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Summary  
Black Ram Project — Field Assessment  
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Rampike Area General

- The portion of the Rampike area viewed during field assessments (Unit 72) is cool and wet, with frequent ephemeral and year-around streams, often connected by small forested wetlands.
- A very stable tree association, dominated by Engelmann spruce and subalpine fir has occupied this area for hundreds of years, as evidenced by the large accumulations of fallen trees/coarse woody debris from the species.
- The Engelmann spruce — subalpine fir association displays old-growth characteristics, including canopy gaps, multilayered canopies, old and large trees for the site quality and elevation, and large quantities of decayed wood in a range of decay classes.
- Long-lived, early seral species, like western larch, Douglas-fir, and western white pine are very infrequent to nonexistent. In a 3350 feet traverse through proposed unit 72, less than 10 western larch, 1 Douglas-fir, and 0 western white pine were encountered. There is evidence that this cool, moist upper elevation site has not been well-suited for the development of long-lived early seral species for many hundreds of years.
- Under the Black Ram Project regeneration harvests, constituting variations of clearcutting, are planned for the majority of the area. This prescription is chosen because managers deem “it is necessary to start to stand over to meet stand objectives.” Given the site characteristics viewed in Unit 72, by far the largest unit in the Rampike Area, a regeneration harvest approach to improving resilience is not an appropriate choice. The areas assessed is covered by an ecologically appropriate tree association, and is ecologically sensitive due to cool, wet sites that dominate the area. Not only is a regeneration cut ecologically inappropriate, but also the cool wet conditions may preclude establishing desired early seral species.
- The canopy gaps, deep layers of decaying fallen trees, and frequent wet areas and water courses indicate that this area is not a high risk for wildfire, catalyzed by global heating. Canopy gaps indicate that “gap dynamics” are the primary disturbance regime in this area, as opposed to fire.
- The old-growth Engelmann spruce — subalpine fir forest that has occupied Unit 72 may be a unique ecosystem type in this landscape, and deserving of protection for its habitat and intrinsic values. A landscape ecology analysis is necessary to determine whether or not this area is a unique ecosystem type, as well as assessing landscape and site level global heating risks.

General

- Log decks from Rampike area firebreak show whole tree skidding. This practice unnecessarily robs short-term nutrient supplies and is unnecessary for fire risk, particularly if slash is lopped to the ground, and/or mulched. (WP 1)

Rampike Unit 72—Central Section

- The overall terrain characteristics of this unit may be described as slightly complex with ephemeral streams, snowmelt pockets, and small wetlands scattered throughout.
- Rich, deep layers of coarse woody debris show no fire evidence, indicating a long period of time since any stand replacing disturbance has occurred in this area. (WP 2 – 4)

- Vertical stand structure is dominated by Engelmann Spruce and subalpine fir. Ephemeral streams and wet patches, i.e. small wetlands continue are found throughout the area. (WP 5) The moisture and soil characteristics in this area are ideal for Engelmann spruce and subalpine fir.
- First western larch since before WP 3. This western larch is located on a well-trained, drier hump in this dominantly wet, imperfectly drained site. Only larch visible for 150 m plus. (WP 6)
- Ephemeral streams and small wetland complexes continue. These areas need to be ecological reserves if any treatment is to occur here. Their high frequency calls into question whether this area is ecologically stable enough to withstand road construction and ground-based logging. I think not. (WP 7)
- The large Engelmann spruce and subalpine forest continues through a very wet area with a wide range of decay classes of coarse woody debris. No past fire evidence. This forest, as has been seen along this transect, has classical old-growth attributes, including old large trees, canopy gaps, and multilayered canopies. The presence of oak fern and lady fern are both indicators of high moisture levels and rich soils, indicative of inland rain forest conditions. (WP 8)
- Another appearance of western larch, which is very infrequent throughout the stand and always located on drier, better drained sites. Engelmann spruce and subalpine fir continue to dominate around this single western larch old growth tree. The thick, deep decayed fallen trees, coupled with the canopy gaps and multilayered canopies of the dominant Engelmann spruce and subalpine fir forest indicate that there has not been a landscape or stand replacing disturbance for hundreds, perhaps thousands of years. This area is too wet and too cold for continuous western larch presence. The presence of these old-growth larch trees indicate that at one point the climate in this area was significantly warmer and drier than current conditions. (WP 9)

#### Rampike Unit 72 — Northeast Arm

- Engelmann spruce subalpine fir old-growth forest continues. Occurrence of very large western hemlock for the Yaak Valley are found here. (WP 10)
- Canopy dynamics illustrate old-growth characteristics, with little disturbance for centuries. Snags amongst live trees are indicative of future canopy gaps, and evidence that the dominant natural disturbance regime here is “gap dynamics,” as opposed to fire. (WP 11)
- An example of the rare western larch found within this proposed treatment unit. (WP 12)
- The infrequent old growth western larch that are likely 800 years or more of age, coupled with the lack of any younger western larch, indicates that this area was a larch forest 800 – 1000 years ago. This theory is further substantiated by the large accumulations of snags and coarse woody debris and a full range of decay classes that are Engelmann spruce and subalpine fir, coupled with the existing old-growth Engelmann spruce—subalpine fir tree association. In one or two areas, we found infrequent, older decay class coarse woody debris that was either western larch or Douglas-fir. This seems to indicate that at one point these two species were much more frequent and the climate in the area was likely much warmer and drier. (WP 12)
- First occurrence of old Douglas-fir, which is in association with Engelmann spruce and subalpine fir. Like the scattered western larch in this area, the Douglas-fir is found on a dry hump. One of the late decay class fallen trees in this area was identified to be a Douglas-fir, again supporting the theory that the species composition of this forest was once significantly different. The local climate changing from warm and dry to cool and wet is likely the reason for the forest shift. (WP 13)

### Bonnet Top Area General

- The Bonnet Top Units viewed as part of this assessment include: Units 20, 21, 22, 23, & 24. The assessment of these units forms the basis for the comments that follow.
- Bonnet Top Units are located on cool, generally north facing slopes at upper elevations. Some of the slopes are extremely steep, greater than 60%.
- Lodgepole pine is found as a major species throughout these units. While some of this pine has died and fallen to enrich soil function and water relations on many of these sites, the units contain a significant portion of older, large, and healthy lodgepole pine. Due to past high mountain pine beetle populations and logging targeting lodgepole pine, such lodgepole pine composition and structure may very well be a unique association and habitat type in the larger landscape. A landscape ecology analysis is necessary to determine the current role of older lodgepole pine forests in the landscape.
- Western larch, Douglas-fir, western red cedar, and to lesser extents Engelmann spruce and subalpine fir are found as either codominant trees with lodgepole pine, or as intermediate trees that will likely succeed lodgepole pine over time.
- A high level of micro-topography diversity on the slopes of the Bonnet Top Units results in incised draws, benches, moist pockets, dry humps, rock outcrops, and ephemeral streams. Thus, the topographic diversity leads naturally to ecosystem and habitat diversity. If the area is treated, this ecosystem and habitat diversity needs to be carefully protected in fine-scale protected ecosystem networks to avoid loss of important habitat values in this area.
- Under the Black Ram Project regeneration harvests, constituting variations of clearcutting, are planned for the majority of the area. This prescription is chosen because managers deem “it is necessary to start the stand over to meet stand objectives.” From an ecological perspective, these stands do not need to be “restarted.” Their current composition, structure, and function provide diverse habitat and associated biological diversity that will support a wide range of species needs for decades to come. As time passes, all of the pieces are in place for a healthy successional process in these stands.
- Following a fire behaviour analysis, and landscape ecology analysis performed for the larger landscape, if some of the Bonnet Top area is deemed to pose a fire risk related to global heating, light partial cutting or intermediate cuts may be appropriate. Such treatments need to occur within the constraints of protected ecosystem networks at multiple spatial scales to protect habitat and other ecological values.

### Bonnet Top Unit 20

- This unit is found on steep slopes — 70% plus/minus (WP 14)
- The forest is a mixture of western larch, Douglas-fir, and lodgepole pine with some inclusions of western red cedar. (WP 14)
- Many of the stems in this forest appear to be young — likely 50 years or less in age
- The prescription calls for removal of all the lodgepole pine, with retention of all of the other species, except where this is not operationally possible. Given the small size of the lodgepole pine stems and their scattered volume, such a treatment would be economically questionable.
- Given the distribution, small size and density of the lodgepole pine, cutting these stems may result in the loss of other tree species for both logistical and economic reasons.
- Frequent benches within this unit create a fine scale diversity that is valuable to a wide spectrum of animals, from small to large mammals, and a variety of songbirds. (WP 14)
- Past logging in this area is evidenced by the old western larch stumps. (WP 15)

- A wide diversity of habitat is part of the composition and structure of this stand, resulting from micro-topography that features benches, incised draws, irregularly shaped pockets of vegetation, steep slopes, and rock outcrops. (WP 15)
- The fire ladders in the intermediate canopy constitute the fire risk in this stand. By comparison, the codominant lodgepole pine crowns in the upper canopy are reasonably spaced, consist of less than 33% of the stems, and do not constitute the fire risk posed by the intermediate canopy. (WP 15)
- Substantial crown cover will remain in this portion of Unit 20, calling into question the need for any treatment here at all in the upper canopy. Protecting the important habitat diversity seems to outweigh the fire risk in this particular stand.
- Portions of the area contain dense patches of larger lodgepole pine, mixed with more open canopies of codominant larch. Amidst this canopy pattern, the understory contains a frequent scattering of soopolallie (*Shepherdia canadensis*). Coupled with the micro-topography diversity, the understory plant mixture and overstory canopy of larger lodgepole pine provide excellent bear habitat. Given the impacts to lodgepole pine from the mountain pine beetle throughout this landscape, and the logging that followed, this stand composition and structure may be rare in the landscape. A landscape ecology analysis is necessary to test this theory. (WP 16) Note: the stand above the road is easier to log and contains a higher lodgepole pine density, indicating it offers a more favourable timber chance than the steep slopes with smaller trees below the road. However, only a small portion of the stand above the road is included in Unit 20.

#### Bonnet Top Unit 21

- This is a very mixed species stand consisting of western larch, Douglas-fir, Engelmann spruce, subalpine fir, western hemlock, and western red cedar. Engelmann spruce occurs both in the overstory and understory. (WP 17)
- Gentle slopes comprise this unit.
- If treatment occurs, tree marking is essential here as the stand composition is highly variable. Marking needs to occur in ways that maintain the mixed species, their distribution, and the canopy structure. (WP 17)
- Terrain here is approximately 30% slope at the top, steepening to 50 – 60% at a slope break. If logged from the road, intermediate supports will be required at the slope break. The gentle slope at the top consists of an overstory of western larch, western red cedar, and scattered Douglas-fir. However, the stand below the slope break has a significantly higher component of western larch. The stand is well suited to a light partial cutting or commercial thinning between the components of a protected ecosystem network (PEN) to protect the thermal cover and hiding habitat. This area is not suited to the clear-cut that is prescribed. (WP 18)
- The heterogeneity of this forest reflects Nature's chaos, creating rich habitat diversity. Even a light logging treatment in this area will begin to move the stand towards homogeneity, decreasing its habitat value. (WP 18)
- The west edge of this unit is very different than the other parts of the unit, because it does not appear to have been logged. This results in an overstory canopy of large western larch and western red cedar with scattered Engelmann spruce, Douglas-fir, and subalpine fir in the understory. If a logging treatment proceeds here there is a definite need for a protected ecosystem network (PEN) to be established prior to logging. (WP 19)

Bonnet Top Unit 22

- This stand consists of a lodgepole pine overstory with scattered western larch vets. Beneath the overstory is a healthy understory of western red cedar, subalpine fir, with a lower density of Douglas-fir and Engelmann spruce.
- The “resilience to disturbance” logging prescription here is to remove all of the lodgepole pine. The habitat value and biological diversity of the stand would be better protected by establishing a protected ecosystem network (PEN), and ensuring that a significant component of the larger, healthier lodgepole pine stems are retained between components of the PEN. The PEN could be designed around biodiversity nodes that contain western larch, Douglas-fir, and/or western red cedar. (WP 20)

An older logged unit between Units 22 and 24, which may represent the stand structure goal for Unit 22. (WP 21)

Bonnet Top Unit 24 (5000 feet elevation)

- The resilience to disturbance prescription here is to cut the lodgepole pine and leave western larch, Douglas-fir, and western red cedar. If this treatment is carried out, it essentially means that there will be a clear-cut with few overstory stems remaining.
- This is not a suitable treatment for this stand, because it currently provides good thermal cover in the winter for Roosevelt elk. This cover is particularly important given the existing, mid-age clear-cut adjacent to this unit. (WP 22) A landscape analysis may show that the winter thermal cover provided by this stand is also relatively unique in a larger landscape.

Bonnet Top Unit 23 (4800 feet elevation)

- This stand consists of a 90 year old plus/minus overstory of lodgepole pine that originated from a 1931 fire. The understory consists of western red cedar and subalpine fir. Near the bottom of the slope in the lower part of the stand there is a significant component of codominant western larch and Douglas-fir. This stand is another example of a treatment area that requires a protected ecosystem network (PEN) to be established prior to any activities. Retaining a significant portion of the overstory lodgepole pine is important for maintaining biological diversity and habitat values in this area. Retaining these overstory trees in addition to the PEN will not result in an appreciably fire risk. (WP 23)
- Stand represents a continuum of the lodgepole pine codominant canopy with the appearance of some codominant western larch, and western red cedar and Engelmann spruce in the intermediate and shaded height classes. (WP 24)
- Western larch increases in the codominant canopy in this portion of the unit. (WP 25) Diversity in this stand is reflected in a large intermediate height class patch of western red cedar. This and similar patches need to be protected as part of protected ecosystem networks (PENs) established prior to any treatment activities. (WP 25)
- A reasonable density of wind thrown trees is found throughout much of Unit 23. Care should be taken during logging to ensure that at least 50% of this course woody debris is protected from damage by logging machinery. Maintaining the natural structure of course woody debris is important to receive the benefits of its function over time. (WP 25)

Spread Creek Unit 12—burned mid-spring 2019 with wet weather, but following a below normal snowpack. This is an example of what the Black Ram Units proposed for regeneration cutting are likely to look like shortly following treatment.

- This treatment resulted in a quite hot burn. Many of the residual white pine and western red cedar appear unlikely to survive fire damage. (WP 26)
- This post-treatment stand is missing a reasonable distribution of understory species that were found in the pre-treatment forest. This calls into question the decision to conduct a prescribed burn. Chipping and/or mulching the slash on this site with burning patches or “islands” of logging slash may have provided better results. (WP 26)

### Garver Mountain Area General

- The Garver Mountain Units viewed as part of this assessment include: Units 38, 39, 40, & 41. The assessment of these units forms the basis for the comments that follow.
- The proposed Garver Mountain Units exist in a highly modified, fragmented landscape of young, clearcut logging initiated tree cover. Thus, the older, mixed species forests that occupy the Garver units play important habitat and biological diversity functions within this logged landscape. The current composition and structure found in the forests proposed for treatment need to be assessed for their landscape ecology and site ecology functions and values before Black Ram treatments are finalized. Changes to treatment plans need to be made according to the results of these analyses.
- With the exception of Unit 39, all of the units visited in the field are scheduled for regeneration cuts. Given the fragmented and young composition and structure of the surrounding landscape, regeneration cuts are not ecologically appropriate here. None of the stands visited need to be “restarted,” as is the primary purpose of the regeneration cut prescriptions.
- Black Ram project plans do not appear to have taken into account the condition of the landscape surrounding these units.
- Fine scale ecological diversity, created by diverse micro-topography and variable landforms may be found throughout many of these units. If treatments proceed, the only reasonable way retain this important ecological diversity is through the establishment of networks of ecological reserves at multiple spatial scales. Such ecosystem-based design needs to occur throughout the Garver Mountain Units.

### Garver Mountain Unit 41

- The overstory of this stand consists of western larch with inclusions of Douglas-fir, lodgepole pine, and western white pine. The stand is estimated to be approximately 90 – 100 years old. Remnant old-growth western larch vets are scattered through the stand. (WP 27)
- Black mountain huckleberry (*Vaccinium membranaceum*) is a frequent shrub cover, with dense patches of this plant found in small openings in the stand. The presence of this species, coupled with older tree cover provides for good bear habitat in a landscape fragmented by logging. (WP 27)
- Ephemeral streams, separated by rounded small “ridges” lead to very diverse habitat throughout this unit: openings on the ridges are cloaked with scattered Douglas-fir and western larch with plentiful huckleberry plants — dense cover in the ephemeral streams consists of western red cedar, western larch, and Douglas-fir. This habitat diversity needs to be maintained in any treatments in this area. (WP 28)
- A natural forested linkage from the lower forest to the “whale back” rock ridge in the centre of the block is important to maintain. The current block boundary for Unit 41 fragments this linkage by removing tree cover that is an essential part of the linkage. (WP 29)

- The regenerated clear-cut below Unit 41 is part of the habitat loss and reduced biological diversity in the landscape that holds Unit 41. (WP 30)

#### Garver Mountain Unit 40

- This unit contains very diverse tree species, as well as diverse vertical structure. Tree species distributed throughout the unit include grand fir, subalpine fir, western red cedar, western hemlock, western white pine, Engelmann spruce and western larch. Vertical tree structures cover the full range, from old-growth vets to young seedlings, and all height classes in between. This species mixture and diverse structure needs to be maintained in any activities in the stand. This is a good location to establish fine-scale networks of ecological reserves. (WP 31)
- Frequent snags of western larch indicate that this species is being replaced by the diverse mixture of other conifers. (WP 31)
- Old logging corridors are evident in this stand, and contain another very mixed species forest. The overstory consists predominantly of western larch, with inclusions of subalpine fir western white pine, Engelmann spruce and western hemlock. Lower height classes contain western red cedar, western hemlock, and subalpine fir. This stand composition and structure is important to maintain, given the fragmented landscape from past clearcutting. (WP 32)

#### Garver Mountain Unit 39 (3700 feet elevation)

- Old logging corridors are found here in patterns very similar to those found in Unit 40. The tree species composition and structure is also similar to Unit 40, with western larch the most frequent species, followed by inclusions of western hemlock, subalpine fir, and western white pine. Western red cedar is beginning to emerge from an intermediate position in the stand into lower portions of the upper canopy. (WP 33)
- Given that the old logging corridors have a very diverse age and species distribution, these areas lend themselves very well to maintaining an uneven aged, mixed species forest. If these stands are modified, a light selection cut to maintain the current composition and structure is the best ecological choice. (WP 33)

#### Garver Mountain Unit 38 (3500 feet elevation)

- This unit consists of a widely spaced western larch overstory, with occasional inclusions of Engelmann spruce. Western red cedar, western hemlock, subalpine fir, and western white pine are found in the intermediate and shaded height classes. (WP 34)
- This multilayered stand is developing very well towards a diverse, mid age coniferous forest. Not only is the forest healthy, but the composition and structure being developed here is missing from much of this fragmented landscape. Thus, considering this area for logging treatments is not appropriate at this time. (WP 34)

Spread Creek Unit 15 — A seed tree cut was performed in this unit approximately two years ago. This is an example of what the Black Ram Units proposed for regeneration cutting — seed tree cuts are likely to look like. Seed tree cuts, as designed in the Black Ram Project are scheduled to retain 10 to 25 “quality trees per acre” following harvest. (3400 feet elevation)

- Well-formed, healthy seed trees of western larch and western white pine are found in Unit 15. The area has been planted with larch and white pine. Natural regeneration of both of these species is also occurring, and planting may not have been necessary. (WP 35)
- Some western larch dwarf mistletoe is present in this stand, but this parasitic plant will not cause significant problems, as seed dispersal and infection of understory larch is not likely to

affect many seedlings. Where seedlings become infected by dwarf mistletoe, they may be easily thinned from the stand to avoid future dwarf mistletoe problems.

- Whole tree skidding was used to log this unit, resulting in large accumulations of slash at the landings. When slash was burned, many nutrients important for maintaining soil fertility are lost, and soil in and around the landing was severely degraded. (WP 36)
- Problems with whole tree skidding may be avoided by manufacturing logs in the woods by topping, limbing, and bucking into log length where trees are felled. If the slash manufactured in this way poses a fire hazard, this problem may be mitigated by lopping and scattering the branches as trees are felled, and/or masticating or mulching the slash created.
- Unit 15 is adjacent to a young, regenerated clear-cut along its top boundary. This is a good example of where landscape ecology analysis of the situation would have developed a network of ecological reserves at an appropriate scale to avoid the fragmentation and habitat loss that has occurred from the current logging patterns. (WP 36)
- The unlogged stands adjacent to the lower portion of Unit 15 show the healthy, well-developed understory that was removed from beneath the seed trees throughout Unit 15. Important habitat, biological diversity, and overall forest development would have benefited from establishing networks of ecological reserves beneath the seed trees to retain much of the understory. The networks of ecological reserves could have been designed to have significant holes, and some of the reserves could have been lightly thinned. Both of these treatments would have reduced any concerns about fire risk and fire ladders in the understory. (WP 36)