The following items have been updated since release of the Final EIS (FEIS), or were inadvertently left out of the FEIS during the document compilation and printing process.

Final EIS Chapter 1:

List of Reasonably Foreseeable Activities. The cumulative effects analysis and documentation within the FEIS included reasonably foreseeable activities within the project area. However, the list of activities was not introduced in Chapter 1 where it is usually included.

Reasonably Foreseeable Activities:

- Ongoing management activities not affected by this project, including: personal firewood cutting, recreation, fire suppression, noxious weed treatments, prescribed fire activities, timber stand improvement activities (such as white pine pruning, pre-commercial thinning), road maintenance, road decommissioning authorized by the Myrtle-Cascade FEIS and Record of Decision, and completion of the Big Mack Timber Sale (approximately 50% of 142 acres remain to be completed as of release of the FEIS).
- Private land activities could include 120 acres of irregular shelterwood/commercial thinning in lower Snow Creek – Section 35, R1W, T62N – lands owned by Forest Capital Partners, LLC. Management of these lands could also include road maintenance or construction by Forest Capital.
- Grandmother Mtn. Land Exchange proposed by the IPNF and Forest Capital Partners, LLC. The exchange involves a number of parcels located mostly within the South Zone of the IPNF. However, if completed as currently proposed, it would add a parcel approximately 280-acres in size in the lower Myrtle Creek watershed to the National Forest System lands.

Final EIS Chapter 2:

(Page 2-27) Features Designed to Protect Soil and Site Productivity. Item g. Retention of Coarse Woody Debris, add Units G1 and G4, so the text reads "… (Units G1, G3, and G4) …"

(Pages 2-16 and 2-21) Fuel Model description for Fuel Model 10 should read in part, "Surface fires burn with more intensity and flame lengths *over* 4 feet can be expected." The FEIS incorrectly read "… flame lengths *up to* 4 feet…"

Final EIS Chapter 3:

(Pages 3-44 and 3-45) The map of Myrtle Creek Terrestrial Integrity is Figure 3.3 as shown on page 3-45. However, the text on page 3-44 incorrectly refers to it as Figure 3.1.

(Page 3-48) The Figure is incorrectly labeled 4.8 when it should be 3.8.

(Pages 3-60 and 3-61) The Figure numbers used to identify the photographs on these pages are correct. However, the text in the last two paragraphs included incorrect Figure numbers. The reference to Figure 3-23 should be to Figure 3-18, references to Figures 3-24 and 3-25 should be 3-21 and 3-22, respectively.

Final EIS Chapter 4:

(Page 4-57) The discussion in the second paragraph incorrectly reads, "… the rate of spread would be approximately 13 *miles* per hour." It should read, "… the rate of spread would be approximately 13 *chains* per hour."

(Page 4-74) Discussion of Forest Plan *Standard 10 (c)* second sentence should read, "These forests have a unique structure and composition that provide habitat for a wide range of plants, animals, and other biota." The FEIS incorrectly carried forward wording from the DEIS that included the word "critical" habitat in the description.

Literature Citation Updates:

Old Growth Literature:

- IPNF, 2004 Inventory and Monitoring Report
- Map of Forest Inventory and Analysis (FIA) Landscape Areas and Summary Database of FIA Landscape Areas
- Bush, R., R. Lundberg, Estimates of Old Growth Percentages and Snag Density on the Idaho Panhandle National Forests, Rpt 06-07, April, 2006, USDA Forest Service, Missoula, MT.
- Bush, R., et. al., Estimates of Old Growth for the Northern Region and National Forests, Rpt 07-06, v1.2, May, 2007, USDA Forest Service, Missoula, MT.

- Zack, A.C., et. al., Calculating Years to Grow to Breast Height for Estimating Old Growth Percentages From FIA Data, May, 2006, USDA Forest Service, Missoula, MT.
- Zack, A.C., Review of Old Growth Assessments for the Idaho Panhandle National Forests, July 2006, USDA Forest Service, Coeur d'Alene, ID.

Silviculture, Vegetation Management, Old Growth, and Fire Literature:

- Agee, 2000
- Allen, 1999 Selkirk Mountains fire history. Fire activity in digital form for future resource planning Bonners Ferry Ranger District, Idaho Panhandle National Forest**.**
- Arno and Brown, 1989, 1991
- Biondi, F. 1996. Decadal-scale dynamics at Gus Pearson Natural Area; evidence for inverse asymmetric competition? Canadian Journal of Forest research 26:1397-1406. In: Stone J.E., T.E. Kolb ,W.W. Covington. 1999. Effects of Restoration Thinning on Presettlement *Pinus ponderosa* in Northern Arizona. Restoration Ecology Vol. 7 No.2, pp. 172-182. June 1999.
- Nelson, 2000. Prediction of Diurnal Change in 10-hour Fuel Stick Moisture Content, in Canadian Journal of Forest Research, Vol. 30, pp. 1071-1087.
- Rothermel, 1991. Predicting Behavior and Size of Crown Fires in the Northern Rocky Mountains, Intermountain Research Station, INT-438, January, 1991.
- Sala, A. and R. Calloway. 2001. Physiological responses of old-growth ponderosa pine and western larch restoration cutting and burning treatments. In: Arno S.F. and C.E. Fiedler. 2005. Mimicking Nature's Fire": Restoring Fire Prone Forests in the West. Island Press. P. 147.
- Stone J.E., T.E. Kolb, W.W. Covington. 1999. Effects of Restoration Thinning on Presettlement *Pinus ponderosa* in Northern Arizona. Restoration Ecology Vol. 7 No.2, pp. 172-182. June 1999.
- Sutherland, E.K. 1983. The effects of fire exclusion on growth in mature ponderosa pine in northern Arizona. M.S. Thesis. The University of Arizona, Tucson. In: Stone J.E., T.E. Kolb ,W.W. Covington. 1999. Effects of Restoration Thinning on Presettlement *Pinus ponderosa* in Northern Arizona. Restoration Ecology Vol. 7 No.2, pp. 172-182. June 1999.
- Van Wagner, C.E. 1977. Conditions for the Start and Spread of Crown Fire. In Canadian Journal of Forestry, Res. 7: 23-24.

Final EIS Appendix B:

The following Bull Trout Checklist was inadvertently left out of the Fisheries Resource documentation in the FEIS.

Checklist for Documenting Environmental Baseline
and Effects of Proposed Action(s) on Relevant Indicators

Authorizing Agency: BLM/**US Forest Service** Management Unit(s): **Bonners Ferry RD**
Section 7 Watershed: **Myrtle Creek** Subwatershed Name:_____
Action Type: **Timber**/Grazing/Minerals/**Roads**/Recreation/Miscellaneous
Specific Actions (list):
Myrtle HFRA Project

Pathway	Indicators	Status of Baseline	Effects of the Action(s)	Basis for Rationale
Subpopulation Characteristics	Subpopulation Size	FA/FR/**UR**/?	R/**M**/D/NA	Pop. Data and PJ; Bull trout presence extremely limited w/in watershed. Resident forms potentially absent, fluvial forms, below falls, are present, but reduced. No change to local population characteristics from this project.

Pathway	Indicators	Status of Baseline	Effects of the Action(s)	Basis for Rationale
	Growth and Survival	FA/FR/**UR**/?	R/**M**/D/NA	Pop. Data and PJ; Fluvial and/or resident populations potentially will not recover w/in two generations. No change in survival as a result of this project
	Life History Diversity and Isolation	FA/FR/**UR**/?	R/**M**/D/NA	Pop. Data and PJ; Resident forms absent and fluvial forms very limited, likely resulting from various management activities and related natural effects in the Myrtle Creek and Kootenai River drainages. Lower Myrtle Creek was channelized for refuge, which may have reduced migratory fluvial populations from Kootenai River as a result of spawning and rearing habitat loss. Connectivity exists from the falls barrier on Myrtle Creek to the Kootenai River; however populations in the river remain perilously low. No change in this element as a result of this project.
	Persistence and Genetic Integrity	FA/FR/**UR**/?	R/**M**/D/NA	Pop. data: Brook trout are known to inhabit Myrtle Creek, and can consequently hybridize with spawning bull trout. No change in this element as a result of this project.
Water Quality	Temperature	FA/**FR**/UR/?	R/**M**/D/NA	Survey data and PJ: Data collected during the late spring, summer and early fall of 2005, showed temperature data for the only portion of Myrtle Creek accessible to bull trout reached a maximum temperature of 17.9° C, which exceeds the bull trout rearing maximum of 13° C. Survey data did not cover the portion of lower Myrtle that has been channelized where temperatures are likely higher, mainly due to high w/d ratios as a result of channelization and pools filling (aggradation) and lack of forest canopy, which may elevate expected maximum summer temperatures and lower winter minimum temperatures. Upper Myrtle did not exceed the bull trout rearing maximum (13° C) or spawning maximum (9° C) during their appropriate time frames. Middle Myrtle slightly exceeded the bull trout rearing maximum (13° C) on a few occasions with a maximum temperature of 14° C, but did not exceed spawning maximum (9° C) during the spawning period. Portions of Myrtle Creek are a 303(d) stream for thermal modification. Project implementation would not affect stream temperature.
	Sediment	FA/**FR**/UR/?	R/**M**/D/NA	Survey Data and PJ: WATSED model indicates that sediment delivery is approximately 33% above natural condition in the Myrtle Creek Watershed mainly due past logging and road building activities, particularly in the headwaters. The Myrtle HFRA project would increase sediment by approximately 2% in the short term, but there would be an overall reduction in sediment in the long term through the decommissioning and reconditioning of existing roads, as well as a decrease in the risk of stand replacing wildfires that would be expected to

Pathway	Indicators	Status of Baseline	Effects of the Action(s)	Basis for Rationale
				increase sediment into Myrtle Creek.
	Chemical Contaminants/ Nutrients	**FA**/FR/UR/?	R/**M**/D/NA	Not a 303 (d) stream for chemical contaminants. No change to this element as a result of this project.
Habitat Access	Physical Barriers	**FA**/FR/UR/?	R/**M**/D/NA	Survey data; Several series of steep cascade/falls and a large barrier falls (approx. 120' high), noted in the survey to be approximately 300-500' feet in length upstream of the West Side road.
Habitat Elements	Substrate Embed.	FA/**FR**/UR/?	R/**M**/D/NA	Survey data and PJ: See sediment. An overall decrease in sediment delivery will result in lower substrate embeddedness in the long term.
	LWD	FA/**FR**/UR/?	R/**M**/D/NA	Survey data and PJ: Surveys indicate moderate to high amounts of LWD throughout the majority of Myrtle Creek. Fires within the riparian area and riparian harvest, particularly on private, and road construction have reduced recruitable LWD from the riparian area in those areas. There would be no change in LWD with project implementation.
	Pool Frequency & Quality	**FA**/FR/UR/?	R/**M**/D/NA	Survey data and PJ: Pool quality and frequency above the channelized portion of Myrtle Creek are functioning appropriately. However, within the reaches affected by the 2003 fire there is a higher degree of sediment within low velocity pools leading to slightly lower pool volumes. No effect to pool quantity is anticipated from this project with possible improvement to quality as a result of long term sediment reduction due to road reconditioning and decommissioning.
	Off-channel habitat	**FA**/FR/UR/?	R/**M**/D/NA	Survey data and PJ: Off channel habitat in the Myrtle Creek drainage consists primarily from side channels (i.e. due to braiding) created primarily by bed load deposition. No change in off-channel habitat with this project.
	Refugia	FA/**FR**/UR/?	R/**M**/D/NA	Survey data and PJ; Below falls barrier, habitat capable of supporting populations are limited and very spatially distributed; and consequently not well connected for all life stages and forms. UR in localized segments.
Channel Condition and Dynamics	Width/Depth Ratio	**FA**/FR/UR/?	R/**M**/D/NA	Survey data and PJ: Overall, Myrtle Creek has relatively good width/depth ratios based on Rosgen stream classification. However, there are reaches that have moderately high to high width/depth ratios, particularly on private land, but not enough to negatively affect the entire watershed. No change to this element as a result of this project.
	Streambank Condition	FA/**FR**/UR/?	R/**M**/D/NA	Survey data and PJ: In depositional zones in some reaches instability was associated with mid- and side-channel unvegetated point bars that materials may become mobile and re-deposited during high

Pathway	Indicators	Status of Baseline	Effects of the Action(s)	Basis for Rationale
				flows. Localized instability as a result of natural mass failure events due to landtype association.
	Floodplain Connectivity	**FA**/FR/UR/?	R/**M**/D/NA	PJ: Nearly all of Myrtle Creek has access to its floodplain. Possible localized loss of floodplain connectivity on short segments of Myrtle Creek because of road encroachment and/or road crossings in headwater reaches.
Flow/Hydrology	Change in Peak/Base Flows	**FA**/FR/UR/?	R/**M**/D/NA	WATSED and PJ: WATSED indicates that annual peak water yield is 6% above natural levels. The project would likely cause a short term increase in water yield of approximately 2%, which is within the capabilities of the watershed, but no long term increase is expected.
	Increase in Drainage Networks	FA/**FR**/UR/?	R/**M**/D/NA	PJ; Past roading and regeneration harvest pulled water to surface & increased active channel length. Some improvement expected through road reconditioning.
Watershed Conditions	Road Density and Location	FA/**FR**/UR/?	R/**M**/D/NA	Road density in the Myrtle Creek watershed area is 2.6 mi./sq. mi. Most roads/skid trails are located at mid-elevations and headwater locations. Road reconditioning and proposed decommissioning would reduce the effects of roads to streams.
	Disturbance History	FA/**FR**/UR/?	R/**M**/D/NA	Modeling and PJ: Early historical fires, timber harvest, road construction, mining, and flood events are all historic disturbance factors. WATSED indicates the watershed is slowly recovery toward natural flow conditions given its management. Myrtle Creek has an ECA value of 14%.
	Riparian Conservation Areas	FA/**FR**/UR/?	R/**M**/D/NA	Survey data and PJ; Myrtle Creek and some of its tributaries were historically harvested to stream edge. There would be no timber harvest or road construction within the RHCAs of this watershed with this project.
	Disturbance Regime	**FA**/FR/UR/?	R/**M**/D/NA	PJ; Overall, natural processes within the watershed are stable. Sediment reduction through road reconditioning and decommissioning would improve watershed resiliency.
Integration of Species and Habitat Conditions	Habitat Quality and Connectivity	FA/**FR**/UR/?	R/**M**/D/NA	PJ and survey data; Resident forms of bull trout appear to be absent in the Myrtle Creek watershed and fluvial forms are perilously low, but habitat connectivity remains available. Historical levee construction and channelization of Myrtle Creek for refuge purposes has altered stream dynamics and potential spawning and rearing habitat. Also, bed load movement and resulting sediment deposition have potentially reduced available spawning gravels for bull trout in the lower valley reaches. Water temperatures could potentially be a related problem to bull trout survival, especially during summertime maximums. Re-establishment of healthy bull trout populations in Lower Myrtle Creek watershed is

Pathway	Indicators	Status of Baseline	Effects of the Action(s)	Basis for Rationale
				unlikely due to: 1) the presence of eastern brook trout throughout the system, which have the potential to out-compete bull trout for limited food and rearing and spawning habitat; and 2) the perilously low population of bull trout in the Kootenai River.

Status: FA = Functioning Appropriately,
FR = Functioning at Risk,
UR = Functioning At Unacceptable Risk

Effect: R = Restore, the action will result in a positive change in the indicator evaluated
M = Maintain, the action will have no effect on the status of the indicator evaluated
D = Degrade, the action will result in a negative change in the indicator evaluated
NA = The indicator evaluated is not applicable to the action

Final EIS Appendix D: Printed copies of the Final EIS inadvertently did not contain the Trend Analysis summary section of the Watershed/Hydrology appendix. This information was included in the electronic versions (CDs and website).

FEIS Section D.11 Watershed/Hydrology Trend Analysis Summary

D.11-A. Introduction Trend Analysis

To assess the expected trend in aquatic habitat condition, from the variety of influences both quantitative and qualitative, the activities and their expected contribution to aquatic condition are summarized in several tables below. The table is a summary of the expected influence of the alternatives on the aquatic conditions in the Myrtle and Snow Creek watersheds. Deep Creek was not analyzed due to the size, locations, and prescriptions proposed and the resulting low potential for effects. Various activities are considered with respect to the variety of aquatic processes that they potentially affect.

The contribution to the overall aquatic condition is estimated in the following terms:

- positive influence (denoted by "+") where the activity is expected to contribute to an improvement in condition, or
- a negative influence (denoted by "-") where the activity is expected to contribute to degradation in aquatic condition.

The amount of influence a specific activity is expected to have on the overall aquatic condition (either positive or negative) is represented by a three-level ranking, as follows:

- High (H), activities that are expected to have a significant effect at the watershed scale (considering both scope and magnitude).
- Moderate (M), activities that are expected to have a significant local effect (i.e. at the subwatershed scale), but not result in a significant effect at the watershed scale.
- Low (L), activities rated "Low" are expected to have only a negligible effect both at the subwatershed and watershed scale.

The watershed hydrology processes potentially affected by an activity are listed in the following Trends Analysis tables (Myrtle Creek, Myrtle Creek Summary, Snow Creek and Snow Creek Summary). Where this project is not expected to have an influence on conditions, a □ symbol was used within the tables to indicate No Ranking. A specific activity's expected contribution on aquatic condition is considered in terms of both short-term and long-term. Short-term influence is judged to be the immediate results of implementing the activity, generally expected to be a 5-10 year timeframe. Long-term influence is judged to be the influence the activity will have on aquatic condition as a result of changes in processes and resource conditions that will over time result in changes in aquatic habitat condition. The timeframe for this influence is greater than 10 years.

Alternative 3: (see Chapter 2 for more information)
Approximately 2800 acres of fuels reduction treatments.
Approximately 2 miles of temporary road construction.

As stated in Chapter 2, Alternative 3 (described on the previous page) was not analyzed in detail; therefore only the trends analysis was conducted for Alternative 3; it is included in the following tables.

D.11-B Trend Analysis – Myrtle Creek

NOTE: To aid the reader in understanding the table and comparing the short term and long term expected effects, the columns that display short term effects are lightly shaded while the columns displaying long term effects are clear (no shading).

Table D.26 – Aquatic Trend Analysis – Myrtle Creek, Alternatives 1, 2, 3 and 5

Action	Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Fuels Reduction	Surface Erosion	Pulse & Chronic Sediment	□	**-L**	**-L**	**+L**	**-M**	**-L**	□	**-L**
	Mass Failure Risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	**-L**	**-L**	**+L**	**-M**	□	□	**-L**
	Solar heating	Riparian shade	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Temporary Road Construction	Surface erosion	Pulse & Chronic Sediment	□	□	□	□	**-M**	**-L**	□	□
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, eaks	Hydrologic process	□	□	□	□	**-M**	□	□	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□
	Riparian shade	Riparian condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Road Reconditioning and Improvement	Surface erosion	Pulse & Chronic Sediment	□	**-L**	**-M**	**+L**	**-M**	□	**-L**	□
	Mass failure risk	Pulse Sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	**-L**	□	**+L**	□	□	□	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□
Road Decommissioning (continues on next page)	Surface erosion	Pulse & Chronic Sediment	□	□	□	□	**-M**	**+L**	□	□
	Mass failure risk	Pulse sediment		□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	□	□	**-L**	**+L**	□	□

Action	Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
	Fish Passage	Habitat availability	□	□	□	□	□	□	□	□
	Riparian Shade	Riparian Condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Stream Crossing Improvement	Surface erosion	Pulse & Chronic Sediment	□	**-L**	**-L**	**+L**	**-M**	□	□	**-L**
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	**+L**	**+L**	**-L**	**+L**	□	□
	Fish passage	Habitat availability	□	□	**+L**	**+L**	**+L**	**+L**	**+L**	□

D.11-B.1 Effects of Future Road Decommissioning Opportunities in Myrtle Creek

Review and assessment of roads throughout the watersheds lead to a priority ranking for decommissioning roads that have associated resource concerns. The Proposed Action (Alternative 2) and Alternative 5 included only road management activities described in Chapter 2, other roads that have been given a decommissioning priority are considered future opportunities. The expected effects of implementing those future opportunities are shown in the following table as "Alt 2 Plus Future Opportunities."

Table D.27 Aquatic Trend Analysis – Myrtle Creek, Alternative 2 Plus Future Opportunities

Action	Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
Fuels Reduction	Surface Erosion	Pulse & Chronic Sediment	**-L**	**+L**
	Mass Failure Risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	**-L**	**+L**
	Solar heating	Riparian shade	□	□
	LWD Recruitment	Potential LWD	□	□
Temporary Road Construction	Surface erosion	Pulse & Chronic Sediment	□	□
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□
	Fish passage	Habitat availability	□	□
	Riparian shade	Riparian condition	□	□
	LWD Recruitment	Potential LWD	□	□
Road Reconditioning and Improvement	Surface erosion	Pulse & Chronic Sediment	**-M**	**+M**
	Mass failure risk	Pulse Sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□

Action	Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
	Fish passage	Habitat availability	□	□
Road Decommissioning	Surface erosion	Pulse & Chronic Sediment	**-M**	**+M**
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	**-M**	**+M**
	Fish Passage	Habitat availability	□	□
	Riparian Shade	Riparian Condition	□	□
	LWD Recruitment	Potential LWD	□	□
Stream Crossing Improvement	Surface erosion	Pulse & Chronic Sediment	**-M**	**+M**
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	**+M**	**+M**
	Fish passage	Habitat availability	**+M**	**+M**

See Chapter 2 concerning the decommissioning of Road 402-C (in Snow Creek watershed), which would be approximately 1 mile total length; and decommissioning Road 1309-UA (in Myrtle Creek watershed), which is also approximately 1 mile long.

Table D.1 displays the road decommissioning priorities in the Myrtle Creek watershed and Table D.2 displays the priorities in the Snow Creek watershed. Roads other than Road 1309-UA and 402-C are considered as Future Opportunities.

The expected **short-term effects** of the Myrtle HFRA project on aquatic condition in Myrtle Creek are fairly balanced between positive and negative influences.

The factors contributing to a short-term reduction in aquatic condition are principally related to the sediment pulse generated from the implementation of the action. They are:

- temporary re-opening of Road 402-C
- fuels reduction treatments
- road decommissioning
- road reconstruction and improvement
- culvert replacement

The temporary re-opening of Road 402-C is judged to be the largest contributor to this influence, followed by the fuels reduction activities, road decommissioning, and road reconstruction and improvement, and culvert replacement..

The factors contributing to an immediate short-term improvement in aquatic condition are related to the reduction in chronic sediment and improvement in the hydrologic process from the following activities:

- culvert upgrades and road decommissioning,
- road reconstruction and improvement, and
- soil restoration.

The immediate improvements in habitat accessibility from culvert upgrades and road decommissioning are judged to be the largest contributors to this improvement.

The expected **long-term effects** of the Myrtle HFRA project on aquatic condition in the Myrtle Creek watershed are all positive.

Activities contributing to the positive long-term effects are:

- road decommissioning
- culvert upgrades
- road improvements
- soil restoration

The road decommissioning and improved habitat accessibility from the culvert upgrades are judged to be the largest contributors to long-term improved aquatic conditions.

Chronic sediment would be reduced and hydrologic processes would be improved by the following activities, which would contribute to the expected improvement:

- road decommissioning
- road improvement
- soil restoration.

The amount of the improvement associated with this group of activities is rated low due to the amount of this work proposed with this project (see Alternative 2 and 5 descriptions in Chapter 2) with respect to the remaining amount of degraded mainstem habitat, roads and compacted soils in the Myrtle Creek watershed. These will continue to contribute negatively to these aquatic processes.

D.11-C Effect Pathways and Trend Analysis Summary – Myrtle Creek

As seen in the above table, the various processes (such as surface erosion or riparian shade) are each potentially affected by more than one activity (action). The activities affecting the process can be grouped by what is called an "effect pathway." For example, the effect pathway for surface erosion includes fuels reduction, temporary road construction, road reconditioning and improvement, road decommissioning, and stream crossing improvement. However, the effect pathway for riparian shade includes fewer activities – temporary road construction and road decommissioning. The effect pathways can be used to summarize the H, M, and L ratings shown in the above tables by assigning a value (Low =1, Moderate = 2, and High =3) to the ranking for each individual activity that is part of the specific pathway . The values are either positive for a positive influence, or negative for a negative influence.

The following table summarizes the alternatives by the effect pathway and includes the total value for the alternative in general. This provides one more means to compare the long-term trend differences between alternatives.

The numeric values in the Aquatic Trend Summary are calculated by tallying the total effect in each pathway; thus there are values other than 1, 2, or 3. Using surface erosion for an example, the summary for Alternative 2 in the long-term would be calculated by adding the value for surface erosion effect of each of the following: fuels reduction (+1) plus temporary road construction (0), plus road reconditioning and improvement (+1), plus road decommissioning (0), plus stream crossing improvement (+1), which equals +3. By using the same formula for each of the effect pathways, then adding those results, the overall total would be +7 for the long-term effects of Alternative 2.

Table D.28 Aquatic Trend Summary – Myrtle Creek

Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Surface Erosion	Pulse & Chronic Sediment	0	-3	-4	3	-10	-1	-1	-2
Mass Failure Risk	Pulse sediment	0	0	0	0	0	0	0	0
Infiltration, runoff, peaks	Hydrologic process	0	-2	2	3	-6	2	0	-1
Riparian Shade	Riparian shade	0	0	0	0	0	0	0	0
LWD Recruitment	Acting LWD	0	0	0	0	0	0	0	0
Fish passage	Habitat availability	0	0	1	1	1	1	1	0
Habitat Quality	Channel Dimensions	0	0	0	0	0	0	0	0
TOTAL		**0**	**-5**	**-1**	**7**	**-15**	**2**	**0**	**-3**

The No Action Alternative and Alternative 5 suggest no change in the short term, but a slight negative trend in the long term related to fire risk associated with untreated stands, as well as their effects on the current road system. Alternatives 2 and 5 includes approximately 96 acres of treatment which has minor overall negative affects due to size, location of fuels reduction treatments. Alternatives 2 and 3 suggest a short term negative affect, followed by long term improving trend. Alt 3 has more negative short term impacts, and less long term improving trend, due to more temporary road building.

Table D.28 Aquatic Trend Summary – Myrtle Creek

Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
Surface Erosion	Pulse & Chronic Sediment	-7	7
Mass Failure Risk	Pulse sediment	0	0
Infiltration, runoff, peaks	Hydrologic process	-1	5
Riparian Shade	Riparian shade	0	0
LWD Recruitment	Acting LWD	0	0
Fish passage	Habitat availability	2	2
Habitat Quality	Channel Dimensions	0	0
		-6	**14**

Alternative 2 plus the future opportunities for improvement projects, suggests a short-term negative effect, followed by a greater long term improving trend than either Alternative 1, 2, or 3. The increased amount of both short term negative trend and long term improving trends in Alternative 2, are largely a result of the greater amount of road decommissioning in the future opportunities.

D.11-D Trend Analysis – Snow Creek

Table D.30 Aquatic Trend Analysis – Snow Creek

Action	Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Fuels Reduction	Surface Erosion	Pulse & Chronic Sediment	□	-L	-M	□	-M	-L	-L	□
	Mass Failure Risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	-L	-M	□	-M	□	-L	□
	Solar heating	Riparian shade	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Temporary Road Construction (continues on next page)	Surface erosion	Pulse & Chronic Sediment	□	□	-L	□	-M	□	-L	□
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	-L	□	-L	□	-L	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□

Action	Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
	Riparian shade	Riparian condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Road Reconditioning and Improvement	Surface erosion	Pulse & Chronic Sediment	□	-L	-M	□	-M	□	-M	□
	Mass failure risk	Pulse Sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	-L	-L	□	□	□	-L	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□
Road Decommissioning	Surface erosion	Pulse & Chronic Sediment	□	□	-L	+L	-M	+L	-L	+L
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	+L	+L	+L	+L	+L	+L
	Fish Passage	Habitat availability	□	□	□	□	□	□	□	□
	Riparian Shade	Riparian Condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Stream Crossing Improvement	Surface erosion	Pulse & Chronic Sediment	□	-L	-L	+L	-M	+L	-L	+L
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	+L	+L	+L	+L	+L	+L
	Fish passage	Habitat availability	□	□	+L	+L	+L	+L	+L	+L

D.11-D.1 Expected Short-term and Long-term Consequences in Snow Creek

The expected short-term consequences of the Myrtle HFRA project on aquatic condition in Snow Creek are fairly balanced between positive and negative influences.
The factors contributing to a <u>short-term reduction</u> in aquatic condition are principally related to the sediment pulse generated from the implementation of the following activities:

- temporary re-opening Road 402-C,
- road decommissioning,
- road reconstruction and improvement,
- culvert replacement, and
- fuels reduction.

The temporary re-opening of Road 402-C, road reconditioning and improvements (Alternative 2 = approximately 29 miles, Alternative 5 = approximately 22 miles), are judged to be the largest contributor to this influence, followed by the fuels reduction activities, and road decommissioning (approximately two miles in Alternative 2 and 5).

The factors contributing to an immediate short-term improvement in aquatic condition are related to the reduction in chronic sediment and improvement in the hydrologic process from the following activities:

- road decommissioning,
- road reconstruction and improvement,
- and soil restoration.

The immediate improvements in habitat accessibility from culvert upgrades and road decommissioning are judged to be the largest contributors to this improvement.

The expected long-term consequences of the Myrtle HFRA project on aquatic condition in the Snow Creek watershed are all positive.

The road decommissioning and improved habitat accessibility are the result of the culvert upgrades. These upgrades are judged to be the largest contributor to long-term improved aquatic conditions.

The following activities also contribute to the expected reduction in chronic sediment and expected improved hydrologic process:

- road decommissioning,
- road improvement, and
- soil restoration

The amount of the improvement associated with these activities is rated low due to the amount of this work being completed with this project with respect to the remaining amount of degraded mainstem habitat, roads and compacted soils in the Snow Creek watershed. Without changes, these conditions will continue to contribute negatively to these aquatic processes.

D.11-E Effect Pathways and Trend Analysis Summary – Snow Creek

As explained in the earlier discussion of effect pathways and trends in the Myrtle Creek discussion, the various processes (such as surface erosion or riparian shade) are each potentially affected by more than one activity. The activities affecting the process can be grouped by what is called an "effect pathway." The following table summarizes the alternatives by the effect pathway and includes the total value for the alternative in general. This provides one more means to compare the short and long-term trend differences between alternatives.

Table D.32 Aquatic Trend Summary – Snow Creek, Alternatives 1, 2, 3, and 5.

Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Surface Erosion	Pulse & Chronic Sediment	0	-3	-7	2	-10	1	-6	2
Mass Failure Risk	Pulse sediment	0	0	0	0	0	0	0	0
Infiltration, runoff, peaks	Hydrologic process	0	-2	-2	2	-1	2	-1	2
Riparian Shade	Riparian shade	0	0	0	0	0	0	0	0
LWD Recruitment	Acting LWD	0	0	0	0	0	0	0	0
Fish passage	Habitat availability	0	0	1	1	1	1	1	1
Habitat Quality	Channel Dimensions	0	0	0	0	0	0	0	0
TOTAL		**0**	**0**	**-5**	**-8**	**5**	**-10**	**4**	**-6**

The following table summarizes the trends that are predicted for Alternative 2 plus implementation of the activities identified as future opportunities (see Tables D.1 and D.2, and footnotes #6 and #7 under Table D.26).

Table D.33 Aquatic Trend Summary – Snow Creek, Alternative 2 Plus Future Opportunities

Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
Surface Erosion	Pulse & Chronic Sediment	-9	7
Mass Failure Risk	Pulse sediment	0	0
Infiltration, runoff, peaks	Hydrologic process	1	5
Riparian Shade	Riparian shade	0	0
LWD Recruitment	Acting LWD	0	0
Fish passage	Habitat availability	2	2
Habitat Quality	Channel Dimensions	0	0
TOTAL		**-6**	**14**

D.11-F Summary of Effects in Snow Creek

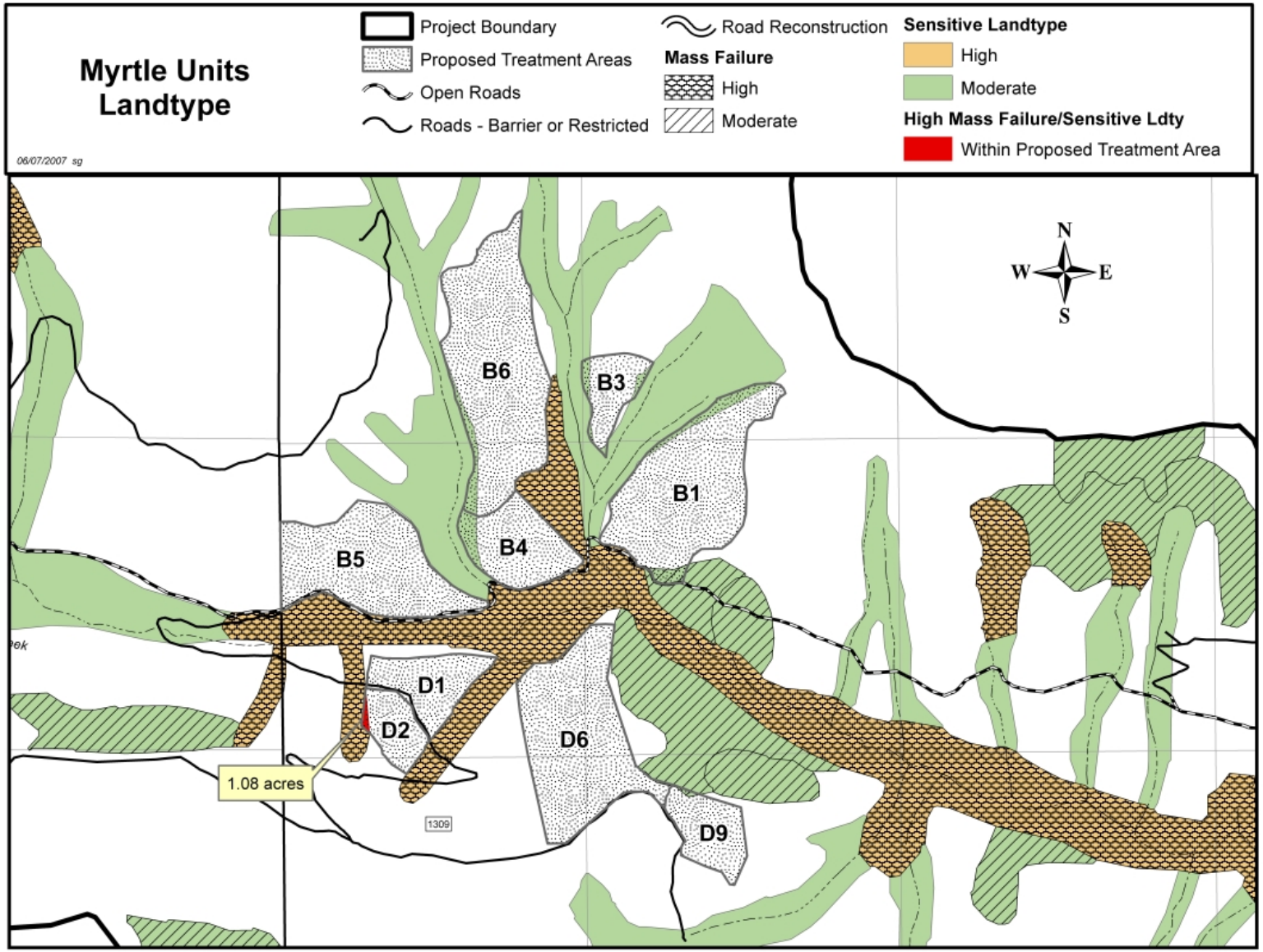
Alternative 1 (No Action) in Snow Creek suggests no change in the short term, but a slight negative trend in the long term related to fire risk associated with untreated stands, as well as their effects on the current road system.

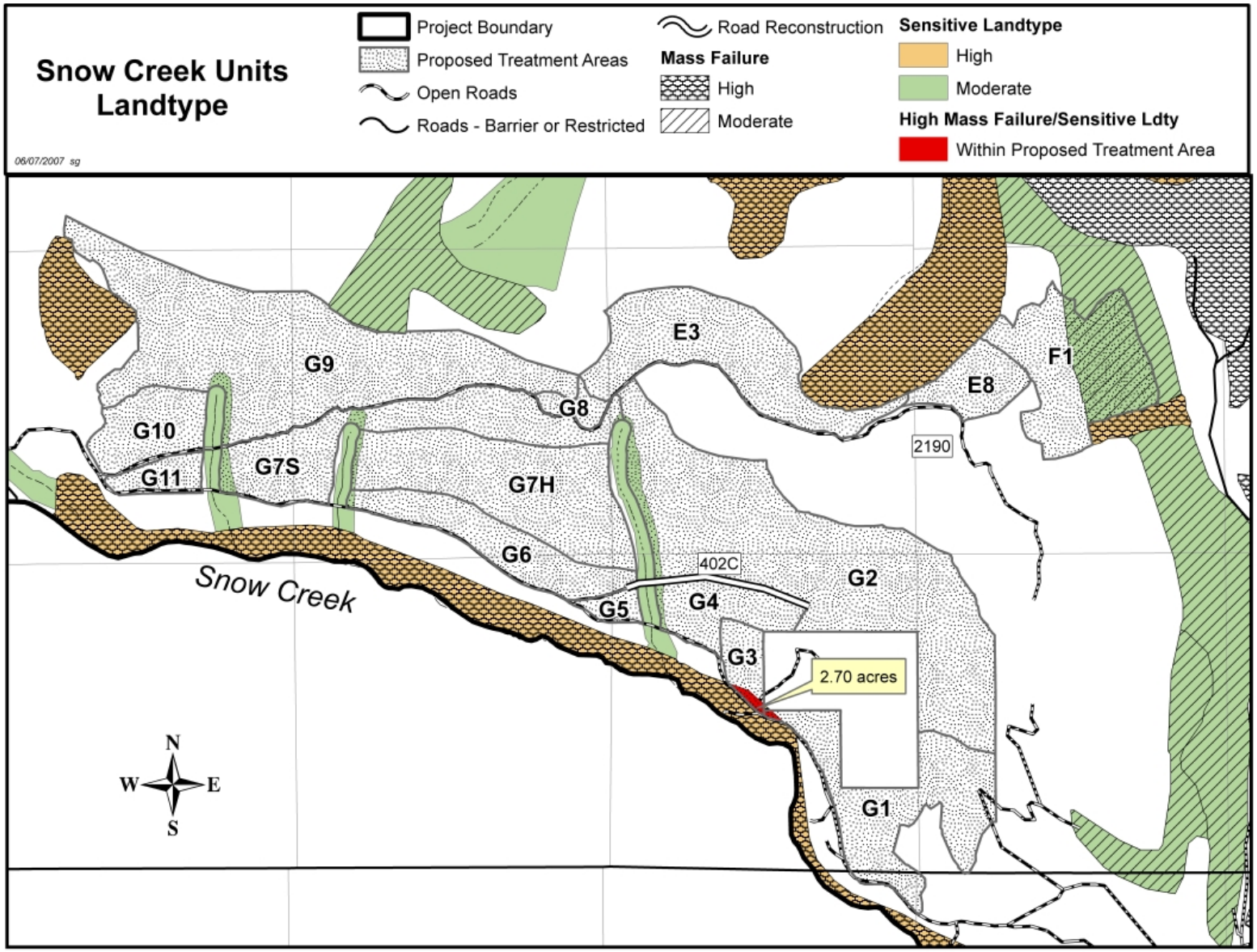
Alternatives 2 and 5 are similar prescriptions in the Snow Creek watershed, with Alternative 5 treating approximately 422 less acres than Alternative 2. (The major difference in the action alternatives is within the Myrtle Creek watershed portion.) Alternatives 2, 3 and 5 suggest a short term negative affect, followed by long term improving trend.

Alternative 2 plus the future opportunities for improvement projects, suggests a short-term negative effect, followed by a greater long term improving trend than the other alternatives without the future opportunities. The larger amount of improving trend in Alternative 2 plus the future opportunities occurs in large part as a result of the greater amount of road decommissioning, when both the currently proposed and future opportunities are considered.

ECA is a general subset of some of the original logic that WATSED eventually uses for estimating changes in runoff; but it does not use all the logic and has not been calibrated, validated, or updated for the IPNF. All the methodology reflects is overall age of the timber stands at a point in time. It does not estimate what happens to water or snow, how fast it melts or runs off the landtype, or how it moves through the watershed. The bottom line is that "ECAs" are at best an index of the state of the timber stand. Being an index, an ECA Analysis might be used to flag the need for a more intense process of watershed response analysis; which was done in the FEIS using WATSED, WEPP, etc., as well as the judgement of professionals educated and experienced in how watersheds function, especially in the Selkirks. Because ECA values relate directly to the quality of timbered stands in a watershed, full ECA recovery is not attainable. This is especially true in glaciated watersheds like Myrtle Creek that have large areas that are not under forest cover. Even in forested portions, fire, disease, and natural ecologic processes have always maintained the basin as a mosaic of vegetation age and size.

Soils – the following maps provide a close-up of the locations of sensitive soils and proposed treatment units.




Snow Creek Units
Landtype
06/07/2007 sg
Project Boundary
Proposed Treatment Areas
Open Roads
Roads - Barrier or Restricted
Road Reconstruction
Mass Failure
High
Moderate
Sensitive Landtype
High
Moderate
High Mass Failure/Sensitive Ldty
Within Proposed Treatment Area
G9
E3
F1
E8
G8
G10
G11
G7S
G7H
2190
G6
402C
G2
Snow Creek
G5
G4
G3
2.70 acres
G1
N
W
E
S