Harvesting Practices and Mountain Goat Habitat in the Babine Watershed — A Background Review

Prepared for:

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1.0 Introduction

This project was initiated by the Babine Watershed Monitoring Trust (and administered by the Bulkley Valley Research Centre for Natural Resources, Research and Management) to summarise ongoing work by the Ministry of Environment and other stakeholders with respect to forest harvesting and mountain goat habitat in the Babine Watershed. In September of 2004, preliminary risk curves were developed based on two objectives: to maintain mountain goat habitat, and to maintain goat populations. These objectives were established to achieve the overall goal of maintaining mountain goats in the Babine Watershed.

At the time that the initial risk curves were developed, it was determined that there was a high priority to collect additional data for the Kispiox Land and Resource Management Plan (LRMP) area (now the West Babine) (Price and Daust 2005). This project was initiated to determine what work has been conducted over the last three years that is relevant to the objectives for mountain goat populations in the BWMT area. The intention is to determine if this work can be used to update the BWMT monitoring framework. Specifically, there is a need to reduce uncertainty around the current indicator data, and to detect consequences in relation to harvesting near critical goat habitat and during critical times (e.g., during the natal period).

2.0 Background Review

Much of the information included in the background review was obtained through interviews and from reports and maps (primarily accessed through the internet). A complete set of references is included with this report.

2.1 Methods

Several people were contacted with regards to this project. At the onset of the project, a meeting was held with Karen Price from the Babine Watershed Monitoring Trust (BWMT) to ensure that project objectives were clear, and to review the initial risk curves (and associated data) generated for the existing monitoring framework (Price and Daust 2005).

The following is a list of people that were contacted to determine if they had completed, or had any ongoing work regarding forest harvesting and the implications for mountain goats (relevant to the Babine Watershed).

BC Ministry of Environment

- Len Vanderstar, Ecosystem Specialist, Ministry of Environment, Skeena Region, Smithers
- Darren Fillier, Ecosystem Specialist, Ministry of Environment, Skeena Region, Smithers
- Kathy Paige, Ecosystems Biologist, Habitat Management Section, Ministry of Environment, Victoria

BC Ministry of Forests

- Doug Steventon, Habitat Biologist, Research Section, Northern Interior Forest Region, Ministry of Forests and Range, Smithers

- Glen Buhr, Stewardship Forester, Skeena-Stikine Forest District, Ministry of Forests and Range, Smithers

University/Colleges

- Michael Gillingham, Ecosystem Science and Management Program, University of Northern British Columbia, Prince George

Private Industry

- Pam Hengeveld, Consultant, Synergy Applied Ecology, Mackenzie
- Alan Baxter, West Fraser Mills Ltd., Pacific Inland Resources Division, Smithers

2.2 Results

Habitat Designation

Most of the work completed over the last three years has primarily focussed on habitat management. Important goat habitat in the BWMT area has been identified for both the Bulkley LRMP area, and the West Babine Sustainable Resource Management Plan (SMRP) area. There are significant differences in the management of mountain goat habitat between the two sides of the watershed.

The west side of the BWMT area (governed by the West Babine SRMP) now has Ungulate Winter Ranges (UWRs) legally designated under the Forest and Range Practices Act (FRPA). Ungulate Winter Range polygons and an associated Order (#U-6-006) have been established and approved for mountain goats for the Kispiox/Cranberry Timber Supply Area (TSA) as of June 20, 2007 (Appendix I). The mountain goat UWRs for this part of the BWMT area are managed based on general wildlife measures (GWMs) outlined in Schedule 1 of the Order. The GWMs outline management both inside the UWR polygons, and for a buffer around them. Len Vanderstar and Darren Fillier are the contact persons for this process at the Ministry of Environment, Skeena Region. As the previous Forest Ecosystem Specialist for the Kispiox Forest District, Mr. Fillier is very familiar with the area, and the LRMP objectives.

The UWR Order is largely based on work completed by Ardea Biological Consulting in 2005 (this was a continuation of the habitat suitability work completed for this area by Reid *et al.* in 2004). Seventy-nine potential mountain goat UWRs were identified in the Kispiox and Cranberry TSAs through this project (Robertson *et al.* 2005). The majority of these proposed UWR polygons were included in the UWR Order. The habitat modelling completed in this project (and the subsequent UWR map) was based on GIS data, compilation of historical information, and aerial surveys. Although this work was very thorough, no ground surveys were completed to monitor use of these UWRs by goats. Additional project work could also include the identification and level of use of important trails or mineral licks (D. Fillier, pers. comm.).

Within the Order, several large goat UWRs (with some level of connectivity) have been delineated in the Atna Range (Figure 1). The Atna–Shelagyote Special Management Zone (SMZ) has since been expanded to include the designated UWRs (D. Fillier, pers. comm.). A few of the UWR polygons (17 – Gail Creek Canyon, 18 (labelled as 52 in Robertson *et al.* 2005)

and 19 – Shenismike Creek) are associated with the Babine River Wilderness Corridor (protected area) and occur (either wholly or in part) within the Babine River Valley SMZ. UWR polygons 17 and 18 are inhabited by canyon dwelling mountain goat populations. The Gail Creek goat population (see polygon 17 on map inset) is in currently believed to be in decline (D. Fillier, pers. comm.).

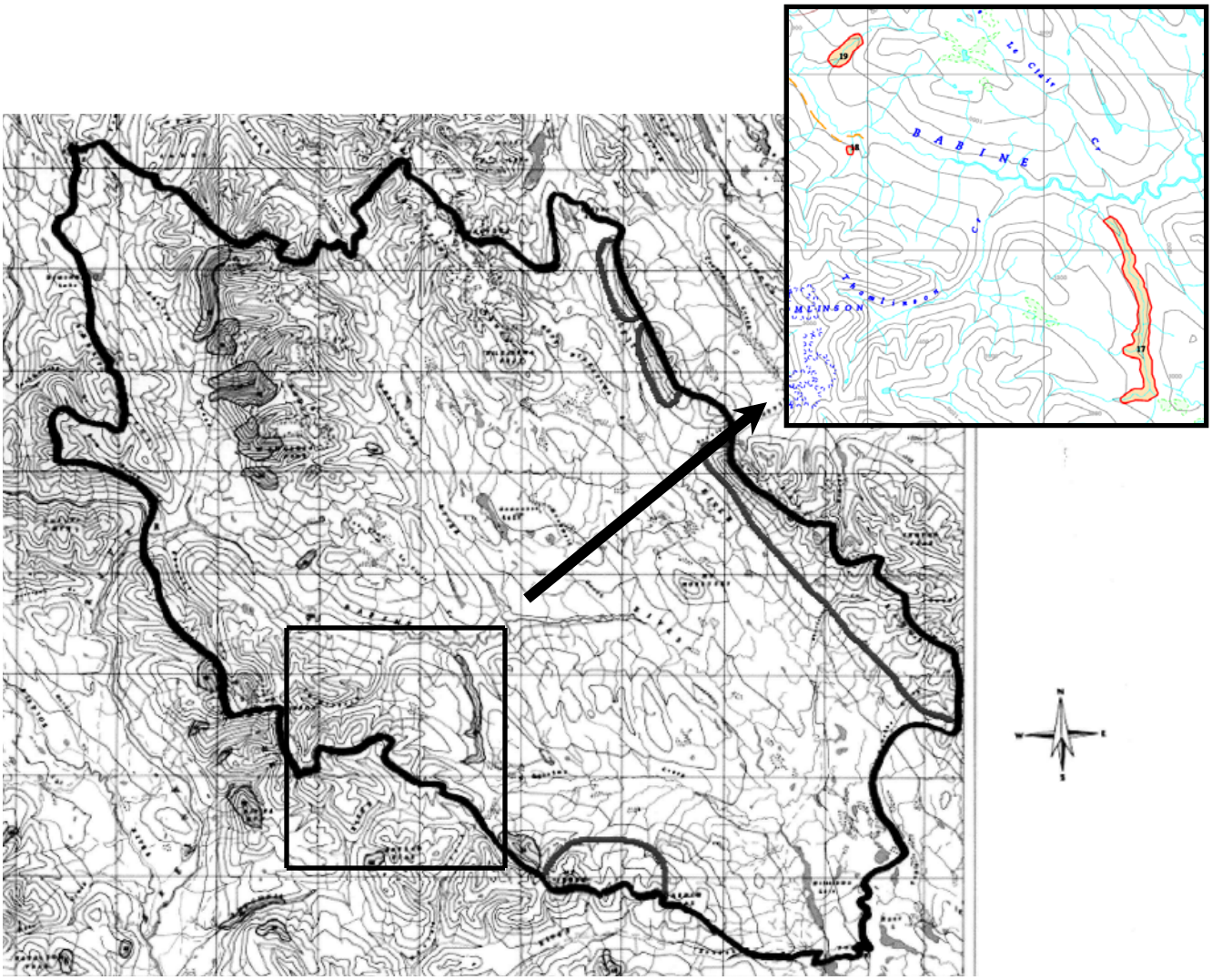

Figure 1. Ungulate winter ranges designated for mountain goat in the West Babine portion of the BMWT area. UWR polygons were designated for the entire Kispiox/Cranberry TSA by the Ministry of Environment in 2007. Also shown, Mapped Habitats used to manage for goats in the Bulkley TSA (hand-drawn lines).

Forest harvesting activities have already taken place in a portion of the mountain goat UWRs (primarily in the low elevation, canyon areas) (Robertson *et al.* 2005, D. Fillier, pers. comm.). Robertson *et al.* (2005) summarised the overlap of the original proposed UWR polygons (and associated buffer zones) in the Kispiox/Cranberry TSA with the timber harvesting land base, and forested and non-forested habitats. These data have been incorporated in the following table, and

used to generate percentages for the level of harvest (as of 2005) and potential harvest within the 79 proposed UWR polygons and their associated buffers.

Table 1. Data indicating the amount of forested area and level of harvest for the 79 potential UWR polygons and associated buffers in the Kispiox/Cranberry TSA (adapted from Robertson *et al.* 2005).

	Total Area (ha)	Portion in the THLB (ha)	Non THLB Forested Area (ha)	Total Forested Area (ha)	THLB Area Harvested (ha)	Area Harvested Outside of THLB (ha)	Total Area Harvested (ha)	Area Currently Harvested (%)	Potential Level of Harvest (%)
UWR Polygon	33 595.7	2 354.0	13 572.4	13 572.4	139.4	20.5	159.9	1.2	17.3
500 m Buffer	40 134.9	9 055.1	17 724.9	17 724.9	1 378.5	169.4	1 547.9	8.7	51.1
1 km Buffer	85 823.0	20 958.6	37 115.9	37 115.9	3 198.7	346.7	3 545.4	9.6	56.5
2 km Buffer	190 286.7	49 672.6	79 238.0	79 238.0	8 052.0	1 406.7	9 458.7	11.9	62.7

Although the above results indicate a relatively low level of harvest in and around the UWRs, the level of harvesting activity is variable across the TSA. Within the BWMT area, the Gail Creek Canyon UWR (polygon 17) has already been heavily impacted by forest harvesting. Attempts will be made by the Ministry of Environment to ensure that mitigative measures are implemented if exemptions with respect to harvesting are made to the UWR Order (D. Fillier, pers. comm.). The two main operators affected by the UWR Order are BC Timber Sales (BCTS) and Gitxsan Forest Enterprises (old Skeena Cellulose chart areas). Recent Timber Supply Review data have been collected for the Kispiox/Cranberry, and a State of the Forest Report is currently in progress (Glen Buhr, pers. comm.).

On the east side of the BWMT area, goat habitat management is currently governed by the Forest Stewardship Plan (FSP) for PIR (2007) and the Bulkley LRMP Objectives Set by Government (2006). Within the two landscape units (LUs) relevant to the BWMT (Nilkitwa and Babine), the majority of the high value goat habitat has been identified as Mapped Habitat along the east side of the Nilkitwa and Babine LUs, and in the southwest corner of the Babine LU (Map 2 of the FSP is included as Appendix II). Based on the Objectives Set by Government, the FSP submitted by PIR outlines specific strategies for forest harvesting in and around Mapped Habitat for goats (Table 2). In addition to the Mapped Habitat, Special Management Zone 1 (no harvest) in the northern part of the Nilkitwa LU is also being used to manage goat habitat.

Although there has been some discussion about identifying UWR polygons in the Bulkley for mountain goats, nothing has been established to date. The management structure for the Bulkley is already very complicated from a mapping perspective, and most of the Mapped Habitat does not occur in a highly operable area (A. Baxter, pers. comm.).

Table 2. Mountain goat habitat management for the BWMT area as set out in the FSP for PIR and the UWR Order for the Kispiox/Cranberry TSA.

		West Babine	Bulkley
Forest Harvesting Activities	Within UWR/ Mapped Habitat	- Retention of all forest cover & vegetation within UWR polygon - Felling of trees is permitted when required for worker safety	- Provide thermal and snow interception cover and forage - Provide security by limiting disturbance - Provide forested cover adjacent to escape terrain
	Buffers	- 500 m horizontal distance - Within 500 m, should not "result in material or adverse disturbance to goats"	- Harvesting within 200 m of Mapped Habitat will be done with non-clearcutting system or with cutblocks < 5 ha
		- 2000 meters line of site for helicopter logging	
	Timing of Harvesting Activities	- June 15 to October 31 window	- No harvesting within 200 m of Mapped Habitat from April 15 to July 15
Roads		- Deactivated if within 500 m of UWR polygon	- All roads within one kilometre of Mapped Habitat will be deactivated and access control points used to limit motorized access

Effectiveness Monitoring

With respect to the monitoring for the above habitat management, there have been no confirmed plans to do any work in the Babine Watershed area. The UWR Order for the Kispiox/Cranberry TSA states that primary forest activities occurring within the 500 m buffer of any UWR polygon should not result in "material or adverse disturbance to goats". At present, the Ministry of Environment does not have a specific measure of this, but is interested in evaluating population numbers over time, and monitoring the level of usage for each of the UWR polygons. Similarly, no monitoring program is planned or on-going for the Mapped Habitat for goats in the Bulkley TSA. The perceived risk that these areas will be impacted by forest harvesting, particularly in the Nilkitwa LU, is currently quite low.

Erickson *et al.* (2007) have outlined a step-by-step approach to evaluating the effectiveness of habitat designations (such as ungulate winter range) under FRPA. The approach is based on a three-tiered evaluation structure (routine, extensive and intensive) designed by the FRPA Resource Evaluation Program (FREP) in 2004. Erickson *et al.* (2007) outlined this approach as follows:

1. Develop key effectiveness monitoring objectives and questions
    - e.g., minimizing disturbance from forest harvesting during the natal period – is forest harvesting occurring within the 500 m (or 200 m buffer if you are in the Bulkley TSA)? Are goats being displaced by these activities?

2. Review and select appropriate indicators to address monitoring questions
    - Area harvested in or around goat habitat (routine), habitat feature disturbance (extensive), movement and habitat use patterns (intensive)
3. Define effectiveness (based on functionality of habitat and risk to population) and establish recommended targets (based on long term strategies for regional populations)
    - Four potential effectiveness definitions: effective or functioning, functioning but at risk, functioning but at high risk, and not effective or non-functioning
4. Develop monitoring protocols
    - Protocols should indicate what you are measuring for each indicator
    - Should be developed for routine and extensive evaluations first
    - Intensive protocols developed as required
5. & 6. Testing and revision of monitoring protocol
    - Draft protocols should be tested with the intention of using them at the regional or provincial scale
7. Implementation
8. & 9. Evaluation and Recommendations

Steve Wilson (EcoLogic Research) has conducted several effectiveness monitoring projects over the last three to four years with a focus on mountain goat UWR designation. Through this work Wilson developed a set of appropriate indicators and associated monitoring protocols (Wilson 2006). These monitoring protocols were tested in the Okanagan-Shuswap and Sunshine Coast Forest Districts as a pilot project (Wilson 2007). Wilson (2006) states that 'evidence of sustained winter use' is one of the most important indicators of UWR effectiveness. According to Wilson, use may be determined by either tracking collared animals, or conducting winter aerial and/or ground surveys.

3.0 Incorporation into Existing BWMT Framework

The objective to maintain goat habitat in the current framework is being addressed by two indicators identified in the land use plans:

1. Type and patch-size distribution of harvest within 200 m of identified goat habitat; and
2. Presence of forested connectors between mountain ranges in Kotsine Pass.

These indicators were largely based on the Bulkley LRMP information because of the lack of indicator data in the Kispiox (Price and Daust 2005). The results of this background review can be used to update the targets for the Kispiox (West Babine) portion of the Babine Watershed. In addition, the estimated risk for the West Babine can be updated based on the harvest data presented above (Table 1).

It is clear from the pilot project conducted by Wilson (2007) that other types of indicators may be useful in determining if the objective of maintaining mountain goat habitat is being met. The indicators and methodologies used by Wilson may not be directly transferable to the transitional (coastal-interior) habitat encountered in the BWMT area as there is considerable variability between mountain goat habitat requirements throughout British Columbia. Despite this, the

monitoring protocols developed by Wilson (2006, 2007), which are intended to be the first step in establishing a provincial standard, could likely be adapted for the BWMT area.

A similar approach may be taken when updating the monitoring framework for the objective to maintain mountain goat populations. The indicators that have been incorporated into the present framework (as per the land-use plans) are:

1. Density of accessible roads within 1 km of identified habitat; and
2. Amount of harvesting within 200 m of habitat during natal time (May or early June).

Again, these targets can be updated with the information from the West Babine portion of the BWMT area presented in this background review. Although the level of harvest between May and early June may be a useful indicator for disturbance during the natal period, this is not the only critical time period when goats are vulnerable. The timing of harvest practices around the Babine Wilderness Corridor may be detrimental to goats for example, as the emphasis is on managing for grizzly bears, and as such much of the harvesting is scheduled during the winter. Although the UWRs associated with the protected area may be buffered somewhat by the GWMs in the Order, increased winter harvesting will likely increase the level of disturbance during a critical time in the life history. It may therefore be important to look at the amount of harvesting that is occurring within 500 m of mountain goat winter range during winter months. Timing of harvesting may not be as critical an issue during the natal period, as it often coincides with the spring break-up.

At this time, there is no additional data to reduce uncertainty around what level of disturbance is required to have a “material or adverse” effect on goats.

4.0 Recommendations

The first recommendation is to re-assess, and potentially increase the number of indicators that are currently being used in the BWMT monitoring framework for the maintenance of mountain goat populations. Although it is useful to know the level of harvest for the forested areas in the winter habitat (and associated buffers), it is also important to continue to link these data with indices of use data. Designation of mountain goat UWRs in the West Babine portion of the BWMT area provides a solid framework that can be used to develop sound effectiveness monitoring protocols (emphasis on routine and extensive). This work could then be expanded to include the Mapped Habitat that is currently being used to manage for goats in the Bulkley TSA. Routine and extensive monitoring protocols could initially be used to collect (or supplement) good baseline data. Indicators that Wilson (2006) recommends for routine monitoring (once or once a year) are:

- the proportion of area in established UWR relative to available suitable winter range habitat, and
- evidence of sustained winter use by goats (as provided by recreational users such as heli-skiers).

Examples of indicators that could be extensively monitored (every 3–5 years; Wilson 2006) are:

- forage availability,
- forest cover characteristics, and

- evidence of sustained winter use by mountain goats.

Targets for some of the indicators listed above could be developed (and continually re-assessed) for the BWMT area using data that is available through the Ministry of Environment (e.g., habitat suitability, UWR designation, etc) and the Ministry of Forests (e.g., the timber supply review data). Targets for other indicators, such as evidence of sustained winter use, could be set based on current information, but should be refined through additional field surveys.

Additional mapping for inclusion into the monitoring framework, such as the location of important trails and mineral licks would also be a key component to achieving the overall objective of maintaining goat populations.

4.1 Potential 2008 Projects

Initially, the collection and analysis of the routine data not already incorporated into the BWMT monitoring framework should be completed. This would include the GIS data for the UWRs (and the potential UWR data collected by Robertson *et al.* in 2005 if possible). Updated road and forest harvesting information could then be used to get a good indication of where the likely areas of disturbance to goats might occur.

The next phase should include the collection of relative use data. The mapping data collected during routine monitoring can be used to prioritize areas for field sampling. Mapped areas where there is a high probability that the goat populations may be disturbed during critical periods (i.e., during winter or natal periods) should be given the first priority. Depending on the number of potential sites, and the number of plots required at each one (dictated by size of area and accessibility), a combination of aerial and ground surveys could be used to update the targets for this indicator (Wilson 2006, Wilson 2007, Robertson *et al.* 2005).

Hengeveld *et al.* (2004) have been working on a habitat modelling project (similar to the one used by Robertson *et al*. in 2005) to develop predictive models for low elevation mineral licks and access trails. Further investigation could determine if this predictive modelling program could be adapted for use in the BWMT area as a continuation of the modelling work already completed.

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Appendix I. UWR Order #U-6-006 for Mountain Goat in the Kispiox/Cranberry TSA

BRITISH COLUMBIA

ORDER – UNGULATE WINTER RANGE #U-6-006

This order is given under the authority of sections 9(1), 9(2) and 12(1) of the *Government Actions Regulation* (B.C. Reg. 582/2004).

The Deputy Minister of Environment orders that:

1. the ungulate winter range shown in the map set out in the attached Schedule A (#U-6-006) is established;
2. the ungulate winter range in the attached Schedule A is established for mountain goat (*Oreamnos americanus*); and
3. the general wildlife measures outlined in Schedule 1 are established for the ungulate winter range in the attached Schedule A;
4. the specified areas as outlined in general wildlife measure 2, 4 and 5, Schedule 1, are established;
5. where there is any discrepancy between the ungulate winter range boundaries as shown in the attached Schedules A and the GIS file *gtwr_ki*, the boundaries as detailed in the GIS file will take precedent. The centre point of the line on the map denoting the ungulate winter range is what establishes the boundary;
6. pursuant to section 7(3) of the *Forest Planning and Practices Regulation* the person(s) required to prepare a forest stewardship plan are hereby exempted from the obligation to prepare results or strategies in relation to the objective set out in section 7(1) of the *Forest Planning and Practices Regulation* for the winter survival of mountain goat in the Kispiox and Cranberry TSAs; and
7. the general wildlife measures outlined in schedule 1 do not apply for the purposes of exploration, development and production activities when these activities have been authorized for the purpose of subsurface resource exploration, development or production by the Mineral Tenure Act, the Coal Act, the Mines Act, the Petroleum and Natural Gas Act, the Pipeline Act or the Geothermal Resources Act.

BRITISH COLUMBIA

Schedule 1 – General Wildlife Measures

In this schedule:

a) "primary forest activity" is defined as in the *Forest Planning and Practices Regulation*,
b) "mountain goat winter range" are those winter ranges established by way of this Order, and
c) "deactivate" or "deactivation" refers to either partial or complete treatment of roads and trails with the intent to prevent, as much as possible, motor vehicle access while taking into account site specific operating constraints; where practicable this activity will include right-of-way revegetation activities to manage long term access.

1. Primary forest activities will result in retention of all forest and vegetative cover within a mountain goat winter range.

2. Wherever feasible, operators should refrain from felling trees within mountain goat winter range. Felling of single trees, such as a danger, guy line anchor, or tail hold tree is permitted within a mountain goat winter range when it is required to address worker safety. Trees felled for the purposes of this Measure (2) will be left on site to provide coarse woody debris.

3. Primary forest activities that occur within 500 meters horizontal distance of a mountain goat winter range will not result in material or adverse disturbance to goats. Operational activities that have not been exempted will take place during the period starting June 15 and ending October 31.

4. Access roads and structures required for primary forest activities within 500 meters of mountain goat winter range will be constructed in a manner that will facilitate effective deactivation. All roads or structures that have not been exempted will be deactivated within one year following forest harvesting activities.

5. All helicopter logging activities conducted within 2000 meters line of sight of a mountain goat winter range that have not been exempted will take place during the period starting June 15 and ending October 31.

Signed this 20th day of June, 2007
Chris Trumpy, Deputy Minister
Ministry of Environment

BRITISH COLUMBIA

The following information is intended to provide background information and support to the legal order establishing UWR 6-006. These appendices are not part of the legal order for UWR 6-006.

Appendix 1

1. Authority to consider an exemption from these general wildlife measures is provided in Section 92(1) of the *Forest Planning and Practices Regulation*. In instances where it is not practicable to comply with these measures, a person proposing to conduct forestry activities should consider seeking an exemption from the requirements to comply with the applicable General Wildlife Measures.

   An exemption application should be submitted to the Minister's delegate (Regional Manager – Ministry of Environment, for the Region that the Ungulate Winter Range is located) with a rationale describing the nature of the problem and options to integrate winter range conservation with proposed forest practices. This submission will assist in timely consideration of the matter, and will inform the conditions, if any, of the exemption that may be granted prior to commencement of activities. Upon receipt of a complete exemption application, a determination will normally be made within 30 days of arrival. Incomplete packages will be returned to the proponent for resubmission.

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Appendix 2

Note that the appendix is not part of the Order and is intended to provide guidance for areas covered under this Order.

1. Retention of forest cover in mountain goat winter range is required to deliver habitat attributes critical to the survival of this species. These attributes include patches of mature/old forest in areas adjacent to escape terrain that provide winter forage production, snow interception, and thermal/security cover.

2. Improvements in scientific and biological information may lead to amendment(s) consistent with the *Government Actions Regulation* of the mountain goat winter range measures including:
    a) the addition of new, or deletion of existing, mountain goat winter range polygon units,
    b) the adjustment of mountain goat winter range unit boundaries including their associated buffer sizes, and
    c) modification of a specific measure to address operational constraints while protecting mountain goat populations and their habitat.

3. Primary forest activities should avoid road or trail construction within 500 meters horizontal distance of a mountain goat winter range. Where no other practical access options exist, roads and trails should utilize strategies to protect goats and their habitat from disturbance including:
    a) placing adequate timber buffers around mountain goat winter range boundaries,
    b) locating a road or trail no closer to mountain goat winter range than made necessary by operational site constraints, or
    c) other suitable techniques.

4. A person conducting forestry activities may consider seeking an exemption from the requirement to comply with the applicable General Wildlife Measures. Authority to consider an exemption is provided in section 92(1) of the *Forest Planning and Practices Regulation*.

    A spatially explicit strategy for conservation of mountain goat winter range will assist in timely consideration of the matter when submitted to the Minister's delegate, and will inform the conditions, if any, of the exemption that may be granted.

Exemptions may be considered for:

a) The construction of roads or trails in a mountain goat winter range, including the harvest of associated right-of-way timber, where it can be demonstrated that no other access options exist.

   These roads and trails will be:

   i. designed, as much as possible, to prevent all motorized vehicle access outside of the June 15th to October 31st timing window, and
   ii. will be deactivated as soon as practicable, and no later than one year, following primary forest activities.

b) The construction of semi-permanent mainline roads within 500 meters horizontal distance of a mountain goat winter range when it can be demonstrated that no other road location options exist to access timber beyond a specific mountain goat winter range.

   These roads and trails will be:

   i. designed, as much as possible, to prevent all motorized vehicle access outside of the June 15th to October 31st timing window, and
   ii. will be deactivated (consistent with the definition for "deactivation" in the order) as soon as practicable, and no later than one year, following primary forest activities.

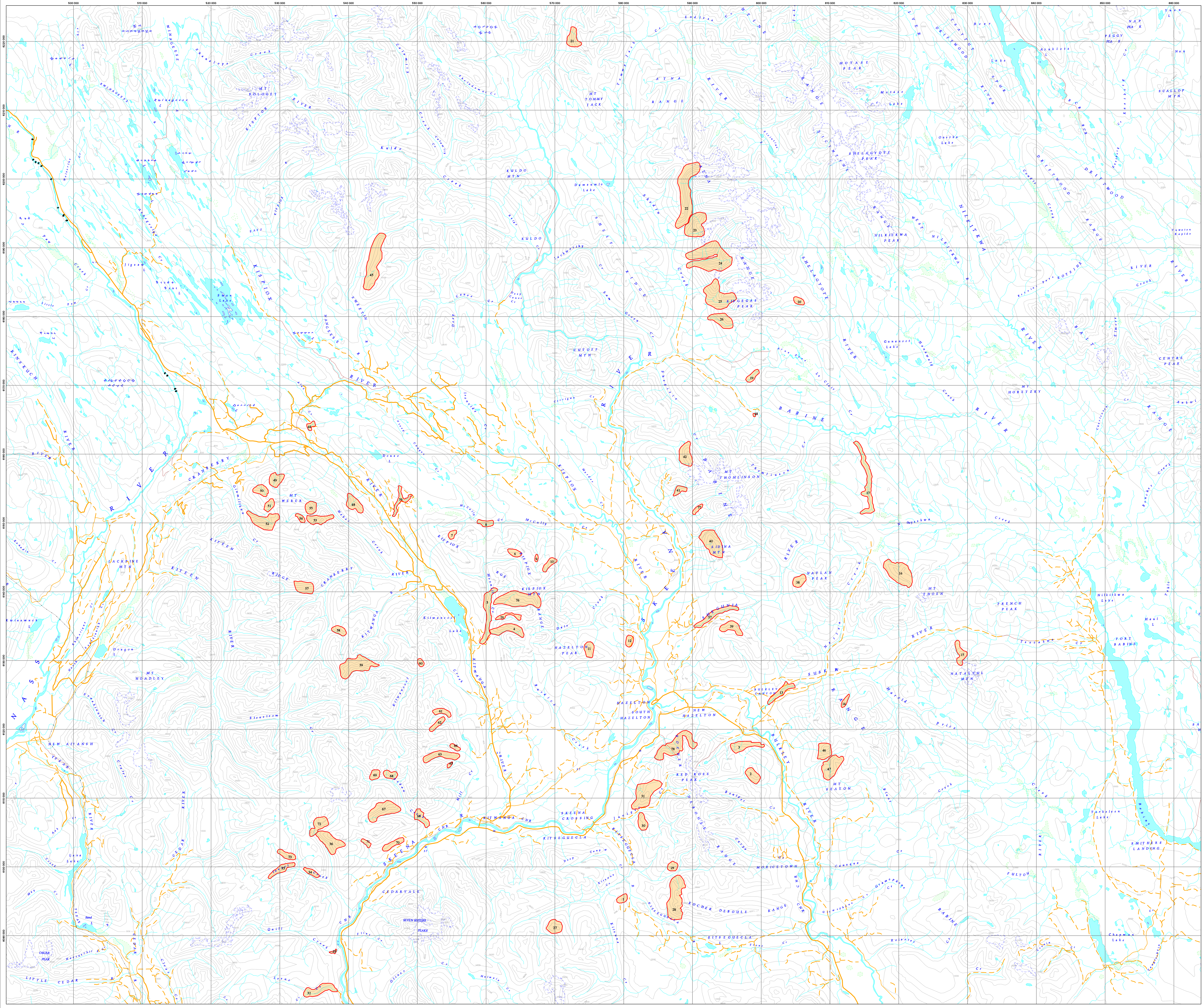
c) The extension of the early period of the timing window. Singular, site-specific extensions may be granted outside the normal window opening where it can be demonstrated by a qualified professional wildlife biologist that, due to exceptional circumstance(s), there is no risk to goats.

5. It is recommended that where forests within mountain goat winter range have been disturbed either by forest fire or prior logging, and where habitat is limited, these units be silviculturally treated to accelerate their restoration and rehabilitation to achieve mature and old forest habitat attributes (snow interception, security and thermal cover, and forage production). Treatments should be based on the recommendations of a qualified professional forester and qualified professional wildlife biologist.

6. It is recommended that existing roads and trails within 500 meters of a mountain goat winter range be assessed for disturbance risk to mountain goat populations. Where

assessment determines that access to mountain goat winter range on such roads and trails has increased risk to goats, plans for the deactivation of these roads should be developed and implemented. Where the deactivation of specific existing roads conflicts with operational activities, the licensee and the Minister's designate should work cooperatively to develop strategies which address both operational objectives and minimize disturbance to mountain goats without constraining operational activities. This may include access restrictions on permanent roads through the development and implementation of an Access Management Plan.

It is recommended that historic and planned (approved Category A) harvesting activities within mountain goat winter ranges be assessed to determine if these activities have, or will, place mountian goat populations and their habitat at risk. Where an assessment determines that winter range is, or will be, limited relative to historic levels, the Minister's designate and the licensee(s) should work cooperatively to develop short and long term strategies aimed at offsetting and re-establishing winter range shortfalls (e.g. temporarily reserving mature or old forest reserves, silivicultural treatments [see item 5 above], and others as deemed appropriate). Where necessary, strategies should include the establishment and implementation of spatially explicit plans.

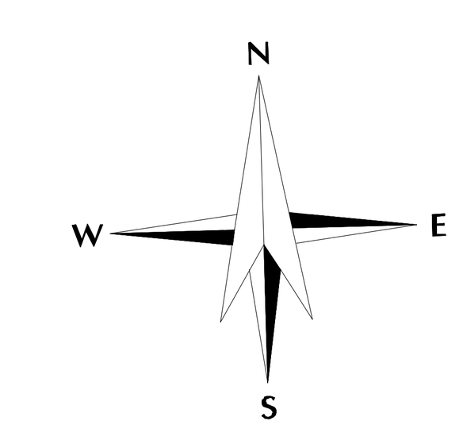


Schedule A
Ungulate Winter Range
UWR Plan No. U-6-006

Total Area 32882 ha

Legend

- Road - Main
- Road (Gravel Undivided) - 1 Lane
- Road (Unimproved)
- Road (Paved Undivided) - 2 Lanes
- Rail Line (Single Track)
- River/Stream - Definite
- River/Stream - Dry
- River/Stream - Indefinite
- Contour - Index
- Contour - Intermediate
- Wetlands
- # Ungulate Winter Range and Unit #



____

Signed this ___ day of ____________,_____

Chris Trumpy, Deputy Minister
Ministry of Environment

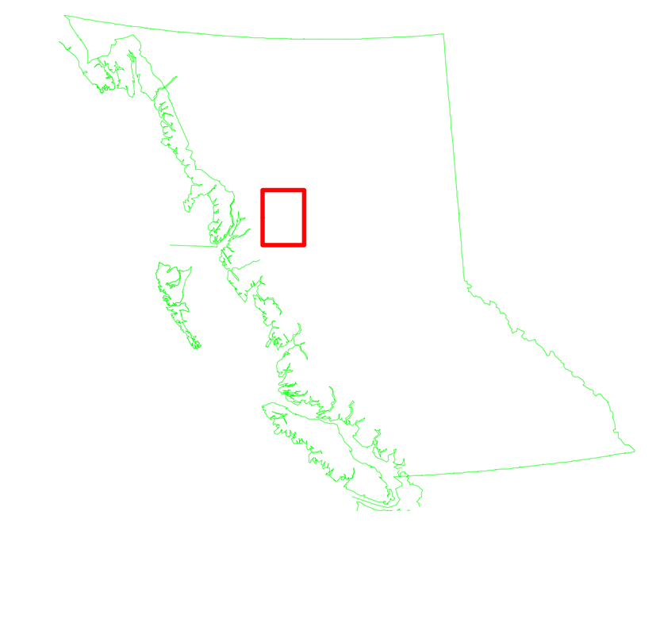
Scale 1:180000

0 2000 4000 6000 8000 10000 meters

Contour Interval 200 m
Projection UTM Zone 9
Datum NAD 83

For more information contact
Ecosystem Planning Section
Ecosystems Branch
Ministry of Environment
250-356-7789

Map Produced by the
Ecosystems Branch
Ministry of Environment
June 08, 2007



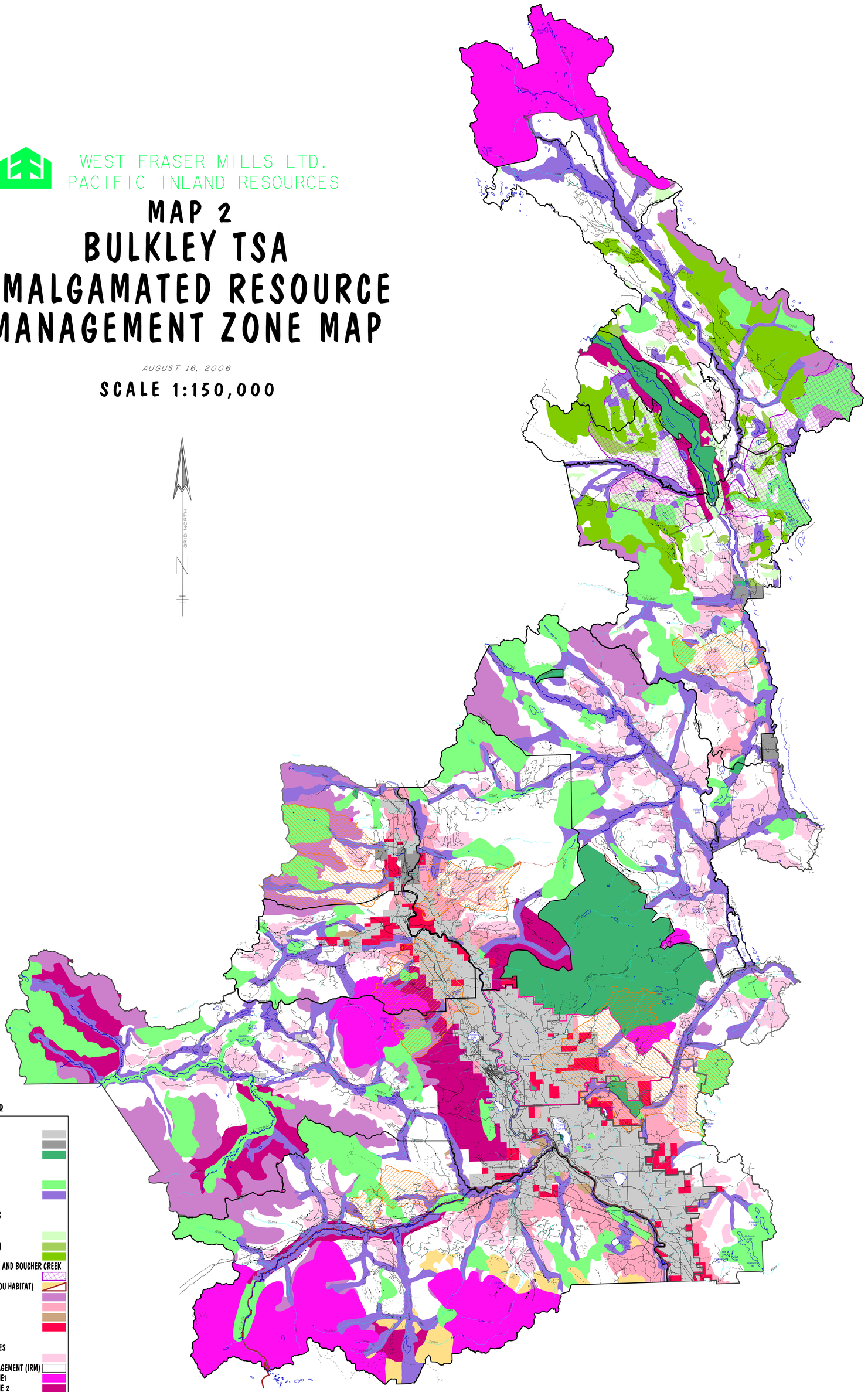
Appendix II: Map 2 Bulkley TSA – Amalgamated Resource Management Zone Map (PIR FSP)

WEST FRASER MILLS LTD.
PACIFIC INLAND RESOURCES

MAP 2
BULKLEY TSA
AMALGAMATED RESOURCE MANAGEMENT ZONE MAP

AUGUST 16, 2006

SCALE 1:150,000



LEGEND

OWNERSHIP
- PRIVATE LAND
- INDIAN RESERVE
- PROTECTED AREAS

ECOSYSTEM NETWORK
- CORE ECOSYSTEM
- LANDSCAPE CORRIDOR

WILDLIFE MANAGEMENT ZONES
- GRIZZLY BEAR
  - -(HIGH VALUE)
  - -(HIGH VALUE MIXED FOREST)
  - -MODERATE
  - -NORTH/SOUTH NICHYESKWA AND BOUCHER CREEK
- CARIBOU (KEY FOREST CARIBOU HABITAT)
- GOAT
- MOOSE
- MULE DEER
- AGWILD

RESOURCE MANAGEMENT ZONES
- ENHANCED TIMBER
- INTEGRATED RESOURCE MANAGEMENT (IRM)
- RESOURCE MANAGEMENT ZONE1
- RESOURCE MANAGEMENT ZONE 2

WATERSHEDS
- FISHERIES SENSITIVE WATERSHEDS (FSW's)
- COMMUNITY WATERSHEDS