

Cariboo-Chilecotin  
Land Use Plan

# Regional Mule Deer Winter Range Strategy

**Update:** Recommended Interim Management  
Guidelines for Mule Deer Winter Range

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Photo by Darcy Peel

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## **Recommended Interim Management Guidelines for Mule Deer Winter Ranges**

The process of preparing management plans for each individual winter range has begun, as directed by the CCLUP Integration Report. The Integration Report calls for the completion of all plans by 2006, subject to the availability of adequate resources. The planning work is ongoing and long-term objectives and full plans will be released for use as they are completed. These plans will provide a stable long-term vision to guide the ongoing management of each winter range. Also, they will provide a 30-year transition plan to help ensure that harvest treatments are planned to maintain or enhance winter range conditions over time, on winter ranges that do not currently meet their long-term objectives. The completed plans will provide a good basis for clear and consistent management decisions in the short and long-term.

After the 30-year transition planning period, decisions about winter range harvesting will be made on a stand by stand basis by comparing current stand conditions to the long-term objective for each stand. As each stand develops to meet its long-term objectives, harvest treatments will be designed to maintain the desired residual stand conditions while harvesting the timber that is surplus to these requirements. The sooner each stand meets its long-term target condition, the sooner it will be managed in this maintenance mode rather than in a restoration mode.

Harvesting decisions made now, prior to the completion of management plans, could have a large influence on how quickly each winter range and the individual stands within it can move towards meeting their long-term objectives. This document provides the Regional Mule Deer Winter Range Committee's recommendations on harvest approvals in the interim period between now and when individual winter ranges plans are completed. As soon as individual winter range plans are completed, they should be used as the main guidance for the specific area covered by each plan. The recommendations address the general direction given in the Integration Report while taking into account the ongoing planning efforts which, upon completion, will provide greater certainty for timber and habitat values. The recommendations also attempt to address direction from Regional MOF management on harvest scheduling for mule deer winter ranges areas within woodlots.

This document includes the following sections:

1. The main body provides recommendations for availability of various harvest opportunities based on the risk category for individual winter ranges and the level of planning work completed on each winter range. These recommendations provide a greater harvesting opportunity for winter ranges on which long-term spatial objectives are completed than those where no planning work has been completed. The risk ratings are from the CCLUP mule deer strategy and provide a rough classification of winter range condition in relation to strategic level objectives.
2. Three appendices as follows:
  - Appendix 1 describes the harvesting types referred to in the interim recommendations and provides guidance regarding the selection of silviculture systems and operational constraints by snowpack zone.

- Appendix 2 summarizes the risk ratings from the CCLUP Mule Deer Winter Range Strategy
- Appendix 3 is a regional map showing all winter ranges, snowpack zones and the planning status of each winter range.

## 1. Interim Harvest Opportunity Recommendations

The harvest opportunity recommendations are given for winter ranges for which a full winter range plan is not yet complete. **As soon as individual winter range plans are complete these recommendations no longer apply.** The recommendations are divided into three separate categories:

- A) Winter ranges for which long-term objectives are completed
- B) Winter ranges for which long-term objectives are not yet completed
- C) Winter range habitat in woodlot tenures

**Table 1.1 Interim Recommendations for Winter Ranges With Completed Long-term Stand Structure Objectives**

- Harvest types refer to those described in Appendix 1 of this document
- Type 5 harvest is limited to a *maximum* Douglas-fir harvest of 20% (see Appendix #1)
- Risk categories are from the Mule Deer Strategy (1996) and included here as Appendix 2

Risk Category	Harvest Availability by Long-Term Stand Structure Objective		
	Low	Moderate	High
All	<ul style="list-style-type: none"> <li>• Harvest type 1-3 available on shallow, moderate, and transition winter ranges. In the deep and very deep snow-pack zones, warm aspect stands containing cedar should be a lower harvest priority and, if harvested, should maintain a component of cedar.</li> <li>• Harvest type 4 available on 10% of each winter range over the period ending in Dec. 31, 2006.</li> </ul>		
Very High	<ul style="list-style-type: none"> <li>• Type 5 harvest Not available</li> </ul>		
High	<ul style="list-style-type: none"> <li>• Type 5 available</li> </ul>	<ul style="list-style-type: none"> <li>• Type 5 Not available</li> </ul>	
Moderate			
Low	<ul style="list-style-type: none"> <li>• Type 5 available</li> </ul>	<ul style="list-style-type: none"> <li>• Type 5 available</li> </ul>	<ul style="list-style-type: none"> <li>• Type 5 Not available</li> </ul>

**Table 1.2 Interim Recommendations for Winter Ranges Without Completed Long-term Objectives**

- Harvest types refer to those described in Appendix 1 of this document
- Type 5 harvest is limited to a maximum Douglas-fir harvest of 20%
- Risk categories are from the Mule Deer Strategy (1996) and included here as Appendix 2

Risk Category	Harvest Availability
All	<ul style="list-style-type: none"> <li>• Harvest type 1-3 available on shallow, moderate, and transition winter ranges. In the deep and very deep snow-pack zones, warm aspect stands containing cedar should be a lower harvest priority and, if harvested, should maintain a component of cedar.</li> <li>• Harvest type 4 available at 5% of individual winter ranges over the period ending in Dec. 31 2006.</li> </ul>
Very High	<ul style="list-style-type: none"> <li>• Type 5 harvest Not available</li> </ul>
High	
Moderate	
Low	<ul style="list-style-type: none"> <li>• Harvest Type 5 available on 10% of Mature (Age 6+), Douglas-fir area outside of OGMA's on each winter range over the 10 year period from 1996 to 2006.</li> </ul>

### **1.3 Interim Recommendations for Winter Range Habitat within Woodlot Licences**

Interim recommendations for woodlots are intended to focus the short-term cut, as much as possible, on the stand types and stand components with lower mule deer habitat values. These recommendations are not intended to reduce the cut below the current annual allowable cut.

- a) The first priority should be harvest of currently attacked bark beetle trees as required to control spread of infestations. Recommended requirements for this treatment are described under harvest type 1 in Appendix 1.
- b) Non - fir types on winter ranges should be the second priority for harvesting in the short-term. Post-harvest silvicultural treatments should be designed to recruit stand attributes important for mule deer. Recommended requirements for this treatment are described in Appendix 1 under harvest type 2 and 3 for the appropriate snowpack zone. In the deep and very deep snow-pack zones, warm aspect stands containing cedar should be a lower harvest priority and, if harvested, should maintain a component of cedar.
- c) The third priority should be commercial thinning opportunities, which enhance the development of stand attributes important for mule deer (typically in stand types with high stocking in the 10 - 35 cm dbh class). Recommended requirements for this treatment are described under harvest type 4 in Appendix 1 under the appropriate snowpack zone.
- d) The fourth priority should be for low volume selection harvest which removes Douglas-fir stems >37.5 cm. dbh. The harvest prescription should maintain a residual stand with at least 80% of the pre-harvest volume and follow the harvesting guidance from the Mule Deer Handbook and the recommended requirements for harvest type 5 described in Appendix 1 under the appropriate snowpack zone.

### **1.4 Old Growth Management Area (OGMA) Planning Considerations**

The CCLUP, FPC and the Integration Report recommended specific targets for old growth representation within planning areas (e.g. Landscape Units, Mule Deer Winter Ranges). However, through Sub-Regional Planning processes, the OGMA distribution has been revisited. As a result, MDWR's may be required to carry a larger percentage of the old area to minimize timber impacts over the landscape unit. Therefore, MDWR's which do not have long-term objectives set, must be managed conservatively in the interim in order to ensure that planning options are not unnecessarily curtailed.

Completed mule deer winter range plans will contain management recommendations for OGMAs within winter range boundaries. Until winter range plans are completed, no management activity is recommended within OGMAs.

## **Appendices**

### **Appendix 1: Interim Harvest Type Recommendations by Snowpack Zone**

This section describes the harvesting types referred to above, and provides further guidance regarding the selection of silviculture systems and operational constraints by snowpack zone. This additional guidance is intended to be used after the decision has been made that it is appropriate to propose harvesting in a particular winter range. Information regarding snowpack zone can be found on the accompanying map. The recommendations for the shallow and moderate snowpack zones are taken directly from the first mule deer winter range plan which will form the template for future plans in these snowpack zones. The recommendations for Transition and Deep snowpack zones are intended as a first iteration, to be refined as required based on further research and discussion with other professionals.

Harvest type recommendations vary by snowpack zone. Therefore, separate tables are presented for each of the following:

- A) shallow and moderate snowpack zone,
- B) transition snowpack zone, and
- C) deep snowpack zone.

In transition and deep snowpack zones, the two different silviculture systems, group selection and clumpy single-tree selection, are recommended for different slope and aspect combinations.

For all Appendix 1 tables, residual damage refers to crown or bark damage. Loss of  $\frac{1}{4}$  or more of the crown would be considered damage. Loss of either 1000 cm<sup>2</sup> of bark or loss of bark from  $\frac{1}{3}$  of the circumference of the tree would be considered damage.

**In all harvest types the amount and size of roads and landings must be minimized. In harvest types 4 and 5 the percent removal on the first entry includes harvesting for roads and landings; 25% for harvest type 4 and 20% for harvest type 5.**

**Table A1.1. Shallow and Moderate Snowpack zone: Description and management requirements for harvest opportunity types potentially available over the 30 year transition period.**

Harvest Opportunity Type	Harvest Regime and Constraints	Comments
1. Harvest of trees currently infested with Douglas-fir bark beetles	<ul style="list-style-type: none"> <li>Single tree removal of currently affected stems with minimal damage or removal of non-affected stems. Previously attacked trees (grey and red attack) should be left to provide snag habitat and to minimize damage to residual stand.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize beetle damage and use of trap trees by prompt removal of currently infested trees, and careful mapping and reconnaissance.</li> </ul>
2. Harvest of non-Fd stems in stands with <40% Douglas-fir in merchantable stand layers	<ul style="list-style-type: none"> <li>Partial cutting methods to harvest non-Douglas-fir stand components with minimal harvest or damage to residual Douglas-fir stems (<math>\leq 5\%</math> harvest or damage including skid road development).</li> </ul>	<ul style="list-style-type: none"> <li>Regenerate to Douglas-fir as much as ecologically possible.</li> <li>Protect and promote established Douglas-fir regeneration.</li> <li>Harvest or damage to residual Douglas-fir stems should be <math>\leq 5\%</math> (including skid road development) of the pre-harvest basal area of stems <math>&gt; 12.5\text{cm. dbh}</math>. To achieve this level will require careful planning of skid trials and may require leaving some scattered non-Fd.</li> </ul>
3. Harvest of non-Fir stems in mixed species stands with $\geq 40\%$ Douglas-Fir in merchantable stand layers	<ul style="list-style-type: none"> <li>Partial cutting methods to harvest non-Douglas-fir stand components with minimal harvest or damage to residual Douglas-fir stems. (<math>\leq 5\%</math> harvest or damage including skid road development).</li> <li>If a stand is 80% or more Douglas-fir, it should ideally only be harvested only in conjunction with harvest types 4 or 5. The level of residual damage associated with removal of small non-fir volumes may not make this a viable treatment type by itself.</li> <li>If treating stand for mountain pine beetle infection without available harvest in types 4 or 5, consideration should be given to alternate methods of dealing with the pine beetle infestation. (e.g. MSMA, fall and burn, allow pine to die without salvage harvest. )</li> </ul>	<ul style="list-style-type: none"> <li>Harvest type 3 and 4 can be done as a combined treatment where applicable.</li> <li>Regenerate to Douglas-fir as much as ecologically possible.</li> <li>Protect and promote established Douglas-fir regeneration.</li> <li>Encourage the development of an all-age stand.</li> <li>Harvest or damage to residual Douglas-fir stems should be <math>\leq 5\%</math> (including skid road development) of the pre-harvest basal area of stems <math>&gt; 12.5\text{cm. dbh}</math>. To achieve this level will require careful planning of skid trials and may require leaving some scattered non-Fd.</li> </ul>



Harvest Opportunity Type	Harvest Regime and Constraints	Comments
<p><b>4. Thinning from below in Douglas-fir dominated stands with a dense pole layer</b></p>	<ul style="list-style-type: none"> <li>• Thinning of the pole layer (trees 12.5 - 37.5 cm DBH) to maintain or enhance long-term forest structure desirable for mule deer habitat.</li> <li>• Within OGMAs, the thinning objective is to enhance old forest attributes.</li> <li>• Reserve all Douglas-fir stems &gt;37.5 cm dbh</li> <li>• Thin from below, retaining a minimum of 75% of the current basal area (stems &gt;12.5). Use long-term target stand structure goals to guide the number of trees to maintain in each diameter class. (MOF Research Extension note 25a recommends long-term stand structure targets). Stem density for dbh classes greater than 20 cm must be maintained at or above long-term density goals.</li> <li>• Note that this residual basal area is the average for the area outside of WTP's.</li> <li>• Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is valuable for managing other values including CWD and undisturbed forest floor.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize harvest or damage of stems &gt;37.5 cm dbh by ensuring that skid trails avoid areas containing these larger trees. In no case should the harvest or damage of these trees exceed 5% basal area of the trees &gt; 37.5 cm dbh</li> <li>• The objective is to maintain a residual stand with adequate numbers of stems in all size classes to meet long-term stand structure goals as quickly as possible.</li> <li>• Silviculture prescription should specify: 1) the appropriate long-term residual stand curve for the habitat type objective and the curve to be used for thinning; 2) how larger trees and snags will be protected from harvest or damage; 3) how logging to the curve will be controlled.</li> <li>• For winter ranges without long-term spatial objectives, type 5 harvest prescriptions should assume a long-term objective of high crown closure.</li> <li>• Concurrent juvenile spacing is encouraged if a dense sapling layer is present.</li> </ul>

Harvest Opportunity Type	Harvest Regime and Constraints	Comments
5. Clumpy single tree selection management using target curves to maintain stand attributes for mule deer winter range	<ul style="list-style-type: none"> <li>• Clumpy single-tree selection following spatial and stand structure direction of the Mule Deer Handbook and MOF Research Extension note 25a. The objective is to maintain or enhance mule deer habitat. Harvested patches should range between 0.3 to 1.0 tree heights with an average of approximately 0.5 tree heights.</li> <li>• For winter ranges without long-term spatial objectives, type 5 harvest prescriptions should assume a long-term objective of high crown closure.</li> <li>• Retain a minimum 80% of the current Douglas-fir merchantable basal area. Diameter distribution of harvest should be designed to move the stand towards the designated long-term habitat objective. (Table 2, MOF Research Extension Note 25a ). Do not harvest stems greater than 37.5 cm dbh unless current large tree density is above targets from Table 2 in MOF Research Extension Note 25a. Note that this residual basal area is the average for the area outside of WTP's.</li> <li>• Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is useful for managing other values including CWD and undisturbed forest floor.</li> <li>• Skid trail area should be minimized by the use of narrow trails (3m –3.5m) at wide spacing (40 - 50m between trails).</li> </ul>	<ul style="list-style-type: none"> <li>• Note that harvest opportunity types 3 and 4 can be applied as part of this harvest regime.</li> <li>• A minimum 30-year cutting cycle is required.</li> <li>• The minimum 80% basal area retention applies to the 30 year transition period only.</li> <li>• Silviculture prescription should specify: 1) the appropriate long-term residual stand curve for the habitat type objective and the curve to be used for current harvest ; 2) how residual stems and snags will be protected; 3) how logging to the curve will be controlled. Marking-to-leave will likely provide the best results.</li> <li>• Concurrent juvenile spacing is encouraged if a dense sapling layer is present</li> <li>• Placement of landings in non-fir area's is preferred.</li> <li>• Minimize3 the area occupied by roads and landings</li> </ul>

**Table A1.2. Transition Snowpack zone:** Description and management requirements for harvest opportunity types potentially available over the 30-year transition period.

Harvest Opportunity Type	Harvest Regime and Constraints	Comments
1. Harvest of trees currently infested with Douglas-fir bark beetles	<ul style="list-style-type: none"> <li>Single tree removal of currently affected stems with minimal damage or removal of non-affected stems. Previously attacked trees (grey and red attack) should be left to provide snag habitat and to minimize damage to residual stand.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize beetle damage and use of trap trees by prompt removal of currently infested trees, and careful mapping and reconnaissance.</li> </ul>
2. Harvest of non-Fd stems in stands with <40% Douglas-fir in merchantable stand layers	<ul style="list-style-type: none"> <li>Partial cutting methods to harvest non-Douglas-fir stand components with minimal harvest or damage to residual Douglas-fir stems (<math>\leq 5\%</math> harvest or damage including skid road development).</li> <li>The level and distribution of harvest should be carefully designed to leave a windfirm residual stand and to not create frost problems for regenerating Douglas-fir.</li> </ul>	<ul style="list-style-type: none"> <li>Regenerate to Douglas-fir as much as ecologically possible.</li> <li>Protect and promote established Douglas-fir regeneration.</li> <li>Harvest or damage to residual Douglas-fir stems should be <math>\leq 5\%</math> (including skid road development) of the pre-harvest basal area of stems <math>&gt; 12.5\text{cm. dbh}</math>. To achieve this level will require careful planning of skid trials and may require leaving some scattered non-Fd.</li> </ul>
3. Harvest of non-Fir stems in mixed species stands with $\geq 40\%$ Douglas-Fir in merchantable stand layers	<ul style="list-style-type: none"> <li>Partial cutting methods to harvest non-Douglas-fir stand components with minimal harvest or damage to residual Douglas-fir stems (<math>\leq 5\%</math> harvest or damage including skid road development).</li> <li>If a stand is 80% or more Douglas-fir, it should ideally only be harvested in conjunction with harvest types 4 or 5. The level of residual damage associated with removal of small non-fir volumes may not make this a viable treatment type by itself.</li> <li>If treating stand for mountain pine beetle infection without available harvest in types 4 or 5, consideration should be given to alternate methods of dealing with the pine beetle infestation. (e.g. MSMA, fall and burn, allow pine to die without salvage harvest. )</li> <li>The level and distribution of harvest should be carefully designed to leave a windfirm residual stand and to not create frost problems for regenerating Douglas-fir.</li> </ul>	<ul style="list-style-type: none"> <li>Harvest type 3 and 4 can be done as a combined treatment where applicable.</li> <li>Regenerate to Douglas-fir as much as ecologically possible.</li> <li>Protect and promote established Douglas-fir regeneration.</li> <li>Encourage the development of an all-age stand.</li> <li>Harvest or damage to residual Douglas-fir stems should be <math>\leq 5\%</math> (including skid road development) of the pre-harvest basal area of stems <math>&gt; 12.5\text{cm. dbh}</math>. To achieve this level will require careful planning of skid trials and may require leaving some scattered non-Fd.</li> </ul>

Harvest Opportunity Type	Harvest Regime and Constraints	Comments
<p><b>4. Thinning from below in Douglas-fir dominated stands with a dense pole layer</b></p>	<ul style="list-style-type: none"> <li>Commercial thinning of the pole layer (trees 12.5 - 37.5 cm DBH) to maintain or enhance long-term forest structure desirable for mule deer habitat.</li> <li>Do not thin in OGMA's.</li> <li>Thin from below, retaining at least 75% of current stand basal area. Note that this residual basal area is the average for the area outside of WTP's.</li> <li>Reserve all Douglas-fir stems &gt;37.5 cm dbh</li> <li>Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is valuable for managing other values including CWD and undisturbed forest floor.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize harvest or damage of stems &gt;37.5 cm dbh by ensuring that skid trails avoid areas containing these larger trees. In no case should the harvest or damage of these trees exceed 5% basal area of the trees &gt; 37.5 cm dbh</li> <li>The objective is to maintain a residual stand with adequate numbers of stems in all size classes to meet long-term stand structure goals as quickly as possible</li> <li>Silviculture prescription should specify: 1) the current and residual density by diameter class; 2) how larger trees and snags will be protected from harvest or damage; 3) how logging to the prescription will be ensured operationally.</li> <li>Concurrent juvenile spacing is encouraged if a dense sapling layer is present.</li> </ul>
<p><b>5a. Single-tree Selection management using target curves to maintain stand attributes for mule deer winter range</b></p> <p>* see table below for description of where to apply these guidelines in the Transition Snowpack zone</p>	<ul style="list-style-type: none"> <li>Clumpy single-tree selection (STS) following spatial and stand structure direction of the Mule Deer Handbook with the objective of maintaining or enhancing mule deer habitat.</li> <li>Retain a minimum of 80% of the current merchantable stand basal area, harvesting in all merchantable size classes in proportion to current stem density. Note that this residual basal area is the average for the area outside of WTP's.</li> <li>Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is useful for managing other values including CWD and undisturbed forest floor.</li> <li>Skid trail area should be minimized by the use of narrow trails (3m –3.5m) at wide spacing (40 - 50m between trails).</li> </ul>	<ul style="list-style-type: none"> <li>No additional type 5 harvest should be targeted for harvest in stands where harvest types 1-4 have removed more than 20% of the total stand volume.</li> <li>A minimum 30-year cutting cycle is required.</li> <li>The minimum 80% basal area retention applies to the 30 year transition period only.</li> <li>Silviculture prescription should specify: 1) the current and residual stem density by diameter class; 2) how residual stems and snags will be protected; 3) how harvesting to the prescription will be ensured operationally.</li> <li>Concurrent juvenile spacing is encouraged if a dense sapling layer is present</li> </ul>

Harvest Opportunity Type	Harvest Regime and Constraints	Comments
<b>5b. Group selection management to maintain stand attributes for mule deer winter range</b>  * see table below for description of where to apply these guidelines in the Transition Snowpack zone	<ul style="list-style-type: none"> <li>Small Group selection (GS) with the objective of maintaining or enhancing mule deer habitat. Maximum opening width is 1.5 tree lengths with sizes ranging from 0.1 – 0.5 ha. (range provided to address varying slopes and aspects.</li> <li>Retain a minimum of 80% of the current merchantable stand volume. Note that the residual volume applies to the area outside of WTP's.</li> <li>Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is useful for managing other values including CWD and undisturbed forest floor.</li> <li>Skid trail area should be minimized by the use of narrow trails (3m –3.5m) at wide spacing (40 - 50m between trails).</li> </ul>	<ul style="list-style-type: none"> <li>No additional type 5 harvest should be targeted for harvest in stands where harvest types 1-4 have removed more than 20% of the total stand volume.</li> <li>A minimum 30-year cutting cycle is required.</li> <li>Silviculture prescription should specify: 1) the mean and maximum harvest patch size 2) how residual stems and snags will be protected; 3) how minimum volume retention will be controlled during harvesting.</li> <li>Concurrent juvenile spacing is encouraged if a dense sapling layer is present.</li> </ul>

**Table A1.3. Decision Matrix for applying STS (single-tree selection) or GS (small group selection) in the Transition Snowpack Zone** (Maximum opening width is 1.5 tree lengths with sizes ranging from 0.1 – 0.5 ha.)

ASPECT	SLOPE (%)			
	Flat (0-10)	Moderate (11-30)	Steep (31-60)	Very Steep (>60)
Warm	GS <sup>1</sup>	STS	STS	STS
Moderate	GS++	GS++	GS+	STS
Cool	GS++	GS++	GS+++	GS+++

#### Aspect

Cool	= 315.1 – 90
Moderate	= 270.1 – 315 and 90.1 – 135
Warm	= 135.1 - 270

#### Silviculture System

GS = Group Selection  
STS = Single Tree Selection

#### <sup>1</sup> Opening Size

+	Lower Size Range (0.1 - 0.3ha)
++	Middle Size Range(0.2 – 0.4ha)
+++	Upper Size Range (0.3 - 0.5ha)

**Table A1.4. Deep and Very Deep Snowpack Zones: Description and management requirements for harvest opportunity types potentially available over the 30-year transition period.**

Harvest Opportunity Type	Harvest Regime and Constraints	Comments
1. Harvest of trees currently infested with Douglas-fir bark beetles	<ul style="list-style-type: none"> <li>Single tree removal of currently affected stems with minimal damage or removal of non-affected stems. Previously attacked trees (grey and red attack) should be left to provide snag habitat and to minimize damage to residual stand.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize beetle damage and use of trap trees by prompt removal of currently infested trees, and careful mapping and reconnaissance.</li> </ul>
2. Harvest of non-Fd stems in stands with <40% Douglas-fir in merchantable stand layers	<ul style="list-style-type: none"> <li>Partial cutting methods to harvest non-Douglas-fir stand components with minimal harvest or damage to residual Douglas-fir stems. (<math>\leq 5\%</math> harvest or damage including skid road development).</li> <li>The level and distribution of harvest should be carefully designed to leave a windfirm residual stand and to not create frost problems for regenerating Douglas-fir.</li> <li>Existing stands located on warm aspects or associated toe slopes which include cedar should be managed to maintain a component of cedar in the residual stand. Some Douglas-fir/Cedar mixed stands are desirable on these deep snow winter ranges.</li> </ul>	<ul style="list-style-type: none"> <li>Regenerate to Douglas-fir as much as ecologically possible.</li> <li>Protect and promote established Douglas-fir regeneration.</li> <li>Harvest or damage to residual Douglas-fir stems should be <math>\leq 5\%</math> (including skid road development) of the pre-harvest basal area of stems <math>&gt; 12.5\text{cm. dbh}</math>. To achieve this level will require careful planning of skid trials and may require leaving some scattered non-Fd.</li> </ul>
3. Harvest of non-Fir stems in mixed species stands with $\geq 40\%$ Douglas-Fir in merchantable stand layers	<ul style="list-style-type: none"> <li>Partial cutting methods to harvest non-Douglas-fir stand components with minimal harvest or damage to residual Douglas-fir stems (<math>\leq 5\%</math> harvest or damage including skid road development).</li> <li>If a stand is 80% or more Douglas-fir, it should ideally only be harvested in conjunction with harvest types 4 or 5. The level of residual damage associated with removal of small non-fir volumes may not make this a viable treatment type by itself.</li> <li>If treating stand for mountain pine beetle infection without available harvest in types 4 or 5, consideration should be given to alternate methods of dealing with the pine beetle infestation. (e.g. MSMA, fall and burn, allow pine to die without salvage harvest. )</li> <li>The level and distribution of harvest should be carefully designed to leave a windfirm residual stand and to not create frost problems for regenerating Douglas-fir.</li> </ul>	<ul style="list-style-type: none"> <li>Harvest type 3 and 4 can be done as a combined treatment where applicable.</li> <li>Regenerate to Douglas-fir as much as ecologically possible.</li> <li>Protect and promote established Douglas-fir regeneration.</li> <li>Encourage the development of an all-aged stand.</li> <li>Harvest or damage to residual Douglas-fir stems should be <math>\leq 5\%</math> (including skid road development) of the pre-harvest basal area of stems <math>&gt; 12.5\text{cm. dbh}</math>. To achieve this level will require careful planning of skid trials and may require leaving some scattered non-Fd.</li> <li>Existing stands located on warm aspects or associated toe slopes which include cedar should be managed to maintain a component of cedar in the residual stand. Some Douglas-fir /Cedar mixed stands are desirable on these deep snow winter ranges.</li> </ul>

Harvest Opportunity Type	Harvest Regime And Constraints	Comments
<p><b>4. Thinning from below in Douglas-fir dominated stands with a dense pole layer</b></p>	<ul style="list-style-type: none"> <li>Commercial thinning of the pole layer (trees 12.5 - 37.5 cm DBH) to maintain or enhance long-term forest structure desirable for mule deer habitat.</li> <li>Do not thin in OGMA's.</li> <li>Thin from below, retaining at least 75% of current stand basal area. Note that this residual basal area is the average for the area outside of WTP's.</li> <li>Reserve all Douglas-fir stems &gt;37.5 cm dbh</li> <li>Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is valuable for managing other values including CWD and undisturbed forest floor.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize harvest or damage of stems &gt;37.5 cm dbh by ensuring that skid trails avoid areas containing these larger trees. In no case should the harvest or damage of these trees exceed 5% basal area of the trees &gt; 37.5 cm dbh</li> <li>The objective is to maintain a residual stand with adequate numbers of stems in all size classes to meet long-term stand structure goals as quickly as possible.</li> <li>Silviculture prescription should specify: 1) the current and residual density by diameter class; 2) how larger trees and snags will be protected from harvest or damage; 3) how logging to the prescription will be ensured operationally.</li> <li>Concurrent juvenile spacing is encouraged if a dense sapling layer is present.</li> </ul>
<p><b>5a. Single-Tree Selection management using target curves to maintain stand attributes for mule deer winter range</b></p> <p>* see table below for description of where to apply these guidelines in the Transition Snowpack zone</p>	<ul style="list-style-type: none"> <li>Clumpy single-tree selection (STS) following spatial and stand structure direction of the Mule Deer Handbook with the objective of maintaining or enhancing mule deer habitat.</li> <li>Retain a minimum of 80% of the current merchantable stand basal area, harvesting in all merchantable size classes in proportion to current stem density. Note that this residual basal area is the average for the area outside of WTP's.</li> <li>Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is useful for managing other values including CWD and undisturbed forest floor.</li> <li>Skid trail area should be minimized by the use of narrow trails (3m –3.5m) at wide spacing (40 - 50m between trails).</li> </ul>	<ul style="list-style-type: none"> <li>No additional type 5 harvest should be targeted for harvest in stands where harvest types 1-4 have removed more than 20% of the total stand volume.</li> <li>A minimum 30-year cutting cycle is required.</li> <li>The minimum 80% basal area retention applies to the 30-year transition period only.</li> <li>Silviculture prescription should specify: 1) the current and residual stem density by diameter class; 2) how residual stems and snags will be protected; 3) how harvesting to the prescription will be ensured operationally.</li> <li>Concurrent juvenile spacing is encouraged if a dense sapling layer is present</li> </ul>

Harvest Opportunity Type	Harvest Regime And Constraints	Comments
<b>5b. Group selection management to maintain stand attributes for mule deer winter range</b>  * see table below for description of where to apply these guidelines in the Transition Snowpack zone	<ul style="list-style-type: none"> <li>Small Group selection (GS) with the objective of maintaining or enhancing mule deer habitat. Maximum opening width is 2 tree lengths with sizes ranging from 0.2 – 0.6 ha. (range provided to address varying slopes and aspects).</li> <li>Retain a minimum of 80% of the current merchantable stand volume. Note that the residual volume applies to the area outside of WTP's.</li> <li>Great care must be taken to maintain existing snags and manage for snag recruitment. Use of wildlife tree patches (WTPs) is the most effective way of managing for snags and is useful for managing other values including CWD and undisturbed forest floor.</li> <li>Skid trail area should be minimized by the use of narrow trails (3m –3.5m) at wide spacing (40 - 50m between trails).</li> </ul>	<ul style="list-style-type: none"> <li>No additional type 5 harvest should be targeted for harvest in stands where harvest types 1-4 have removed more than 20% of the total stand volume.</li> <li>A minimum 30-year cutting cycle is required.</li> <li>Silviculture prescription should specify: 1) the mean and maximum harvest patch size 2) how residual stems and snags will be protected; 3) how minimum volume retention will be controlled during harvesting.</li> <li>Concurrent juvenile spacing is encouraged if a dense sapling layer is present</li> </ul>

**Table A1.5. Decision Matrix for applying STS (single-tree selection) or GS (small group selection) in the Deep and Very Deep Snowpack Zones**  
(Maximum opening width is 2 tree lengths with sizes ranging from 0.2 – 0.6 ha.)

ASPECT	SLOPE (%)			
	Flat (0-10)	Moderate (11-30)	Steep (31-60)	Very Steep (>60)
Warm	GS <sup>1</sup>	GS+	STS	STS
Moderate	GS++	GS++	GS++	GS++
Cool	GS++	GS++	GS+++	GS+++

#### Aspect

Cool	= 315.1 – 90
Moderate	= 270.1 – 315 and 90.1 – 135
Warm	= 135.1 - 270

#### Silviculture System

GS	= Group Selection
STS	= Single Tree Selection

#### <sup>1</sup> Opening Size

+	Lower Size Range (0.2 – 0.4ha)
++	Middle Size Range (0.3 – 0.5ha)
+++	Upper Size Range (0.4 – 0.6ha)



## Appendix 2 – Risk Rating by Mule Deer Winter Range – Regional Mule Deer Strategy

Mule Deer Winter Range	Current Risk Category	Mule Deer Winter Range	Current Risk Category
111 Mile-Forest Grove	Very High	Horsefly Lake	Moderate
51 Creek	Very High	Horsefly River	Moderate
Alix-Honeyburn	Very High	Howard Lake North	Very High
Alkali Lk	Moderate	Jesmond Stable Cr	Moderate
Alkali-Dog Creek	High	Jones Creek	High
Anahim Creek	Very High	Knife Creek	High
Antoine Lake	Very High	Koster-Grinder	Low
Australian-Alix	High	Kostering Creek	Moderate
Baker Creek	Very High	Lac La Hache North	Very High
Beaver Valley North	Moderate	Lac La Hache South	Very High
Beaver Valley South	Moderate	Likely	Very High
Big Creek	Very High	Little Lake	High
Big Lake (100 Mile)	Very High	Lone Cabin	Low
Big Lake (WL)	Moderate	Loon Creek	Very High
Blackwater River	High	Lower Loon Creek	Very High
Bonaparte River	Very High	Lower Quesnel	High
Borland Valley	Low	Mackin-Buckskin	Very High
Bradley Creek	Very High	McIntosh Lakes	Very High
Bridge Lake North	Moderate	McLeese Lake	High
Buffalo Creek	Very High	Meldrum	Very High
Canim Lake North	Moderate	Mosley Creek	Moderate
Canim Lake West	Very High	Narcosli	Very High
Canoe Creek North	Very High	Nazko	High
Canoe-China Gulch	Moderate	Needa Lake North	High
Chilanko Creek	Very High	Niquidet	Moderate
Chimney Creek	High	North Taseko	Moderate
Chimney-Alkali	Low	Porcupine Creek	Low
China Gulch-Big Bar	Moderate	Prouton Lakes	High
Churn Creek	High	Puntzi Lake	Very High
Deadman Creek	High	Pyper Lake	Very High
Deka Lake North	Very High	Quesnel Forks	High
Dombey Lake	High	River Ranch	Very High
Dragon-Australian	Moderate	Rose Lake	Very High
Drewry Lake North	Very High	Roserim	High
Edge Hills	Low	Skelton	Low
Enterprise	Moderate	South Chilcotin	Very High
Farwell	Very High	South Gaspard	Very High
Fawn Lake	Very High	South Taseko	Very High
Fletcher Lake	Very High	Sulphurous Lk South	High
Gaspard	Very High	Tatlayoko	High*
General Tingley	Very High	Temapho-Nazko	Very High
Gerimi	High	Timothy-Rail	High
Haines Creek North	Very High	Upper Quesnel	Very High
Haines Creek South	Very High	Watch Lake North	Very High
Hance's Timber	Very High	West Arm	Very High
Hart-Marguerite	Low	West Chilcotin	Very High
Hawks Creek North	Very High	West Chilko	Very High
Hawks Creek South	Low	West Road South	High
Horse Lake	High	WL-Chimney	Moderate
		WL-Hawks Creek	Moderate
		Young Lake	Very High

\* indicates the risk rating has been estimated.

### **Appendix 3 – Map of Snowpack Zones and Planning Status of Mule Deer Winter Ranges**

attached