

**YUN KA WHU'TEN HOLDINGS LTD
STRATEGIC RESOURCE PLAN FOR
WILDLIFE AT RISK IN THE
ANAHIM SUPPLY BLOCK**

DRAFT

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EXECUTIVE SUMMARY

Yun Ka Whu'ten Holdings Ltd (YKW) has developed a strategic plan for wildlife in the Anahim Supply Block to provide habitat for naturally occurring wildlife across their historic range. This work is part of a process that began with the Cariboo Chilcotin Land Use Plan (CCLUP 1996). The CCLUP is a higher level plan that guided the application of the Forest Practices Code (FPC 1995) and provided resource management targets for the Cariboo Region. Together with the CCLUP Integration Report (1998) these documents serve to guide planning at the sub-regional level.

The Anahim Round Table (ART) sub-regional plan was conducted using a community approach to set resource planning targets. This strategic wildlife plan provides mechanisms to meet targets of the CCLUP and ART documents, provide information to statutory decision makers and landscape level planning, as well as guidance to planners at the operational level. The information used in this plan has been gathered from local studies conducted by YKW, government publications, and information gathered elsewhere. It has been conducted to ensure that most recent information available was used in formulating a wildlife plan. This is especially significant given the large changes in seral distribution and potential impacts to biodiversity expected due to the current MPB epidemic.

The MPB epidemic now impacting this area will result in the creation of large areas of early seral forest in a short timeframe as salvage operations attempt to minimize economic losses. Very early seral forest (<20 years) generally lacks features, such as complex forest structure and overhead cover, that are required by many wildlife species. The infestation is expected to be so large that salvage operations will not be able to harvest all affected stands before they become un-merchantable. Unharvested stands impacted by insect infestations have features, such as abundant snags and CWD, that are desirable for many species and retaining a component of these stands in the landscape will increase the chances of maintaining biodiversity. To address this, "core habitat" areas will be designated where no harvesting will occur for approximately 15 years during the period of this infestation. Core habitats will be largely spruce leading stands >80 years old. Mature spruce has been found to be important to many wildlife species, such as marten and moose, and spruce leading stands will have a lower incidence of MPB attack. In the long term, core habitats will be managed using a group selection silviculture system (small patch <0.5ha) to provide contiguous mature/old habitat through time.

The delineation of core habitats is expected to benefit many species; however, spruce is relatively restricted in distribution on the landscape and many species have large home range requirements. Therefore, a second type of wildlife habitat area called "matrix habitat" will also be created. Ideally, matrix habitat areas will envelope core habitats and other constrained areas (e.g. OGMA's). During the period of this infestation, harvesting in matrix habitats (where permitted) will only occur in stands with high levels of beetle attack. In the long term, matrix habitats will be managed to ensure that mature/old forest stands are connected spatially through time. This will provide large areas of contiguous mature/old forest for species such as fisher while permitting timber harvesting.

Other measures include the creation of “biodiversity patches”, managing new stands for prey species, and the retention of spruce in harvested stands. Biodiversity patches are areas of naturally or artificially elevated woody debris levels. Trees may be harvested from the patch, but machinery traffic is limited while harvesting and no site prep will occur. Ideally, the patches would also contain advanced regeneration, snags, and rare tree species. Biodiversity patches will provide islands of increased structural and floristic complexity in harvested stands that can be used by wildlife for cover, denning, and foraging. New stands will also have areas of higher stem densities for snowshoe hare which forms a large component of the prey base in the Anahim Supply Block. Providing adequate snowshoe hare habitat will help to ensure the persistence of most carnivores. The retention of spruce is especially important in the context of the current MPB epidemic. In many areas of the SBPS biogeoclimatic zone spruce will form the only mature/old structure present after the current outbreak is concluded. Furthermore, spruce is more likely to attain the larger diameter stems that are most beneficial as wildlife trees.

The increased riparian reserves already part of development planning in the Anahim Supply Block is also endorsed here. Riparian areas are biologically rich due to the increased moisture available there and usually contain greater percentages of spruce. Along with core/matrix habitats, the reserves will provide for mature/old forest connectivity through the landscape. As well, water quality and fish habitat both benefit from this increased protection.

These measures together with coarse filter guidelines in the Biodiversity Guidebook are likely to ensure that most wildlife populations will persist in the Anahim Supply Block. However, monitoring of the response of wildlife to these measures is also important. YKW has made important contributions to research on wildlife populations in this area and an adaptive framework should be used to assess and modify the practices that are implemented where necessary. Finally, forest health planning is also required to decrease the potential for future large scale insect infestations. That planning must include adaptive management regarding the response of wildlife species as well as the development of models capable of predicting the spatial and temporal dynamics of MPB outbreaks in relation to forest management.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1.0 INTRODUCTION.....	1
2.0 METHODS	2
3.0 WILDLIFE MANAGEMENT STRATEGIES	2
3.1 General Wildlife Strategy to Deal with the Current MPB Epidemic.....	2
<i>Short term plan</i>	3
<i>Long term plan</i>	4
3.2 Riparian Associated Furbearers	7
3.3 Forest Associated Furbearers.....	10
3.4 Fisher.....	11
3.5 Marten.....	13
3.6 Wolverine.....	15
3.7 Grizzly Bear	16
3.8 Northern Caribou	17
3.9 Moose.....	20
3.10 Mountain Goat	21
3.11 American White Pelican	22
3.12 Northern Goshawk	23
3.13 Sandhill Crane.....	25
3.14 Bull Trout and Dolly Varden	25
3.15 Other Wildlife Species.....	27
4.0 RELATIONSHIP OF YKW WILDLIFE STRATEGIES TO OTHER COMPONENTS OF BIODIVERSITY PLANNING	28
5.0 OTHER PLANNING REQUIREMENTS	28
6.0 REFERENCES.....	29
APPENDIX 1. Example of core and matrix habitats.	32
APPENDIX 2. Table of Objectives and indicators.....	34

1.0 INTRODUCTION

This strategic resource plan will form one component of a Sustainable Forest Management Plan for the Anahim Supply Block. Yun Ka Whu'ten Holdings Ltd (YKW) has undertaken this project to gather the most up to date information on wildlife habitat needs which can then be integrated with forest management planning. This work is part of a process that began with the Cariboo Chilcotin Land Use Plan (CCLUP 1996). The CCLUP is a higher level plan that guided the application of the Forest Practices Code (FPC 1995) and provided resource management targets for the Cariboo Region. Together with the CCLUP Integration Report (1998) these documents serve to guide planning at the sub-regional level.

Sub-regional planning in the Anahim Lake area culminated in 2000 with the Anahim Round Table (ART) Subregional Plan (SRP) which was submitted to the Inter Agency Management Committee and the Regional Resource Board. The plan was endorsed in 2001 with the understanding that any outstanding tasks will be satisfactorily addressed. Among the outstanding tasks were recommendations for addressing the needs of regionally important and endangered wildlife. This strategic plan for wildlife provides mechanisms to meet these targets using information from BC government publications, studies conducted by YKW and wildlife literature from elsewhere. The plan will be used to provide information to statutory decision makers and landscape level planning, as well as guidance to planners at the operational level. It has been conducted to ensure that most recent information available was used in formulating a wildlife plan and is especially significant given the large changes in seral distribution and potential impacts to biodiversity expected due to the current mountain pine beetle (MPB) epidemic.

Wildlife is a component of biodiversity and previous planning has resulted in the Anahim Supply Block having no low biodiversity option areas. There are nine landscape units (LU) under the Intermediate Biodiversity Emphasis Option and seven under the high Biodiversity Emphasis Option. LUs designated as intermediate and high emphasis are more likely to have natural levels of biodiversity. However, the MPB epidemic now impacting this area will result in the creation of large areas of early seral forest in a short timeframe as salvage operations attempt to minimize economic losses. Very early seral forest (<20 years) created by harvesting generally lacks features, such as complex forest structure and overhead cover, that are required by many wildlife species. The infestation is expected to be so large that salvage operations will not be able to harvest all affected stands before they become un-merchantable. Unharvested stands impacted by insect infestations have features, such as abundant snags and CWD, that are desirable for many species and retaining a component of these stands in the landscape will increase the chances of maintaining biodiversity.

The challenge now faced is to take the opportunity to designate areas for retention instead of allowing the areas to be created by default. Salvage harvesting is likely to concentrate on areas with both the greatest attack rates and highest economic return. This will result in a greater proportion of harvesting at lower elevations where access already exists and greater fragmentation of those areas. Since there are already large amounts of area preserved at higher elevations (parks), YKW is taking the opportunity to retain contiguous areas of habitat at low to mid elevations. These areas will not be permanently removed from the timber harvesting landbase, but harvesting will be

restricted during the period of this infestation and subsequent salvage harvesting resulting from the infestation. Recommendations for the period following this are aimed at maintaining wildlife habitat while managing forests to reduce the risk of future insect infestations and allow timber harvesting. However, this report does not provide specific recommendation on forest health planning. Direction on this aspect of biodiversity can be found in the *Regional Biodiversity Conservation Strategy – Update #5*¹.

This project is funded by the Forest Investment Account under the Strategic Resource Planning Component and Sustainable Forest Management Planning Activity Area. The Eligible Activity is the development of legal objectives at the landscape level to provide direction for forest management planning. The aim of this document is to provide more direct objectives and strategies to meet targets in higher level plans such as the CCLUP and the ART SRP and that can be incorporated into YKW's SFMP.

2.0 METHODS

This plan outlines habitat needs of wildlife species of concern in the Anahim Supply Block and provide species specific objectives to address those needs. This more comprehensive direction is given for species requirements that can not be met using coarse filter guidelines outlined in the Biodiversity Guidebook (1995). Where present, areas of overlap are identified and strategies for meeting the needs of multiple species are addressed.

As well, options for adaptive management and monitoring will be identified in the strategies. The information presented here on species requirements represents the best known information at this time. However, new information will arise through research or monitoring efforts that can be used to improve forest management. Therefore, an adaptive management paradigm should be used where the information collected is analyzed periodically and improvements are made to applicable objectives and strategies.

3.0 WILDLIFE MANAGEMENT STRATEGIES

3.1 General Wildlife Strategy to Deal with the Current MPB Epidemic

The current MPB epidemic has the potential to seriously impact several subzones in the Anahim Supply Block. The SBPSmc and SBPSxc subzones have the greatest risk due to the higher percentage of lodgepole pine >80 years old found at lower elevations in this supply block. The MSxv has generally a lower risk due to a higher elevation and greater percentage of other species found there. However, average winter temperatures have increased by 2.2-2.6°C over the last century, and it is likely that lower elevations of the MS will have an increasing future incidence of attack if this trend continues.

¹ Biodiversity Conservation Strategy Committee. 2002. Regional Biodiversity Conservation Strategy – Update #5. An Integrated Mountain Pine-Biodiversity Conservation Management Strategy. Prepared for the Cariboo Mid-Coast Interagency Management Committee.

The landscape level effects of the mountain pine beetle have the potential for both positive and negative effects on wildlife. Stinton et al (2000) found that insect infestations resulted in forest stands that have abundant snags, increased levels of woody debris, and dynamics that favored shade tolerant species. Habitats with these features can benefit many species, but are often in low supply in managed landscapes. These stand level components benefit small mammals, birds, amphibians, arthropods, and nonvascular plants (Stadt 2001). The YKW furbearer study found that most furbearing species had significant relationships with increased levels of woody debris (Davis 2003), and stands resulting from spruce budworm infestations were readily used by American marten (Payer and Harrison 2000). Despite these benefits, the landscape wide effects of the beetle epidemic also has the potential to negatively impact some species. High levels of MPB attack (>50%) are undesirable in northern caribou habitat due to negative impacts on both terrestrial and arboreal lichen production as well as restricting caribou movement (Youds et al. 2002). Although many wildlife species use snags, the high incidence of attack over a short period is likely to result in fewer large diameter snags available in the mid to long term. Overall, landscapes with high variability in the timing, intensity, pattern, and frequency of disturbance will tend to have the greatest diversity of ecosystem components (Swanson et al. 1990). These findings indicate that a matrix of surviving forest, beetle killed stands, and salvaged areas will provide the greatest chance of preserving biodiversity in the Anahim Supply Block. Such a landscape matrix is also more likely to be resistant to MPB epidemics such as the one we are facing now.

Desired future forest condition: The future forest will contain patches of a variety of stand ages, that are floristically varied, and structurally diverse. Different harvesting systems will be used to develop stands that reflect a range of disturbance intensities ranging from large clearcut areas that reflect the natural pattern of fire to partial cut stands that reflect smaller scale disturbances such as produced by insects or pathogens. To produce this type of landscape, it is necessary to develop both short term plans to address the current MPB epidemic and long term plans that reduce the chance of future large scale outbreaks of forest pests while providing for wildlife habitat.

Short term plan

To address the effects of the current MPB epidemic, planning is required to delineate areas where harvesting will be limited in salvage BMUs. This planning will produce islands of habitat that provide for connectivity in the landscape. Two types of special management areas will be designated for wildlife. The first type will be “core habitat” areas that are comprised largely of spruce leading stands in age classes 5+, although small areas of pine leading stands and/or younger age classes may be included within these areas. Wherever possible, core areas will be overlapped with existing land use constraints. Where permitted, harvesting within core areas will use partial cut systems, such as group selection, to develop a multi-aged stand structure that always has a significant mature/old component. However, this management will be deferred for 15 years until salvage harvesting to address the current MPB infestation is concluded.

The second type of special management area will be “matrix” wildlife areas. Harvesting in matrix areas will be restricted to stands with high levels of beetle caused mortality. Up to 33% of a matrix area meeting the mortality criteria could be harvested at any time.

Ideally, matrix areas will envelope “core” areas, other constrained areas (e.g. OGMAs), some mid seral stands, and pine leading stands that have a component of other species. This will result in distinct areas where there is a mosaic of structurally and floristically diverse stands. Within the mosaic, there will always be a matrix of connected mature/old forest for wildlife species that have large home range requirements.

Stand level management in all areas should concentrate on the retention of structural and floristic elements that will benefit biodiversity in developing stands. Local studies on furbearers and moose have identified spruce as a critical component of high use areas. Over the next 15 years, spruce should be reserved wherever possible, since in some areas it will form the only available mature/old structure. Similarly, the retention of other species that are limited in the landscape should be attempted wherever possible to increase structural and floristic diversity. Increasing the number of WTPs in upland positions within cutblocks is also important in promoting structural diversity in the new stand. Generally, SRP requirements for riparian reserves in the Anahim supply block have led to most of WTP requirements being tied up in riparian areas. However, even where upland WTPs would be composed solely of dead pine, these patches will provide structural legacies that will last through most of the next rotation. Given that industrial operations will be unable to harvest all the dead pine available over the next 15 years, increasing the percentage of WTPs in salvage BMUs would incur minimal cost while providing important benefits for wildlife.

Providing natural levels of CWD is part of all management plans and generally it is present after harvest. However, important characteristics of natural CWD such as vertical complexity, long piece size, and large diameters are often missing after harvest. A major stumbling block to preserving these characteristics on harvested blocks is created by site preparation activities. Most cutblocks in the Anahim Supply Block require some form of site preparation to achieve stand stocking goals. Activities such as drag scarifying and mounding require heavy machinery to traverse most areas of a cutblock. This results in CWD being broken into shorter pieces, pressed flat to the ground, and oriented in consistent directions. Promoting a more natural CWD distribution will entail reserving areas from site prep. These areas would have naturally (or artificially created) greater accumulations of large, long woody debris. Ideally, these “biodiversity patches” would also include standing live and dead trees in a variety of ages. Silviculture prescriptions must stipulate that no site preparation will occur in the patches. Ideally, all cutblocks would have some biodiversity patches; however, their placement will be dependent on the presence of suitable conditions. It is likely that some areas will have abundant opportunities for patch placement while others will have few or none. If harvesting operations take advantage of suitable conditions where they are found, the clumped distribution of biodiversity patches that results is likely to emulate natural patterns of resource availability.

Long term plan

At endemic levels, bark beetles serve an important ecological function that benefits wildlife by attacking older, weaker trees and creating snags. Wildlife species, such as woodpeckers, use the larvae as a primary food source while the snags may be used by cavity nesters and the fallen trees will benefit both terrestrial and aquatic fauna. For these reasons, an endemic level of MPB in the landscape will be beneficial. Management practices to control MPB while providing for wildlife include creating a

mosaic of susceptibility classes. Such a successional patchwork should ensure that critical levels of habitat are always available in a landscape that is spatially and temporally dynamic.

Matrix habitats will be managed to produce this type of successional patchwork. Further, the delineation of matrix habitats should focus on stands that have a component of other species, such as spruce, to lower the potential for large scale insect infestations. In the long term, matrix areas should be managed to provide connectivity between patches of mature/old forest. Mid-aged stands (40-80 years) and riparian corridors could provide some degree of connectivity where mature/old is limited in availability. Young stands (<40 years) should not compose more than 33% of matrix areas at any time. This management regime is likely to result in areas with disturbance patches that are at the lower end of the recommended distribution of patch sizes for NDT3 ecosystems (Biodiversity Guidebook 1995) (i.e. <250ha). However, matrix areas will not form a large percentage of the landscape and the smaller openings there may be offset by larger openings or aggregate cutting elsewhere in the landscape such that the overall distribution conforms to recommendations in the Biodiversity Guidebook (1995).

The use of partial cutting silvicultural systems on “core” areas is one strategy for providing a continual supply of mature habitat through time. The stands will be managed to maintain a significant component of mature/old stands. Core areas will be a combination of pure spruce, spruce leading and may have small areas of pine leading stands. This combination of habitat can be managed effectively using a group selection system that promotes the development of spruce in the new stands. The presence of riparian systems is usually associated with spruce leading habitats, and the associated reserves will aid in providing connectivity throughout core habitats.

Continued use of biodiversity patches in the long term is expected to increase the habitat potential of regenerating stands for wildlife. The increased structural complexity associated with the patches will provide security cover, subnivean access, and denning opportunities for a variety of wildlife while increasing floristic variability in the developing forest.

Other strategies for controlling MPB include the promotion of multi-species stands and thinning treatments. However, such strategies will require adaptive management regarding the response of wildlife species as well as the development of models capable of predicting the spatial and temporal dynamics of MPB outbreaks in relation to forest management.

Objective 1. Create “core habitat” areas that are comprised largely of spruce leading stands in age classes 5+.

Strategy 1.1 Identify areas with a high percentage of spruce leading stands age class 5+ to manage as core habitat areas for wildlife. A small component of the stands in the core habitat area may be pine leading or immature. MPB attack within the core areas will be left unharvested. Manage the areas using a group selection silviculture system, in patches <0.5ha in size. Up to 28% of the core area may be in young seral patches at any time.

However, any management will be deferred for at least 15 years until salvage is complete for the current MPB epidemic.

Strategy 1.2 Manage core areas on an extended rotation (140 years) to allow old forest feature to develop in new stands. In any 20 year period, 14% will be available for harvest. Layout will follow a total resource planning approach that considers all stand entries. This will maintain timber volume and quality through time.

Indicator 1.1 Report yearly on area managed as core habitat in the Anahim Supply Block by landscape unit. Reporting should specify the amount of core habitat in each seral stage.

Objective 2. Create and manage “matrix habitat” areas for species with large home range requirements. Matrix areas should envelope other areas with land use constraints where possible.

Strategy 2.1 Ideally, matrix habitat will envelope core habitat; however, in some areas spruce leading stands are not available. In these areas identify areas with a high percentage of wetlands or other timber constraints and some component of younger age classes. Matrix areas should be at least 1000ha in size. In the short term, harvesting within the matrix can only occur in stands where 40% of the merchantable stems have been killed by MPB. Up to 33% of the matrix area outside of core areas could be in young seral forest . Matrix wildlife areas will be managed in this way for at least 15 years until salvage is complete for the current MPB epidemic.

Strategy 2.2 In the long term, matrix areas will be managed to provide connectivity between areas of mature/old forest. Only 33% of the matrix area outside of core areas could be in young seral forest (<40 years) at any time.

Strategy 2.3 Conduct research on the effects of MPB on wildlife in the Anahim Supply Block. Preserving stands surrounding transects from the local furbearer study would provide baseline information for further study.

Indicator 2.1 Report on area managed as matrix habitat in the Anahim Supply Block.

Indicator 2.2 Report yearly on percentage of forested matrix habitat that is less than 40 years of age.

Indicator 2.3 Report on status of research on the effectiveness of retaining matrix habitat areas.

Objective 3. Reserve rare tree species to provide floristic and structural diversity in managed stands.

Strategy 3.1 Over the period of salvage harvesting for the current MPB epidemic, reserve as much spruce and as possible. In some areas, this may provide the majority of mature forest structure.

Strategy 3.2 Spruce regeneration should be reserved where operationally feasible to promote future stands that are multi-species.

Strategy 3.3 Reserve aspen, cottonwood, and Douglas fir to provide wildlife trees in future stands.

Indicator 3.1 Audit 10% of harvested blocks each year to determine effectiveness of retention strategies.

Objective 4. Provide patches of abundant CWD for wildlife in regenerating cutblocks.

Strategy 4.1 Within harvested areas, create biodiversity patches where small patches of high CWD abundance and advanced regen are delineated with MFZ and stub trees. Trees can be removed from the patches but no site prep would be allowed.

Strategy 4.2 Leave some cull piles unburned. Optimally, the piles should be composed of large material that is spread loosely to provide more internal space. This strategy only applies when cull material is not infested by insects.

Strategy 4.3 Create some WTPs in upland positions to improve habitat conditions in future stands. Due to the high amount of riparian features present in the Anahim Supply Block, WTPs are often only designated in riparian areas. However, ensuring that patches of complex habitat are available in all landscape positions will increase biodiversity in the new stand.

Strategy 4.4 Apply a short term increase (15yrs) in the WTP percentage requirement in MPB salvage Beetle Management Units (BMU) to alleviate the impacts of the increase in young seral stands. WTPs could be comprised of all dead pine, but some component of live stems (e.g. advanced regeneration) would be desirable.

Indicator 4.1 Report on the number of biodiversity patches/km² created each year. Cull piles left unburned will be counted as a biodiversity patch.

Indicator 4.2 Report on percentage of harvested area composed of upland WTPs created in each year (Upland WTPs will be defined as WTPs not located in riparian management areas).

Indicator 4.3 Report on WTPs percentage by LU (and BMU during the period of salvage harvesting).

3.2 Riparian Associated Furbearers

Furbearers such as beaver, muskrat, mink, and river otter are largely found in or near riparian ecosystems. For these species, maintaining natural drainage patterns, minimizing sedimentation, and promoting natural components of riparian structure would be beneficial.

The best habitat for beaver is slower moving sections of streams and ponds or lakes that are not exposed to heavy wave action. Streams with stable flows and muddy substrates are preferred. Aspen and cottonwood stands adjacent to water provide the most productive habitat for beaver. However, such stands only last 10 years once colonized by beaver. Willows in riparian areas can also provide important forage. Providing deciduous stands adjacent to streams and not undertaking silviculture practices that shorten the duration of this part of the forest cycle are important management considerations for beaver.

Muskrats are found in standing or slow moving water with permanent marshes or lakes forming the best habitat. Muskrat live in lodges made of coarse vegetation or burrows in the bank of a water system. Their food is supplied largely by aquatic vegetation. The maintenance of natural drainage patterns and minimizing sedimentation are the main aspects of muskrat habitat that can be influenced by forestry.

Mink are semi-aquatic members of the weasel family that rarely move far from water. Mink forage along the edge of streams and lakes both within the water and in the adjacent riparian zone. More complex structure provides better habitat for mink with CWD, undercut banks and heavy vegetative cover being important attributes. Denning structures are usually close to water and associated with woody debris, and cavities in earth or rock. Mink have variable diets ranging from aquatic beetles, fish, amphibians and upland species such as mice or voles. The maintenance of natural drainage patterns, preventing sedimentation, and promoting complex riparian structure will benefit this species.

River otter use streams, lakes, and wetlands as habitat as long as suitable prey is present. The main prey species are fish, but aquatic invertebrates, amphibians, reptiles, waterfowl, and shorebirds are also taken. Management that promote healthy fish populations, such as the maintenance of natural drainage patterns, preventing sedimentation, maintaining stream shade, and maintaining natural levels of CWD input to streams will also benefit otters.

Desired future forest condition: Maintain sufficient quantity and quality of habitat to maintain aquatic associated furbearer populations in perpetuity throughout the Anahim Supply Block. To accomplish this, riparian systems must be maintained in natural states that provide structural and floristic diversity. Negative impacts such as sedimentation should be minimized and natural drainage patterns should be maintained.

Objective 5. Maintain natural drainage patterns.
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Strategy 5.1 Locations where drainage systems (streams, wetlands, NCDs, gullies, draws) are crossed by roads should have the appropriate size and type of drainage structures.

Indicator 5.1 Audit a percentage of new road sections created each year to ensure that appropriate drainage has been installed.

Objective 6. Minimize sedimentation of watercourses and waterbodies.
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Strategy 6.1 Minimize the number of classifiable streams crossed by roads within a watershed.

Strategy 6.2 Forest development within riparian management areas should include actions to minimize the deposition of sediment into watercourses. Actions include minimizing the area scalped at stream crossings, re-vegetation of scalped areas within RMAs, and the construction of sediment traps or other structures designed to capture sediment.

Strategy 6.3 No site preparation activities should take place within 20m of a classifiable stream. Site preparation in the vicinity of a NCD must not

result in the deposition of sediment in a classifiable stream or fisheries sensitive zone.

Strategy 6.4 Collect baseline information on water quality in sensitive watersheds to examine effectiveness of measures to control deleterious impacts.

Indicator 6.1 Report on the number of stream crossings/km² by sub-basin.

Indicator 6.2 Audit a percentage of stream crossings for appropriate installation and sediment reduction practices.

Indicator 6.3 Audit a percentage of harvested blocks and report on area of site preparation within 20m of classifiable streams.

Indicator 6.4 Report yearly on water quality information and effectiveness of strategies to control sedimentation.

Objective 7.	Maintain structurally and floristically diverse riparian areas.
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Strategy 7.1 Streams with legislated reserve zones will have an additional 0-25% in basal area retention in the RMZ. Increased retention will be targeted on areas with high wind throw risk in the reserve zone and/or high value fish streams.

Strategy 7.2 S4 and S5 streams within the Itcha-Ilgachuz SRDZ will have a 10m forested reserve. However, if the reserve is not windfirm or there are forest health concerns such as MPB green attack the reserve may be varied to zero. Where no reserve is established, any windfirm spruce or balsam present will be retained within 10m of the channel.

Strategy 7.3 S4, S5, and S6 streams outside the Itcha-Ilgachuz SRDZ will have a 20m forested reserve or equivalent area partial cut. This applies to streams shown on current FC1 files.

Strategy 7.4 Select S5 and S6 streams to conduct adaptive management trials into the effects of changed disturbance cycles on riparian areas. These streams would have portions of RMA harvested. Monitoring would be conducted on differences in vegetation structure and impacts on aquatic systems. Despite the many benefits of placing reserves on streams, species that require deciduous forest such as beaver may be affected negatively by the coniferous ingress and increased woody debris that will accumulate in riparian areas under the current management regime. The reaches selected would have low gradient streams (<5%) and gentle riparian terrain to minimize potential deleterious effects.

Strategy 7.5 Wetlands inside of the Itcha-Ilgachuz SRDZ will have variable retention based on wetland area. In the SBPS, a 15m average reserve will be established on W1/W5 wetlands and a 10m average reserve on W3 wetlands. In the ESSF, MS, and IDF, a 26m average reserve will be established on W1/W5 wetlands and a 15m average reserve on W3 wetlands. Retention may be less due to windthrow or other risks. Non-merchantable trees (except pine) and shrubs should be retained within 20m of the feature where the average buffer is less than the range stated.

Strategy 7.6 Wetlands outside of the Itcha-Ilgachuz SRDZ will have variable retention based on wetland area. Wetlands 0.5-1ha will have average 10m reserve or equivalent area in partial cut. Wetlands >1ha will have 20m average reserve or equivalent area in partial cut. RMZ on W3 will have 65% basal area retention and W1/W5 will have 25%.

- Strategy 7.7 All L1 Lakes in the ART area that have been classified and will have management as specified in the ART Draft Resource, Management Objectives, Strategies, and Recommendations Supplement on Lakes Management (2002). L3 lakes in the ESSF, MS, and IDF will have a 15m average reserve. L3 lakes in the SBPS will have a 10m average reserve.
- Indicator 7.1 Report on average width of riparian reserves by FPC classification.
- Indicator 7.2 Where development has occurred within the Lakeshore Management Zone of a L1 lake, report on how management has met management objectives.

3.3 Forest Associated Furbearers

Forest associated furbearers include lynx, red fox, coyote, weasels, and wolf. These species have been grouped together due to their dependence on a variety of forested habitat. Suitable habitats largely depend upon prey availability and range from young seral to old growth forests.

Lynx is likely to be the most specialized furbearer out of this grouping. The YKW furbearer study indicated that lynx had a preference for mature spruce habitat and avoided mature pine habitat; however, younger stands were not sampled in this project. Studies of southern boreal populations also show an increased use of old seral habitat, but this may be related to more patchy, disjunct distributions of prey and a reflection of travel corridors between foraging or den sites. Others have suggested that regenerating stands >20years old with high snowshoe hare numbers and high CWD abundance provide good lynx habitat. CWD was an important predictor of lynx presence in the Anahim Lake study and high volumes of CWD has been associated with lynx denning sites elsewhere.

Lynx management will depend on providing habitat for snowshoe hare, travel corridors with overhead cover, and denning opportunities for lynx. Management based on natural disturbance types will provide for lynx habitat at the landscape level as long as connective cover is maintained. An extensive conversion of beetle killed stands to clearcuts is likely to be detrimental in the short run; however, hare populations are likely to be high in the period 20-40 years from now. In the interim, maintaining connectivity between suitable stands will ensure the persistence of lynx. Other stand level management practices include the provision of high levels of CWD to ensure that regenerating stands have denning habitat and providing areas of high density regeneration (8000-30,000+ stems/ha) for hare.

Wolf, red fox, coyote, and weasels occupy a wider range of habitats and management that provides a suitable abundance of prey will benefit these species. Coarse filter management based on natural disturbance types will provide a range of forest patch sizes, seral stages, and natural connectivity in the landscape. This type of management will ensure that the habitat needs of most species can be met. The resulting landscapes are likely to provide habitat for a variety of prey species through time and space. At the stand level, management that provides natural levels of CWD and shrub cover in regenerating stands will also benefit prey species.

Desired future forest condition: Maintain sufficient quantity and quality of habitat to maintain forest associated furbearer populations in perpetuity throughout the Anahim Supply Block. Coarse filter management practices under the FPC will fill most requirements for these species. At the stand level, regenerating forests require patches of abundant CWD for denning and areas of dense regeneration for snowshoe hare.

Objective 8.	Provide patches of abundant CWD for lynx denning in regenerating cutblocks.
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Strategy 8.1 Manage using strategies associated with Objective 4 to maintain CWD in new stands.

Indicator 4.1 Report on the number of biodiversity patches/km² created each year. Cull piles left unburned will be counted as a biodiversity patch.

Indicator 4.2 Report on area of upland WTPs created each year (Upland WTPs will be defined as WTPs not located in riparian management areas).

Indicator 4.3 Report on WTPs percentage by LU and BMU.

Objective 9.	Provide areas of >8000 stems/ha for good quality snowshoe hare habitat in regenerating cutblocks.
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Strategy 9.1 Drag scarify blocks to increase natural regeneration densities.

Strategy 9.2 Do not conduct pre-commercial thinning except where densities result in stagnation of tree growth.

Indicator 9.1 Report area of conifer regeneration at densities of >8000 stems/ha.

3.4 Fisher

Fisher is an identified wildlife under the FPC that has recently been upgraded from blue to red listed. The document *Managing Identified Wildlife: Procedures and Measures* (IWMS 1999) makes recommendations for the management of this species; however, these are not mandatory. The IWMS (1999) suggests that areas managed for fisher should contain 30-45% mature/old forest that is suitable for fisher. Suitable habitat is characterized by shrub cover, coniferous canopy cover, sub-hygic or wetter moisture regime, patches of large, declining trees (especially Ac), and greater than average amounts of CWD for that ecosystem. Landscape connectivity should be maintained using corridors of mature/old forest. Ideal corridors would be centered on stream systems with 100m of reserve on each side. Cutblock distribution should focus on the small and large ends of the recommended size range. Fisher will use small cutblocks, but large areas of contiguous habitat will need to be provided.

Weir (2003) suggests that core areas for fisher management need to contain contiguous patches of 1000ha in mature/old forest intermixed with mid seral stands. A viable sub-population would require at least 10 territories that are spatially connected by forested stands with overhead cover. The sub-population must also have some degree of connectivity with other sub-populations to ensure that immigration/emigration can occur.

Local studies indicate that the SBPS provides the best habitat for fisher in the Anahim Supply Block and personal communications with R. Weir indicate that this is supported by habitat supply models.

Both local and studies elsewhere have documented the importance of snowshoe hare in the diet of fisher. Maintaining good hare habitat in areas managed for fisher will ensure that this forage item is available. Good snowshoe hare habitat is characterized by coniferous stands 20-40 years old and high stem densities. Patches of very high stem densities (>20,000) act as refugium for hares during low points in the population cycle. Tall shrub (>2m) habitats, spruce types, and greater CWD levels were also associated with increased hare abundance in a local study.

At the stand level, maintaining overhead cover at levels >20%, retaining spruce and aspen, as well as preserving/creating stands with >200m³/ha of woody debris is important in managing for fisher. Within stands, reserving patches of abundant, large diameter (>20cm dia.) CWD, large diameter trees (>40cm dbh) that are prone to heart rot, trees with rust broom/witches broom, and cover around features such as rock outcrops will provide fisher with important habitat elements in future stands. The importance of wildlife tree patches has been demonstrated by Weir (1995) who found that fisher could use generally unsuitable areas by focusing on remaining patches that provide overhead cover.

Desired future forest condition: Maintain sufficient quantity and quality of habitat to maintain fisher populations in perpetuity throughout the Anahim Supply Block. This will require setting aside large areas of mature/old forest in a matrix that provides connectivity between suitable stands. Spruce stands are also important for fisher and a component of these stands will also be retained. In the northern end of the supply block, the Dean River Corridor will supply a portion of this habitat as well as an important dispersal corridor.

Objective 10. Create and manage “core habitat” and “matrix habitat” areas for fisher in the SBPS.

Strategy 10.1 Use the core and matrix habitat strategies listed in Section 3.1 (see Objectives 1 and 2) to maintain habitat for fisher.

Indicator 1.1 Report yearly on area managed as core habitat in the Anahim Supply Block by landscape unit. Reporting should specify the amount of core habitat in each seral stage.

Indicator 2.1 Report on area managed as matrix habitat in the Anahim Supply Block.

Indicator 2.2 Report on percentage of forested matrix habitat that is less than 40 years of age.

Indicator 2.3 Report on status of research on the effectiveness of retaining matrix habitat areas.

Objective 11. Maintain corridors on riparian systems that allow fisher dispersal between sub-populations.

Strategy 11.1 Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain dispersal corridors for fisher.

Indicator 7.1 Report on average width of riparian reserves by FPC classification.

Objective 12. Provide patches of abundant CWD and large spruce stems for fisher in regenerating cutblocks.

- Strategy 12.1 Use the CWD strategies outlined in Section 3.1 to ensure that regenerating cutblocks have adequate CWD levels (Objective 4).
- Strategy 12.2 Reserve large spruce (>40cm), aspen, and cottonwood, to ensure the persistence of trees that have the potential for fisher denning and resting.
- Strategy 12.3 Increase the WTP percentage requirement in MPB salvage BMU's to alleviate the impacts of the increase in young seral stands (See strategy 8.4).
- Indicator 4.1 Report on the number of biodiversity patches/km² created each year. Cull piles left unburned will be counted as a biodiversity patch.
- Indicator 4.2 Report on area of upland WTPs created each year (Upland WTPs will be defined as WTPs not located in riparian management areas).
- Indicator 8.1 Report on WTPs percentage by LU and BMU.
- Indicator 12.1 Audit a percentage of harvested blocks for effectiveness of single tree retention strategy for large spruce (>40cm), aspen, and cottonwood.

3.5 Marten

In studies conducted locally and elsewhere, marten show a preference for mature coniferous forest during winter. Marten show a strong association with CWD and this attribute has been associated with access to subnivean prey, escape from predation, and the provision of thermoregulatory resting/denning sites. Local studies also indicate that rock outcrops and crevasse are used by marten. This feature also provides increased habitat complexity and subnivean access that have been used as denning sites elsewhere and may also provide subnivean access to food resources during winter. Greater basal area in large dead trees is also associated with greater use. Large dead trees provide opportunities for denning and these structures have been found to be important marten den sites. Locally, marten also showed some selection for habitats with greater shrub densities, and this may occur when taking advantage of greater hare densities in those habitats. Marten also prey on microtines, squirrels, and grouse.

At the landscape level, habitat loss and fragmentation have been identified as significant threats to population viability. The threat is due to the large area required by marten and its low dispersal ability. The Anahim Lake DNA study found 10 marten in 384km² (1 marten/3,840ha) around Anahim Lake. However, most individuals were captured in the western portion of the study area giving a density of 1 marten/1200ha. This area generally has a greater spruce component, older stands, and approximately 20% of the area in recent (<12 years) clearcuts. Generally the harvested openings were aggregated with large areas of natural landscape still untouched. Studies elsewhere have found that marten are not found in landscapes with large proportions (25% in one study and 40% in another) in regenerating forest. Management recommendations from other areas (Ontario) indicate that suitable habitat should have large areas (3000-5000ha) of suitable stands. Suitable stands have been described as having greater

than 50% conifer cover, are at least 15m tall, with mixed species and uneven canopies preferred.

Wildlife habitat ratings for marten in the Itcha Ilgachuz indicate that mature to old forest with canopy closures ranging between 20-60% and mesic to hygric moisture regime will form the best sites for marten (Himmer and Power 1999). More complex under stories were also associated with high value sites in this rating scheme.

Desired future forest condition: Maintain sufficient quantity and quality of habitat to maintain marten populations in perpetuity throughout the Anahim Supply Block. This will require ensuring that moderate sized patches of mature/old forest exist in a matrix that provides suitable corridors for movement between core areas. Stand level retention of CWD and WTP's will improve future stands as marten habitat.

Objective 13. Create and manage "core habitat" and "matrix habitat" areas for marten.

Strategy 13.1 Use the core and matrix habitat strategies listed in Section 3.1 (see Objectives 1 and 2) to maintain habitat for marten.

Indicator 2.1 Report on area managed as matrix habitat in the Anahim Supply Block.

Indicator 2.2 Report on percentage of forested matrix habitat that is less than 40 years of age.

Indicator 2.3 Report on status of research on the effectiveness of retaining matrix habitat areas.

Objective 14. Maintain corridors on riparian systems to facilitate marten dispersal between sub-populations.

Strategy 14.1 Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain dispersal corridors for fisher.

Indicator 7.1 Report on average width of riparian reserves by FPC classification.

Objective 15. Provide patches of abundant CWD and large spruce stems for marten in regenerating cutblocks.

Strategy 15.1 Use the CWD strategies outlined in Section 3.1 to ensure that regenerating cutblocks have adequate CWD levels (Objective 4).

Strategy 15.2 Reserve large spruce (>40cm), aspen, and cottonwood, to ensure the persistence of trees that have the potential for marten denning and resting.

Strategy 15.3 Increase the WTP percentage requirement in MPB salvage BMU's to alleviate the impacts of the increase in young seral stands (See strategy 8.4).

Indicator 4.1 Report on the number of biodiversity patches/km² created each year. Cull piles left unburned will be counted as a biodiversity patch.

Indicator 4.2 Report on area of upland WTPs created each year (Upland WTPs will be defined as WTPs not located in riparian management areas).

Indicator 8.1 Report on WTPs percentage by LU and BMU.

Indicator 12.1 Audit a percentage of harvested blocks for effectiveness of single tree retention strategy for large spruce (>40cm), aspen, and cottonwood.

3.6 Wolverine

Wolverine is a blue listed species in BC that is associated with remote wilderness areas. In mountainous areas, there is a tendency for seasonal migrations to high elevations in summer and lower elevations in winter. Wolverine use a broad range of habitats that is related to the availability of prey and carrion. Home ranges can vary from 100km² to over 900km² and individuals can cover more than 50km in a day.

Management for wolverine generally relates to protecting suitable habitat from human disturbance. Large remote refugia can provide a dispersal source for individuals and undisturbed natal denning habitat. Suitable denning sites are usually associated with rock and/or woody debris and found at higher elevations. Healthy prey populations are also an essential component of wolverine habitat. Ungulate carrion is an important food source and management that promotes healthy populations of moose and caribou will benefit wolverine.

Desired future forest condition: Maintain sufficient quantity and quality of habitat to maintain wolverine populations in perpetuity throughout the Anahim Supply Block. The maintenance of the large protected areas adjacent to the Anahim Supply Block will provide suitable denning habitat for this species. Forest management practices that maintain a healthy population of moose and caribou will ensure that wolverines persist. However, management of human access should provide areas that are temporally free from disturbance, especially during the natal denning period which extends from February to May.

Objective 16. Regulate access to provide large undisturbed areas for wolverine and limit disturbance during the denning period.

Strategy 16.1 Where possible, conduct harvesting in temporally short, discrete intervals that are separated by long periods when no harvesting takes place in a sub-basin.

Strategy 16.2 Create and follow access management plans for each landscape unit. Place access restrictions on areas that historically had no motorized access to ensure that some areas have low levels of human disturbance.

Indicator 16.1 Divide the Anahim Supply Block into logical sub-basins and report on periods of development activity and inactivity.

Indicator 16.2 Report on status of and compliance with Access Management Plan.

3.7 Grizzly Bear

Grizzly have nutritional, security, thermal, reproductive, and space requirements that must be met within their habitat. Home range sizes vary from 350km² in coastal areas to 2500km² in the northern interior. Grizzly bears rely mainly on vegetation, but are efficient predators and scavengers when opportunities are present. Reproduction rates are low and population densities vary both geographically (5-65 bears/1000km²) and seasonally (e.g. high concentrations can be found during salmon runs). Habitat requirements are highly variable due to the diverse regional ecosystems present and behavioral adaptations of individual bears. For instance, transient bears move seasonally to specific areas of a region to take advantage of seasonally available forage while resident bears concentrate their activities within distinct home ranges (SPCAIW 1997).

Habitat quality should be viewed at several spatial and temporal scales. Grizzlies require specific patches of habitat or complexes of habitat that may only have specific food producing microsites. Temporally, the abundance of forage can change between years (berry crop failures, peak salmon run years) as well as over the long term due to effects such as fire suppression or global warming. It is estimated that 20,000-50,000km² of occupied and connected habitats are required to ensure long term viability. The bears must be allowed to move freely between habitats without human blockages or mortality sinks around human settlements (SPCAIW 1997).

In spring, grizzlies require an abundance of early green-up vegetation such as sedges, grasses, and horsetails (Himmer and Power 1999). Habitats with moist to wet soil moisture and rich soil nutrient regimes provide the best habitat. Meadows, avalanche tracks, and seepage sites that become snow free early in the season are important during this period. Some bears may concentrate on ungulate calving areas during June to take advantage of this rich resource. Moist, rich habitats are also important in summer and fall for feeding. In some areas, the bears may prey on marmot colonies or forage for whitebark pine cones in late summer and fall. Security and thermal cover are provided by mature to old mixed or deciduous forests in all three seasons. Winter requirements are provided by steep slopes in alpine and sub-alpine areas that provide suitable substrate for digging. Mature and old forests adjacent to avalanche chutes are also likely to provide good habitat for hibernation (Himmer and Power 1999).

Desired future forest condition: Maintain sufficient quantity and quality of habitat to maintain grizzly bear populations in perpetuity throughout the Anahim Supply Block and surrounding area. Moist rich habitats in the Anahim Supply Block are generally in moister subzones, at higher elevations, associated with riparian areas, or associated with spruce stands. Increased retention of forest cover in these habitats will provide thermal and security cover while foraging. Important riparian areas along the Dean River are protected as part of the Dean River Corridor. There is also has a large amount of area in higher elevation protected areas adjacent to the supply block that will provide secluded denning opportunities for grizzly. In the southern portion of the supply block, south facing avalanche tracks will be prioritized for wildlife tree retention to provide cover. Access control should strive to provide areas that are temporally free from disturbance.

Objective 17. Provide a combination of security/thermal cover in association with riparian meadows, seepage sites, avalanche tracks, and moist spruce forests.

Strategy 17.1 Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain cover along riparian areas.

Strategy 17.2 Use the “core habitat” strategy to manage large contiguous areas of spruce leading stands (See Objective 1).

Strategy 17.3 Place WTP’s preferentially along avalanche tracks to provide security cover for grizzly bear.

Indicator 7.1 Report on average width of riparian reserves by FPC classification.

Indicator 1.1 Report on area managed as core habitat in the Anahim Supply Block by landscape unit.

Indicator 17.1 Audit a percentage of harvested blocks for effectiveness of WTP strategy along avalanche tracks (where applicable).

Objective 18. Regulate access to provide large undisturbed areas for grizzly and limit disturbance during the denning period.

Strategy 18.1 Where possible, conduct harvesting in temporally short, discrete intervals that are separated by long periods when no harvesting takes place in a sub-basin (See Objective 16).

Strategy 18.2 Create and follow access management plans for each landscape unit. Place access restrictions on areas that historically had no motorized access to ensure that some areas have low levels of human disturbance.

Indicator 16.1 Divide the Anahim Supply Block into logical sub-basins and report on periods of development activity and inactivity.

Indicator 16.2 Report on status of and compliance with Access Management Plan.

3.8 Northern Caribou

The management of northern caribou is covered in detail in the CCLUP document *Northern Caribou Strategy* (Youds et al. 2002). This management plan will summarize information that document that pertains to the Anahim Supply Block. However, for more detailed information, please consult the Northern Caribou Strategy. The Anahim supply block contains portions of the ranges of three caribou herds: the Rainbow heard, the Itcha-Ilgachuz herd, and the Charlotte Alplands herd. The caribou are dependant on terrestrial and arboreal lichens which are more abundant in mature or older forest. Habitat management for caribou concentrates on providing a continual supply of large, connected areas of suitable summer and winter habitat where vehicle access is restricted. These conditions will allow caribou to space out and avoid both predators and poachers.

Radio telemetry studies on these herds have identified a number of different habitat use patterns. During the December to March period, a portion of the Rainbow herd move from alpine areas to lower elevation areas in the Sub-boreal Pine Spruce (SBPS) biogeoclimatic zone. Mature and old forests are used primarily; however, there has

been increased use of recently harvested areas during late winter and spring. Portions of the Rainbow and Itcha-Ilgachuz herd also winter in alpine areas with greatest use on the Rainbow and Ilgachuz Mountains. Animals wintering on the Ilgachuz Range may sometimes move north to lower forested elevation areas.

Management for caribou in the Anahim Supply block is based on the following four strategies: No Harvest Zone, Modified Harvest Zone, Natural Disturbance Seral Distribution Zone (NDSZ), and Conventional Harvest Areas. The no harvest and modified harvest zones are composed primarily of higher elevation Montane Spruce biogeoclimatic zone forests that have lower incidences of MPB. The Natural Seral Distribution Area (NSDA) is primarily within the SBPS which is more susceptible to both MPB and mistletoe.

Modified Harvest Zones will utilize an irregular group-shelterwood silvicultural system on terrestrial lichen sites and a group selection silvicultural system on arboreal lichen sites. In the Modified Harvest Zone, 13% of the timber volume is available in each 20 year period, individual disturbance areas will be large, and forest development should be spatially and temporally concentrated.

The NDSZ Zone will have natural seral distribution targets that apply to the SBPS area of each LU. Harvesting should be concentrated in large blocks (up to 1000ha) and be interspersed with large leave areas (>250ha) of mature/old forest. WTPs should be located in areas with the greatest lichen abundance. The Dean River Migration Corridor (area between Tanswanket Ck and Beef Trail Ck) overlaps with the NDSZ Zone and has a number of special requirements. Cutblocks in the corridor should be oriented in an east west direction to maximize the amount of forest cover for caribou in migration. Harvested blocks should be concentrated on stands with heavy underbrush, blowdown, and terrain features that make movement difficult for caribou. Stand stocking in the corridor should be at low levels (1000 stems per ha), and stand rotation should be managed at normal rotation ages.

The *2002 Northern Caribou Strategy* also includes a MPB strategy for Northern Caribou Range. At this time, the Upper Dean, Tusulko, Beef Trail, Corkscrew, and Christenson LUs are areas of special caribou management that have been designated as salvage beetle management units (2003). Nimpo, Hotnarko, Holtry, and Telegraph LUs are areas of special caribou management that have been designated as holding beetle management units (2003). The *2002 Northern Caribou Strategy* contains direction for Suppression and Salvage BMUs. However, the 2003 Provincial Bark Beetle Strategy also includes a new "Holding" BMU where the strategy is to maintain an existing outbreak at current levels. Although this BMU was not addressed, personal communications with Harold Armleder² indicate that holding efforts should be directed toward preventing or slowing the spread of MPB into the Modified Harvest and No Harvest Zones. If there is the threat of significant spread of MPB in the Modified Harvest Zone (i.e. it meets the definition of a suppression zone) aggressive sanitation harvesting is warranted. The Caribou Strategy Committee should be consulted for management direction when there are significant levels of attack in No Harvest Zones.

Management in Modified Harvest Zones within Salvage BMUs is based on the percent attack and area of infestation. Areas with <50% attack or areas of attack less than 40ha

² Harold Armleder, Research Wildlife Habitat Ecologist, South Interior Region, Cariboo Sub-office.

in size and >50% attack should have the recommended caribou prescription but with openings concentrated on patches with the greatest mortality. In stands with >50% mortality and >40ha, remove dead trees and retain all green trees. No Harvest Zones with 50% attack over areas >200ha may be eligible for salvage, but the Caribou Strategy Committee should be consulted for management direction.

Management for MPB in the NDSZ Zone should be directed at stands with the greatest levels of attack first (e.g. >50% mortality). Lower levels of attack should not impede caribou movement and lichen production is not likely to be significantly impacted. Salvage activities can move the target seral distribution between LUs; however, there must be sufficient area in SBPS available within other LUs to cover the lost percentage. This increased flexibility only apply if the harvested stands have >30% beetle induced mortality.

Future Forest Conditions

Maintain caribou habitat quality and quantity within caribou management areas (No Harvest Zone, Modified Harvest Zone, Natural Disturbance Seral Distribution Zone, and Dean River Migration Corridor) and to a limited extent within the conventional harvest part of their natural range using measures in the *2002 Northern Caribou Strategy*.

Objective 19 Manage Crown Land in caribou No Harvest Zone, Modified Harvest Zone, Natural Disturbance Seral Distribution Zone, and Dean River Migration Corridor consistent with the *2002 Northern Caribou Strategy*

Strategy 19.1 Manage Crown Land in caribou No Harvest Zone, Modified Harvest Zone, Natural Disturbance Seral Distribution Zone, and Dean River Migration Corridor consistent with the *2002 Northern Caribou Strategy*.

Indicator 19.1 Report yearly on the rate and distribution of harvest to ensure compliance in each of the caribou management zones.

Indicator 19.2 Report on compliance with access recommendations in each caribou management zone.

Objective 20 Manage Conventional Harvest Areas to minimize the buildup of moose and deer populations near special management areas for caribou and protect microsites valuable to caribou.

Strategy 20.1 Use Map 10 in the *2002 Northern Caribou Strategy* to identify areas of caribou winter range that overlap with conventional harvest areas. Map 3 in the *2002 Northern Caribou Strategy* identifies areas of good or better habitat suitability (Habitat Capability Maps may be available soon). The majority of cutblocks in areas of good or better caribou habitat suitability should be large (250-1000ha) to lower the suitability for moose and deer. Microsites with higher than average lichen abundance should be targeted for WTPs.

Indicator 20.1 Report on range of cutblock sizes in conventional harvest areas of good or better caribou habitat suitability.

3.9 Moose

Good moose habitat is characterized by abundant browse in moist, semi-open, successional stages of forested habitats and wetlands. In early spring, moose often forage on sedges in wetlands, but then switch to forbs in spring-summer when the nutritional content of sedges declines. By late summer, moose begin to rely on woody browse which dominates the diet over winter. Willow, birch, and aspen are among the main winter forage items in the Anahim Lake area.

Both the CCLUP and ART have indicated that moose winter, calving, and summer habitat should be managed for. However, management for moose should only occur in areas outside of those specified as important for caribou management. Areas managed for moose winter and calving habitat should seek to minimize human disturbance, provide thermal cover, snow interception cover and maximize suitable browse production. In the west Chilcotin, wetlands with adjacent mature/old spruce stands provide important security cover, as well as thermal and snow interception cover. Forest management should retain a component of spruce stands adjacent to W1 and W5 wetlands that have >15% cover in deciduous shrubs. Mesic to moist forests of structural stage 3 where average vegetation is >2m tall can also provide abundant forage for summer and winter. Winter use of these sites will be restricted by snow depths of >80cm (Himmer and Power 1999).

A recent report (Intrepid Biological Contracting 2003) has identified high value wetlands in the Anahim Supply Block based on moose sightings during winter surveys. These high value wetlands largely agree with higher value areas identified by the Itcha Terrestrial Ecosystem Mapping Winter Moose Capability Map (2003). Recommendations for management of high value wetlands include buffers (100m), extended harvest rotations, seral stage management, and limiting the area of harvest to 1/3 of a wetland complex. Maintaining connectivity through the use of travel corridors and limiting access within 1km of high value wetlands were also important recommendations for moose management (Intrepid Biological Contracting 2003).

Desired future forest condition: The forest landbase should have a range of structural stages that will provide browse production for moose through time. This requirement will generally be met by coarse filter guidelines in the Biodiversity Guidebook. Large wetlands and wetland complexes should have security and thermal cover for moose. Increased riparian retention, especially in spruce, would provide this cover. Where there are extensive spruce stands associated with wetlands, browse production could be improved by partial cutting of spruce outside of the riparian reserve while still providing cover. In areas adjacent to moose wintering and calving areas, road densities should be minimized to decrease disturbance.

Objective 21. Provide a combination of security/thermal/forage cover for moose in association with riparian areas.

Strategy 21.1 Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain cover along riparian areas.

Strategy 21.2 Some “core habitat” areas should be identified adjacent to high value wetlands where spruce stands of sufficient size exist (See objective 1).

Strategy 21.3 Avoid broadcast herbicide treatments within riparian management areas where shrubs show obvious indications of repeated heavy browsing by ungulates.

Strategy 21.4 At least 50% of the RMA of wetlands >5ha should be maintained as advanced immature (>40 years) or mature forest cover (>80 years).

Indicator 7.1 Report on average width of riparian reserves by FPC classification.

Indicator 21.1 Report on area of core habitat located adjacent to high value wetlands for moose.

Indicator 21.2 Report on area of riparian management areas treated with broadcast herbicides.

Indicator 21.3 Report on area of advanced immature (>40 years) or mature forest cover (>80 years) maintained in wetland RMAs of W1 wetlands.

Objective 22. Reduce the disturbance of moose during winter and spring calving.

Strategy 22.1 Where possible, locate main roads >500m from W1 or W5 wetlands. Aggressively deactivate secondary and temporary roads within 500m of W1 or W5 wetlands to levels impassable to 4 wheel drive vehicles.

Indicator 22.1 Report on length of road within 500m of W1 or W5 wetlands that is not deactivated.

3.10 Mountain Goat

The CCLUP, ART, and IWMS (1999) identify mountain goat as a species that requires management to ensure its persistence. Goats are usually found in mountainous areas where there is rugged escape terrain present. Summers are spent in alpine and subalpine areas where their diet is dominated by sedges, grasses and forbs. In winter, there may be a movement to lower elevations with mature forest where shrubs and trees may form a significant portion of the diet. The natal period for mountain goat is between April 15th and July 15th.

Generally, mountain goat avoid areas where snow depths are >50cm. Mature and old forest adjacent to escape terrain on south to southwest slopes can provide cover during severe winters. Goats may also seek windswept alpine ridges where forage is exposed during winter. Management for mountain goat focuses on minimizing human disturbance in critical areas such as winter range, natal areas, and on escape terrain.

Desired future forest condition: Areas of the forest landbase that are within or adjacent to mountain goat wintering areas, natal areas, and associated escape terrain will be managed to ensure that healthy populations of mountain goat are maintained in perpetuity across its historic range.

Objective 23. Manage forested land within areas designated as mountain goat winter range to minimize disturbance, retain cover, and provide forage.

Strategy 23.1 Follow the general wildlife measures outlined in Managing Identified Wildlife Volume 1: Procedures and Measures for areas of mountain goat winter range delineated on maps in Appendix 3.

Indicator 23.1 Report on area of development in mountain goat winter range and General Wildlife Measures implemented.

Objective 24. Limit aircraft disturbance associated with forestry operations to mountain goats occupying winter range or natal areas.

Strategy 24.1 Ensure aircraft operation is consistent with the *Interim Wildlife Guidelines for Commercial Backcountry Recreation in British Columbia* (2002) or its successor documents.

Strategy 24.2 Ensure that aircraft operation is consistent with an alternate operational strategy which has the support of the Ministry of Water, Land, and Air Protection, Environmental Stewardship Division and the responsible authority for tenure issuance.

Indicator 24.1 Implementation of training programs to ensure that staff and contractors are familiar with guidelines associated with operating aircraft in *Interim Wildlife Guidelines for Commercial Backcountry Recreation in British Columbia* (2002) or its successor documents.

Objective 25. Ensure that mountain goat winter range has sufficient security and thermal cover within 200m of escape terrain.

Strategy 25.1 On designated mountain goat winter range, no more than 33% of the forested habitat within 200m of escape terrain should be early seral (<40 years) and at least 50% should be mature and old (>80 years) forest at any time.

Indicator 25.1 Report yearly on area of mountain goat winter range where harvesting has occurred. Include the percentage of forested habitat in the winter range unit that is <40 years old and >80 years old.

Objective 26. Prevent disease transmission to mountain goats from domestic sheep where used for vegetation management.

Strategy 26.1 Maintain separation of domestic sheep used for vegetation management and areas used by mountain goats in summer.

Indicator 26.1 Report on use of domestic sheep for vegetation management and range of distance to nearest mountain goat summer range.

3.11 American White Pelican

American white pelican are migratory waterbirds that breed and forage in the Chilcotin. There are several lakes in the Anahim Supply block that are used for foraging; however,

only one (Abuntlet Lake) has an established wildlife habitat area. The pelicans are sensitive to disturbance while feeding and chronic disturbance can have negative impacts on breeding success.

Desired future forest condition: Manage lakes that provide pelican habitat to minimize disturbance. Forestry operations will minimize the number of roads adjacent to pelican habitat and development will not occur during the breeding season.

Objective 27. Maintain the quality and isolation of pelican habitat around Abuntlet , Lake.

Strategy 27.1 Follow procedures in the IWMS (1999) for wildlife habitat areas on American white pelican lakes.

Indicator 27.1 Report on any management that deviates from the IWMS guidelines within the Abuntlet Lake WHA.

Objective 28. Maintain the quality and isolation of pelican habitat around Anahim, Aktaklin and Pelican Lakes.

Strategy 28.1 Minimize the number of new roads required for forest development within 1000m of lakes listed under objective 28. Roads required within 1000m of the lakes should be promptly deactivated (or gated) so that they are impassable to 4 wheel drive vehicles.

Strategy 28.2 No harvesting or site preparation should be conducted during the breeding season within 1000m of the lakes listed above unless there is no other practicable option.

Indicator 28.1 Report on length of road within 1000m of Anahim, Aktaklin and Pelican Lakes that is not deactivated.

Indicator 28.2 Report any harvesting or site preparation that take place within 1000m of Anahim, Aktaklin and Pelican Lakes and reasons for deviance from strategy 28.2.

3.12 Northern Goshawk

In the Chilcotin, northern goshawks are primarily found in mature/old stands. Good quality goshawk habitat is characterized by a closed canopy and open understorey. Goshawks feed on small mammals and birds found within forest stands or along forest edges. The home range is hierarchically organized into nest sites, nest areas, a post fledging area, and the foraging area. Nest areas and post fledging areas are selected to provide important protection for the breeding through post fledging time period (March 15 – September 1). Wildlife habitat area guidelines in the IWMS indicate that goshawk management should include a 240ha post fledging areas that contains three 12ha nest areas. However, recent research in the Morice and Lakes Forest Districts indicate that fledging generally occurs within the much smaller nesting area in the sub-boreal spruce zone (24ha)(Mahon et al. 2003). That study recommends that 24ha goshawk management areas (GMA) be placed around at least 75% of known goshawk nest areas. The GMA should be designed to provide a 100m forested buffer on all nests

found in the area, and at least 30% of the perimeter should be attached to adjacent mature forest.

It is likely that northern goshawks in the SBPS and MS have similar habitat requirements to those found in the SBS. To be prudent, the size of the GMA should be increased to 36ha (i.e. the size of three 12 ha nest areas) for active nests found in the Anahim Supply Block. The current MPB epidemic is likely to have negative effects on the supply of suitable post fledging habitat for a considerable period. However, higher elevation subzones such as the MS and “matrix” habitat areas in the SBPS (see objective 2) with lower levels of attack should provide adequate habitat for goshawks to persist in the interim.

Desired future forest condition: Maintain sufficient habitat to ensure that northern goshawks persist across their historic range. Key to this will be ensuring that potential goshawk habitat areas exist through time across the landscape.

Objective 29. Provide goshawk management areas for 75% of known nest areas.

Strategy 29.1 Designate a 36ha goshawk management area (GMA) around 75% of active nest sites. GMA delineation should be based on habitat suitability and indications of use as determined by a qualified biologist. GMA's not used for 5 consecutive years are likely abandoned and the designation could be removed.

Strategy 29.2 Where an active goshawk nest area will be removed, there must be two suitable potential nest areas within 1km of the original area.

Strategy 29.3 Where MPB attack has occurred within an active nest area in a *salvage* BMU, the habitat quality may still be acceptable if <40% of the trees (>12.5cm) are attacked. Where the nest area has an attack level of less than 40%, establish a 36ha GMA. Where attack levels are ≥40%, install a 100m radius GMA around the active nest and harvesting must occur outside of the breeding season (March 15 – September 1).

Strategy 29.4 Where MPB attack has occurred within an active nest area in a *suppression* or *holding* BMU, install a 100m radius GMA around the active nest and harvesting must occur outside of the breeding season (March 15 – September 1).

Strategy 29.5 No mechanized activity is permitted within 500m of an active nest between March 15 – September 1 (except for existing access structures). Minimize human activity within 100m of an active nest between March 15 – September 1.

Indicator 29.1 Report on percentage of active goshawk nests managed as GMA's.

Indicator 29.2 Report on management activities where GMA's are not established.

Objective 30. Ensure that potential goshawk habitat is present in all landscape units.
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Strategy 30.1 Provide suitable habitat for goshawks by creating “matrix habitat” areas (Objective 2) in each landscape unit.

Indicator 2.1 Report on area managed as matrix habitat in the Anahim Supply Block.

Indicator 2.2 Report on percentage of forested matrix habitat that is less than 40 years of age.

3.13 Sandhill Crane

The sandhill crane is a blue listed species that nests in secluded wetlands that are surrounded by forest cover. The cranes are omnivorous and forage in open habitats such as wetlands, fields, and early seral forests. The breeding season extends from April through August. The IWMS (1999) recommends maintaining nesting wetlands that are not already protected or adequately managed through the Riparian Area Guidebook as Wildlife habitat areas. WHAs should have a 50m buffer where 40% of the dominant and co-dominant trees are retained, understory vegetation is protected, and forest development occurs outside of the breeding season.

Desired future forest condition: High quality breeding habitat for sandhill cranes will be maintained through the use of greater than minimum width forested buffers on all wetlands. Where there is evidence of breeding, forest harvesting will occur outside the breeding season.

Objective 31. Maintain the quality of wetlands that are potential sandhill crane breeding habitats.

Strategy 31.1 Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain habitat quality for sandhill crane on wetlands.

Indicator 7.1 Report on average width of riparian reserves by FPC classification.

Objective 32. Maintain the quality of wetlands that are known sandhill crane breeding habitats.

Strategy 32.1 Establish wildlife habitat areas on known sandhill crane breeding wetlands and manage using guidelines in the IWMS.

Indicator 32.1 Report on the number of known sandhill crane breeding wetlands and WHAs established for their protection.

3.14 Bull Trout and Dolly Varden

Both the bull trout and Dolly Varden are blue listed species in BC. These species have a variety of life history patterns. Stream residents are found in small headwater streams that have cold temperatures and often steep gradients. Others live in large rivers, but migrate to smaller tributaries to spawn. A third form lives in lakes and spawns in tributary streams. In the Anahim Supply Block, Dolly Varden are found in the Dean River system and bull trout are found in the other river systems.

Bull trout are identified wildlife and the IWMS lists management strategies for this species. Although Dolly Varden are not listed in the IWMS, general management strategies for bull trout will benefit this species as well. The objectives of this management are to prevent habitat fragmentation and degradation by minimizing access and maintaining natural channel morphology, substrate composition, cover, and temperature of watersheds.

Desired future forest condition: Sufficient quality and quantity of habitat will be maintained for bull trout and Dolly Varden to maintain viable populations in perpetuity across the Anahim Supply Block. Forest practices will minimize sedimentation, retain stream cover, and ensure that fish can access all portions of their historic range. Watershed sub-basins will be monitored to ensure that development activities do not result in detrimental impacts to these species.

Objective 33. Maintain intact functioning riparian areas for bull trout and Dolly Varden.

Strategy 33.1 Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain habitat quality for bull trout and Dolly Varden.

Strategy 33.2 Conduct watershed assessment procedures on all sub-basins where: >1 landslide/km² has occurred and >2 have entered the mainstem river; there is >150m of road/km² or >1km of stream/km² on unstable or erodible soils; and >0.6 stream crossings/km².

Strategy 33.3 Use Strategy 6.4 (Objective 6) to collect baseline information on water quality in sensitive watersheds.

Indicator 7.1 Report on average width of riparian reserves by FPC classification.

Indicator 33.1 Report on the number of sub-basins exceeding criteria specified in Strategy 33.2.

Indicator 33.2 Report on management plans for any sub-basin where the watershed assessment procedure results in a rating of moderate or high. Plans must minimize effects on riparian habitat due to the temporal and spatial layout of cutblocks, hydrologic green up and recovery standards, and road layout and design.

Indicator 6.4 Report yearly on water quality information and effectiveness of strategies to control sedimentation.

Objective 34. Establish wildlife habitat areas where significant congregations of bull trout and Dolly Varden collect.

Strategy 34.1 Following strategies outlined in the IWMS (1999) for the establishment and management of wildlife habitat areas.

Indicator 34.1 Report on the number and status of WHAs established for the protection of bull trout and Dolly Varden habitat.

3.15 Other Wildlife Species

It is anticipated that coarse filter guidelines outlined in the Biodiversity Guidebook (1995) will provide sufficient management protection for the majority of wildlife species in the Anahim Supply block. However, the CCLUP (p. 156) states that inventories should be conducted to identify species and habitats that are at risk. Recovery plans may be required for species listed as blue or red in BC and endangered, threatened, or of special concern nationally (listed by the Committee on the Status of Endangered Wildlife in Canada). First Nations are also likely to have additional cultural and environmental values concerning specific wildlife species in the Anahim Supply Block. All species known to occur on forested lands in the Anahim Supply Block that have special habitat requirements have been listed previously in this document. However, as our knowledge base on the distribution and requirements of these species grows, management practices may require some modifications to address new information. Wildlife habitat areas will continue to be proposed as new sites requiring protection are discovered and monitoring of wildlife populations is likely to provide important information on the success of these strategies.

Desired future forest condition: Forested habitats in the Anahim Supply Block will be managed to maintain healthy populations of all naturally occurring species. For most species, coarse filter guidelines in the Biodiversity Guidebook will ensure that their requirements are met. Where other species have more specific needs that cannot be met at that level of management, direction from the IWMS, species recovery plans, and best known information will be used to guide forest management.

Objective 35. Maintain habitat requirements for all red and blue listed species, regionally important wildlife, and all species listed by the Committee on the Status of Endangered Wildlife in Canada as nationally endangered, threatened, or of special concern.

Strategy 35.1 Following strategies outlined in the IWMS for the protection of identified wildlife where those species are identified as being present in the Anahim Supply Block.

Strategy 35.2 Follow the direction of recovery teams where recovery plans have been formulated for wildlife at risk.

Strategy 35.3 Monitor the effectiveness of the strategies presented in this document and adjust or change those strategies that are not effective at protecting the target species. Monitoring techniques could include winter track transects, aerial surveys, and breeding bird surveys.

Indicator 35.1 Report on any changes to the IWMS or species recovery plans that impact on the management of species found in the Anahim Supply Block.

Indicator 35.2 Report on liaison activities with government agencies on changes in the status of wildlife populations and success of management activities.

Indicator 35.3 Conduct and report on monitoring for wildlife on a periodic basis, such as the same interval as for the ART Sub-Regional Plan update.

4.0 RELATIONSHIP OF YKW WILDLIFE STRATEGIES TO OTHER COMPONENTS OF BIODIVERSITY PLANNING

Planning for biodiversity occurs at a number of hierarchical levels that range from province wide initiatives to practices applied at the stand level. Access management plans and coarse filter guidelines such as seral stage distribution are essential components that address a wide range of biodiversity needs. In contrast, the wildlife strategies presented in Section 3 are fine filter guidelines designed to provide protection to species whose habitat needs cannot be met solely by coarse filter strategies. The successful implementation of this plan depends on its integration with the ART document. Many of the strategies presented here will need to be components of higher level plans such as the ART Access Management Plan. Other wildlife strategies may be complementary to or provide area of overlap with the management objectives of ART components such as Lakes Management or Visual Quality Objectives. However, other strategies may have economic impacts and modeling will be required to examine these effects. There may also be other strategies not listed in this plan that can achieve the desired objectives. Therefore, YKW will remain flexible to suggestions that provide alternative strategies for objectives presented here.

5.0 OTHER PLANNING REQUIREMENTS

Monitoring for the successful achievement of wildlife objectives requires that targets be developed for the indicators that have been suggested in this plan. Before this can occur, modeling is required to determine whether the strategies are achievable. Following this process, an infrastructure will need to be set up to conduct monitoring and tracking of indicators. Monitoring results should be reported to a board of community representatives. The board would provide local input on the effectiveness of the wildlife strategy and ensure that all stakeholders are involved in management.

Finally, the MPB-Wildlife strategies listed in Section 3.1 are an umbrella strategy for wildlife that will be at risk from widespread timber salvage activities associated with the current epidemic. While these strategies will mitigate the effects this infestation, a regional strategy that incorporates wildlife needs is required to increase the effectiveness of this plan and decrease the potential for future epidemics. Ensuring that species at risk persist in this region will require a coordinated strategy, since the exchange of individuals (and genes) between sub-populations is essential for most species to exist. Therefore, complementary management in other supply blocks is required to maintain all native species in perpetuity across the region.

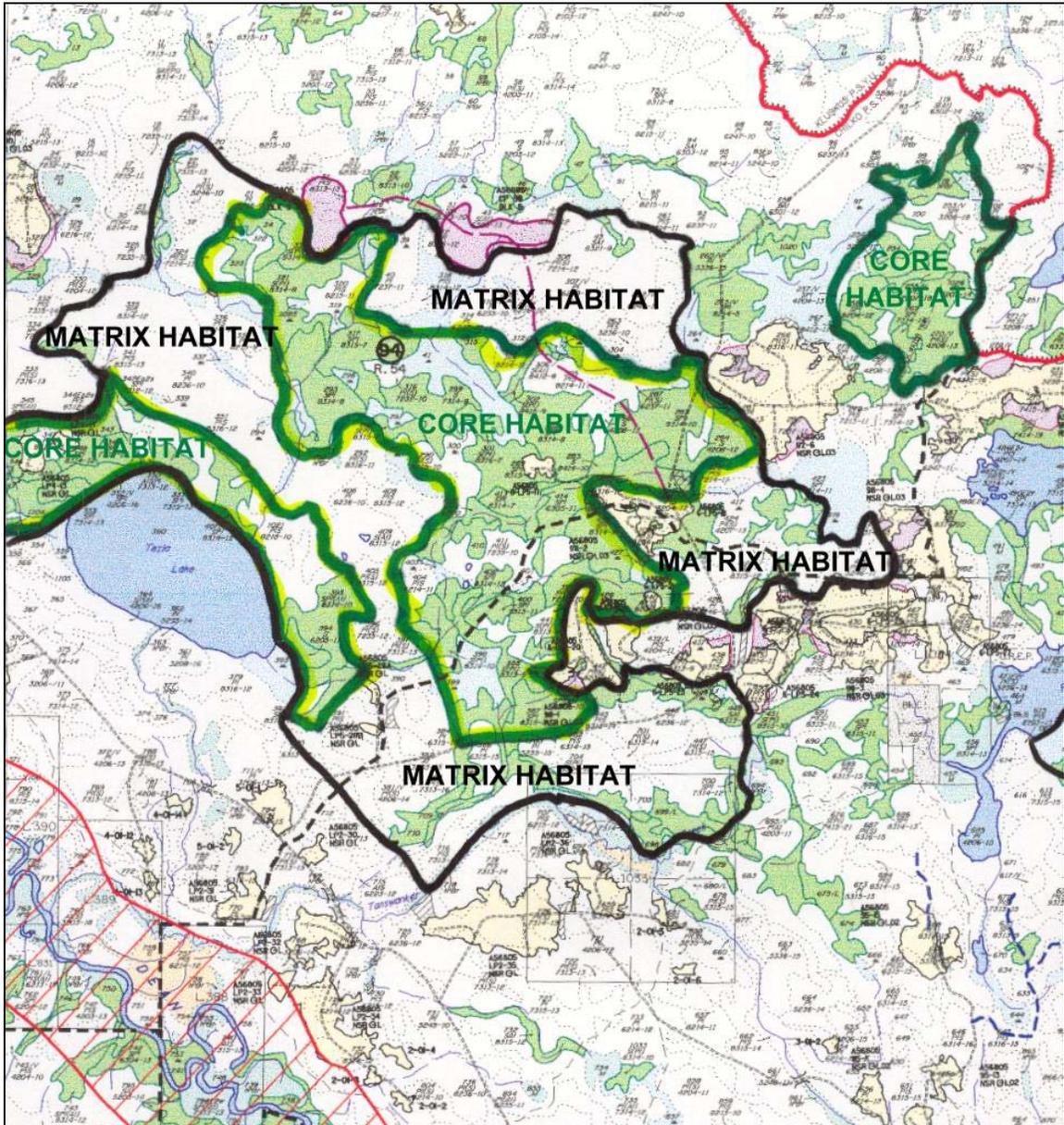
6.0 REFERENCES

- Anahim Round Table. 2000. ART Sub Regional Plan. Report of Objectives and Strategies: Recommended Option.
- BC Min. of Fisheries and Habitat Conservation Trust Fund. B.C. Fish Facts, Dolly Varden *Savelinus malma*. 2pp.
- BC Min. of Forests. 2003. Timber Supply and the Mountain Pine Beetle Infestation in British Columbia. Min. of Forests Forest Analysis Branch.
- BC Min. of Water Land and Air Protection. 2002. 2002 Indicators of climate change for British Columbia. Victoria, B.C.
- BC Min. of Water Land and Air Protection. 2002. Interim Wildlife Guidelines for Commercial Backcountry Recreation in British Columbia. Min. WLAP, Biodiversity Branch.
- Cannings, S.G., Ramsay, L.R., Fraser, D.F., and Fraker, M.A. 1999. Rare amphibians, reptiles, and mammals of British Columbia. Wildl. Branch and Resour. Inv. Branch of BC Min. Environ. Lands and Parks, Victoria, BC.
- CCLUP Caribou Strategy Committee. 2002. Caribou-Chilcotin Land Use Plan – Northern caribou strategy. Report prepared for Cariboo-Mid-Coast Interagency Management Committee. 84pp.
- CCLUP Conservation Strategy Committee. 2002. Regional Biodiversity Conservation Strategy. Update Note #5 – An Integrated Mountain Pine-Biodiversity Conservation Management Strategy. Unpublished report for Cariboo Mid-Coast Interagency Management Committee.**
- Hatler, D.F and Beal, A.M. 2003. Furbearer Management Guidelines – Mink *Mustela vison*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F and Beal, A.M. 2003. Furbearer Management Guidelines – Beaver *Castor canadensis*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F., Badry, M. and Beal, A.M. 2003. Furbearer Management Guidelines – Fisher *Martes pennanti*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F., Mowat, G. and Beal, A.M. 2003. Furbearer Management Guidelines – River Otter *Lontra canadensis*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F., Mowat, G. and Beal, A.M. 2003. Furbearer Management Guidelines – Ermine *Mustela erminea*, Long-tailed weasel *Mustela frenata*, and Least weasel *Mustela nivalis*. Province of BC and Habitat Conservation Trust Fund.

- Hatler, D.F., Mowat, G., Pool, K. and Beal, A.M. 2003. Furbearer Management Guidelines – Gray Wolf *Canis lupus*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F., Pool, K. and Beal, A.M. 2003. Furbearer Management Guidelines – Red Fox *Vulpes vulpes*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F., Pool, K. and Beal, A.M. 2003. Furbearer Management Guidelines – Coyote *Canis latrans*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F., Blood, D. and Beal, A.M. 2003. Furbearer Management Guidelines – Marten *Martes americana*. Province of BC and Habitat Conservation Trust Fund.
- Hatler, D.F., Blood, D. and Beal, A.M. 2003. Furbearer Management Guidelines – Muskrat *Ondatra zibethicus*. Province of BC and Habitat Conservation Trust Fund.
- Himmer, S. and Power, D. 1999. Wildlife Species Habitat Models and Final Wildlife Suitability Ratings for the Itcha/Ilgachuz Area. Draft. Unpublished report on file with Wildlife Branch, Min. of Water, Land, and Air Protection, Williams Lake, BC.**
- Intrepid Biological Contracting. 2003. Preliminary list of 'high value' wetlands for moose within the Cariboo Forest Region. Unpublished report for Min. Water, Land, and Air Protection, Williams Lake, BC.
- MSRM Cariboo Region. 2003. Cariboo-Chilcotin Land-Use Plan, Horsefly Sustainable Resource Management Plan, Draft 22.
- Province of British Columbia. 1999. FPC of BC Managing Identified Wildlife: Procedures and Measures, Volume 1. BC Min. of Forests and BC Environment. 180pp.
- Province of British Columbia. 1997. FPC of BC Species and Plant Community Accounts for Identified Wildlife, Volume 1. BC Min. of Forests and BC Environment. 180pp.
- Samman, S. and Logan, J. 2000. Assessment and Response to Bark Beetle Outbreaks in the Rocky Mountain Area. USDA, Rocky Mountain Research Station, General Technical Report RMRS-GTR-62.
- Stadt, J. 2001. The ecological role of beetle killed trees: a review of salvage impacts. Unpublished report. BC MWLAP. 13pp.
- Steventon, J.D. 2001. Harvesting patterns, fragmentation, and historic landscape pattern in sub-boreal forests of the Prince Rupert Forest Region. Draft report with Prince Rupert Forest Region.
- Steventon, J.D., Coates, D. and Kranabetter, M. 1998. Why do partial cutting? Forest Sciences Prince Rupert Region, Extension Note #31.
- Watt, R., Baker, J., Hogg, D., McNicol, J. and Naylor, B. 1996. Forest Management Guidelines for the Provision of Marten Habitat – Version 1.0. Ont. Min. of Natural Resources, Forest Man. Branch.

Weir, R.D. 2003. Status of Fisher in British Columbia. BC Min. WLAP Biodiversity Branch and Min. SRM Conservation Data Centre, Wildlife Bulletin No. B-105.

APPENDIX 1. Example of core and matrix habitats.



Example of core and matrix habitat in the northern portion of the Anahim Supply Block (Scale 1:50,000). Spruce leading polygons of age class 5+ have green fill. Core habitats have a green boundary and matrix habitats have a black boundary.

APPENDIX 2. Table of Objectives and indicators.

Objective		Strategy		Indicator		Target
1	Objective 1. Create “core habitat” areas that are comprised largely of spruce leading stands in age classes 5+.	1.1	Identify areas with a high percentage of spruce leading stands age class 5+ to manage as core habitat areas for wildlife. A small component of the stands in the core habitat area may be pine leading or immature. MPB attack within the core areas will be left unharvested. Manage the areas using a group selection silviculture system, in patches <0.5ha in size. Up to 28% of the core area may be in young seral patches at any time.	1.1	Report yearly on area managed as core habitat in the Anahim Supply Block by landscape unit. Reporting should specify the amount of core habitat in each seral stage.	
		1.2	Manage core areas on an extended rotation (140 years) to allow old forest feature to develop in new stands. In any 20 year period, 14% will be available for harvest. Layout will follow a total resource planning approach that considers all stand entries. This will maintain timber volume and quality through time.			
2	Create and manage “matrix habitat” areas for species with large home range requirements. Matrix areas should envelope other areas with land use constraints where possible.	2.1	Ideally, matrix habitat will envelope core habitat; however, in some areas spruce leading stands are not available. In these areas identify areas with a high percentage of wetlands or other timber constraints and some component of younger age classes. Matrix areas should be at least 1000ha in size. In the short term, harvesting within the matrix can only occur in stands where 40% of the merchantable stems have been killed by MPB. Up to 33% of the matrix area outside of core areas could be in young seral forest. Matrix wildlife areas will be managed in this way for at least 15 years until salvage is complete for the current MPB epidemic.	2.1	Report on area managed as matrix habitat in the Anahim Supply Block.	
		2.2	In the long term, matrix areas will be managed to provide connectivity between areas of mature/old forest. Only 33% of the matrix area outside of core areas could be in young seral forest (<40 years) at any time.	2.2	Report yearly on percentage of forested matrix habitat that is less than 40 years of age.	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
2	Create and manage “matrix habitat” areas for species with large home range requirements. Matrix areas should envelope other areas with land use constraints where possible.	2.3	Conduct research on the effects of MPB on wildlife in the Anahim Supply Block. Preserving stands surrounding transects from the local furbearer study would provide baseline information for further study.	2.3	Report on status of research on the effectiveness of retaining matrix habitat areas.	
3	Reserve rare tree species to provide floristic and structural diversity in managed stands.	3.1	Over the period of salvage harvesting for the current MPB epidemic, reserve as much spruce and as possible. In some areas, this may provide the majority of mature forest structure.	3.1	Audit 10% of harvested blocks each year to determine effectiveness of retention strategies.	
3		3.2	Spruce regeneration should be reserved where operationally feasible to promote future stands that are multi-species.			
3		3.3	Reserve aspen, cottonwood, and Douglas fir to provide wildlife trees in future stands.			
4	Provide patches of abundant CWD for wildlife in regenerating cutblocks.	4.1	Within harvested areas, create biodiversity patches where small patches of high CWD abundance and advanced regen are delineated with MFZ and stub trees. Trees can be removed from the patches but no site prep would be allowed.	4.1	Report on the number of biodiversity patches/km ² created each year. Cull piles left unburned will be counted as a biodiversity patch.	
4		4.2	Leave some cull piles unburned. Optimally, the piles should be composed of large material that is spread loosely to provide more internal space. This strategy only applies when cull material is not infested by insects.	4.2	Report on percentage of harvested area composed of upland WTPs created in each year (Upland WTPs will be defined as WTPs not located in riparian management areas).	
4		4.3	Create some WTPs in upland positions to improve habitat conditions in future stands. Due to the high amount of riparian features present in the Anahim Supply Block, WTPs are often only designated in riparian areas. However, ensuring that patches of complex habitat are available in all landscape positions will increase biodiversity in the new stand.	4.3	Report on WTPs percentage by LU (and BMU during the period of salvage harvesting).	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
4	Provide patches of abundant CWD for wildlife in regenerating cutblocks.	4.4	Apply a short term increase (15yrs) in the WTP percentage requirement in MPB salvage Beetle Management Units (BMU) to alleviate the impacts of the increase in young seral stands. WTPs could be comprised of all dead pine, but some component of live stems (e.g. advanced regeneration) would be desirable.			
5	Maintain natural drainage patterns.	5.1	Locations where drainage systems (streams, wetlands, NCDs, gullies, draws) are crossed by roads should have the appropriate size and type of drainage structures.	5.1	Audit a percentage of new road sections created each year to ensure that appropriate drainage has been installed.	
6	Minimize sedimentation of watercourses and waterbodies.	6.1	Minimize the number of classifiable streams crossed by roads within a watershed.	6.1	Report on the number of stream crossings/km ² by sub-basin.	
		6.2	Forest development within riparian management areas should include actions to minimize the deposition of sediment into watercourses. Actions include minimizing the area scalped at stream crossings, re-vegetation of scalped areas within RMAs, and the construction of sediment traps or other structures designed to capture sediment.	6.2	Audit a percentage of stream crossings for appropriate installation and sediment reduction practices.	
		6.3	No site preparation activities should take place within 20m of a classifiable stream. Site preparation in the vicinity of a NCD must not result in the deposition of sediment in a classifiable stream or fisheries sensitive zone.	6.3	Audit a percentage of harvested blocks and report on area of site preparation within 20m of classifiable streams.	
		6.4	Collect baseline information on water quality in sensitive watersheds to examine effectiveness of measures to control deleterious impacts.	6.4	Report yearly on water quality information and effectiveness of strategies to control sedimentation.	
7	Maintain structurally and floristically diverse riparian areas.	7.1	Streams with legislated reserve zones will have an additional 0-25% in basal area retention in the RMZ. Increased retention will be targeted on areas with high wind throw risk in the reserve zone and/or high value fish streams.	7.1	Report on average width of riparian reserves by FPC classification.	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
7	Maintain structurally and floristically diverse riparian areas.	7.2	S4 and S5 streams within the Itcha-Ilgachuz SRDZ will have a 10m forested reserve. However, if the reserve is not windfirm or there are forest health concerns such as MPB green attack the reserve may be varied to zero. Where no reserve is established, any windfirm spruce or balsam present will be retained within 10m of the channel.	7.2	Where development has occurred within the Lakeshore Management Zone of a L1 lake, report on how management has met management objectives.	
		7.3	S4, S5, and S6 streams outside the Itcha-Ilgachuz SRDZ will have a 20m forested reserve or equivalent area partial cut. This applies to streams shown on current FC1 files.			
		7.4	Select S5 and S6 streams to conduct adaptive management trials into the effects of changed disturbance cycles on riparian areas. These streams would have portions of RMA harvested. Monitoring would be conducted on differences in vegetation structure and impacts on aquatic systems. Despite the many benefits of placing reserves on streams, species that require deciduous forest such as beaver may be affected negatively by the coniferous ingress and increased woody debris that will accumulate in riparian areas under the current management regime. The reaches selected would have low gradient streams (<5%) and gentle riparian terrain to minimize potential deleterious effects.			

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
7	Maintain structurally and floristically diverse riparian areas.	7.5	Wetlands inside of the Itcha-Ilgachuz SRDZ will have variable retention based on wetland area. In the SBPS, a 15m average reserve will be established on W1/W5 wetlands and a 10m average reserve on W3 wetlands. In the ESSF, MS, and IDF, a 26m average reserve will be established on W1/W5 wetlands and a 15m average reserve on W3 wetlands. Retention may be less due to windthrow or other risks. Non-merchantable trees (except pine) and shrubs should be retained within 20m of the feature where the average buffer is less than the range stated.			
		7.6	Wetlands outside of the Itcha-Ilgachuz SRDZ will have variable retention based on wetland area. Wetlands 0.5-1ha will have average 10m reserve or equivalent area in partial cut. Wetlands >1ha will have 20m average reserve or equivalent area in partial cut. RMZ on W3 will have 65% basal area retention and W1/W5 will have 25%.			
		7.7	All L1 Lakes in the ART area that have been classified and will have management as specified in the ART Draft Resource, Management Objectives, Strategies, and Recommendations Supplement on Lakes Management (2002). L3 lakes in the ESSF, MS, and IDF will have a 15m average reserve. L3 lakes in the SBPS will have a 10m average reserve.			
8	Provide patches of abundant CWD for lynx denning in regenerating cutblocks.	8.1	Manage using strategies associated with Objective 4 to maintain CWD in new stands.	4.1 to 4.3	Use indicators associated with Objective 4.	
9	Provide areas of >8000 stems/ha for good quality snowshoe hare habitat in regenerating cutblocks.	9.1	Drag scarify blocks to increase natural regeneration densities.	9.1	Report area of conifer regeneration at densities of >8000 stems/ha.	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
9	Provide areas of >8000 stems/ha for good quality snowshoe hare habitat in regenerating cutblocks.	9.2	Do not conduct pre-commercial thinning except where densities result in stagnation of tree growth.			
10	Create and manage “core habitat” and “matrix habitat” areas for fisher in the SBPS.	10.1	Use the core and matrix habitat strategies listed in Section 3.1 (see Objectives 1 and 2) to maintain habitat for fisher.	1.1 2.1 to 2.3	Use indicators associated with Objectives 1 and 2.	
11	Maintain corridors on riparian systems that allow fisher dispersal between sub-populations.	11.1	Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain dispersal corridors for fisher.	7.1	Report on average width of riparian reserves by FPC classification.	
12	Provide patches of abundant CWD and large spruce stems for fisher in regenerating cutblocks.	12.1	Use the CWD strategies outlined in Section 3.1 to ensure that regenerating cutblocks have adequate CWD levels (Objective 4).	4.1 to 4.2	Use indicators associated with Objective 4.	
		12.2	Reserve large spruce (>40cm), aspen, and cottonwood, to ensure the persistence of trees that have the potential for fisher denning and resting.	8.1	Report on WTPs percentage by LU and BMU.	
		12.3	Increase the WTP percentage requirement in MPB salvage BMU’s to alleviate the impacts of the increase in young seral stands (See strategy 8.4).	12.1	Audit a percentage of harvested blocks for effectiveness of single tree retention strategy for large spruce (>40cm), aspen, and cottonwood.	
13	Create and manage “core habitat” and “matrix habitat” areas for marten.	13.1	Use the core and matrix habitat strategies listed in Section 3.1 (see Objectives 1 and 2) to maintain habitat for marten.	2.1 to 2.3	Use indicators associated with Objective 2.	
14	Maintain corridors on riparian systems to facilitate marten dispersal between sub-populations.	14.1	Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain dispersal corridors for fisher.	7.1	Report on average width of riparian reserves by FPC classification.	
15	Provide patches of abundant CWD and large spruce stems for marten in regenerating cutblocks.	15.1	Use the CWD strategies outlined in Section 3.1 to ensure that regenerating cutblocks have adequate CWD levels (Objective 4).	4.1 to 4.2	Use indicators associated with Objective 4.	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
	Provide patches of abundant CWD and large spruce stems for marten in regenerating cutblocks.	15.2	Reserve large spruce (>40cm), aspen, and cottonwood, to ensure the persistence of trees that have the potential for marten denning and resting.	8.1	Report on WTPs percentage by LU and BMU.	
		15.3	Increase the WTP percentage requirement in MPB salvage BMU's to alleviate the impacts of the increase in young seral stands (See strategy 8.4).	12.1	Audit a percentage of harvested blocks for effectiveness of single tree retention strategy for large spruce (>40cm), aspen, and cottonwood.	
16	Regulate access to provide large undisturbed areas for wolverine and limit disturbance during the denning period.	16.1	Where possible, conduct harvesting in temporally short, discrete intervals that are separated by long periods when no harvesting takes place in a sub-basin.	16.1	Divide the Anahim Supply Block into logical sub-basins and report on periods of development activity and inactivity.	
		16.2	Create and follow access management plans for each landscape unit. Place access restrictions on areas that historically had no motorized access to ensure that some areas have low levels of human disturbance.	16.2	Report on status of and compliance with Access Management Plan.	
17	Provide a combination of security/thermal cover in association with riparian meadows, seepage sites, avalanche tracks, and moist spruce forests.	17.1	Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain cover along riparian areas.	7.1	Report on average width of riparian reserves by FPC classification.	
		17.2	Use the "core habitat" strategy to manage large contiguous areas of spruce leading stands (See Objective 1).	1.1	Report on area managed as core habitat in the Anahim Supply Block by landscape unit.	
		17.3	Place WTP's preferentially along avalanche tracks to provide security cover for grizzly bear.	17.1	Audit a percentage of harvested blocks for effectiveness of WTP strategy along avalanche tracks (where applicable).	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
18	Regulate access to provide large undisturbed areas for grizzly and limit disturbance during the denning period.	18.1	Where possible, conduct harvesting in temporally short, discrete intervals that are separated by long periods when no harvesting takes place in a sub-basin (See Objective 16).	16.1	Divide the Anahim Supply Block into logical sub-basins and report on periods of development activity and inactivity.	
		18.2	Create and follow access management plans for each landscape unit. Place access restrictions on areas that historically had no motorized access to ensure that some areas have low levels of human disturbance.	16.2	Report on status of and compliance with Access Management Plan.	
19	Manage Crown Land in caribou No Harvest Zone, Modified Harvest Zone, Natural Disturbance Seral Distribution Zone, and Dean River Migration Corridor consistent with the <i>2002 Northern Caribou Strategy</i>	19.1	Manage Crown Land in caribou No Harvest Zone, Modified Harvest Zone, Natural Disturbance Seral Distribution Zone, and Dean River Migration Corridor consistent with the <i>2002 Northern Caribou Strategy</i> .	19.1	Report yearly on the rate and distribution of harvest to ensure compliance in each of the caribou management zones.	
				19.2	Report on compliance with access recommendations in each caribou management zone.	
20	Manage Conventional Harvest Areas to minimize the buildup of moose and deer populations near special management areas for caribou and protect microsites valuable to caribou.	20.1	Use Map 10 in the <i>2002 Northern Caribou Strategy</i> to identify areas of caribou winter range that overlap with conventional harvest areas. Map 3 in the <i>2002 Northern Caribou Strategy</i> identifies areas of good or better habitat suitability (Habitat Capability Maps may be available soon). The majority of cutblocks in areas of good or better caribou habitat suitability should be large (250-1000ha) to lower the suitability for moose and deer. Microsites with higher than average lichen abundance should be targeted for WTPs.	20.1	Report on range of cutblock sizes in conventional harvest areas of good or better caribou habitat suitability.	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
21	Provide a combination of security/thermal/forage cover for moose in association with riparian areas.	21.1	Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain cover along riparian areas.			
		21.2	Some “core habitat” areas should be identified adjacent to high value wetlands where spruce stands of sufficient size exist (See objective 1).	7.1	Report on average width of riparian reserves by FPC classification.	
		21.3	Avoid broadcast herbicide treatments within riparian management areas where shrubs show obvious indications of repeated heavy browsing by ungulates.	21.1	Report on area of core habitat located adjacent to high value wetlands for moose.	
		21.4	At least 50% of the RMA of wetlands >5ha should be maintained as advanced immature (>40 years) or mature forest cover (>80 years).	21.2	Report on area of riparian management areas treated with broadcast herbicides.	
				21.3	Report on area of advanced immature (>40 years) or mature forest cover (>80 years) maintained in wetland RMAs of W1 wetlands.	
22	Reduce the disturbance of moose during winter and spring calving.	22.1	Where possible, locate main roads >500m from W1 or W5 wetlands. Aggressively deactivate secondary and temporary roads within 500m of W1 or W5 wetlands to levels impassable to 4 wheel drive vehicles.	22.1	Report on length of road within 500m of W1 or W5 wetlands that is not deactivated.	
23	Manage forested land within areas designated as mountain goat winter range to minimize disturbance, retain cover, and provide forage.	23.1	Follow the general wildlife measures outlined in Managing Identified Wildlife Volume 1: Procedures and Measures for areas of mountain goat winter range delineated on maps in Appendix 3.	23.1	Report on area of development in mountain goat winter range and General Wildlife Measures implemented.	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
24	Limit aircraft disturbance associated with forestry operations to mountain goats occupying winter range or natal areas.	24.1	Ensure aircraft operation is consistent with the <i>Interim Wildlife Guidelines for Commercial Backcountry Recreation in British Columbia</i> (2002) or its successor documents.	24.1	Implementation of training programs to ensure that staff and contractors are familiar with guidelines associated with operating aircraft in <i>Interim Wildlife Guidelines for Commercial Backcountry Recreation in British Columbia</i> (2002) or its successor documents.	
25	Ensure that mountain goat winter range has sufficient security and thermal cover within 200m of escape terrain.	25.1	On designated mountain goat winter range, no more than 33% of the forested habitat within 200m of escape terrain should be early seral (<40 years) and at least 50% should be mature and old (>80 years) forest at any time.	25.1	Report yearly on area of mountain goat winter range where harvesting has occurred. Include the percentage of forested habitat in the winter range unit that is <40 years old and >80 years old.	
26	Prevent disease transmission to mountain goats from domestic sheep where used for vegetation management.	26.1	Maintain separation of domestic sheep used for vegetation management and areas used by mountain goats in summer.	26.1	Report on use of domestic sheep for vegetation management and range of distance to nearest mountain goat summer range.	
27	Maintain the quality and isolation of pelican habitat around Abuntlet , Lake.	27.1	Follow procedures in the IWMS (1999) for wildlife habitat areas on American white pelican lakes.	27.1	Report on any management that deviates from the IWMS guidelines within the Abuntlet Lake WHA.	
28	Maintain the quality and isolation of pelican habitat around Anahim, Aktaklin and Pelican Lakes.	28.1	Minimize the number of new roads required for forest development within 1000m of lakes listed under objective 28. Roads required within 1000m of the lakes should be promptly deactivated (or gated) so that they are impassable to 4 wheel drive vehicles.	28.1	Report on length of road within 1000m of Anahim, Aktaklin and Pelican Lakes that is not deactivated.	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
28	Maintain the quality and isolation of pelican habitat around Anahim, Aktaklin and Pelican Lakes.	28.2	No harvesting or site preparation should be conducted during the breeding season within 1000m of the lakes listed above unless there is no other practicable option.	28.2	Report any harvesting or site preparation that take place within 1000m of Anahim, Aktaklin and Pelican Lakes and reasons for deviance from strategy 28.2.	
29	Provide goshawk management areas for 75% of known nest areas.	29.1	Designate a 36ha goshawk management area (GMA) around 75% of active nest sites. GMA delineation should be based on habitat suitability and indications of use as determined by a qualified biologist. GMA's not used for 5 consecutive years are likely abandoned and the designation could be removed.	29.1	Report on percentage of active goshawk nests managed as GMA's.	
		29.2	Where an active goshawk nest area will be removed, there must be two suitable potential nest areas within 1km of the original area.	29.2	Report on management activities where GMA's are not established.	
		29.3	Where MPB attack has occurred within an active nest area in a <i>salvage</i> BMU, the habitat quality may still be acceptable if <40% of the trees (>12.5cm) are attacked. Where the nest area has an attack level of less than 40%, establish a 36ha GMA. Where attack levels are \geq 40%, install a 100m radius GMA around the active nest and harvesting must occur outside of the breeding season (March 15 – September 1).			
		29.4	Where MPB attack has occurred within an active nest area in a <i>suppression</i> or <i>holding</i> BMU, install a 100m radius GMA around the active nest and harvesting must occur outside of the breeding season (March 15 – September 1).			
		29.5	No mechanized activity is permitted within 500m of an active nest between March 15 – September 1 (except for existing access structures). Minimize human activity within 100m of an active nest between March 15 – September 1.			

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
30	Ensure that potential goshawk habitat is present in all landscape units.	30.1	Provide suitable habitat for goshawks by creating “matrix habitat” areas (Objective 2) in each landscape unit.	2.1 to 2.2	Use indicators associated with Objective 2.	
31	Maintain the quality of wetlands that are potential sandhill crane breeding habitats.	31.1	Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain habitat quality for sandhill crane on wetlands.	7.1	Report on average width of riparian reserves by FPC classification.	
32	Maintain the quality of wetlands that are known sandhill crane breeding habitats.	32.1	Establish wildlife habitat areas on known sandhill crane breeding wetlands and manage using guidelines in the IWMS.	32.1	Report on the number of known sandhill crane breeding wetlands and WHAs established for their protection.	
33	Maintain intact functioning riparian areas for bull trout and Dolly Varden.	33.1	Use the riparian retention strategies listed for riparian associated furbearers (see Objective 7) to maintain habitat quality for bull trout and Dolly Varden.	7.1	Report on average width of riparian reserves by FPC classification.	
		33.2	Conduct watershed assessment procedures on all sub-basins where: >1 landslide/km ² has occurred and >2 have entered the mainstem river; there is >150m of road/km ² or >1km of stream/km ² on unstable or erodible soils; and >0.6 stream crossings/km ² .	33.1	Report on the number of sub-basins exceeding criteria specified in Strategy 33.2.	
			Use Strategy 6.4 (Objective 6) to collect baseline information on water quality in sensitive watersheds.	33.2	Report on management plans for any sub-basin where the watershed assessment procedure results in a rating of moderate or high. Plans must minimize effects on riparian habitat due to the temporal and spatial layout of cutblocks, hydrologic green up and recovery standards, and road layout and design.	
				6.4	Report yearly on water quality information and effectiveness of strategies to control sedimentation	

YKW Strategic Resource Plan for Wildlife

APPENDIX 2. Table of Objectives and Indicators continued.

Objective		Strategy		Indicator		Target
34	Establish wildlife habitat areas where significant congregations of bull trout and Dolly Varden collect.	34.1	Following strategies outlined in the IWMS (1999) for the establishment and management of wildlife habitat areas.	34.1	Report on the number and status of WHAs established for the protection of bull trout and Dolly Varden habitat.	
35	Maintain habitat requirements for all red and blue listed species, regionally important wildlife, and all species listed by the Committee on the Status of Endangered Wildlife in Canada as nationally endangered, threatened, or of special concern.	35.1	Following strategies outlined in the IWMS for the protection of identified wildlife where those species are identified as being present in the Anahim Supply Block.	35.1	Report on any changes to the IWMS or species recovery plans that impact on the management of species found in the Anahim Supply Block.	
		35.2	Follow the direction of recovery teams where recovery plans have been formulated for wildlife at risk.	35.2	Report on liaison activities with government agencies on changes in the status of wildlife populations and success of management activities.	
		35.3	Monitor the effectiveness of the strategies presented in this document and adjust or change those strategies that are not effective at protecting the target species. Monitoring techniques could include winter track transects, aerial surveys, and breeding bird surveys.	35.3	Conduct and report on monitoring for wildlife on a periodic basis, such as the same interval as for the ART Sub-Regional Plan update.	