extent possible, minimize the potential for adverse impacts to the resources, including wildlife and fisheries. These items did not change.

The Wildlife analysis utilizes vegetation data in determination of existing habitat conditions and effects to species. As described in the Revised Chapter 3 ("Validation of Data used in the Forest Vegetation Analysis"), the TSMRS data fields were reviewed, including forest type, habitat type, size class, year of origin, past disturbances, elevation, aspect, slope and special use code (used to label allocated old growth). In addition, stand trees per acre, stand basal area, and tree age were also verified. Based on the review, the existing condition and effects determinations for wildlife did not change.

F. Forest Plan Fry Emergence Standard

The 9th Circuit Court held that because the Inland Native Fish Strategy (INFS) standards and the Forest Plan fry emergence standard measure different variables, are triggered by different conditions, and have different remedies, applying both to any conceivable project presents no conflict.

The 1987 Land and Resource Management Plan (Forest Plan) for the Idaho Panhandle National Forests used fry emergence as one standard to help meet objectives of maintaining and improving fish habitat capacities

in order to achieve cooperative goals with the Idaho Department of Fish and Game and comply with state water quality standards. Appendix I of the Forest Plan describes the Fishery/Watershed Analysis to be used on IPNF site-specific projects.

At the time the Forest Plan was written, models determining fry emergence (e.g., Stowell *et al.* 1983) were popular. These empirical models were later found to have limited application and were unreliable outside of where they were developed (J. Kershner, personal communication). In addition, the use of fry emergence survival (regardless of the threshold) as a surrogate for effects analysis came into question, primarily for two reasons: first, fry emergence is highly variable, second and more important, egg-to-fry mortality is usually density-independent (in most cases there are enough fry to inhabit all available habitat within a stream). The 1989 Forest Plan Evaluation and Monitoring Report documents the change away from use of the fry emergence standard (Item G-1, pages C-1 and C-2). Item G-1 was combined with item G-3, which includes a comprehensive array of fisheries and hydrology parameters.

The analysis used in development of the 2004 Environmental Assessment utilized the additional detailed analysis, as required by the Forest Plan (Twomile EA, pages 3-102, 3-103), as well as meeting INFS standards. Forest Plan Appendix I Fishery/Watershed Analysis specifies additional analysis shall include the following items:

1) *Fish habitat and hydrologic conditions, utilizing field measurements of spawning sites, equivalent clearcut acres total and to be harvested within one decade of the proposed units, water yield analysis, field measurements of sediment loads (if available), and stream survey results (if available).*

2) *Transportation system conditions, including road miles per square mile of the drainage, road conditions, locations of proposed roads, and proposed mitigation measures.*

3) *Harvest units, including existing regeneration units, location of past and proposed treatment units, and past and proposed harvest systems.*

4) *The environmental setting, including vegetative conditions, fire history and natural succession, identified sediment sources, geology and soil characteristics.*

This project complies with Forest Plan direction because, although fry emergence was not computed, a detailed analysis of the effects to fish habitat and water resources was developed as required in Appendix I. This information has been provided to the line officer as required in Appendix I (please see page R3-14).

The Idaho Panhandle National Forests is in the process of amending the Forest Plan to remove objectives, standards, and monitoring requirements pertaining to fish fry emergence. The documentation will be contained in the Fry Emergence Amendment EA; with implementation expected in June 2005. This is a reasonably foreseeable action related to the Twomile Resource Area project.

3.0 OVERVIEW OF REVISIONS TO CHAPTER 3

Chapter 3 of the Twomile EA outlined the regulatory policies and guidance applicable to forest management; described the methodology used in analysis of specific resources; and disclosed the changes that would occur to each depending on the treatment alternative selected for implementation. The status of each section in Chapter 3 is provided in the table below. Those sections identified in **bold** have been revised; the new information is provided in this Chapter as noted.

Table 3-0. Status of Information Provided in Chapter 3 of the Twomile Environmental Assessment.

Information Provided	Status
Section 3.1 – Introduction	Incorporated
Section 3.2.1 - Regulatory Framework for Forest Vegetation	Incorporated
3.2.2 Vegetation Analysis Methodology	**Revised – See page R3-2**
3.2.3 Affected Forest Vegetation Environment	**Revised – See page R3-2**
3.2.4 Environmental Consequences to Vegetation	**Revised – See page R3-4**
3.2.5 Consistency With Forest Policy & Legal Mandates	**Revised – See page R3-5**
3.2.6 References Cited in the Forest Vegetation Analysis	Incorporated
Section 3.3.1 Regulatory Framework Related to Fire/Fuels	Incorporated
3.3.2 Methodology Used in the Fire/Fuels Analysis	Incorporated
3.3.3 Existing Fire/Fuels Conditions	**Revised – See page R3-7**
3.3.4 Environmental Consequences to Fire/Fuels	Incorporated
3.3.5 Consistency With Forest Policy and Legal Mandates	Incorporated
3.3.6 References Cited in the Fire/Fuels Analysis	Incorporated
Section 3.4.1 Regulatory Framework for Aquatic Resources	Incorporated
3.4.2 Affected Aquatic Environment	**Revised – See page R3-9**
3.4.3 Environmental Consequences to Aquatic Resources	Incorporated
3.4.4 Consistency With Forest Policy & Legal Mandates	**Revised – See page R3-13**
3.4.5 References Cited in the Aquatics Analysis	Incorporated
Section 3.5.1 Regulatory Framework for Soil Productivity	Incorporated
3.5.2 Methodology Used for the Soil Analysis	**Revised – See page R3-15**
3.5.3 Existing Soil Productivity Conditions	**Revised – See page R3-19**
3.5.4 Environmental Consequences to Soil Productivity	**Revised – See page R3-21**
3.5.5 Consistency With Forest Policy & Legal Mandates	**Revised – See page R3-26**
3.5.6 References Cited in the Soil Productivity Analysis	Incorporated
Section 3.6.1 Regulatory Framework for Wildlife	Incorporated
3.6.2 Methodology	Incorporated
3.6.3 Affected Environment and Effects to Wildlife	**Revised – See page R3-29**
3.6.4 Consistency With Forest Policy and Legal Mandates	Incorporated
3.6.5 References Cited in the Wildlife Analysis	Incorporated
Section 3.7 - Recreation	Incorporated
Section 3.8 – Scenic Resources	Incorporated
Section 3.9 – Finances	Incorporated
Section 3.10.1 - Regulatory Framework for TES Plants	Incorporated
3.10.2 Methodology Used in the Analysis for TES Plants	Incorporated
3.10.3 Existing Plant Conditions	**Revised – See page R3-39**
3.10.4 Environmental Consequences to TES Plants	**Revised – See page R3-45**
3.10.5 Consistency With Forest Policy & Legal Mandates	Incorporated
3.10.6 References Cited in the TES Plants Analysis	Incorporated

↓REVISED FOREST VEGETATION INFORMATION↓

3.2.2 Vegetation Analysis Methodology

All of Section 3.2.2 from the Twomile EA is incorporated into this revised EA. In addition, subsection B has been added to provide validation of data used in the Forest Vegetation analysis.

B. Validation of Data Used in the Forest Vegetation Analysis

Various analyses for the Two Mile EA use TSMRS as a data source. The Timber Stand Data Record System or TSMRS is a regional standardized approach that combines an automated database, index map (compartment map) and stand folder. At the initiation of TSMRS in the mid 1970s, its purpose was 1) to provide information for silvicultural prescriptions, 2) for planning and scheduling of treatments, 3) to make required reports, 4) to keep an historical record of all treatments and 5) to provide information to update and revise the timber resource plan and harvest schedule. TSMRS has evolved over time, and portions have been replaced by new databases. Most recently, the FACTS database replaced the TSMRS activities table.

The usefulness of the any data tracking system is directly proportional to the reliability and completeness of the data entered. The database portion of TSMRS is actually a summary database i.e. it summarizes information at the stand scale from a variety of sources including stand exam field data (found in R1Edit, which has recently been replaced by the national database FSVeg), photo interpretation, contract accomplishments, historical records/maps and field observations. The Timber Management Control Handbook (FSH 2409.21e) describes how each field in TSMRS is determined, as well as providing standardized definitions and protocols for each data field and code (FSH 2049.21e is available at the following webpage: *www.fs.fed.us/ipnf/eco/yourforest/gis/veg/tsmrshb.pdf*). Obviously, the reliability of any individual field from TSRMS is dependent on how that data field information is acquired i.e. the forest type field is automatically crossed from the most current stand exam field data, as it is available, and forest type is based on the plurality of tree numbers or basal area depending on size of the trees. However, without field data, forest type may be based on field reconnaissance and/or photo interpretation.

A validation of two categories of vegetative information used for the Two Mile EA was completed (see VEG-36 Vegetation Data Validation). The first of these categories is the TSMRS data fields. The validation includes a review of the following TSMRS data fields: forest type, habitat type, size class, year of origin, past disturbances, elevation, aspect, slope, and special use code (used to label allocated old growth)--- note that all of these are stand level parameters. VEG -36 reviews the data collection protocols for these data parameters as well as a current validation from a comparative sample of these items. Another category of vegetative information used for the EA includes: stand trees per acre, stand basal area and tree age. These items are either taken directly from the field data database FSVeg (which updated R1Edit) or are generated from standard summarizations of field data. These are also stand-based parameters for which statistical information can be available if using standard summarizations or reports. VEG -36 reviews the data collection protocols for these and discloses a current validation of samples of this information.

3.2.3 Affected Forest Vegetation Environment

Allocated old growth was addressed in the 2004 Twomile EA (page 3-9) as part of the forest structure analysis (as a subset of the mature/large timber stage). The following describes additional review of allocated old growth in Old Growth Management Unit (OGMU) 121.

The description of effects to old growth under each alternative is also revised with the following information, as is the discussion regarding consistency with Forest Plan old growth standards.

Old Growth

The definitions for old growth and the direction for allocation of old growth are from the 1987 Forest Plan (PF Doc. CR-002), the Regional Task Force Report "Old Growth Forest Types of the Northern Region" (Green et al, 1992 with errata corrected 2/05 in PF Doc. VEG-37), and Forest Supervisor letters of direction for implementing old growth standards (PF Doc. VEG-15). The table below is a very condensed synopsis from Green et al to display some of the minimum standards used as part of the definitions for old growth types in the Twomile Area—clearly these are not the only considerations for old growth allocation (see full document Green et al, 1992 with errata corrected February 2005 in PF Doc. VEG-37).

Table 3-VEG-1A. Minimum Standards for Old Growth Types in the Twomile Analysis Area

forest type	habitat group	minimum number of trees per acre greater than threshold diameter (dbh)	large tree threshold diameter (dbh)	minimum age of large trees (years)	minimum basal area (sf/ac)
ponderosa pine, Douglas-fir,or western larch	warm-dry	8	21"	150	40
Douglas-fir, grand fir, western hemlock, western larch or white pine	cool-moist	10	21"	150	80

The Twomile Analysis Area is within OGMU 121 (PF Doc. VEG-44). This review allows another look at OGMU 121 based on:

1. *A detailed review of the allocated old growth in OGMU 121.*
2. *A review of all stands in OGMU 121 to find stands not previously allocated that meet allocation definitions and could be allocated.*
3. *An additional review of proposed treatment units for potential old growth definition criteria.*
4. *A review by the wildlife biologist and silviculturist of landscape arrangement, consistency with Forest Plan old growth standards (see below), and an additional review of August 2004 digital aerial photos to determine if there had been any changes (natural or human cased) since the earlier field exam that could change the old growth allocation.*

Supporting documentation is provided in the Project Files (PF Doc. VEG-40, VEG-41, and VEG-42).

Table 3-VEG-1B. Comparison of allocated old growth in OGMU 121 before and after the old growth allocation review (stands within the Twomile Resource Area are marked with an *).

stand number	In Twomile EA (acres)	After review (acres)	Change
11102014	95	95	no change
11201006	34	34	no change
11201007	47	47	(no change
11203006	70	00	dropped
11301001 *	00	55	added
11301002 *	00	78	added
11301004 *	7	00	dropped
11301007 *	17	00	dropped
11301013 *	44	44	no change
11301014 *	57	57	no change
11301015 *	64	64	no change
11302023 *	86	00	dropped
11302028 *	44	00	dropped
11302029 *	36	36	no change
11302030 *	30	30	no change
11302031 *	26	00	dropped
11303028 *	63	63	no change
11305014 *	68	68	no change
11305021 *	79	79	no change
11305022 *	45	45	no change
11305023 *	82	82	no change
11401004	30	30	no change
11401005	22	22	no change
11401006	13	13	no change
11401007	60	00	dropped
11401008	18	18	no change
total acres of allocated old growth in OGMU 121	***1,137***	***960***	
% of OGMU 121 allocated as old growth	***7.5***	***6.4***	

3.2.4 Environmental Consequences to Forest Vegetation

The description of effects to old growth under each alternative is revised based on recent review of old growth allocations.

Timber harvest under Alternatives 2 and 3 would reduce the mature/large size classes each by 14 to 15% respectively in the Twomile Resource Area. This size class is desirable to maintain in the Resource area since it provides the structure necessary to be resilient to fire. The small/medium timber would be slightly reduced from 8% to 6%. The seedling/sapling stage would be increased to between 19 and 20% respectively under Alternatives 2 and 3. The areas changed into the seedling/sapling stage are more likely to provide a long-term improvement in stand structure and increased resiliency to native change agents (such as insects, pathogens and fire) due to species conversion to long-lived seral. Alternative 3 would harvest in approximately 180 acres of allocated old growth. Under Alternatives 2 and 3, commercial thinning would occur within allocated old growth (45 acres and 70 acres respectively); however, this treatment would not change the old growth allocation. Target stand descriptions are found in the project file (PF Doc. VEG-10).

Table 3-VEG-5. Comparison of allocated old growth acres affected, by alternative.

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Acres of allocated old growth in OGMU 121 before treatment	960	960	960	960
Acres of harvest treatment proposed in allocated old growth	0	45 acres Unit 28 (in stand 11301001) would be commercially thinned with helicopter yarding. There would be no change in old growth allocation.	70 acres 25 acres in Unit 19 (stand 11302029) and 45 acres in Unit 28 (stand 11301001) would be commercially thinned, with helicopter yarding. There would be no change in old growth allocation.	0
Acres of noncommercial treatment (slashing and underburning) proposed in allocated old growth	0	75 acres Includes 40 acres in Unit 2 (in stands 11305022 and 11305021) and 35 acres in Unit 32 (stand 11301013).	75 acres Includes 40 acres in Unit 2 (stands 11305021 and 11305022) and 35 acres in Unit 32 (stand 11301013).	75 acres Includes 40 acres in Unit 2 (stands 11305021 and 11305022) and 35 acres in Unit 32 (stand 11301013).
Changes in old growth allocation acres as a result of treatment	0	0	0	0
Acres of allocated old growth in OGMU 121 after treatment	960	960	960	960
Percent of OGMU in allocated old growth	6.4	6.4	6.4	6.4

3.2.5 Consistency with Forest Policy and Legal Mandates

As described in the Twomile EA (pages 3-28 through 3-30), the Forest Plan provides standards for old growth (Forest Plan, page II-29). This additional review updated the compliance to Forest Plan old growth standards as part of the final decision for old growth allocation.

<u>Forest Plan Standards for Old Growth</u>

Old Growth Standard 10a: A definition for old growth is being developed by a Regional Task Force and will be used by the Forest when completed. As an interim guideline, stands classified as old growth should meet the definition given by Thomas (1979).

Allocation of old growth within the Twomile Resource Area is based on current and widely accepted science and follows current old growth definitions from the Forest Plan (page II-29 PF Doc. VEG-15), the Regional Task Force Report including "Old Growth Forest Types of the Northern Region" (Green et al, 1992 and February 2005 errata; PF Doc. VEG-37) and Forest Supervisor letters of direction for implementing Forest Plan old growth standards (PF Doc. VEG-15). This standard is fully met.

Old Growth Standard 10b: Maintain at least 10 percent of the forested portion of the IPNF as old growth.

The IPNF old growth allocation of 10% (231,000 acres) was distributed among the districts as documented in the Forest Supervisor's May 7, 1991 letter concerning the subject "Forest Plan Explanation: Implementing Old Growth Standards (PF Doc. VEG-15). The Coeur d'Alene River Ranger District was responsible for allocating 56,000 acres for old growth management (with 18,000 acres on the former Fernan Ranger District and 38,000 on the former Wallace Ranger District).

The 2003 Forest Plan Monitoring Report indicates that the Forest's total allocated old growth at the end of 2003 was 275,200 acres (11.9%); and the Coeur d'Alene River sub-basin had a total of 64,922 acres (2003 Forest Plan Monitoring Report, page 91; PF Doc. CR-022). This standard is exceeded at both the IPNF and District levels.

Old Growth Standard 10c): Select and maintain at least five percent of the forested portion of those old growth units that have five percent or more of existing old growth.

and

Old Growth Standard 10d: Existing old growth stands may be harvested when there is more than 5% in an old growth unit, and the Forest total is more than 10%.

Old Growth Standard 10b (above) displays that the Forest total old growth allocation is more than 10%. The Twomile Resource Area is within a portion of Old Growth Management Unit 121 (OGMU), which is 15,078 acres in size. Within OGMU 121, 960 acres (6.4% of the OGMU) is allocated old growth. Therefore OGMU 121 exceeds the minimum Forest Plan desired level of 5 percent allocated old growth per OGMU.

Alternative 2 proposes commercial thin/improvement cut in one unit (Unit 28) that is within allocated old growth. This unit is within the WUI and is immediately adjacent private land with structures. The treatment would be designed and accomplished to maintain the old growth characteristics; therefore these acres would not have a change in old growth allocation.

Alternative 3 proposes commercial thin/improvement cut in a total of 70 acres in two units (Units 19 and 28) that are within allocated old growth. This unit is within the WUI and is immediately adjacent private land with structures. The treatment would be designed and accomplished to maintain the old growth characteristics; therefore these acres would not have a change in old growth allocation.

All Action Alternatives would treat approximately 75 acres of allocated old growth with a non-commercial slashing and underburning treatment. This treatment would not change the old growth structure of these areas; therefore these acres do not have a change in old growth allocation.

The old growth allocation in OGMU is based on thorough review of the Twomile Resource Area by the project interdisciplinary team to verify the best possible old growth allocation. This review, all related old growth information and a validation of vegetative data used for old growth allocation are found in the Project Files (PF Doc. VEG-36 through VEG-46). Old growth standards 10c and 10d are met.

Old Growth Standard 10e: Old growth stands should reflect approximately the same habitat types series distribution as found on the IPNF.

A demonstration of compliance with this standard is found in the Forest Plan 2003 Monitoring Report, page 92 (PF Doc. CR-022), which concludes, "Old growth on the IPNF does reflect approximately the habitat type series distribution of the forest…old growth distribution is less than proportional to habitat type series distribution only in the Douglas-fir and grand fir series…the huge, severe 1910 burn and other big early 20th century fires, subsequent suppression of low severity fires, early 20th century timber cutting, root diseases and bark beetles have contributed to the low proportion of old growth in these two habitat type series," (Forest Plan 2003 Monitoring Report, page 92; PF Doc. CR-022). Old growth standard 10e is met.

Old Growth Standard 10f: One or more old growth stands per old growth unit should be 300 acres or larger. Preferences should be given to a contiguous stand; however the stand may be subdivided into stands of 100 acres or larger if the stands are within one mile. The remaining old growth management stands should be at least 25 acres in size. Preferred size is 80 plus acres.

The Twomile Resource Area is within old growth management unit (OGMU) 121. A patch size work map of OGMU 121 and supporting documentation for the following discussion is found at VEG-39. Allocated old growth in OGMU 121 is made up of 8 separated patches, with the largest patch being 269 acres and the smallest 66 acres. The 269-acre patch is within 500 to 600 feet of a 68-acre patch that possibly could be combined to make a patch larger than 300 acres; however the smaller patch is less than the 100-acre criteria of

this standard. The stand between the 269 acre and 68 acre patches has a rather open canopy (based on 2004 photo interpretation) and based on the 1984 stand exam, even after 20 years, it would not have sufficient old trees to meet Forest Plan definitions. All patches in OGMU 121 are greater than 25 acres and six of the eight allocated old growth patches are over 80 acres in size.

This OGMU was almost entirely burned in the 1889 fire and some areas were again burned in 1910. In addition, the forest health (related to species composition, insects and disease) and in some cases obvious vegetative smelter damage associated with mining activities in the Silver Valley previous to 1980 (within OGMU 121 west of the Twomile Resource area) and the juxtaposition of the WUI, towns and private lands/homes/structures make this a complicated OGMU to reasonably locate areas for old growth allocation. Every attempt has been made in this review/analysis to meet this Forest Plan standard (including a thorough review to find additional old growth in the OGMU that meet Forest Plan old growth definitions- see PF Doc. VEG-41); however based on the locations of the old growth in OGMU 121 that does meet Forest Plan old growth definitions and in some cases with the juxtaposition of past fires, effects of mining and private ownership and/or WUI this standard cannot be fully met.

Old Growth Standard 10g: Roads should be planned to avoid old growth management stands to maintain unit size criteria.

No new permanent road construction or temporary road construction would occur in allocated old growth. Old growth standard 10g is met.

Old Growth Standard 10h: A long-term objective should be to minimize or exclude domestic grazing within old growth stands.

The proposed activities would not include any new domestic grazing allotments in the Twomile Resource Area nor in allocated old growth. There are currently no grazing allotments in the area. It is unlikely that grazing would occur within mature or allocated old growth structures in the Twomile Resource Area in the future since mature and old growth structures do not normally provide much forage for these animals. This standard is met.

Old Growth Standard 10i: Goals for lands to be managed as old growth within those lands suitable for timber production are identified in the management area prescriptions.

A demonstration of compliance with this standard is found in the Forest Plan 2003 Monitoring Report, pages 91 and 92, (PF Doc. CR-022) where a table displaying both the goals by management area and what is currently allocated for old growth on the IPNF. "Only the four management areas have specific Forest Plan old growth goals. Current old growth allocations meet and far exceed these Forest Plan goals." Old growth standard 10i is met.

↓REVISED FIRE/FUELS INFORMATION↓

3.3.3 Existing Fire/Fuels Conditions

All of Section 3.3.3 from the Twomile EA is <u>incorporated</u> into this revised EA. In addition, the following subsection has been <u>added</u> to describe additional analysis related to Fire Regime Condition Class.

C. Fire Regime Condition Class

An analysis of the Fire Regime Condition Class (FRCC) was completed for the Twomile Resource Area (PF Doc. FF-34). Fire Regime Condition Class is a classification of the amount of departure from the natural regime (Hann and Bunnell 2001, PF Doc. FF-40). FRCC includes three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one (or more) of the following ecological components:

vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing and drought). The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside.

Table 3-FF-1. Approximate habitat type, fire regime and fire regime condition class (FRCC) distribution in the Twomile Resource Area.

Habitat Group	Fire Regime	FRCC	Acres	% Composition
Dry	I	3	2,280	30
Moist	III	2	5,320	70

Table 3-FF-2. Description of Fire Regime Condition Classes.

Fire Regime Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate; Risk of loss of key ecosystem components is moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components is high.

Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), "high-graded" forest composition and structure (e.g. large trees removed when they would have lived in a frequent surface fire regime).

Fire regimes in the Two Mile Resource area were determined using VRU's (Vegetation Response Units). The VRU's were grouped into two broad habitat type groups: dry and moist. Subalpine habitats comprised such a small portion of the project area that they were not included. Dry habitats are primarily south aspects where ponderosa pine or Douglas-fir is the climax species,

Fire Regime Definitions:

I – 0-35 year frequency and low (surface fire most common to mixed severity (less than 75% of the dominant overstory vegetation replaced.

II – 0-35 year frequency and high (stand replacement) severity (greater that 75% of the dominant overstory vegetation replaced.

III – 35-100+ year frequency and mixed severity (less thatn 75% of the dominant overstory vegetation replaced)

IV – 35-100+ year frequency and high (stand replacement severity (greater that 75% or the dominant overstory vegetation replaced)

V – 200+ year frequency and high (stand replacement) severity

although in the Two Mile Resource area, some of these sites are dominated by shrubs. Dry habitats fall into Fire Regime I. Moist habitats are generally more northerly aspects or draws, and host a variety of species such as western larch, white pine, grand fir, Douglas-fir, and western red cedar. The most dominant climax species on moist sites in the Two Mile Resource Area is western hemlock. The moist habitats fall into Fire Regime III.

The Fire Regime Condition Class Analysis for the Two Mile Resource area showed that the landscape as a whole is in Condition Class 2, and is in need of restoration of fire effects, vegetation composition/structure and fuel characteristics. The dry habitat types are most altered, falling into Condition Class 3. Moist habitats fall into Condition Class 2. Both the departure from natural fire frequency and severity and the departure from natural vegetation composition/structure, and fuel characteristics influenced the dry and moist habitat types. Fire exclusion, white pine blister rust, and timber harvest not mimicking the natural fire regime were primary factors in pushing the Condition Class rating towards Condition Classes 2 and 3. The following graph shows the result of the analysis. A Map of Condition Classes is in the project file (PF Doc. FF-41).

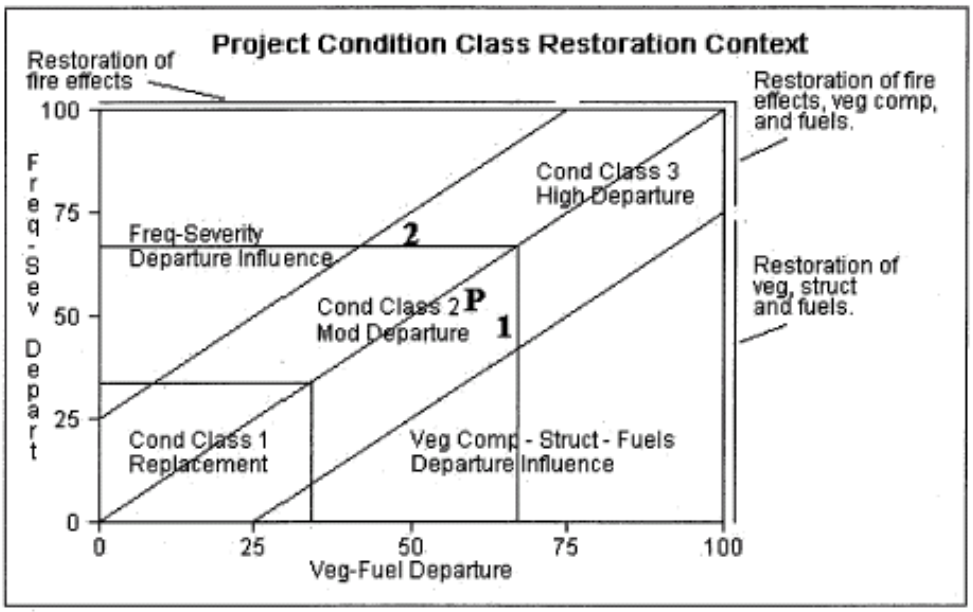


Figure 3-FF-26. Summary graph of the Fire Regime Condition Class Analysis for the Twomile Resource Area. *Moist habitats are represented by the number '1', and dry by the number '2'. The resource (project) area is represented with a 'P'. The graph shows dry habitats in Condition Class 3, moist in Condition Class 2, and the resource area as a whole in Condition Class 2.*

↓REVISED AQUATICS INFORMATION↓

All of Section 3.4.2 from the Twomile EA is <u>incorporated</u> into this revised EA, with the exception of that portion of subsection A (Methodology Used in the Assessment and Description of the Affected Aquatic Environment) relating to the WATSED Model. That subsection has been <u>revised</u> to provide information regarding the limitations of the WATSED Model, as described below.

There have been no new Threatened, Endangered or Sensitive fish species identified since release of the 2004 Twomile EA; therefore there are no changes to the analysis or determination of effects to fish species addressed in the 2004 Twomile EA.

3.4.2 Affected Aquatic Environment

The WATSED Model and Limitations

Anticipated sediment and water yield runoff modification for the Twomile Creek, Nuckols Gulch, and Revenue Gulch watersheds were estimated from the methods documented in the R1/R4 Sediment Guides (USDA 1981; PF Doc. AQ-14) and the WATBAL Technical User Guide (Patten 1989; PF Doc. AQ-15). The version calibrated for the Idaho Panhandle National Forests, known as WATSED, is an analysis tool that spatially and temporally organizes typical watershed response relationships as a result of forest practices. The estimated responses are combined with other sources of information and analyses to help determine the findings of probable effects.

WATSED is a computer program watershed response simulation model used by several Forests in the Northern Region, developed and updated specifically to do the following:

- Estimate changes in watershed responses in terms of stream flows and sediment yields as a cumulative result of logging, roading, and fire;
- compare differences among management alternatives in forested mountain watersheds;
- identify trends; and
- characterize potential risks.

The model is a tool that objectively estimates expected changes in water and sediment regimens that are likely to result from the cumulative forest practices over time throughout a watershed. It is not designed to produce absolute or accurately quantified solutions; rather, the model is meant to be reasonably precise in terms of changes and trends. It is supported with scientific literature, field review, and field data collected by qualified scientists (hydrologists, fluvial geomorphologists, or soil scientists) and used to provide decision makers with an understanding of different likely watershed responses in response to various forest management alternatives (USDA Forest Service, Northern Region, 1992).

WATSED is a watershed response model designed to address the cumulative effects of timber harvest operations, roads, and fire on watersheds generally between 4 and 40 square miles in size. Its precursor the WATBAL model was developed using empirical data primarily from the Clearwater National Forest and north-central Idaho; its precision has been validated with averaged measured data collected on Forests within the Northern Region of the USDA Forest Service over sequences of years. This validation work will be expanded during 2006.

WATSED is designed to objectively compare relative differences among forest management alternatives in terms of changes in trend, risks, and regimen of water and sediment yield. Estimates are calibrated using measured data that include a combination of primary watershed processes. The model is driven by local climatic conditions and it uses Equivalent Clearcut Area (ECA) notation to represent the apparent degree of landscape disturbance through time. Recovery curves for various road designs and configurations (clearing width, cutslope area, width, and length), logging systems and harvest methods (tractor, cable, aerial), wildfire, and site preparation (mechanical, prescribed fire, or hand) are used to characterize the watershed disturbances that result in cumulative effects.

Watershed processes in WATSED are stratified relative to landtypes (Ford et al, 1997). The Forests have measured and rated the typical erosion and slope stability hazards of the landtypes that characterize the Forests' watersheds. They use that information to calibrate the model and resulting interpretations. Slope characteristics and activity data are WATSED input information used to modify the typical values for mapped landtypes. Project-level field investigations may identify local unusual or non-typical conditions. Such information is used to adjust model input or it can be factored into interpretation of the modeled results by a watershed specialist with the appropriate skills and experience (e.g., a wildland hydrologist, fluvial geomorphologist, or soil scientist).

WATSED incorporates the concepts of the R1/R4 Sediment Guides (Cline et al, 1981) which focus on slope hydrology, erosion, stability, and sediment delivery processes. It generally estimates the water flow and

sediment likely to be delivered to the channel network of a study watershed over time as forest management actions occur within the entire watershed from its headwaters to a downstream reach. The routing of sediment and water through the main channel system is estimated using broadly based regional curves. Channel erosion is not modeled directly; however it is represented in the empirical data used to calibrate the model.

WATSED is **not** intended to simulate watershed response for individual or episodic storm, mass erosion events or extreme drought or flood years. It is not intended to accurately predict sediment and water yields that might occur as a result of stochastic events or non-forest related actions. It does not address or analyze the effects of grazing or mining (other than vegetation removal and road construction) or other non-silviculture related practices.

The expected response to individual events, including singular rain-on-snow events, high intensity thunderstorms, and extreme runoff events (e.g. flood flows) can be addressed using other modeling tools and methods. Several supplemental hydrology and watershed analysis tools are available in Region One:

- *Surface erosion models such as WEPP can be used to help address some episodic events at the site scale for a specific hillslope. These models and tools coupled with other available information (climate and runoff) and spatial data (soil type, topography, vegetation cover, etc.) may also help estimate the risks and likely impacts of some episodic events. The assumptions and limitations of WEPP are documented if it was utilized.*
- *Slope stability (including mass erosion and delivery potential can be addressed on a broad scale using the databases associated with the Land System Inventory (landtypes) and the known history of mass erosion. On-the-ground reviews and observations by trained personnel were conducted to address project level mass erosion potential. In cases where roads or other ground disturbing activities are proposed in unstable sites, geotechnical experts are utilized to access specific risks. Tools such as the "Level I Stability Analysis" (LISA) are available to estimate the risks associated with slope stability and mass erosion under certain circumstances.*

The WATSED Model used in this analysis was not the only tool utilized for analysis of watershed responses. The model results have been incorporated with other analysis tools and sources of information to provide the basis for interpretation. These sources of information include:

- *Locally-derived monitoring or monitoring of similar systems;*
- *Reviews of pertinent scientific literature and reports;*
- *Reasonably local calibration of the driving variables used in the models (i.e., land type response variables and hydrologic response curves);*
- *Validation of the model, using independent data for major geomorphic groups used on the Forest (i.e., rock belts, border zone, granitics, etc.); and*
- *Professional judgments and interpretations of skilled watershed specialists with local experience and observations.*

The resource interpretations are based on the integration of these sources and with model results have been used to provide the expected hydrologic responses and changes produced by each alternative. The judgments and determinations of the professional resource specialists were based on the integration of available tools and were factored into resource recommendations. This relationship is documented in Decision document, supporting NEPA and project files.

WATSED, like any quantitative model, is only a tool. Estimates have been verified with, compared to, and evaluated against measured flow and sediment yield data from sites with similar characteristics. User interpretations are expected to have the best possible degree of validity when they are made by trained and experienced water resource specialists who have the basis to understand the logical framework of the model itself as well as the hydrologic, hydraulic, and slope stability principles and processes that are actually taking place on the watershed and in the stream.

It is the author's intention that the WATSED model and its supporting databases and landtype interpretations be continually calibrated and validated and re-calibrated again. The specialists on this project have verified for themselves the results and trends that WATSED simulates. Analysis conclusions have not been made solely on the results of the model. Interpretation of modeling results, review of pertinent scientific literature, on the ground field observations and measurements have all been used in concert with the informed and educated judgment of the water resource scientist.

WATSED estimates a series of anticipated annual values over a period of years. The model predicts an estimate of most likely mean annual sediment loads (reported as tons per square mile per year, or as routed tons per year), and the expected sediment load modifications over time. The estimate of additional loading is expressed as a percent of the "natural" (i.e., historic mean load prior to significant development activities) sediment load, which is based on the history of disturbances and average climate patterns in the watershed. In this analysis, the existing condition represents the year 2003, which is prior to any anticipated disturbances related to the proposed activities.

The estimates of sediment and peak flow reflect how watersheds with similar conditions and landtypes have responded over time to a similar history of disturbance. WATSED is neither intended nor designed to model event-based processes and functions, or specific in-channel responses. It does, however, incorporate the results of those processes in the calibration of its driving coefficients. WATSED does not evaluate increases in sediment and peak flows specifically resulting from "rain-on-snow" events or other stochastic events, nor does it attempt to estimate in-channel and stream-bank erosion. The Idaho Panhandle National Forests (IPNF) frequently validates the WATSED coefficients and estimates using long-term water quality monitoring networks on the IPNF (USDA 2000, 1999, and 1998b; PF Doc. AQ-5-7).

The forest management activities used to calibrate the model include standard BMPs and Soil and Water Conservation Practices; therefore, standard BMPs and Soil and Water Conservation Practices are necessary requirements for maintaining an effective confidence level in the model's use. Non-standard BMPs, management or natural disturbances not related to forest practices, and site-specific non-standard BMPs must be integrated into the final analysis to fully determine watershed response.

WATSED was designed to address and integrate a vast and complex array of landtypes and disturbances within the context of a watershed and organize the evaluation according to rule sets established by the author and cooperators. In the case of WATSED, the rule sets reflect watershed processes and functions based on research, data, and analyses collected locally and regionally. Forest Plan monitoring reports (USDA 2000, 1999, and 1998b; PF Doc. AQ-5-7) describe how the calibration and validation of WATSED has been an annual process on the forest and where changes have been made. The model, however, also includes simplifying assumptions, and does not include all possible controlling factors. Therefore, the use of models is to provide one set of information to the technical user, who, along with knowledge of the model and its limitations, other models, data, analysis, experience and judgment must integrate all those sources to make the appropriate findings and conclusions.

3.4.3 Environmental Consequences to Aquatic Resources

All of Section 3.4.3 from the Twomile EA is incorporated into this revised EA. In addition, the following discussion is added to address peak flows and the risk of disturbing downstream toxic sediments.

Peak Flows and Risk Of Disturbing Downstream Toxic Sediments in The Lower Coeur d'Alene River

The Twomile analysis area is approximately 20% of the upper South Fork of the Coeur d'Alene River Basin (a 79,000 acre drainage area), from the point the Twomile Analysis Area streams join the river. Alternative 2 (the preferred alternative) would treat 1,104 acres, which is approximately 1.4% of upper South Fork of the Coeur d'Alene River Basin. Toxic sediments exist throughout the South Fork of the Coeur d'Alene River near and downstream of the analysis area. These toxic sediments are also concentrated in the lower reaches of the Coeur d'Alene River near Lake Coeur d'Alene. The contributing drainage area of the Coeur d'Alene Basin near Lake Coeur d'Alene is 1,475 sq miles (943,996 acres). This means that the Twomile analysis area represents 1.7% of the drainage area of the Coeur d'Alene River Basin and the treatment area represents 0.1%

of the Coeur d'Alene River Basin. Under any alternative, the risk of measurable increases in water yield and peak flows in the headwaters of project area streams would be zero to slight under any alternative. Considering that the predicted water yield and peak flow increases have only a slight risk of increasing at the subwatershed scale within the Analysis Area, there would be much less risk of peak flows affecting flows in the South Fork downstream of the Analysis Area and even less risk at the mouth of the Coeur d'Alene River where concentrated toxic sediments exist.

Table 3-AQ-8B. Comparison of the Treatment Area, Analysis Area, Upper South Fork Coeur d'Alene River, and entire Coeur d'Alene River Basin Scales.

Area Description	Size (acres)	% of Upper South Fork Coeur d'Alene River	% of entire Coeur d'Alene River Basin
Entire Coeur d'Alene River Basin	943,996	n/a	100%
Upper South Fork Coeur d'Alene River (from Twomile Creek to headwaters	79,000	100%	8.4%
Twomile Analysis Area	16,304	20.6%	1.7%
Treatment Area	1,104	1.4%	0.1%

3.4.4 Consistency With Forest Plan and Other Regulations

All of Section 3.4.4 from the Twomile EA is incorporated into this revised EA, with the exception of those discussions relating to consistency with:

- *Forest Plan fish standards 1 and 2 (Twomile EA, pages 3-101 through 3-103)*
- *Species viability under the National Forests Management Act (Twomile EA, page 3-104), and*
- *the Clean Water Act (Twomile EA, page 3-104)*

These discussions have been revised with the following information.

Consistency With Forest Plan Fish Standards 1 and 2 (Fry Emergence)

Fish Standard 1: Activities on National Forest lands will be planned and executed to maintain existing water uses. Maintain is defined as "limiting effects from National Forest activities to maintain at least 80 percent of fry emergence success in identified fishery streams." The percent is measured from pristine conditions. Current methodology will not detect an impact of less than 20 percent. During the life of the plan, new technologies may permit more precise assessments; however, the goal of this standard will remain as "to maintain 80 percent of fry emergence success.

and

Fish Standard 2: Streams providing spawning and rearing habitat, which are considered critical to the maintenance of river and resident populations of special concern *["high value streams"],* will be managed at a standard higher than the 80 percent standard. Monitoring will be needed to detect this higher standard.

The objectives for fisheries in the Forest Plan state that the forest "will be managed to maintain and improve fish habitat capacities in order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards. Sediment arising from land management activities will be managed so that in forest fisheries streams the objective is to maintain 80 percent fry emergence success as measured from pristine condition" (II-7). The first two standards for fish use similar language (II-29). The Fishery/Watershed Analysis to determine effects of land management activities on fry emergence is described in Appendix I (I-1, 2).

Appendix I requires that if, during the environmental assessment process, cumulative effects of the proposed and past activities on stream sedimentation are projected to result in greater than 20% reduction in fry emergence, then additional detailed analysis will be undertaken. The analysis, along with best professional judgment, is then used to determine the significance of the project on water resources. This information is

then presented to the line officer, who incorporates socio-economic and multi-resource considerations and makes a decision on the project. If the project is judged to have a "significantly negative effect" on water resources, it will be reviewed by the State for conformance with water quality standards prior to the final decision.

At the time the Forest Plan was written, models determining fry emergence (such as Stowell et al, 1983) were popular. These empirical models were later found to have limited application and were unreliable outside of where they were developed (J. Kershner, personal communication). In addition, the use of fry emergence survival (regardless of the threshold) as a surrogate for viability came into question, primarily for two reasons:

- *First, fry emergence is highly variable. This can be due to changing natural conditions (e.g., floods, temperature regimes, geology) or human-induced causes (e.g., increased sediment input, chemical spills). Both agents are at work in most cases so it is difficult to determine what proportion of egg-to-fry mortality is due to each cause. As a result the underlying relationship between sediment in redds and survival is difficult to predict (Chapman 1988).*
- *Second, and more important, egg-to-fry mortality is usually density-independent (i.e., a percentage of fry will survive regardless of the number of eggs). This means that in most cases there are enough fry to inhabit all available habitat within a stream. Therefore fry-to-smolt (sub-adult) survival, where density dependent mortality plays a significant role, is a more effective and appropriate predictor of population viability than egg-to-fry survival (for a review of these concepts see Hilborn and Walters 1992). Currently the indicator used as a surrogate of fry-to-smolt survival is stream habitat characteristics.*

The 1989 Forest Plan Evaluation and Monitoring Report documented the change away from use of the fry emergence standard (Item G-1, pages C-1 and C-2). After two years of monitoring by measuring and analyzing the intergravel fines of approximately 610 core samples from 25 streams across the forest, no determinations on fry emergence success or trends were possible due to high variability. As a result, the findings were that it was not a good monitoring tool to report stream health. G-1 was combined with item G-3, which includes a comprehensive array of fisheries and hydrology parameters.

Based on the above information, it is not possible to generate an accurate percent of fry emergence. Therefore, additional detailed analysis was undertaken and that information was used to determine the significance of the project on water resources, as required by the Forest Plan.

In conclusion, this project complies with Forest Plan direction because, although fry emergence was not computed, a detailed analysis of the effects to fish habitat and water resources was developed as required in Appendix I. This information has been presented to the line officer.

Consistency With the National Forests Management Act – Species Viability

Fish species that may be affected by the project (westslope cutthroat trout and rainbow trout) are also distributed across the Forest. For example, westslope cutthroat and rainbow trout are found in thirteen (100 percent) of the thirteen 4th-code HUC watersheds (i.e., large watersheds, such as the Coeur d'Alene River) on the IPNF. There is possible connectivity between the Coeur d'Alene River Basin (which includes Twomile Creek) and one of the twelve other 4th code HUC watersheds on the Forest (i.e. St. Joe River).

- Further westslope cutthroat are well distributed and found in 100 percent of the 6th-code HUCs in the Coeur d'Alene River Basin. Though introduced, rainbows are not as well distributed.
- At the smaller watershed scale, westslope cutthroat and rainbow are known to inhabit Twomile Creek (a 7th Code HUC watershed). Based on the distribution of species across the Forest, the lack of connectivity between large watersheds, and the limited cumulative effects area (i.e. Twomile Creek and Nuckols and Revenue Gulch), **activities in the Twomile Resource Area will not affect viability of any threatened, endangered, sensitive, or MIS fish species on the IPNF.**

Consistency With the Clean Water Act (Including State of Idaho Implementation)

All alternatives would be consistent with the requirements of the Clean Water Act, 33 U.S.C. §1251. Sediment and metals, the pollutants of concern, would not increase in the water quality limited South Fork of the Coeur d'Alene River segment from Placer Creek to Big Creek. Risks to beneficial uses in all streams of the Twomile Resource area would not be changed by this project. In compliance with the current draft TMDL implementation plan for the South Fork of the Coeur d'Alene River, there would be no net increase in sediment or metals into the South Fork of the Coeur d'Alene River through the proposed management activities.

↓REVISED SOILS INFORMATION↓

All of Sections 3.5.1 (Regulatory Framework for Soil Productivity) and 3.5.6 (References Cited in the Soil Productivity Analysis) from the Twomile EA are incorporated into this revised EA. Revisions have been made to the remainder of the Soils sections as identified below.

3.5.2 Existing Soil Productivity Conditions

A. Methodology Used to Describe Existing Soil Productivity

Analysis of the soil resource was carried out utilizing a landtype map that displays the entire analysis area. Each action alternative was analyzed to allow for the various harvest unit proposals and to identify those units that would require design modifications to achieve the Forest Plan standard. A systematic procedure was established to identify the existing condition of each proposed unit in terms of highly disturbed soils, low potassium and units that do not meet the standard.

Data lists were developed for all the proposed treatment units in each alternative; the existing condition for those units, including acres of constructed or designated trails, roads (permanent/temporary) within or adjacent to harvest units and logging systems. The activities were compiled into lists from aerial photos, timber stand and road databases. On-the-ground reviews were conducted to assess existing conditions within the proposed activity areas (PF Doc. SOIL-17 and SOIL-67). Calculations were performed utilizing the data sheets to determine the disturbance factor for each activity area. The disturbance factors represent an average percentage of detrimentally disturbed soils, which was obtained through past monitoring methodology on existing harvest units (Forest Plan Monitoring and Evaluation Reports, 1988, 1991, 1993, 1997, and 1999; PF Doc. SOIL-46 through SOIL-50).

All of the proposed activities related to harvest (including specific features designed to protect soils, as described in Chapter 2) were compared to the existing conditions as a rough evaluation for each unit and their relation to the Forest Plan Standards.

There is a natural deficiency of potassium associated with the Prichard and Lower Wallace geologic formations. The Intermountain Forest Tree Nutrition Cooperative (IFTNC) is researching the relationship of potassium feldspars to the underlying bedrock (see Table 3-SOIL-3). Geologic formations and their descriptions within the Resource Area are taken from Hobbs et al, (1965; PF Doc. SOIL-34).

Soils in the project area are generally weakly weathered and have moderate to moderately good timber production potential. The practice of timber management can have long lasting impacts on the soil resource if activity precautions are not taken. The following three design and management criteria relate to the area's soil productivity:

1. **Detrimentally disturbed soils within activity areas (harvest units).**

   Detrimental soil impacts are defined as the proportion of an activity area that may be subjected to compaction, displacement, or severe burning due to a particular management activity such as harvest or

fuels treatment, exclusive of committed resources such as system roads. The soils in an activity area are considered detrimentally disturbed when the following soil conditions exist as a result of Forest practices:

a. *Soil displacement results in the loss of either one inch of or half of the humus-enriched surface layer (A-soil horizon), whichever is less. The loss of the litter layer alone could be detrimental on some marginal sites. Displacement removes the most productive part of the soil resource. Roading, ground-based yarding, dozer piling and cable corridors are the major contributors to displacement.*

b. *Soil compaction that results in a 20 percent or more increase in bulk density, or a 50% reduction in water infiltration rates typical for volcanic ash influenced surface soils. Soil compaction reduces the supply of air, water and nutrients to plants. Roading, ground based yarding and piling are the major contributors to compaction.*

c. *Fire consumes most woody debris and the entire duff and litter layer, exposing mineral soil. Burn ash that is white or reddish color indicates that much of the carbon was oxidized by fire (Burned-Area Emergency Rehabilitation Handbook FSH 2509.13). Burns that create very high temperatures at the soil surface when soil moisture content is low result in almost complete loss of surface and upper soil horizon organics. Many of the nutrients stored in these organics can be lost to the atmosphere through volatilization and removed from the site in fly-ash (Garrison and Moore, 1998; PF Doc. SOIL-30).*

2. Low Potassium Sites - Sites containing geologic formations that are naturally deficient in potassium bearing minerals.

Natural deficiencies of potassium may occur within Belt series metasedimentary rock formations. The Belt Series supergroup is the main bedrock component throughout the Coeur d' Alene River Ranger District. Areas of lower tree productivity appear to be related to the bedrocks weathering characteristics with some of the calcite and carbonate bearing rock of the Lower and Middle Wallace Formation now being possibly the more productive sites on Belt series rock (Johnston et al, 2004; PF Doc. SOIL-63). Geologic formations and their descriptions within the project area are taken from Hobbs et al. (1965; PF Doc. SOIL-34).

Potassium is derived almost entirely from the underlying rock formations as potassium feldspar. A study by the Intermountain Forest Tree Nutrition Cooperative (IFTNC) is comparing area lithology to its weathering potential index (WPI). The IFTNC believes the percentage of potassium alone does not characterize 'good' rock from 'bad' rock (Johnston et al., 2004; PF Doc. SOIL-63), but rather that the WPI may provide a means of quantifying bedrock weathering patterns and their release of potassium from their mineral composition of potassium feldspar. Harrison and Campbell (1963; PF Doc. SOIL-33) state that most Belt metasedimentary rocks have percentages of potassium feldspar within their mineral composition that vary from 2 to 12 percent and past studies by the IFTNC categorized the Prichard and Lower Wallace Formations as having the lowest percentage of potassium feldspar. The cooperative's present research using the WPI indicates that non-carbonate bearing argillites and quartzites weather slowly and their release of potassium is low. Most of the Twomile Resource Area's underlying bedrock are the Belt series group and include 43 percent Prichard Formation, 56 percent Burke Formation and 1 percent of granitic intrusive (Resource Area Geology Map, PF Doc. SOIL-19).

In general, 45 percent of a site's potassium is held in trees, with the remainder being tied up in subordinate vegetation, the forest floor, and soil pools (Garrison and Moore, 1998: PF Doc. SOIL-32). Within the trees, about 85 percent of the potassium is held in the branches, twigs, and foliage. Under natural circumstances, the potassium returns to the soil when the tree dies. Whole tree yarding, removal of treetops, and grapple piling can therefore lead to the direct loss of potassium (Morris and Miller, 1994: PF Doc. SOIL-41), which can be long-term depending on the site's geology and silvicultural prescription.

Further research shows a possible correlation of potassium deficiency to the lack of tree resistance against root rot (Garrison-Johnston et al, 2005; PF Doc. SOIL-63). On the other hand, results from the seedling establishment/nutrition experiment conducted by the IFTNC show that potassium was non-limiting from a tree growth standpoint on the Flat Creek Belt Metasedimentary site (Garrison and Moore, 1998; PF Doc.

SOIL-30). This site is on the metasedimentary Striped Peak Formation and, according to Harrison and Campbell (1963), contains about seven percent potassium feldspar in its mineral composition.

Additional research on the nutrient contents within tree species and different rock types may establish more definite minimum thresholds and effects on tree growth and resistance to diseases (Mika, 2005, PF Doc. SOIL-64; Shaw, 2005, PF Doc. SOIL-65). Until these minimum thresholds are developed, the Idaho Panhandle National Forests are using management recommendations from the IFTNC as a guideline for maintaining sufficient potassium on a site. In the winter of 2002, the Idaho Panhandle National Forests initiated tree foliar analysis in cooperation with the Cooperative in order to gather more information on forest potassium levels. Additional sampling is planned in the coming years. Information gained from these samplings will be used to obtain baseline data pertaining to soil nutrient levels and its effect on tree growth and health.

The IFTNC recommends the following practices to retain the maximum partible potassium on site after logging:

a. *Practice conventional removal (lop and scatter) rather than whole-tree removal. The lop and scatter technique should be used during intermediate as well as final harvest operations.*

b. *Let slash remain on site over winter so mobile nutrients such as potassium can leach from fine materials back to the soil.*

c. *Light broadcast burn or underburn for release of potassium and other nutrients.*

d. *Avoid mechanical site preparation.*

e. *Plant species appropriate to site.*

3. Maintenance of large woody debris and organic matter.

The third soil productivity criteria relates to the management of coarse woody debris (CWD) and organic matter which would follow the research guidelines contained in Graham et al., (1994; PF Doc. SOIL-32). Retaining CWD and organic matter is important to maintaining the soils most productive layer. CWD is defined as woody material derived from tree limbs, boles, and roots greater than three inches in diameter and in various stages of decay. It performs many physical, chemical, and biological functions in forest ecosystems and is a key habitat component for many wildlife species and for stream ecology (Graham et al, 1994; PF Doc. SOIL-32). Because CWD is such a valuable part of a functioning ecosystem, a portion of the material must be maintained to ensure that organic matter is recycled for long-term productivity.

The optimum level of fine organic matter is 21 to 30 percent; which equates to 1 to 2 inches of surface litter and humus (Graham et al, 1994; PF Doc. SOIL-32). Optimum levels of fine organic matter relate to ectomycorrhizae fungus, which is a good indicator of healthy forest soil. In moist western hemlock and cedar habitat types strong levels of ectomycorrhizae exists when organic levels exceed 30 percent. Soil survey data indicates that most forest sites have adequate organic matter levels to support strong ectomycorrhizae populations.

This soil productivity criterion is addressed as a guideline and is not part of the alternative evaluations because project alternatives are designed to meet the large woody debris guidelines as referred to in Graham et al., 1994; (PF Doc. SOIL-32) and silvicultural prescriptions.

B. Methodology Used to Analyze Effects to Soil Productivity

This analysis includes potential effects from proposed logging systems, permanent and temporary roads, landings and fuel treatments on soils. To determine whether proposed activities would detrimentally impact or have cumulative effects on soils, the IPNF Soil NEPA Analysis Process (Niehoff 2002; PF Doc. SOIL-41) was used. For each alternative the detrimentally disturbed acres were calculated using coefficients based on past IPNF soil monitoring data. The coefficients were developed as an average soil disturbance level and equated to the harvest equipment; time of year (summer vs. winter logging), the fuel treatment method, and

the time of year the fuel treatment took place. Since the coefficients are based on an average, areas that have had prior harvest activities could have soil disturbance levels lower or greater then the coefficient's average. This monitoring information is contained in Forest Plan Monitoring and Evaluation Reports and is summarized in the IPNF Soil NEPA Analysis Process. For direct and indirect effects the calculations incorporated the acres and types of proposed logging, burning and the acres of roads/landings constructed.

All of the harvest activity units were assessed for past activities, CWD and organic matter (PF Doc. SOIL-67). Soil transects indicate that most of the proposed harvest activity units are in a natural condition and have had no previous harvest entries. Some activity units have a low CWD ratio. The CWD on these units will increase as woody debris is left on site in the form of tree tops and slash.

Based on past monitoring efforts (Niehoff 2002; PF Doc. SOIL-41), tractor logging prior to 1990 has had the most detrimental impacts to soils, which is between 24 and 42 percent. Since 1990, tractor logging methods and recommended protection measures have decreased most detrimental impacts to an average of 13 percent (Niehoff 2002; PF Doc. SOIL-41), which is two percent less than the maximum allowable criteria established by the Regional guidelines. Helicopter and skyline/cable logging systems tend to have between 0 and 2 percent detrimental effects (Niehoff 2002; Doc. SOIL-41; McIver and Starr 2000, pp. 11-16; PF Doc. SOIL-37). These logging systems have less impact than tractor systems because the equipment stays on the road and the logs are partially suspended, restricting impacts to times when logs are being dragged over the ground. (Krag 1991, PF Doc. SOIL-36; Seyedbagheri 1996 pp. 7-9, PF Doc. SOIL-44). Helicopter logging has minimal impacts as the logs are lifted into the air and transported to a landing site (Poff 1996; PF Doc. SOIL-42) and (McIver and Starr 2000, pp. 11-16; PF Doc. SOIL-37). The landing site is usually one acre in size and receives the most impact from the ground base equipment that processes and transports the logs.

Direct effects on soils from proposed activities were measured by analyzing the effects of compaction, severe burning, and displacement on the soil surface, which is the most productive layer and also the easiest layer to disturb through activities. The potential for these effects would result from the type of logging system and fuel treatments used and the area disturbed due to the construction of roads and landings.

Compaction, displacement and severe burning can affect the soil's physical, chemical and biological properties, which indirectly can affect the growth and health of trees and other plants. Compaction reduces soil permeability and infiltration, which can cause soil erosion. Displacement reduces plant growth where topsoil and organic matter are removed. Severely burned soils can become hydrophobic (water repellent) and lead to increased erosion, runoff, and/or reduced productivity.

Tractor, skyline/cable and helicopter logging systems are included in different amounts for each action alternative. Roads and landings constructed that are to remain on the landscape for future use cause irretrievable effects on productivity as those lands become dedicated to the permanent transportation system. Those roads that are temporarily needed for project work and are planned for decommissioning have detrimental effects initially, but rehabilitation efforts (ripping, recontouring) would initiate a long-term recovery sequence. Recovery time is approximately 30 to 40 years at which second growth timber becomes established around the disturbed areas and develops enough crown foliage to intercept and evapotranspirate moisture (Switalski et al, 2004, PF Doc. SOIL-60; Luce, 1997, PF Doc. SOIL-61).

Coefficients for road construction used 35-foot widths, which take into account a 14-foot wide running surface and includes the cut and fill slope disturbance. Log landing areas associated with new road construction are accounted for in the road calculations. Log landings that are proposed outside of any harvest units are each calculated as one acre. These areas would become dedicated lands and their effect is irretrievable (see Table 3-SOIL-2.

Indirect effects include the loss of site productivity due to the removal of large woody debris and potassium. Large woody debris is essential for maintenance of sufficient microorganism populations and long-term site productivity. Research has indicated that potassium, among other nutrients, is an important element for site productivity and may be deficient among certain Belt super group formations. Mitigation measures are therefore designed to meet the management of large woody debris and organic matter as detailed in the research guidelines contained in Graham et al. (1994) (PF Doc. SOIL-32). These recommendations emphasize tons/per acre and are defined as any woody residue larger than 3 inches in diameter. On potassium limited sites, treetops, foliage and branches would be left to over winter, which allows potassium to leach out of these materials (Baker et al. 1989, PF Doc. SOIL-55; Edmonds 1987, PF Doc. SOIL-56; Garrison and Moore 1998, PF Doc. SOIL-30; Laskowski et al. 1995, PF Doc. SOIL-57; and Palviainen et al. 2004, PF Doc. SOIL-59). The reduction of available potassium leaching back into the soil profile could affect tree growth.

Acres of detrimental disturbance were calculated by multiplying the areas of activity disturbance by the disturbance coefficient derived from monitoring reports. All are based on greater than 25% soil moisture at the time of activity. Coefficients used for proposed logging systems are:

Tractor Logging

Spring burning or grapple piling	**= 13 percent**
Fall burning, no grapple piling	**= 15 percent**

Skyline/Cable and Aerial Logging

Spring burning	**= 1 percent**
Fall burning on south/southwest aspects	**= 3 percent**

Cumulative effects include the combination of direct and indirect effects from past, present and reasonably foreseeable activities. Since direct and indirect effects from soils are measured within activity areas, the cumulative effects analysis area for the soil's resource consists of those activity areas proposed for soil disturbing activities within the Resource Area. Future foreseeable actions, primarily road construction, reconstruction, and timber harvesting would continue to affect the soil. As an aggregate, these activities would be analyzed as a new NEPA proposal and would be required to meet standards and guidelines. Existing roads and landings designated as classified on the National Forest transportation system are considered dedicated lands. The loss of soil productivity on these sites occurred when the roads and landings were constructed and are an irretrievable effect. These lands are not considered a part of the cumulative effects because they are now included as part of the permanent transportation system.

3.5.3 Existing Soil Productivity Conditions

A. Affected Environment

The project area is a series of subsidiary ridges descending from an accordant main ridge with well-incised, dry to wet drainages. Drainages are moderate to steeply sided. Valley fill is Quaternary age alluvial deposits with older gravel remnants indicating an abandoned river channel of Tertiary age. The bedrock is comprised of Precambrian Belt Supergroup metasedimentary geology that was uplifted as part of an early delta depositional feature. This mature landscape had major periods of aggradations, which have left the steep V-shaped valleys and eroded the pre-existing weathered soils, thus new parent material became partially weathered to non-weathered and evolved into the present day geomorphology.

Ridge tops in the project area are generally broad with shallow soils that can be skeletal (rocky) in nature and exhibit a volcanic ash surface layer (6 to 12 inches deep). The deepest soils are located on the side slopes, in the draws and basin depression areas where the ash-capped soils can attain a depth of 40+ inches. The ash-cap's soil texture is a silt loam with rock fragments found throughout the profile, averaging 3 to 35 percent. Subsoils and substratums are developing in fractured parent rock (Belt metasediments) and have sandy to gravelly loam textures. Rock fragments increase with depth and can average 40 to 60 percent. As the parent rock fractures the soil has migrated down through the parent rock's interstices, which facilitates water percolation. Out crops of parent rock are usually situated as isolated features along the mid to upper slopes in conjunction with subsidiary benches having southerly aspects.

B. Soil Productivity

Soil productivity is the output of a specified plant or group of plants under a defined set of management practices, or the total plant mass that is produced annually per unit area.

The most productive part of the Resource Area's soil occurs near the surface at the contact between the forest litter and the mineral soil. Here the litter has been highly decomposed into dark colored amorphous material, which is the richest and most productive part of the soil. This layer is frequently only a few inches thick but its presence is much more important than its thickness would indicate. The rich organic matter layer contains most of the soil nitrogen, potassium and mycorrhizae that must be present for a site to be productive.

Below the soil's organic horizon is volcanic ash, which occurs at the surface layer of the mineral soil. In north Idaho, the ash layer is typically 16 inches thick, ranging between 7 and 24 inches on most sites. See pedon descriptions (PF Doc. SOIL-17). The top part of the ash is usually enriched in organic matter, which also contributes nitrogen, potassium and mycorrhizae to this part of the soil. The lower part of the volcanic ash has less organic matter and is not as fertile as the upper part. The ash has a high water holding capacity and nutrient-holding capacity, both of which are important for soil productivity.

Below the volcanic ash, the subsoil and substratum tend to be medium textured in the Belt, metasedimentary soils. These subsoil and substratum materials are very weakly weathered. They tend to have a high component of rock fragments, although this can be quite variable, particularly in the alluvial bottoms and outwash materials (PF Doc. SOIL-17).

Most of the productivity of all Resource Area soils is found near the soil surface. This is also the part of the soil that is most easily disturbed by management activities. Retaining large woody debris and organic matter is important to maintaining this productive layer (Graham et al., 1994; PF Doc. SOIL-32).

C. Past Logging Activities

Past management activities within the proposed treatment areas were queried from the District's Timber Stand Management Record System (TSMRS) database and checked against timber maps, aerial photographs, and ground surveys. Out of a total of 32 proposed treatment areas one unit has had previous harvest treatments. Unit 11 was commercially thinned as a seed production site using a skyline with no substantial impacts. Cable logging systems have been shown to produce minor (2%) detrimental impacts (Niehoff, 2002; PF Doc. SOIL-41) and (McIver and Star 2000, pp.11-16; PF Doc. SOIL-37). The unit is proposed for only underburning to reduce brush and improve browse. Other logging activities have occurred in the resource area, but are not associated with any of the proposed treatment sites. These treatments total 158 acres and were either shelterwood or commercial thins using skyline or cable yarding systems.

Logging has occurred on private lands within the Twomile Resource Area (page R2-2). The typical practice on these lands is to leave submerchantable stands after being logged by either tractor, cable or helicopter methods. Over the last twenty-five years it is estimated that 80 percent of the private lands within the Twomile Resource Area has been harvested with most of the slash being left on site and not burned. The residual stocking follows State of Idaho Best Management Practices (BMPs). No regeneration harvest treatments have occurred on any of the private lands.

D. Existing Roads

The present road system that is designated as "classified" on the National Forest transportation system are considered dedicated lands and total 8.6 miles within the Twomile Resource Area. There are approximately 21 miles of unclassified roads, the majority of which were created during bulldozer mineral exploration activities or access to core drilling sites. On the private lands there are approximately 6 miles of roads. Roads are classified as either dedicated (under the area transportation plan) or non-dedicated (unclassified roads that are not considered necessary for long-term forest management objectives). In both cases the loss of soil productivity on transportation routes and unclassified roads is considered irretrievable.

E. Potassium Limitations

Potassium limited areas are attributed to non-carbonate bearing argillites and siltites within Belt Series bedrock and could potentially reduce tree growth and increase susceptibility to root disease (Garrison et al. 2001; PF Doc. SOIL-31). Although pockets of root disease occur throughout the Resource Area and may correlate with specific geologic formations, its cause can be initiated by a variety of environmental factors. Research by the IFTNC continues to look at the bedrock lithology and the weathering characteristics in relationship to available potassium (Mika, 2005, PF Doc. SOIL-64; Shaw, 2005, PF Doc. SOIL-65).

The recommendation for all fuels reduction management is to allow the slash to over winter before the unit is burned. In harvest treatment areas treetops are to be lopped/scattered and allowed to over winter before underburning occurs. Adjacent to private residences fuel breaks will be hand piled and left to over winter. This would allow most of the foliar potassium to leach from the fine vegetative debris and reduce potassium volatilization (Baker et al. 1989, PF Doc. SOIL-65; Edmonds 1987, PF Doc. SOIL-56; Garrison and Moore, 1998, PF Doc. SOIL-30; Laskowski et al. 1995, PF Doc. SOIL-57; Palviainen et al. 2004, PF Doc. SOIL-59;). For additional information refer to the Twomile EA (Chapter 2, Features Designed to Protect Soils and Site Productivity).

F. Potential for Erosion

The potential for soil erosion concerns on the Coeur d'Alene River Ranger District is not so much associated with harvest treatments, but with existing roads (Cacek, 1998; PF Doc. SOIL-27). Landtypes within the Resource Area have a predominately low to moderate erosion hazard potential, as displayed in the following table.

Table 3-SOIL-1. Percentage of sensitive landtypes in the Twomile Resource Area, and their potential for erosion hazards. Includes lands under private or other ownership.

Surface Erosion Potential			Sediment Yield Potential			Mass Failure Potential		
Low	Moderate	High	Low	Moderate	High	Low	Moderate	High
100	0	0	52	12	36	52	4	8

Soil disturbance factors associated with skyline/cable and helicopter yarding range from 0 to 2 percent with most of the disturbance being caused by the dragging of logs on the ground prior to becoming suspended. Tractor yarding can produce soil disturbance levels that are much greater when not restricted to properly spaced skid trails or additional ground protecting measures such as slash mats or winter logging. When working on initial entry ground with skid trails spaced at 100 feet, the expected disturbance averages 8 percent for ground based skidding.

3.5.4 Environmental Consequences

A. Effects to Soil Productivity Common to All Alternatives

Given the decades of fire suppression that have occurred in the Resource Area, the chance of a lethal wildfire occurring again could be high if an ignition starts in an untreated area during extreme, dry weather conditions. As stated in the Fire and Fuels section, the proposed vegetation and fuels treatment in the Resource Area would not necessarily prevent lethal wildfires from occurring, but would increase the ability to suppress such a fire should the ignition occur in the treated areas. Vegetation and fuels treatments would reduce the chance that a wildfire could have as severe an effect on the soils in treated areas as it could in untreated areas because there would be a reduction in the tons per acre of fuels on those treated sites.

The occurrence of a high intensity wildfire would have a high potential for impacts to soils and soil productivity in severely burned areas, especially since the risk of soil erosion and damage increases proportionally with fire intensities (Megahan 1990, p. 146; PF Doc. SOIL-38). Ashes that have burned to a white or a reddish color indicate that much of the organic carbon has been oxidized and is no longer available to the soil. Other effects would include the loss of organics, loss of nutrients and a reduction in water

infiltration (Wells et. al. 1979, p. 26; PF Doc. SOIL-50). When soil moisture content is low, burns can create high surface temperatures that can result in a complete loss of almost all of the woody debris and usually the entire organic layer, exposing mineral soil. Nutrients stored in the organic layer, such as potassium and nitrogen, can also be lost through volatilization and as fly-ash (DeBano 1991, pp. 152-153; PF Doc. SOIL-29) and (Amaranthus et. al. 1989, p. 48; PF Doc. SOIL-25).

If hydrophobic soils resulted from severe, high temperature fire, moderate surface erosion would occur, but the potential for mass failures would be low because of the Twomile Resource Area's overall landtype characteristics. The areas of primary risk after a severe burn are toe slopes adjacent to streams, stream banks and possible debris flows. Following a severe fire, rehabilitation efforts to mitigate the fires effects on erosion and sediment delivery would be performed as funding became available. If completed in a timely manner rehabilitation work could negate most of the erosion concerns.

B. Effects to Soil Productivity Under The No Action Alternative (Alternative 1)

No direct effects to the soil resource would occur in Alternative 1 since there would be no road construction, logging or fuel treatment activities. Throughout the silvicultural landscape tree mortality from pathogens and weather events would continue as in the past, which have a direct influence on the area's recycling of organic matter and changes in fuel loading. In moist habitat sites the increase in organic matter is a benefiting function to overall soil productivity. In dry habitat types increases of organic matter may result in a negative response. Soil damage risks could increase as fuel loading levels rise followed by a high severity fire. The effects of such a fire would result in a greater loss to the soil's organic matter, nutrient availability, and reduced water infiltration, which effects soil productivity. In addition the effects of such a fire followed by heavy storms could greatly increase surface erosion and sediment deliveries.

Under the No Action Alternative, no new management-induced detrimental impacts would occur in the Twomile Resource Area. Stands currently at high risk for mortality would not be treated, which may increase the risk of stand loss due to wildfire (see above), severe burning, and loss of soil nutrients. Moreover, the introduction of weeds and unwanted flora following a fire could lead to higher competition between less desirable and native vegetation. In the absence of such a hot fire, nutrients would be retained on site. However, stand conversion back to more site-appropriate tree species would be delayed relative to the action alternatives. No direct effects to soils would occur under the no action alternative as no road construction, logging, or fuels treatment would occur. There would be no compaction or displacement beyond existing levels. On existing roads, no change in use or management would occur in the foreseeable future.

C. Effects to Soil Productivity Under the Action Alternatives 2 and 3

Minor disturbances would occur on skyline and helicopter yarded harvest units and where hand line is constructed around specified units. Forest monitoring indicates these activities result in minor detrimental effects (USDA 1991; PF Doc. SOIL-47). Activity areas that propose tractor yarding, new roads, or road reconstruction, and new helicopter landings would have the highest probability of detrimental effects to the soil resource. These disturbances can range from over 12 percent to irretrievable. Skyline and helicopter logging systems that are proposed in conjunction with spring underburning and no new road construction would have much lower detrimental effects, usually 1 to 3% (Niehoff 2002; PF Doc. SOIL-41; see Table 3-SOIL-2 at the end of the Soils section).

Potential for Erosion: Under Alternatives 2 and 3, Activity Areas (Units) 7, 21, 30, 31, 37c, 37d and 37e each have portions that rate high in sediment yield and mass failure potential (Map, PF Doc. Soil-22). The proposed harvest treatment is commercial thinning with helicopter yarding in four activity areas and skyline yarding in the remaining three areas. These yarding techniques result in minimal soil disturbance. The silvicultural thinning treatments would retain a stocked stand, which will maintain rooting strength and evapotranspiration across the activity areas (please refer to Chapter 2, Tables 2-7 and 2-8 for percent of tree canopy retained). In this manner soil strength would continue with no concerns from mass failure or sediment yields (Megaham, 1990; PF Doc. SOIL-38). A portion of Activity Area (Unit) 5 under Alternatives 2 and 3 rates high in sediment yield. Because skyline yarding is proposed for the activity area there would be minimal effects to the surface organic layer. There would be no erosion or mass failure concerns in any of the

proposed activity areas.

Effects of Road Construction: The new road construction proposed under Alternative 2 (1.9 miles) and 3 (1.0 miles) would result in an irreversible effect to site productivity due to compaction and displacement. Under either alternative, the new roads would be identified as a capital investment and added to the District's permanent transportation plan as National Forest system roads.

Effects of Decommissioning Existing Roads: Road decommissioning under Alternatives 2 and 3 would include front-end obliteration, ripping, recontouring the road prism, woody debris barriers and culvert removal. Fill slopes would be stabilized and stream channel crossings restored to their natural grade. Where necessary, grass seeding, fertilizing and additional woody debris would be applied across the disturbed areas. This method of rehabilitation would begin to reduce compaction of the soil and return a portion of the topsoil to the surface, which helps restore soil productivity and decreases hydrologic effects from road surface runoff. For additional information on road decommissioning, please refer to the RAPs document in the Project Files (Table 5.1; PF Doc. TRAN-1). The work is dependent upon funding and if carried forward, fill slopes would be stabilized and stream channel crossings restored to their natural grade. Where necessary, grass seeding, fertilizing, and additional woody debris would be applied across the disturbed areas. This method of rehabilitation would initiate the recovery of soil productivity and decrease road surface runoff. At this time most of the unclassified roads are moderately to heavily brushed in and are considered to have no affect to the hydrology of the Resource Area (Beschta 1978, p. 1015; PF Doc. SOIL-26 and FSH 5409.17-94-2).

Effects of Road Storage: Road management under both Alternatives 2 and 3 would designate up to 12.6 miles of roads for storage once all project work is completed (storage means the road is closed to motorized traffic, and the roads are considered self-maintaining). As the stored roads brush in, erosion and sediment delivery decline over time and pose little to no resource risk (Beschta 1978, p. 1015; PF Doc. SOIL-26) and (FSH 5409.17-94-2). These roads can be reopened for future management if needed. These roads remain on the landscape as an irretrievable disturbance until such time that they are fully decommissioned. For additional information on road storage, please refer to the RAPs document in the Project Files (Table 5.3, PF Doc. TRAN-1).

Effects of Road Maintenance: No additional soil impacts would occur from proposed road maintenance activities such as blading, drainage improvements and surfacing on existing dedicated roads. Where a culvert is upgraded or removed, there will be short durations of increased sediment yields while in-stream work is accomplished.

Effects of Additional Trail for Motorized Use: An additional 4.4 miles of ATV/motorcycle trails are proposed to be added to the existing motorized trail system in the Twomile Resource Area. The additions would be developed primarily on existing bulldozer mining exploration roads and would incorporate a segment of National Forest system road. These developments would have a minimal effect to soils in the Twomile Resource Area. For additional information on these trails, please refer to the RAPs document in the Project Files (Table 5.1, PF Doc. TRAN-1).

Effects of Harvest Treatments: The analysis assumes that all proposed harvest treatments would occur during non-winter conditions when the disturbance potential would be the greatest. If some harvest units were logged during the winter months, the effects from compaction and soil displacement could be reduced (Krag 1991, p. 64; PF Doc. SOIL-36).

Under Alternatives 2 and 3, proposed management activities would increase detrimental soil disturbances (specifically related to soil compaction and displacement), especially where roads and landings are proposed. There would be no increase in detrimental impacts in the proposed burn-only units (see Chapter 2, Tables 2-7 and 2-8). For all of the proposed harvest treatments, 19 units have an average predicted detrimental effect of 2.3 percent, with the highest being 4.8 percent in unit 31. This higher percentage is primarily the result of past bulldozer mining exploratory roads within the unit. The highest harvest equipment related disturbance is associated with 6 acres of incidental tractor ground in unit 29 (34 acres) and will account for a 13 percent disturbance on the 6 acres. See Table 3 Soil-2 for a list of soil disturbance conditions.

Other than incidental tractor use on a portion of Unit 29, all proposed harvest units would have minor disturbance due to the predominant use of skyline and helicopter yarding. Forest monitoring indicates these activities result in minor detrimental effects (USDA 1991; PF Doc. SOIL-47).

The effects from four proposed helicopter log-landing sites have been calculated into the overall effects related to the proposed harvest treatments. Helicopter landings average one acre in size; disturbance to these sites from compaction, displacement, and pile burning are considered irreversible effects. All of the proposed helicopter landings would become dedicated lands for future use once the project's activities have ended. The landings are classified as a capital improvement in the same manner as a National Forest system road and are not considered as part of the Resource Area's cumulative disturbance level.

On all proposed harvest sites, the logging slash would remain within the unit and be allowed to over winter one or two seasons before underburning. This would allow the foliage and branches to leach into the soils organic layer to recycle nutrient capital, especially potassium and nitrogen.

The commercial thinning of Douglas-fir in association with leaving ponderosa pine would allow the release of stored foliar potassium from the Douglas-fir as a benefiting nutrient for up take by the ponderosa pine (Moore et al 2004, PF Doc. SOIL-58; Johnston, 2005, PF Doc. SOIL-66). Ponderosa pines are more potassium efficient trees and would be planted throughout the units where ponderosa pine is a primary stand component. Where ponderosa pine is not a primary stand component white pine and larch would be planted, which are also more potassium efficient than Douglas-fir.

Effects of Prescribed Burning and Slash Disposal: Under Alternatives 2 and 3, all units after harvest/slash activities are complete would have underburning or hand piling except for unit 34, which would be chipped. The burning especially in the fuel reduction only units would reduce the fuel loadings to a manageable level. Slash would remain in each unit (instead of being whole-tree yarded to the landing). There would be some incidental piling of materials at landings as logs are processed for transport. In either case the residual tops, branches and foliage would be allowed to over winter, giving the leaching process enough time to recycle nutrients before the areas are burned. Before ignition can take place, the soil moisture is to be 25 percent or greater, which would reduce the potential for soil resource damage. There is a risk that detrimental effects to the soil occur as a result of severe burning should the logging slash ignite with soil moistures below 25 percent and before the proposed fuel treatments are to be implemented.

D. Effects to Soil Productivity Under the Action Alternative 4

This alternative is proposed as a reintroduction of fire to dry-site ecosystems by slashing and then underburning. No direct effects would occur from new road construction or logging activities. The only effect is from prescribed fuel treatments in the more drier timber stands to reduce hazardous fuel loadings that have built up over the past 90+ years. Timber stands with variable ponderosa pine components would have their understories treated for slash and then underburned. The underburning treatment would be carried out on 11 proposed units that total 309 acres. Also proposed are 28 acres of hand piling/burning and 31 acres of chipping or lop/scatter with no burning.

To retain potassium levels, all slash treated areas would be left to over winter, which allows the foliage, small branches and fine litter to leach out the foliar potassium (Baker et al. 1989, PF Doc. SOIL-55; Edmonds 1987, PF Doc. SOIL-55; Garrison and Moore 1998, PF Doc. SOIL-30; Laskowski et al. 1995, PF Doc. SOIL-57; and Palviainen et al. 2004, PF Doc. SOIL-59). Before the areas are burned the soil moisture must be >25 percent. This would maintain the soil's surface organic layer integrity and its capacity to infiltrate water and also reduces the potential concerning severe burning to the soil resources (Niehoff 1985; PF Doc. SOIL-40). If these management concerns are followed, there would be little to no effect on the soil resource concerning the proposed fuel treatments. The proposed hand slashing and precommercial thinning work would not contribute to additional soil compaction.

E. Effects of Ongoing and Reasonably Foreseeable Activities on Soil Productivity

The majority of ongoing and reasonably foreseeable activities applicable to the soil analysis are fire suppression and native seeding. Helicopter landings and existing roads are dedicated lands for specific uses.

Successful fire suppression activities would eliminate the chance of a severe wildfire that could impact soil productivity. When suppression activities are needed, light hand line work causes minor effects to the soil and in some cases forms a seedbed opportunity. The use of large ground-based machinery for firebreak construction would increase the cumulative soil effects within the Resource Area. Steps are taken during post-fire rehabilitation work to avoid or ameliorate detrimental soil effects.

Noxious weed treatment and timber stand improvement would not be a concern to the soil resource, since large equipment or fire use is not required. Future salvage opportunities can occur, but they have to meet and are guided by specified soil protection guidelines. Firewood gathering and hunting activities create no soil impacts.

F. Effects of Opportunities on Soil Productivity

Wildlife and Watershed Improvements: Road decommissioning would accomplish two purposes. First, it would begin restoration of soil productivity on those impacted sites by reducing compaction of the soil. Proposed culvert removals will improve fish passages and remove the possibilities of increased alluvial erosion due to their failures. In some cases a culvert's removal effectively blocks the use of unclassified, drivable roads.

Effects of Noxious Weed Treatments: This would have a positive affect on soil productivity by reducing or eliminating competing vegetation that interferes with native vegetation.

3.5.5 Consistency with Forest Policy and Legal Mandates

All alternatives would comply with Forest Plan Standards related to detrimentally disturbed soils, maintaining or exceeding 80 percent of the area in a productive state. Soil disturbing management practices would not exceed 20 percent detrimental conditions and would maintain at least 80 percent of each activity area in a condition of acceptable productivity potential for trees and other managed vegetation. Large woody debris would follow the research guidelines of Graham et al. (1994; PF Doc. SOIL-32) to insure the maintenance of site productivity. IFTNC guidelines would ensure the retention of the maximum amount of potassium on sites after treatments.

***Table 3-SOIL-2*. Soil disturbance conditions by alternative.** *Proposed units displayed are only those with existing detrimental conditions or proposed units that have conditions which could cause detrimental changes of 1% or more. A complete list of units and their estimated disturbance levels is in the Project Files (Soils).*

Proposed Unit	Alternative 1 (Existing		Alternative 2 (Proposed Action)				Alternative 3				Alternative 4 (No Commercial Harvest)			
Unit #	Acres of Disturbed Soil	% of Activity Area	Unit Acres	Acres of Disturbed Soil	% of Activity Area	Cumulative Effects %	Unit Acres	Acres of Disturbed Soil	% of Activity Area	Cumulative Effects %	Unit Acres	Acres of Disturbed Soil	% of Activity Area	Cumulative Effects %
5	0.34	1.7	20	0.4	2	3.7	20	0.4	2	3.7	0	N/A	N/A	N/A
7	0.69	0.74	93	0.93	1	1.7	93	0.93	1	1.7	0	N/A	N/A	N/A
9	0.95	1.8	51	0.51	1	2.8	51	0.51	1	2.8	0	N/A	N/A	N/A
10	2.1	8.5	0	N/A	N/A	N/A	0	N/A	N/A	N/A	24	0	0	8.5
11	0.48	2	0	N/A	N/A	N/A	0	N/A	N/A	N/A	24	0	0	2
17	0.35	0.4	0	N/A	N/A	N/A	82	0.82	1	1.4	0	N/A	N/A	N/A
20	0.69	5	0	N/A	N/A	N/A	0	N/A	N/A	N/A	13	0	0	5
23	0.51	2.2	23	0.28	1.5	3.7	23	0.23	1	3.2	0	N/A	N/A	N/A
24	0.26	1.2	0	N/A	N/A	N/A	22	0.22	1	2.2	22	0	0	1.2
25	0.38	2	0	N/A	N/A	N/A	0	N/A	N/A	N/A	19	0	0	2
27	2.8	3.5	78	0.78	1	4.5	61	N/A	N/A	N/A	0	N/A	N/A	N/A
29	0	0	34	1.1	3.1	3.1	34	0.34	1	1	0	N/A	N/A	N/A
30	0.38	0.65	58	0.58	1	1.65	58	0.58	1	1.65	0	N/A	N/A	N/A
31	2.4	3.8	63	0.63	1	4.8	63	0.63	1	4.8	0	N/A	N/A	N/A
34	0.95	10.5	0	N/A	N/A	N/A	0	N/A	N/A	N/A	9	0	0	10.5
36A	0	0	36	0.72	2	0	0	N/A	N/A	N/A	0	N/A	N/A	N/A
37A	0	0	10	0.19	2	0	0	N/A	N/A	N/A	0	N/A	N/A	N/A
37B	0	0	25	0.51	2	0	0	N/A	N/A	N/A	0	N/A	N/A	N/A
37C	0	0	17	0.34	2	0	0	N/A	N/A	N/A	0	N/A	N/A	N/A
37D	0	0	16	0.32	2	0	0	N/A	N/A	N/A	0	N/A	N/A	N/A
37E	0	0	10	0.2	2	0	0	N/A	N/A	N/A	0	N/A	N/A	N/A
	dedicated		4 landings = 4 acres dedicated				4 landings = 4 acres dedicated				0 landings = 0 acres dedicated			
	0 road construction = 0 acres dedicated		1.9 Miles = 8.5 AC Dedicated				1.0 Miles = 4.5 AC Dedicated				0 road construction = 0 acres dedicated			
	Total proposed disturbance = . 0 acres		Area Harvested = 731 acres Area Treated = 1,103 acres Past Disturbance = 8.1 acres Proposed Disturbance = 8.6 Acres AverageDisturbance Per Unit = 2.4%				Area Harvested = 804 acres Area Treated = 1,129 acres Past Disturbance = 5.9 acres Proposed Disturbance = 8.2 acres Average Disturbance Per Unit = 1.7%				Area Harvested = 0 acres Area Treated = 374 acres Past Disturbance = 4.9 acres Proposed Disturbance = 0 acres Average Disturbance Per Unit = 1.3%			

Table 3-SOIL-3. Geology of proposed activity areas and possible potassium deficiencies in the Twomile Resource Area.

Alternative 2			Alternative 3			Alternative 4		
Unit	Formation	Possible Potassium Deficient Soils?	Unit	Formation	Possible Potassium Deficient Soils?	Unit	Formation	Possible Potassium Deficient Soils?
1	Burke	No	1	Burke	No	1	Burke	No
2	Burke	No	2	Burke	No	2	Burke	No
3	Burke	No	3	Burke	No	3	Burke	No
5	Burke 75% Intrusive 25%	No	5	Burke 75% Intrusive 25%	No	6	Burke	No
6	Burke	No	6	Burke	No	10	Prichard	Yes
7	Burke	No	7	Burke	No	11	Burke	No
9	Prichard	Yes	9	Prichard	Yes	13	Prichard	Yes
10	Prichard	Yes	10	Prichard	Yes	20	Prichard	Yes
11	Burke	No	11	Burke	No	21	Prichard	Yes
12	Prichard	Yes	12	Prichard	Yes	22	Prichard	Yes
13	Prichard	Yes	13	Prichard	Yes	24	Prichard	Yes
20	Prichard	Yes	15	Burke 85% Prichard 15%	No 85% Yes 15%	25	Prichard	Yes
21	Prichard	Yes	16	Burke 25% Prichard 75%	No 25% Yes 75%	32	Burke	No
22	Prichard	Yes	17	Prichard	Yes	34	Prichard	Yes
23	Prichard	Yes	18	Prichard	Yes	35	Prichard	Yes
25	Prichard	Yes	19	Prichard	Yes			
27	Prichard	Yes	20	Prichard	Yes			
28	Prichard	Yes	21	Prichard	Yes			
29	Prichard	Yes	22	Prichard	Yes			
30	Prichard	Yes	23	Prichard	Yes			
31	Burke 75% Prichard 25%	No 75% Yes 25%	24	Prichard	Yes			
32	Burke	No	25	Prichard	Yes			
33	Prichard	Yes	27	Prichard	Yes			
34	Prichard	Yes	28	Prichard	Yes			
35	Prichard	Yes	29	Prichard	Yes			
36a	Prichard	Yes	30	Prichard	Yes			
36b	Prichard	Yes	31	Burke 75% Prichard 25%	No 75% Yes 25%			
37a	Burke	No	32	Burke	No			
37b	Burke	No	33	Prichard	Yes			
37c	Burke 66% Prichard 34%	No 66% Yes 34%	34	Prichard	Yes			
37d	Burke 50% Prichard 50%	No 50% Yes 50%	35	Prichard	Yes			
37e	Burke 50% Prichard 50%	No 50% Yes 50%						

↓REVISED WILDLIFE INFORMATION↓

The Regional Forester issued a revised list of Sensitive species in October 2004, and U.S. Fish & Wildlife Service released an updated list of Threatened and Endangered wildlife species in March 2005. As a result, there are two additional Sensitive wildlife species that need addressed (pygmy nuthatches and fringed myotis), and one species that was added to the list but does not need to be addressed in the Twomile Resource Area (Black Swift), as discussed below. All of Section 3.6.3 from the Twomile EA is incorporated into this revised EA. In addition, the following subsections have been added to describe additional analysis based on the 9th Circuit Court ruling. There are no changes to the analysis or determination of effects to other wildlife species addressed in the 2004 Twomile EA.

3.6.2 Methodology

A. Introduction

USDA Forest Service policy (Forest Service Manual 2670.32) requires a documented review of Forest Service programs or activities in sufficient detail to determine how an action may affect threatened, endangered, candidate, or sensitive species. This environmental assessment serves as the primary **biological evaluation (BE)** for sensitive wildlife species. Effects to wildlife species listed under the Endangered Species Act are addressed separately in a **biological assessment (BA).** Consultation with the U.S. Fish & Wildlife Service has been ongoing throughout the planning and design of this project. The BA will be completed based on the alternative selected for implementation, with review and concurrence by the U.S. Fish & Wildlife Service.

Much of the wildlife analysis is tiered to the following documents and information, which provide the primary direction and methods used to develop the analysis for potential effects on wildlife**:**

- *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin*
- *Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin*
- *The Road Analysis Process and the District Travel Plan*
- *Recorded species observations*
- *Suitable and potential habitat models and field validation of these habitats*
- *Applicable scientific research, literature, management recommendations and conservation strategies*

The wildlife analysis is done at different levels (ranging from coarse filter to fine filter) as appropriate to address issues and concerns relative to each species. According to CEQ regulations, the level of analysis should be commensurate with the importance of the impact, the risk associated with the project, the species involved, and the current level of knowledge (CEQ 1502.15). Species for which it has been determined there would be no measurable effects are not analyzed in detail.

Direct, indirect, and cumulative effects are disclosed by alternative and by species (please refer to the Twomile EA, Chapter 2 for a list of ongoing and reasonably foreseeable projects). For each wildlife species analyzed, the cumulative effects analysis area has been identified based on the species' or guilds' relative home range size in relation to available habitat, topographic features that affect how species move and utilize their home range (such as watershed boundaries), and boundaries that represent the furthest extent of effects. Maps depicting wildlife habitat by species are provided in the project files (PF Docs. WL-7, 8, 44, 45, 46, 47, 48, 49, and 50).

Based on habitat relationships, appropriate indicators of habitat with a potential to be impacted by the proposed action have been measured. Queries of the Timber Stand Management Records System database

(TSMRS) were used to identify capable and suitable habitat within each wildlife analysis area (PF Doc. WL-3, 18, 22, 24 and 30). This data is supported by species observation records, field verification, and field surveys for specific species and habitats. Field verification is provided in the Project Files (PF Doc. WL-16, WL-17, WL38, WL-39, WL-40, WL-57, WL-58, and VEG-36).

Walk throughs by a wildlife biologist was a process of visual verification to confirm stand characteristics of preferred habitats as described in PF doc. WL-25 and model queries (PF doc. WL-26) matched on-ground characteristics (PF Doc. WL-16, WL-57, WL-58). Changes in habitat for each relevant species are disclosed with a discussion of the effects on species. Basal area in TSMRS was the criteria used to find canopy closures required by species (PF. Doc. WL-25 & WL-26). Basal area for the flammulated owl was a range of 34-139, for the fisher the basal area was $\geq$ 266.

B. MIS Habitat Model Validation

The IPNF has developed Forest-wide wildlife habitat capability/suitability model for Threatened, Sensitive and Management Indicator species or species guilds (Canada lynx, flammulatd owl/pygmy nuthatch, fisher, Northern goshawk, and elk). In order to validate these models, Forest Service personnel conducted site visits of representative capable habitat for these species, with emphasis on stands modeleed as "currently suitable." Some proposed treatment areas potentially include suitable habitat for one or more species addressed in the model; most of these areas were not visited if they were determined to be obviously suitable or unsuitable for modeled species based upon field notes and unit descriptions provided by a District forester or verification by aerial photo interpretation.

Capable habitat is determined by habitat type and topographic factors. Since these do not change over time, the data offers reliable information on habitat capability. Descriptions of how data used in wildlife habitat suitability models were validated for each species, as follows:

Flammulated owl/Pygmy Nuthatch: The habitat suitability index (HSI) model uses vegetation characteristics to determine if stands are currently suitable flammulated owl nesting/foraging habitat (ref: Habitat descriptions & IPNF Wildlife Queries; PF Doc. WL-25, WL-26). The habitat capability index model identified 1,716 within the Two Mile Resource Area as capable habitat. An additional 642 acres were identified as suitable flammulated owl/pygmy nuthatch habitat. The biologist primarily surveyed suitable habitat acres (PF Doc. WL-16) and compared visited acres to non-visited acres with aerial photo comparisons. The purpose of the visits between November 20, 2002 and August 13, 2003 was to visually validate that the acres the model extracted from TSMRS met the needs of the flammulated owl and pygmy nuthatch. The biologist noted that the stands provided large ponderosa pine, patchy grass understories, stands of brush, and an open growing character to the stands. These characteristics were validated in the field surveys. The suitable habitat acres identified by the model were consistent with the requirements of these species. In addition, several night calling surveys for flammulated owl occurred (PF Doc. WL-38, WL-39 & WL-40). No responses were detected.

Northern Goshawk: Suitable Northern goshawk nesting habitat was initially determined using the Forest-wide HSI model (PF Doc. WL-25 & WL-26). No suitable habitat was identified for the Northern goshawk. Capable habitat for the goshawk was identified on 395 acres. Much of the validation for the lack of goshawk habitat was done using aerial photography and forester's reconnaissance notes. Moist habitats with large trees (goshawk habitat) are generally lacking in the Two Mile Resource Area. Large trees are found primarily on the dry sites within this resource area, which in northern Idaho, are not used by nesting goshawks. To further validate the lack of habitat calling surveys were done along Two Mile Creek and in the headwaters of Two Mile Creek, where capable habitat was identified. No responses by goshawks were detected (PF Doc. WL-16).

Fisher/Marten: Within the Two Mile Resource Area 3,852 acres of capable fisher habitat was identified through the Habitat Suitability Index Model. None of the habitat currently met the needs of the fisher and none was identified as currently suitable. Validation of the lack of suitable habitat was done using field reviews and discussion with GIS specialist, Siliviculturist, and assistant forest biologist (PF Doc. WL-17).

In summary: Moist habitats within Two Mile Resource area lacked size class of MHRS, MLRS, or SAWT. In addition, the capable stands lacked trees in the greater than 20" diameter size class. Approximately 2/3s of the capable stands would provide suitable fisher habitat in 25-50 years.

Elk: The elk model relies on security acres within a resource area, road density, cover/forage ratio, and distance to cover. Components of the model were verified using information provided by the transportation specialist regarding road densities and condition (PF Doc. WL-10, WL-11, WL-12). Security was calculated using GIS data (PF Doc. WL-8). This model does not rely on TSMRS data. Biologist verified road and security status.

3.6.3 Affected Environment and Effects to Wildlife

M. Pygmy Nuthatch (Sensitive Species)

Life History of Pygmy Nuthatch

Pygmy nuthatches are non-migratory and only move short distances (Ghalambor, 2003 WL-R102). Pygmy nuthatches are primary cavity nesters and can excavate their own nesting structure or use existing holes. Flammulated owls are secondary cavity nesters relying on medium to large woodpecker species (such as flickers, sapsuckers and pileated woodpeckers) to excavate their nesting cavity (Reynolds et.al. 1987; PF Doc. WL-R45).

Management Recommendations for Pygmy Nuthatches

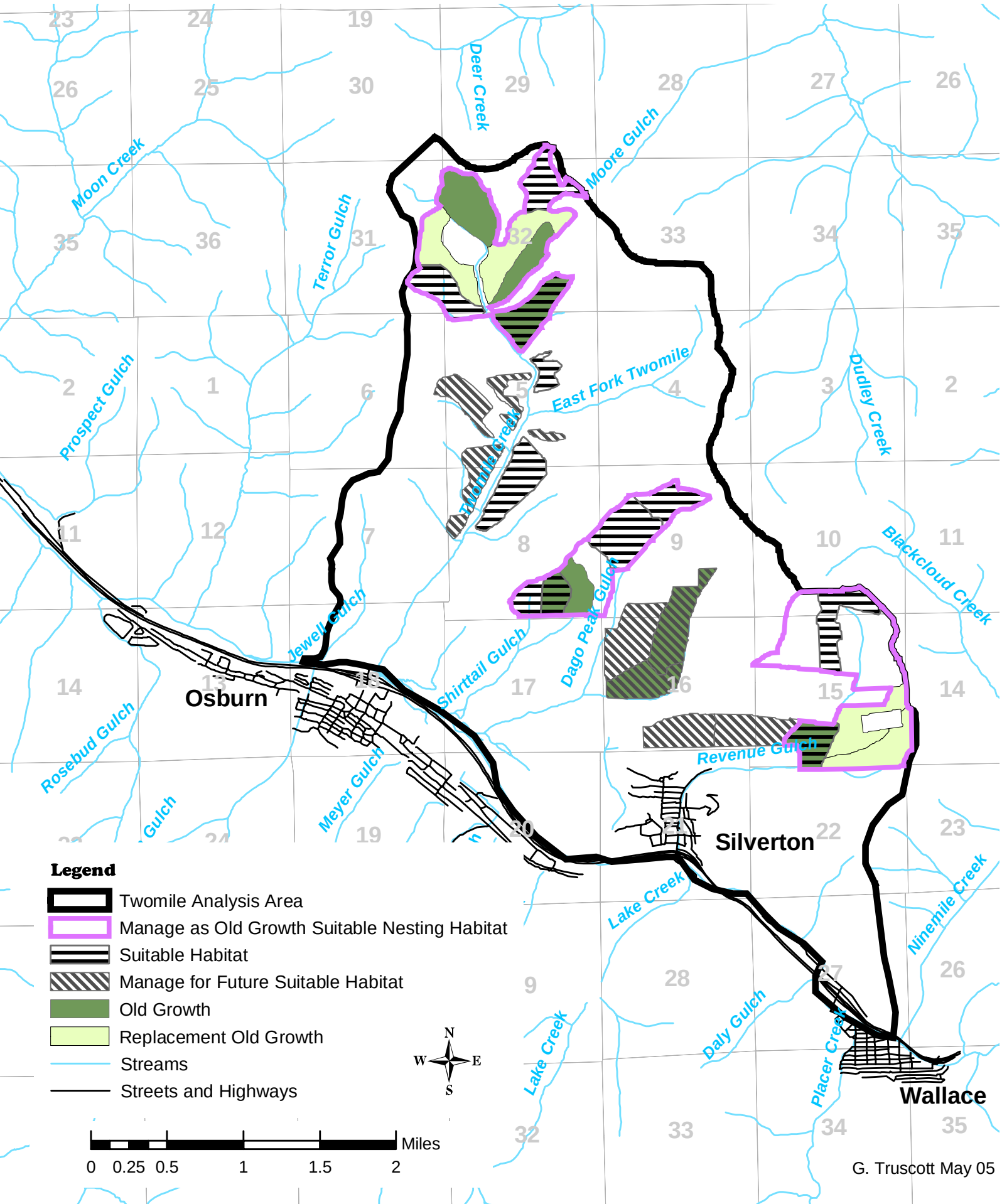
Pygmy nuthatches appear to require well-spaced, old pines and vigorous trees of intermediate age (Balda et. al. 1983 in Ghalambor, 2003, PF Doc. WL-R102). Snags are very important to the pygmy nuthatch, not only for nesting but also for their communal roost sites (Sydeman et. al. 1988, PF. Doc. WL-R103). Pygmy nuthatches are very sensitive to extreme cold and cavity openings almost always face the south or east (Ghalambor, 2003, PF Doc. WL-102). Based on these studies, in order to maintain suitable habitat for pygmy nuthatches, silvicultural prescriptions should lead to the retention of old ponderosa pine with an average of 20 inches in diameter (minimum 17 inches) such that upper canopy closure ranges from 35 to 55 percent. Region 1 protocols for snag retention are used to maintain sufficient snag habitat in areas where forest management occurs (USDA 2000; PF Doc. WL-R54).

Reference Condition for Pygmy Nuthatches

There are no historical records of these species specifically, but the Interior Columbia Basin Assessment (Quigly et.al. 1996; PF Doc. WL-R44) found that the amount of interior ponderosa pine forest maintained by frequent, low intensity fires has declined by 80 percent. A regional study by the National Fire Plan Cohesive Strategy Team in Region 1 (2002; PF Doc. WL-R69) suggests that 12-18% of the historical pine stands currently exist.

The Geographic Assessment determined that historic amounts of dry-site large/mature and old growth ponderosa pine and large, old Douglas-fir were more common in the Coeur d'Alene River Basin than under current conditions. Records for the Coeur d'Alene Basin and the Twomile Resource Area indicate that open ponderosa pine stands had a larger distribution than today throughout the Resource Area and across the IPNF. Historic photographs of the Rathdrum Prairie indicate much larger and continuous stands of ponderosa pine with a well-stocked larger diameter overstory was found at the lower elevations in the Coeur d'Alene Basin. Historically, the Rathdrum Prairie provided habitat. It is expected that there were greater numbers, larger distribution and more stable populations both locally and on the broad scale at that time. Much of the historic ponderosa pine habitat on the Rathdrum Prairie is now gone due to agriculture and urban expansion. This loss of habitat places greater importance on national forest dry forest habitat like that found in Twomile.

Twomile Flammulated Owl & Pygmy Nuthatch Habitat and Old Growth



Affected Environment for Pygmy Nuthatches

Ponderosa pine and Douglas-fir stands in the watershed appear to provide some of the best pygmy nuthatch habitat found on the Coeur d'Alene River Ranger District. Ponderosa pine is the primary component on dry ridges. In stands lower on the slope, ponderosa pine is widely scattered with encroaching Douglas-fir and grand fir. Field surveys found very large, old ponderosa pine scattered throughout the Twomile Resource Area, many surrounded by stands of Douglas-fir (Figure 3-WL-13). Some of these ponderosa pine trees are 40 to 50 inches in diameter. Habitat modeling shows 905 acres of suitable pygmy nuthatch habitat (the same as that for flammulated owls) in the Twomile Resource Area (PF Doc. WL-22, WL-57, WL-58). There are 1,903 acres of potential habitat that could become suitable for these species over the long-term. Potential habitat includes all suitable habitat. Pygmy nuthatches were given a moderate probability of occurrence in the resource area because there are large blocks of suitable habitat, and potential habitat exists, but no sightings of the species have been reported within the Two Mile Resource Area.

No surveys have been conducted for the pygmy nuthatch because of its recent listing; however there have been sightings of this species on the Coeur d'Alene River Ranger District.

Environmental Consequences to Pygmy Nuthatches

Habitat for these species was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS). Field and aerial photo verification was done by the wildlife biologist for the habitats queried with the timber stand data bases (PF Doc. WL-16, WL-26, WL-57, WL-58). Field surveys reviewed tree species composition and size class, canopies, grass and shrub understories and presence of cavities (PF Doc. WL-16, WL-58). Specifics of the model can be reviewed in the wildlife project file (PF Doc. WL-26). Impacts were assessed by predicting changes in current habitat and snag availability under each alternative.

Table 3-WL-14. Suitable Pygmy Nuthatch habitat that would be reduced to potential habitat after implementation of alternatives.

	Alternatives 1, 2 and 4	Alternative 3	Amount of Change
Suitable Habitat	642	497	- 145 acres
Potential Habitat	1,716	1,861	+ 145 acres

Direct and Indirect Effects Under Alternative 1: There would be no short-term change to suitable or potential pygmy nuthatch habitat under the No-Action Alternative. Over time, database modeling shows that stands would decrease in canopy closure. Stands that now have 60 percent canopy closure are predicted to decrease to half that over the next fifty to one hundred years as a result of mortality related to current high insect and disease occurrence in the resource area (refer to the Forest Vegetation section of Chapter 3 for more detail). As these canopies decrease the stand would continue to provide habitat for the pygmy nuthatches until stand characteristics decline. Over the short term, this alternative would result in retention of all suitable habitats.

With reductions in the seed source and competition with Douglas-fir and other species such as grand fir, the potential for dry-site stands in the resource area to become suitable over the long term in the absence of management (under the no action alternative) is low. Due to the density of Douglas-fir and grand fir and the loss of fire tolerant species to harvest, seed sources have been lost. The potential for stand replacing fire would be highest under Alternative 1 (please refer to the Fire/Fuels section of Chapter 3 in the Twomile EA for further discussion).

The following action alternatives propose restoring fire as an ecological process in the watershed. Pygmy nuthatches are closely tied to dry-site ecosystems that evolved with fire. Any suitable or potential habitat for these species would benefit from the reintroduction of fire, which would maintain habitat. The long-term goal of this project is to restore fire adapted ecosystems. These are the habitats preferred by pygmy nuthatches. No snags are planned for harvest – in fact, fire is likely to create additional snags. Restoration of ponderosa pine would eventually benefit Pygmy nuthatches.

Direct and Indirect Effects to Pygmy Nuthatches Under Alternative 2: This alternative would establish large blocks of dry habitat old growth and suitable pygmy nuthatch habitat. The size of these blocks is based on the Montana Partners in Flight Bird Conservation Plan (2000, PF Doc. WL-R39), which recommends managing habitat in blocks large enough to accommodate multiple home ranges with suitable habitat. Alternative 2 would protect from harvest activities all **suitable** pygmy nuthatch habitat within the Twomile Resource Area.

There are a total of 487 acres of suitable pygmy nuthatch habitat and 748 acres of old growth. Blocks range in size from 161 to 446 acres (Old Growth/Flammulated Owl Habitat Patches, PF Doc. WL-20 and WL-21). These blocks would not be treated with any commercial harvest under Alternative 2 and are intended to provide pygmy nuthatch habitat for about the next 50 years, until the stands begin to fall apart and no longer meet the needs of these two species.

Approximately 57 acres of suitable habitat would be treated for fuels reduction with slashing and/or underburning. Ponderosa pine would be retained on the site and sapling Douglas-fir and grand fir are slashed. These stands would then be underburned. The ponderosa pine would increase in size over time and these stands would provide habitat for the pygmy nuthatch over the long term (50-150 years).

Various treatments would also occur in future (capable) habitat. These areas do not currently provide habitat for the pygmy nuthatch. Treatments would promote large ponderosa pine and some large Douglas-fir. Over the long term (50 to 100 years), these areas should provide suitable habitat for pygmy nuthatches.

Direct and Indirect Effects to Pygmy Nuthatches Under Alternative 3: Alternative 3 was designed to focus on reducing fuels in the wildland urban interface, not to provide old growth blocks for pygmy nuthatch nesting. Alternative 3 shows an increase in potential habitat because harvest would occur in some of the suitable habitat, which would reduce it to potential habitat. This alternative would treat 145 acres of suitable pygmy nuthatch habitat with shelterwood or group shelterwood harvest methods (Table 3-WL-14). The shelterwood harvest method alters pygmy nuthatch habitat by reducing canopies, understories and the Douglas-fir component. These stands would not provide suitable habitat for the pygmy nuthatch for a period of 50 to 100 years. In addition to the shelterwood treatments, 112 acres of suitable habitat would be slashed and underburned. It is not anticipated that this activity would impact pygmy nuthatch habitat. Historically pygmy nuthatch habitat burned at periodic intervals. Various treatments would also occur in future (capable) habitat. These areas do not currently provide habitat for the pygmy nuthatch. Treatment would promote large ponderosa pine and some large Douglas-fir. Over the long term (50 to 100 years), these areas should provide suitable habitat for pygmy nuthatches.

Direct and Indirect Effects to Pygmy Nuthatches Under Alternative 4: This alternative would treat stands with a combination of slashing and/or underburning. No commercial harvest would occur. Alternative 4 would have slash/underburn treatments in four suitable pygmy nuthatch stands totaling 95 acres. All large diameter trees would be retained. Underburning could result in some mortality of trees within the stand. These would still provide snags and structure within the stand. However, loss of canopy that could occur due to mortality could alter the stand characteristics and trend the area towards larger ponderosa pine. Historically, these dry-site stands were maintained by frequent low intensity ground fires that retained the seral species (usually ponderosa pine) and reduced understories. These stands would provide suitable pygmy nuthatch habitat in both the short and long term. Burning would also stimulate growth of brush species. Currently much of the brush in the Twomile Resource Area is tall and in a decadent condition. Burning should kill some of the older brush and produce new growth. These shrubs are host species for moths, which make up much of the pygmy nuthatches' prey base.

Cumulative Effects to Pygmy Nuthatches: Reduction in habitat for these species has occurred throughout the Coeur d'Alene River Basin, particularly on the Rathdrum Prairie and on lower elevation private lands in the Twomile Resource Area as a result of urban development and private timber harvest. Timber harvest, salvage logging, fuelwood gathering, road construction and fire suppression have all played a role in the declining size and distribution of stands that provided suitable habitat for the species on public lands.

Historically, lower elevation private lands likely had the best habitat for pygmy nuthatches in the Twomile Resource Area. Activities on private lands and reductions in ponderosa pine habitats on these private lands have probably contributed to decreased abundance of pygmy nuthatches and placed more importance on the dry forest habitat on National Forest System lands in the drainage. Today the value of open ponderosa pine stands, which evolved with fire, is becoming more widely recognized. Currently, most proposed projects in ponderosa pine habitats have the objective of restoring this conifer species and the ecological processes that maintain it. This should result in a trend towards improved habitat for wildlife species dependent on this habitat on both the small scale and the large scale.

Reasonably foreseeable precommercial thinning projects within the Twomile Resource Area will trend the area towards larger ponderosa pine, improving habitat for the pygmy nuthatch. Timber harvest on private lands will likely reduce mature dry forest habitat for the pygmy nuthatch within the Twomile Resource Area.

There would be no reduction in suitable habitat for the pygmy nuthatch with the implementation of Alternatives 1, 2 or 4 (Table 3-WL-5). **Implementation of Alternative 2 or 4 may impact individuals but would not trend the species towards listing.** (Alternative 4 may impact individuals due to the proposed burning activities.) Viability concerns would be addressed under either alternative, because there would be no reduction of the already below historic levels of suitable pygmy nuthatch habitat across the landscape. In addition, habitat would be provided to accommodate multiple nesting territories, R1 snag protocol would be followed (exceeding IPNF Forest Plan standards), dry site old growth would be maintained on the landscape, and 10% old growth would be maintained across the IPNF (USDA 2000; PF Doc. WL-R54)) (IPNF 1987; PF Doc. WL-R53, WL-41).

The same snag guidelines would be applied under all alternatives. However, Alternative 3 would reduce suitable habitat for the pygmy nuthatch by 145 acres. These treatment areas would not provide habitat for the pygmy nuthatch for approximately 50 to 100 years. This would be a substantial loss of habitat, since only 10% of historic habitat remains across the Coeur d'Alene River basin. The additional loss of suitable pygmy nuthatch habitat under **Alternative 3 would impact the pygmy nuthatch and trend the pygmy nuthatch towards listing.** Viability would not be assured under Alternative 3.

B. Fringed Myotis (Sensitive Species)

Life History of Fringed Myotis

Fringed myotis use caves, mines, and buildings as hibernacula and maternity roosts (PF Doc. WL-R100 Montana Animal Field Guide Schmidt 2003; WL-R101). Snags, especially those sloughing bark, are important day roost habitat for the fringed myotis (IBID PF Doc. WL-R101).

Management Recommendations for Fringed Myotis

Retention of snags in a buffer of .25 miles around adits should be implemented to protect day roost habitat adjacent to other habitats of the fringed myotis (Keinath 2004; WL-R104). Managing for large long-term snags, emulating historic fire regimes, and snag retention are recommended management practices (PF Doc. WL-R101). In addition, smoke management protects both species of bats that may be using adits (PF Doc. WL-56).

Reference Condition for Fringed Myotis

In northern Idaho, these bats primarily roost in abandoned mines. Loss and disturbance of hibernacula and roosting habitat are the limiting factors for the species.

Affected Environment for Fringed Myotis

There are many abandoned mines in the Twomile watershed that may serve as potential habitat (PF Doc. WL-48). Several surveys have been done on abandoned adits within the watershed (PF Doc. WL-35, WL-37). The Townsend's big-eared bat has never been documented to occur in the watershed. Although there has been no documented use of mines in the Coeur d'Alene Mountains by Townsend's big-eared bats, there is potential habitat and many adits have not yet been surveyed. Fringed bats have been documented using the Coeur d'Alene River Ranger District, although they have not been found within the Two Mile Resource Area. Several other bat species have been identified within the analysis area. Most abandoned mine sites on the Idaho Panhandle National Forests are cool and wet making them suitable for hibernacula, mating sites, bachelor roosts and night roosts (Sherwin 2003; PF Doc. WL-48). Derusseau (2003; PF Doc. WL-15) also found that other bat species were using mines on the Coeur d'Alene River Ranger District as foraging sites or night roosts.

Environmental Consequences to Fringed Myotis

Mining activities within the Twomile Resource Area have created bat habitat. This habitat is important on a broader scale since nation-wide natural (caves) bat habitat has been altered and, in some cases, lost. Some bat friendly closures have been installed within the Resource Area. Open adits on BLM and private lands within the Resource Area provide additional habitat. Some of the adits within the Resource Area will likely close naturally over time, as tunnels become unstable and eventually collapse.

Mitigation measures would ensure protection of the fringed myotis should it occur within the Twomile Resource Area. Therefore, the implementation of any of the alternatives **may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** Retaining snags at levels recommended in the R1 Snag Protocol and mitigations implemented to protect bats during burning operations (PF Doc. WL-56) will ensure viability of the fringed myotis.

C. Black Swift

Black swift (*Cypeloides niger)* is a Sensitive species that is present or has habitat on the Coeur d'Alene River Ranger District. However, there is no probability of occurrence in the Twomile Resource Area and the species and its' habitat would not be potentially affected by activities proposed in the Twomile Resource Area. Therefore, the species was not analyzed further in the Twomile EA (PF Doc. WL-56).

↓REVISED TES PLANT INFORMATION↓

The Twomile EA was released in May 2004; in October 2004, the Regional Forester released a revised list of Threatened, Endangered and Sensitive species. The new list included the following changes:

- *Ute ladies' tresses (a Threatened species) was dropped from the list*
- *Britton's Grimmia (a Sensitive species) was added to the list*
- *Henderson's sedge changed from a Sensitive Species to a Forest Species of Concern*
- *Naked Mnium(a Sensitive species) was added to the list*
- *Slender Moonwort changed from a Forest Species of Concern to a Sensitive Species*

In addition, field surveys for rare plants have been conducted in the Twomile Resource Area since the release of the EA in 2004, and updated information is provided for Spalding's catchfly. There are no changes to the analysis or determination of effects to other plant species addressed in the 2004 Twomile EA.

3.10.3 Existing Plant Conditions

The following discussions add information regarding existing conditions for the newly-listed Sensitive species and revises information regarding species that have recently been surveyed:

- *The Britton's Grimmia discussion should be inserted in the Twomile EA under10.3 Existing Plant Conditions, "Rare Plant Species With Potential for Effects From Project-Related Activities," "Moist Forest Plant Guild," directly above the Henderson's sedge discussion at the bottom of page 3-191.*
- *The Henderson's Sedge discussion should replace the existing information in the Twomile EA under 3.10.3 Existing Plant Conditions, "Rare Plant Species With Potential for Effects From Project-Related Activities," "Moist Forest Plant Guild," at the bottom of page 3-191.*
- *The Naked Mnium discussion should be inserted in the Twomile EA under 3.10.3 Existing Plant Conditions, "Rare Plant Species With Potential for Effects From Project-Related Activities," "Moist Forest Plant Guild," directly above the Slender moonworts discussion on page 3-192.*
- *The Slender Moonwort discussion should replace the existing information in the Twomile EA under 3.10.3 Existing Plant Conditions, "Rare Plant Species With Potential for Effects From Project-Related Activities," "Moist Forest Plant Guild," on the middle of page 3-192.*
- *The Spalding's Catchfly discussion should replace the existing information in the Twomile EA under 3.10.3 Existing Plant Conditions, "Rare Plant Species With Potential for Effects From Project-Related Activities," "Grassland Plant Guild," on the middle of page 3-193.*

Britton's Grimmia (*Grimmia brittoniae)* is a rare moss endemic to northwestern Montana and adjacent Idaho. It is known from only a few locations in the world, and is one of the rarest mosses in the interior Pacific Northwest (Greven and Spribille 1999, p.118; PF Doc. TES-40). It occurs in shaded cliff faces in moist forest on calcareous rock where seepage is present. The geological formations of the Twomile Resource Area are non-calcareous, and are unlikely to support this moss species. There is a remote chance that it may occur there.

Henderson's sedge (*Carex hendersonii*) is a perennial forb of low elevation (less than 3,500 feet), moist forest habitats. The principal range of this species is west of the Cascade Mountains from southwestern British Columbia to northwestern California. It has a disjunctive distribution in northern Idaho, extending from the Selway River, north to the Coeur d'Alene subbasin. It is most often found on the IPNF in western redcedar/hemlock and grand fir forests, often near streams or seeps, and on moist benches upslope from streams. Lichthardt and Moseley, 1994 (PF Doc. TES-19, pp. 10, 11, and 23) suggest that there may be genetic differences between plants on mesic versus moist sites, making this an important consideration for population protection. Henderson's sedge is sometimes found associated with elk trails; ungulates or rodents may be important vectors for seed dispersal, since seed heads are commonly nipped off just below the flag leaf (Lichthardt and Moseley 1994, PF Doc. TES-19, p. 23). There are 38 documented occurrences of Henderson's sedge on the IPNF and 32 in the Coeur d'Alene River subbasin (ICDC 2002, PF Doc. TES-3). Most of the occurrences are centered near the Hayden Creek drainage. A "source" population in Stump Creek, a tributary of Hayden Creek, is important to the viability of the species in the Coeur d'Alene subbasin. Stable source populations are thought to supply seed to replace ephemeral populations and individuals in surrounding, less optimal habitat (Pulliam 1988, PF Botany, TES-20). The closest occurrence of Henderson's sedge is approximately two miles north to the Resource Area in Beaver Creek.

Naked Mnium *(Rhizomnium nudum)* is found in the Pacific northwest from Alaska to northern California, with inland populations in northeastern Oregon, northern Idaho, northwestern Montana, and Alberta. It occurs on damp forest soil, humus, and along streams. Naked Mnium is documented from near Priest Lake

on the IPNF, and from an historical location along the North Fork Coeur d'Alene River (ref?) This plant may be present in suitable moist to wet habitats in the Resource Area.

Slender moonwort (*Botrychium lanceolatum*), a Candidate species for Federal listing and a Forest Service Sensitive species is one of the more distinctive moonworts. The habitat has been described as "deep grass and forbs of meadows, under trees in woods, and on shelves on limestone cliffs, mainly at higher elevations" (Wagner and Wagner 1994, PF Doc. TES-36). However, a specific habitat description for this species is problematic because of its formerly widespread distribution ranging from sea level in Quebec to nearly 3,000 meters, 9.840 feet in Boulder, Colorado (USDI 2000, PF Doc. TES-22, p. 2). Although slender moonwort was previously documented from Oregon, Colorado, Idaho, Montana and California, only two populations in two states (Montana and Colorado) are thought to exist currently. The Idaho population, documented from Upper Priest River on the Idaho Panhandle National Forests was last observed in 1925, and has not been relocated. The likelihood of slender moonwort occurring in the Twomile Resource Area is very low due to the predominance of Dry Forest Guild habitat. Rare plant surveys to date have not located any occurrences of this species.

Grassland Plant Guild

The Threatened plant Spalding's catchfly (*Silene spaldingii*) may occur in the Resource Area if suitable grassland habitat is present. Potential grassland habitat occupies approximately nine percent of the Resource Area, primarily on south to southwest facing slopes in Twomile, East Fork Twomile, and Nuckol's Gulch drainages. Potential Spalding's catchfly habitat was identified using satellite imagery (Mousseaux 2000, PF Doc. TES-23) as a coarse filter approach to defining grassland and forb communities. These communities cannot be identified solely by using timber stand database (TSMRS) queries, because the areas have not been thoroughly inventoried and delineated on maps. Potential habitat in proposed treatment areas is field surveyed to determine suitability and to detect Spalding's catchfly occurrences that may be present.

Spalding's catchfly is a perennial herb endemic to the Palouse region of southeast Washington and adjacent Oregon and Idaho and is disjunct in northwest Montana (Lesica 1997, PF Doc. TES-24, P. 1). This species is suspected to occur on the IPNF. Field surveys of potential habitat that were completed for recent projects such as the Douglas-fir Beetle FEIS (USDA 1999, PF Doc. TES-25), Small Sales FEIS (USDA 2000, PF Doc. TES-26), and Iron Honey FEIS (USDA 2001, PF Doc. TES-27) did not detect any occurrences of this species.

Suitable habitat for Spalding's catchfly consists of grasslands dominated by native perennial grasses such as Idaho fescue (*Festuca idahoensis*) and rough fescue (*Festuca scabrella*), with associated species such as bluebunch wheatgrass (*Pseudoroegneria spicata*) snowberry (*Symphoricarpos albus*), ninebark (*Physocarpus malvaceus*) and Nootka rose (*Rosa nutkana*). Depending on soil moisture characteristics, some sites have few to no shrubs or trees present, whereas other sites may have scattered individual ponderosa pine or Douglas-fir (USFWS 2000, p. 2; PF Doc. TES-28). Spalding's catchfly sites range from 1,750 to 5,100 feet. Soils are generally "moderately deep" to "deep." The closest documented occurrences to the project area are in Spokane County, Washington. No occurrences of this species were documented during field surveys conducted in 2003 and 2004 for this project. Potential habitat was found to be of low suitability, mainly because of the presence of thin soils and surface rock. Some areas were found to be noxious weed infested, which lowers habitat suitability, though does not preclude the possibility of the species occurrence.

3.10. 4 Environmental Consequences to TES Plants

Discussions are provided to add information regarding effects to Spalding's catchfly (based on field survey information): The Spalding's Catchfly discussion should replace the existing information in the Twomile EA under 3.10.4 Environmental Consequences to TES Plants, "Direct and Indirect Effects to TES Plants Common to All Alternatives," "Direct and Indirect Effects to Threatened Plants Common to the Action Alternatives," on the middle of page 3-198.

The new existing condition information for Britton's Grimmia, Henderson's Sedge, Naked Mnium, and Slender Moonwort did not result in any change to the discussion of anticipated effects to TES plants in Chapter 3.

In response to the additional information provided in the revised Chapter 2 regarding past activities, the cumulative effects discussion has been revised. The revised information should replace the information in the Twomile EA under 3.10.4 Environmental Consequences to TES Plants, "Cumulative Effects to TES Plants Common to All Alternatives," on the middle of page 3-200.

Direct and Indirect Effects to Threatened Plants Common to the Action Alternatives

Approximately 537 acres of potential habitat for the Threatened species Spalding's catchfly has been identified in the Twomile Resource Area. Treatment units are proposed in Spalding's catchfly habitat under all action alternatives. All field surveys in potential habitat within proposed activity areas were completed in 2003-2004. Survey documentation is contained in the project files, PF Doc TES-16. No Spalding's catchfly populations were found during field survey, and low suitability habitat was confirmed.

Proposed activities **may effect, but are not likely to adversely affect,** Spalding's catchfly based on the presence of low suitability habitat. Management activities that would occur in potential habitat for Spalding's catchfly include slashing, underburning and timber harvesting. There would be little actual timber harvesting in habitat because these areas are already quite open, occupied primarily by herbaceous, grassland species, shrubs, scattered ponderosa pine and Douglas-fir. Prescribed fire is the primary activity to be conducted in habitat areas. Fire would be low intensity, spring underburning for the most part. The dry grasslands and grassy openings in Douglas-fir/ponderosa pine forest that provide habitat for Spalding's catchfly, were historically maintained by frequent, low-intensity fires. Studies of Spalding's catchfly (Lessica 1997, PF Doc. TES-24; Lesica, PF Doc. TES-32) suggest that fire may contribute to maintenance of grassland habitats through removal of excess litter and creation of sites for seedling recruitment. Increased recruitment and plant vigor were observed following spring and fall burns on experimental plots in Montana.

Weed invasion following management activities is a potential threat to grassland habitats when weeds such spotted knapweed and Dalmatian toadflax are present. Features of the action alternatives provide measures that would reduce the spread of noxious weeds in the Resource area due to management activities, per direction in Forest Service Manual FSM 2081.2.

If occurrences of Spalding's catchfly are found prior to or during the implementation process, protective measures would be designed and carried out as described under the alternative design features and mitigation measures described in Chapter 2. Table 3-TES 4 (on page 3-193 of the Twomile EA) displays the Rare Plant Guild acreage potentially affected by each alternative. A complete list of Grassland Guild stands and units that may support Spalding's catchfly is located in the Project File (PF Doc. TES-35). For further information on effects to Threatened plants, please refer to the Biological Assessment in the Project Files.

Cumulative Effects to TES Plants Common to All Alternatives

The cumulative effects analysis for TES plants and FSOC considered the effects of past, present and reasonably foreseeable future actions listed in the Revised Chapter 2. There is little existing information regarding documented rare plant occurrence or habitats in the Twomile Resource Area. Prior to 1988 the USFS did not conduct rare plant surveys, and occurrence reports to the Idaho Conservation Data Center were incidental (IPNF 2003; TES-40). Past activities on Federal lands prior to policies affording protection of rare plants, have affected populations and habitat of sensitive plant species. Current activities proposed on Federal lands are required by law and policy to address sensitive plant species. Populations, when found, are managed for. Activities on State and private lands are not required to protect these species; therefore, loss of populations and modification of habitat is likely occurring.